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FARM LIVE STOCK OF GREAT BRITAIN



[*Frontispiece.*

PREJEVALSKI'S WILD HORSES, WOBURN PARK, CAUGHT IN CENTRAL ASIA.
Imported with Mongolian foster-mothers through Russia. Photo presented to the Author by His Grace the Duke of Bedford,

FARM LIVE STOCK OF GREAT BRITAIN

BY

ROBERT WALLACE

Professor of Agriculture ana Rural Economy in the University of Edinburgh

FOURTH EDITION

REWRITTEN AND GREATLY ENLARGED

WITH OVER 400 ILLUSTRATIONS FROM PHOTOGRAPHS, AND NUMEROUS FIGURES IN THE LETTERPRESS

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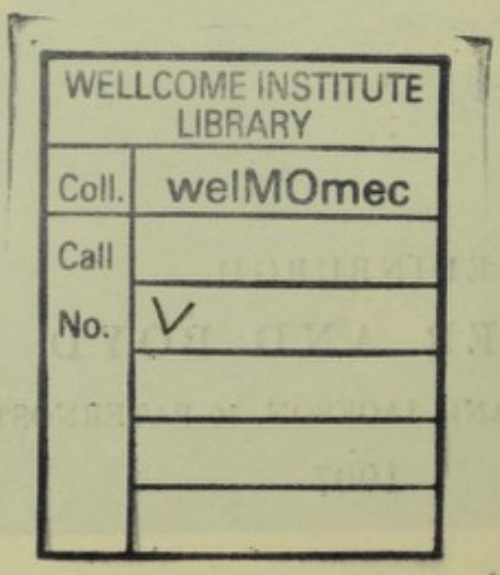

DEDICATED

TO THE

LIVE-STOCK BREEDERS OF THE UNITED KINGDOM

IN WHOSE INTERESTS CHIEFLY THE WORK HAS
BEEN REWRITTEN

PREFACE TO THE FOURTH EDITION

THE present edition of this work has been rewritten, more than doubled in size, and, it is hoped, more than quadrupled in value. It has been in process of preparation for over three years, and its date of publication has been more than once changed, owing to the magnitude of the work of finishing a book dealing with such a vast number of breeds of animals, all of which had to be treated separately from the historical as well as from the present-day point of view. The modern history of many of the breeds of British Live Stock has been undergoing manufacture at a rapid rate, and the increase of the money value of good cattle has stimulated an increase of interest. The influence of the foreign buyer, who insists upon a registered pedigree with each animal, has been so beneficial that hardly a breed of any importance in the country now exists that does not possess a Breed Society, which, among other chartered duties registered under the Limited Liability Companies Act, annually issues a list of breeders, and records their stock-breeding transactions.

Special thanks are due to the secretaries of these Breed Societies, who have rendered valuable assistance by providing copies of the historical notices of the breeds in their Society publications, and photographs of typical specimens of the animals concerned, and also the most recent information relating to them. But, while fully acknowledging indebtedness for assistance rendered, I assume the entire responsibility for what has been stated generally as well as in relation to

individual breeds, as I have had to keep in view not only the interests of one special breed, but also its connection with other breeds, and the position that it occupies in the great Live Stock economy of the country.

The works originally consulted in the preparation of the earlier editions are enumerated in the extract from the Preface to the Second Edition, page xiii. I have also endeavoured in the text or by footnotes to indicate the sources of further indebtedness to previous writers, but it is necessary to make mention here of the following works, which have been of more than usual value, and to whose authors I am personally grateful :—

Alvin H. Sanders' *Shorthorn Cattle: A Series of Historical Sketches, Memoirs, and Records of the Breed and its Development in the United States and Canada*, second edition, 1901 ; G. Archdall Reid's *Principles of Heredity;* W. Ridgway's *Origin and Influence of the Thoroughbred Horse;* Hamilton Busbey's *The Trotting and the Pacing Horse in America;* Cossar Ewart's *Penicuik Experiments*, and various papers on Horses and Zebra crosses; W. B. Tegetmeier and C. L. Sutherland's *Horses, Asses, Zebras, Mules and Mule Breeding;* J. A. Craig's *Judging of Live Stock;* Hayes' *Points of a Horse;* Sydney Galvayne's *The Twentieth Century Book of the Horse;* Major-General Tweedie's *The Arab Horse: His Country and People;* Prof. J. Worthley Axe's *The Horse: Its Treatment in Health and Disease;* Charles S. Plumb's *Types and Breeds of Farm Animals;* E. J. Powell's *History of the Smithfield Club;* the publications of the Boards of Agriculture in London and Dublin, and of the Agricultural Department at Washington, U.S.A.

In this edition the histories of the various breeds have been very carefully examined, and references have been made to the sources of information, so that readers who desire to study any breed in detail may be assisted in doing so.

The home- or first-aid of farm animals has been ex-

haustively dealt with. Their common diseases have been fully though briefly described, and the remedies to be used in each case stated. In this part of the work thanks are due for much appreciated help to Sydney F. Pennington, B.Sc. (Edin.), M.R.C.V.S., now of the Agricultural School, Ghizeh, Egypt; and to Wm. R. Davis, M.R.C.V.S., Enfield.

To friends, too numerous to name, who have assisted in reading part or the whole of the proofs, I have pleasure in recording grateful thanks.

The half-tone process-blocks have been reproduced from a unique collection of photographs of picked animals, representing the different breeds; and in every case where known, the name of the photographer, whether amateur or professional, has been given. To mention the fact that the work was executed by Hislop & Day is a sufficient guarantee of its quality. We cannot refrain from acknowledging the great additional interest which is attached to a book of this kind by the products of the camera.

It is a great gratification to the Author, and it will also inspire confidence in the general public, to know that the printing and publication of the Fourth Edition has returned to the old-established firm of Oliver & Boyd, Edinburgh, under whose auspices the first two editions acquired world-wide success.

ROBERT WALLACE.

UNIVERSITY,
EDINBURGH, *June* 1907.

EXTRACT FROM THE PREFACE TO THE THIRD EDITION

J. WORLIDGE, in the Proemium to his *Systema Agriculturæ*, 1681, says:—"This is an Age wherein to commend or extol an Ingenious Art or Science might be esteemed a Needless Labour, especially in a Country so highly improved in everything; but that we find the more Noble, Advantagious, Useful, or Necessary, any Art, Science, or Profession is, the stronger Arguments are framed against it; and more particularly against the Rustick Art and its infinite Preheminences and Oblectations, by the vainer and more pedant sort of persons despising the worth or value of what they are ignorant of, who judge it below their honour or reputation to take any notice of so mean a profession; that esteem the Country no other than a place for Beasts as Cities for men."

History repeats itself, and after the lapse of more than two hundred years we find still prevailing the same spirit of antipathy to Agriculture so quaintly described by Worlidge. It is a misfortune, though perhaps more for humanity than for Agriculture, that men who have received a liberal education, in the ordinary acceptation of the term, in science, literature, and philosophy, so frequently when referring to Agriculture assume the rôle of "the vain and more pedant sort of persons, despising the worth or value of what they are ignorant of." By some it is denied that Agriculture is an art, although of all arts it is undeniably the oldest and the most widely distributed, as well as the most important, the most indispensable, the most interesting, and the most elevating. With another school of philosophers it is not a science, though in each of its varied and numerous branches it involves the most complicated scientific processes. Agriculture can afford to smile at such pedantry, and excuse it on the plea of ignorance. She has also the consolation of knowing that, in spite of the modern philosopher's ingratitude to, and want of appreciation of, Agriculture (in which he contrasts unfavourably with his prototype of Egypt, Carthage, or Rome), yet

not a day passes without repeated acknowledgment in deed, if not in word, of his absolute dependence upon her for his very existence; an undeniable proof that in this respect, in spite of all his assumed airs of superiority, the pedantic philosopher is in no superior position to the most humble toiler in the farmyard or the field.

If Agricultural literature has hitherto failed to secure the attention of some of those "wise" men who despise Agriculture, but who, by going to the country, themselves show that they do not quite "esteem it no other than a place for beasts," it is to be hoped that the pictures presented in this volume may induce many such to undertake a course of study which would create in their minds intelligent ideas of the processes of nature, of the rural work of man, and, above all, of the actions and dispositions of the animals which are constantly displayed before them. Such "wise" men would then be able to enjoy during a change to the country, relaxation and resuscitation of mind, as well as attain the meaner and less elevating object of the restoration of the animal constitution.

R. W.

EXTRACT FROM THE PREFACE TO THE SECOND EDITION

I HAVE endeavoured to acknowledge in suitable terms the sources of much of my information, but I should also add that I am indebted to the "Stock," "Herd," or "Flock" books relating to the various breeds. I would also refer my readers to the following works, which treat generally of farm stock, and which discuss fully various subjects of interest which could not conveniently be dealt with in an exhaustive manner in the following pages:—

(1) Youatt's various works on Live Stock. (2) Coleman's *Cattle, Sheep, and Pigs of Great Britain.* (3) Low's *Domesticated Animals of the British Isles*, 1845. (4) The same, with a selection of illustrations produced from the collection of 100 oil paintings, mainly by W. Shields, R.S.A.,

belonging to the Agriculture Department of the University of Edinburgh, and presented by the author, who was for over thirty years Professor of Agriculture and Rural Economy in that University. (5) Pringle's *Live Stock.* (6) Warfield's *Cattle Breeding.* (7) Sheldon's *Dairy Farming.* (8) *Polled Cattle;* and (9) *Hereford Cattle,* by Macdonald and Sinclair.

Without naming any, I desire most heartily to thank all who have been good enough to lend me assistance in the accomplishment of the work entailed in the reproduction of this volume. I have, as has always been my wont, discontinued the use of the prefix Mr. I trust that each authority named will fully understand that this is done from no lack of courtesy, but because I believe that in a book of this sort it is right and proper to name men as authorities and not as private individuals.

R. W.

EXTRACT FROM THE PREFACE TO THE FIRST EDITION

THE object of this volume is to lay before the student, in the shortest possible form, the many interesting facts about Farm Live Stock which ought to be known to every one who takes an interest in this branch of the extensive subject of Agriculture.

The subject-matter has been selected and arranged with the main object of making it a students' text-book. This accounts for the unusual number of intricate though very necessary calculations which occur here and there, and which will require much close attention and study. It is hoped, however, that all those of the farming community who may think the book worthy of their patronage will find the time taken up in reading it profitably spent; as besides a record of the many common facts known almost instinctively to many practical men, it contains descriptions of the causes, prevention, and remedies of the common diseases of stock, given in the ordinary language with which a farmer is familiar.

R. W.

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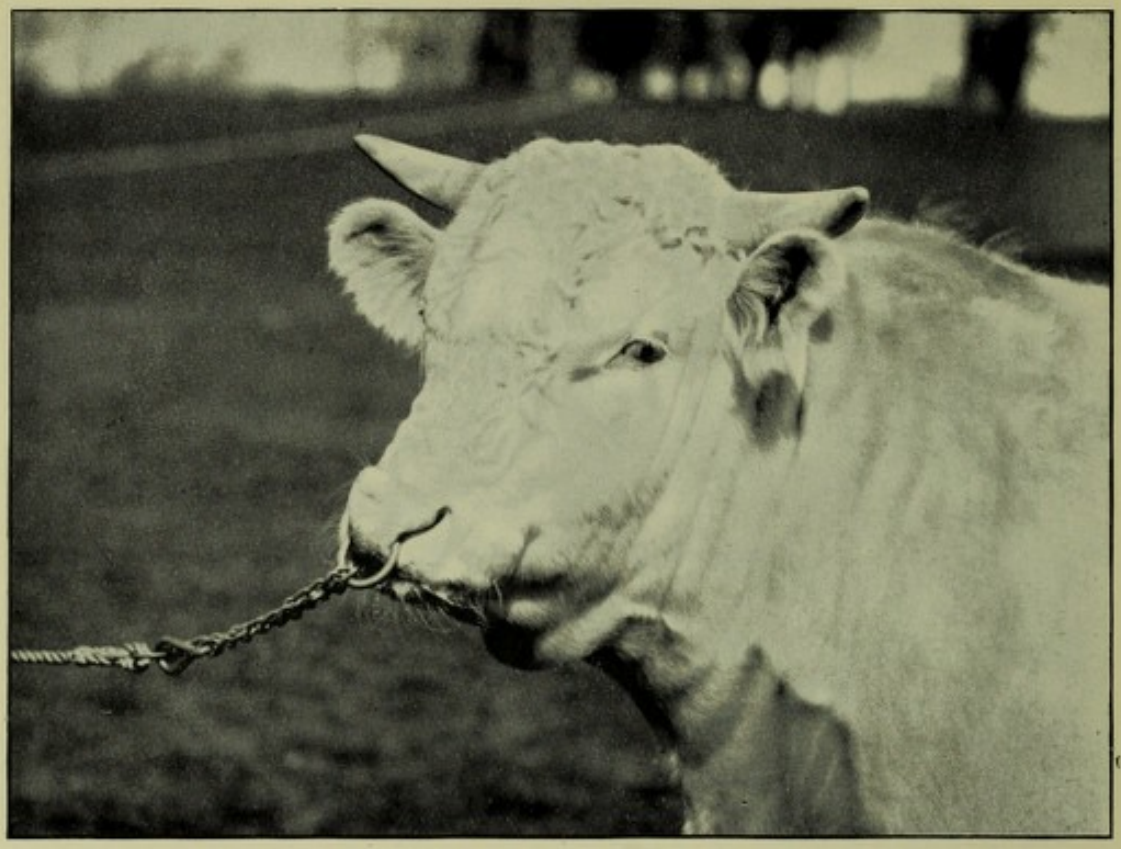


A. Head of Typical Two-Year-Old Shorthorn Bull, "Meteor."
Owned by Sir R. P. Cooper, Bart., Lichfield.



B. Head of Typical Shorthorn Cow, "White Heather."
Owned by J. Deane Willis, Bapton Manor, Wiltshire.

[*Both by G. H. Parsons, Alsager, Cheshire.*

FARM LIVE STOCK OF GREAT BRITAIN

INTRODUCTION

A PROPER **knowledge of the habits** and treatment of the animals of the farm is, without doubt, the most important branch of a farmer's education. It is the one, too, that is found to offer the greatest difficulties to men who take to the profession of farming late in life. In fact, few men who have not, as boys, been intimately associated with animals can ever hope to attain the first rank as judges or managers of stock. For the same reason we never find a really first-rate shepherd in a hill district—the place where superior knowledge and intelligence are most wanted—who has not as a boy seen, and assisted in, all the many little details of the management of a flock. He drinks in the information, as it were, with his mother's milk, and does not realise in after-life that he was not born with much of the knowledge he possesses. Nor is it only a knowledge of animals, but also an interest in them, that a boy gains by associating with them. They are the playthings of his youth, and the objects of his affection as he grows in years. A first-rate judge and prize-winner—it does not matter in what class of stock—is invariably found to spend much of his time gloating over the points of his favourite beasts. It is only in this way, and not from books, that a man can ever master the details of structure and the peculiarities of breed and constitution, and obtain that knowledge which alone can lead to financial success as a breeder, and victory in the show-ring.

A servant entrusted with the management of stock must make his charge his hobby if he is to be successful in his

avocation. A man is quite as happy in the enjoyment of one hobby as of another, provided it be of his own choice; and it is much better for himself, for the sake of his own comfort as well as of the permanency of his employment and amount of remuneration for the same, if the hobby be that by which he wins his daily bread. One of the weak points in the **British system of education,** so far as agricultural labourers and the small working-farmer classes are concerned, is that no adequate provision is made for their learning in their youth (the time when all the deepest and most lasting impressions are formed) the business they intend to follow. Agriculture—more particularly in the **live-stock branch**—is not like an ordinary trade or profession, which admits of hard and fast rules being laid down, and of being learnt in so many years, even after a man reaches maturity. Its principles, whether they be acquired by the farmer or by the labourer, have to be taken in little by little, through a long period of time, which must embrace a considerable proportion of his boyish days. The knowledge must come, as it were, instinctively: it cannot be learnt by rote. It would indeed be wrong to deny the obligation to give every working man in the kingdom a good plain education. Putting aside all considerations of sentiment towards our fellow-men, and the necessity of having every one educated who is to have a voice in the government of the country, there is an undoubted advantage in having work performed by the aid of that intelligence which accompanies education. But what calls loudly for protest is the virtual prohibition of the learning by boys, at the only time when they can do so perfectly, of the one branch of their business by which they themselves will live and in time rear families. The present system is much too one-sided. It is the extreme into which we have fallen, after a long period of deficiency in the branch which now receives too much attention. Youth is entirely spent upon book-learning; interest and inclinations which must develop are led into channels far away from the employments of adult life; work, when it has to be done, is performed as a drudgery and with a heavy heart; the frame is not trained, while it is being built up by Nature, to dexterity and efficiency, nor yet is it strengthened and enlarged by that practice which always precedes efficiency.

Why should not our educational system provide for the training of our labouring classes in both its branches, manual and mental, when this would conduce so much to their future happiness and the public good? In saying this, it is fully realised that the only possible places where a sound practical training such as schoolboys should have are ordinary farms managed on commercial principles. Every facility ought to be given by school authorities to boys to avail themselves of the opportunity of taking part in the regular work of busy seasons, under conditions which provide work of a natural and useful kind, of which they are able to recognise the practical value.

Darwin's work on *Animals and Plants under Domestication* treats of most of the trustworthy principles of breeding that have been propounded. His lines have been departed from only in those instances where investigations have extended the knowledge of the subject. **Warfield's** excellent book on the *Theory and Practice of Cattle-breeding* forms a useful supplement to the work of the older authority.

Those who wish to investigate the subject of heredity as applied to the whole field of animal and plant life will find two recent publications (1905), by acknowledged experts on the subject, that will repay perusal, viz.—(*a*) **G. Archdall Reid** on *The Principles of Heredity, with some Applications;* and (*b*) **Hugo De Vries** on *Species and Varieties, their Origin by Mutation*, being lectures edited by Daniel Trembly MacDougal.

CHAPTER I

PRINCIPLES OF BREEDING

Family Resemblance—Heredity—Darwin's Theory of Pangenesis—Weismann's Continuity of Germ-plasm Theory—Archdall Reid on Recapitulation a Leading Factor in Heredity—Force of Inheritance—Ewart's Telegony Experiments—Constitutional Weakness—Imagination—Crossing and In-and-in Breeding, including Line-breeding—Natural Breeding—Formation of New Breeds—Atavism in Pure Breeds and in Crosses — Domestication — Barrenness — Latent Characters—Mendel's Laws of Inheritance.

THE **strong family resemblance** which is seen both in the human species and amongst animals related to each other is a direct consequence of the existence of the first law of breeding, viz.,—that "like begets like," "or tends to produce like." Other laws are in operation at the same time; consequently, when an organism comes within the immediate spheres of their action, the effects of this and various other laws are modified to harmonise with surrounding conditions. The influence of a parent, as such, in his or her procreative function, is not always exerted under exactly the same conditions; and we have differences among individuals, alike in many respects, which distinguish them from one another. To the uneducated eye, every member of a herd of polled cattle or of a flock of Southdown ewes looks exactly like its neighbour, and a townsman marvels when he is told that some shepherds know individually every member of a flock of several hundreds. Moreover, both wild and domesticated animals recognise each other by eyesight as well as by smell. The existence of **exceptions** to this law of similarity is the great incentive to the stock breeder to try his skill in producing or discovering and then conserving superior qualities in his animals. Effort in this direction is as ancient as the civilisation of Egypt, and the Arab horse is a striking example of its success.

The Theory of Heredity, lucidly expounded by Charles Darwin, explains the perpetuation of like characteristics in parents and offspring, "due to the capacity of every plant and animal to produce other individuals of a like kind" (*Spencer*). "It is that science which deals with the organic relationships of progenitors with descendants" (*Reid*). **Variation** is the production of unlike characteristics. Hereditary similarity is the usual rule, and variation the anomaly; but "when a new character arises, it generally tends to be inherited, at least in a temporary and sometimes in a most persistent manner." Such sudden changes are not due to the influence of environment, but to "unknown laws acting on the organisation or constitution of the individual" (*Darwin*). Heredity is evidenced in numerous ways, which require only to be mentioned to be generally recognised. We may instance the strong personal resemblance that runs through certain families, not to mention races of men, *e.g.*, the Jews, and through breeds of horses, *e.g.*, the Clydesdale and the Arab; the extraordinary resemblance of the handwriting of three or four brothers in one family,[1] seemingly the result of similar physical structure of the hand and arm; the tendency to the production of doubles at birth, apart from the well-known influence exerted by the abundance of food; abnormal growths of hair—such as the grey patch on the neck and shoulder of an Aberdeen-Angus heifer in Queensland[2] and on a number of cattle in America, all descended from "Grey-breasted Jack No. 2" (Vol. I. of the *Herd Book*); the tendency to specific disease like tuberculosis, and even disease itself, appearing, like a splint or other bone affection, and sometimes disappearing, like certain forms of chronic indigestion in human beings, at a definite stage of the development of the individual. As a set off to hereditary defects, Darwin points out that "good health, vigour, and longevity are equally inherited," and we may add, in cattle, feeding and milking properties. Provisionally to explain why like tends to produce like, Darwin propounded the theory of **Pangenesis.** He assumed that *gemmules*, retaining the characters of the original cells, are shed from every cell in the

[1] The Author's family is a case in point.

[2] Recorded in the Author's work on the *Agriculture and Rural Economy of Australia and New Zealand*, p. 413.

body; that the gemmules are aggregated in the reproductive cells; and that by this means the characters of the original structure are transmitted from generation to generation.

Professor Weismann,[1] elaborating the theory of the **continuity of germ-plasm,** advanced by **Francis Galton,** maintains that there are two distinct classes of cells involved in the structure of the reproductive germ-cells,—the one being the origin of the body, or *soma*, the other being exclusively for the development of reproductive germ-cells, which, though associated with the body, are nevertheless, in everything, except in the matter of protection and nourishment, independent of it. The reproductive germ-plasm in any germ-cell is therefore supposed to be derived from the parent germ-cell, and not from the individual in which it was produced. This theory practically excludes the possibility of the continuance in a breed of the results of any change arising in the individual that does not originate in the cells exclusively devoted to the perpetuation of the species. Any change in, or influence exerted upon, the body of the immediate parent could not, according to Weismann, be reproduced in the young. Although we are not in a position actually to disprove this theory, which has made the name of Weismann familiar, we are not prepared to accept it as indisputable.

G. Archdall Reid in *The Principles of Heredity* assumes that "educated men are agreed that all forms of life are related to one another through an ancestry which, in the case of more divergent forms, is very remote; and that all the higher and more complex forms have been evolved from lower and more simple forms." He divides all acquired characters that appear in the process of evolution or otherwise into two groups: (*a*) "inborn traits or characters, those which take origin in the germ-plasm," and give rise to "variations," or "new inborn characters," which are congenital and come to the individual "by nature"; and (*b*) "acquired characters or modifications of inborn characters, caused by the play of forces from the environment on those characters after (as a rule) they have developed from the germ-cell. The importance of exact definition is due to the fact that, while it

[1] A translation of Weismann's *Essays* was published by the Clarendon Press, Oxford, in 1889 (New edition, 1891-2), and one of his, *The Germ-Plasm: A Theory of Heredity*, by Walter Scott, Limited, London and Newcastle, in 1893.

is admitted on all hands that inborn traits (including variations) tend to descend from parents to offspring, and to more remote descendants, it is now denied by the vast majority of biologists that 'modifications' (or 'acquirements') are ever inherited. . . . The whole problem of heredity centres round this question of the causation of variations. It lies at the starting-point of every conceivable doctrine of evolution. . . . Early in the last century the philosopher **Lamarck** published a theory of evolution which assumes in effect that all variations are due to the transmission of acquirements. His modern followers, a dwindling body, assume that *some* variations arise thus. **Darwin** started where the Neo-Lamarckians leave off. He assumed that, while many variations arise apart from the transmission of acquirements, some variations arise in consequence of their transmission. His modern followers, the Neo-Darwinians, who include the great majority of biologists, go a step further. They assume that *no* acquirements are transmissible, and therefore, that none of the variations of the child are due to the inheritance of parental modifications. . . . When dealing with problems of heredity we must always bear in mind that germ-plasm, not the individual, is the real subject of discussion. The germ-plasm undergoes gradual changes; the individual enables us to ascertain and indicate those changes. . . . It is probable that there is continuity of the germ-plasm, and therefore that the individual is nothing more than an incident in its career, a dwelling-place where shelter and nutrition are obtained. All evolution consists, in essence, of a gradual change in the character of the germ-plasm contained in successive germ-cells —a change of such a nature that it is reflected in the successive individuals that spring from the cells."

"The **Theory of Natural Selection** as propounded by Darwin is not a theory of heredity, but one of evolution only. As a doctrine of heredity he propounded the hypothesis of Pangenesis. But the two do not stand or fall together. On the contrary, Pangenesis, since it implies the transmission of acquirements, is distinctly incompatible with Natural Selection, and is, moreover, quite irreconcilable with the facts of modern embryology. His modern followers have accepted Natural Selection while they have rejected Pangenesis, as they have the Lamarckian and Bathmic doctrines of heredity.[1] Instead they have propounded several theories

[1] "The Bathmic theory supposes that evolution has occurred in obedience to, and under the immediate direction of, a Deity, who has rejected both natural selection and the transmission of acquirements as means to His ends."

of heredity which fall naturally into two categories: (*a*) the doctrine that variations are due, as a general rule, to the immediate and direct action of the environment on the germ-plasm, and (*b*) the doctrine that they arise as a rule 'spontaneously.' The two doctrines, as commonly formulated, are not entirely exclusive. Most biologists admit the existence of both, but differ greatly in the relative importance they attach to the two factors. Some biologists believe that the environment does not now influence the germ-plasm, but that it did so in a very distant past. Useful variations in proportion to their usefulness are preserved and, in succeeding generations, are accentuated by Natural Selection. Of the useless variations some may be rendered latent, but the vast majority are immediately planed away by reversion directed by bi-parental reproduction—the intermixture of somewhat similar germ-plasms."

In discussing the theory of **recapitulation**, Reid says:— "The development of every individual, except for his own variations, is a complete recapitulation of the parents' development, but it is not a complete recapitulation of the life-history of the race. No child could develop unless there were recapitulation; but no race could undergo extensive evolution unless the recapitulation were incomplete and inexact. . . . 'As it is, the dim and fleeting resemblances to lower animals, displayed by the embryos of all higher types, present the strongest evidence of the truth of the doctrine of evolution that exists in the whole range of science' (*Romanes*). We have here a real history retold in every generation with the additions and omissions made by the preceding generation —a history which ever grows longer with the lapse of years, and ever more and more inaccurate and incomplete in its earlier parts. . . . The theory of recapitulation is essentially physiological. It supposes that under fit conditions the embryo tends to develop by repeating the life-history of the race, thus growing into an organism much like the parent form. No attempt, impossible of verification in the present state of our knowledge, is made to pry into the morphological details of the germ-plasm. . . . All the organs and tissues of which an individual is compounded possess the power of independent variation. Every single cell may possess this power. . . . All evolution in shape and function depends on this power of independent variation; without it, descendants might become larger or smaller than ancestors, but otherwise would remain exact copies. In studying heredity our attention is apt to be distracted by the multitude of variations, and the consequent complexity of the subject, from the main fact of development,

viz., the recapitulation of the parent by the child, and, consequently, of the life-history of the race by the individual. In every normal individual—in every individual who survives—the variations from the parent are as a drop in the ocean compared with the likenesses. Were it otherwise, no organism would reproduce its kind. . . . Every variation, when once it has started, may be looked upon as a structure capable of independent variation in an almost infinite number of directions, regressive and progressive. As a consequence every species of plant and animal is in a condition of continual flux and change. As a whole the likeness to the parent is well preserved. But in minutiæ there is an immense amount of variation.

"Evolution is **adaptive** racial change. . . . 'Many instances could be given to prove that progression and retrogression are the two main principles of evolution at large' (*De Vries*). A progressive variation constitutes a deviation from the parental *and* ancestral type, which, speaking generally, is in the direction of increased magnitude and complexity. It results from the complete recapitulation of the parental development *plus* an addition. A regressive variation constitutes a deviation from the parental *towards* the ancestral type. As a rule it is in the direction of diminished magnitude and complexity. It results from an incomplete recapitulation of the parental development. . . . The tendency to vary spontaneously has been evolved by Natural Selection. Like any other character it may be increased or diminished by the same agency, or by reversion to a more or less variable ancestral type. Whenever a hitherto stable environment changes, the tendency is increased. If the stringency of selection is increased, the tendency to vary is exalted by Natural Selection. If the stringency is diminished, the tendency is exalted by reversion. In both cases adaptation to the changing environment is hastened. . . . Every instance of regression is a failure to recapitulate part of the parents' development, and consequently part of the life-history. It is therefore, of logical necessity, an instance of reversion. . . . The remote ancestor of the modern horse, the Hipparion, had three functional toes. The embryo of the horse has also three toes of considerable size. But the two outer toes of each limb, which in the embryo are nearly as well developed as in the Hipparion, degenerate partially during development, so that the horse is born with only one functional toe. Occasionally a foal is born with two hoofs on one limb. When an outer toe persists, we have plainly, in a real sense, an arrest of development. The toes remain in the embryo

in the ancient condition ; the whole life-history is not recapitulated. But in the normal horse there is no arrest of development. The recapitulation is carried out to its full extent, though, in the later stages, in a reversed direction. . . . When, therefore, we see an organ better developed in the embryo than in the adult, we must conclude that reversed selection has been at work. . . . There is on the average a greater tendency towards reversion than towards progression, a greater tendency to vary towards the ancestry than away from it . . . a greater tendency to let the last steps made in the life-history lapse in the development than to add other steps to them. . . . Two forces are constantly at work in Nature — Natural Selection and Reversion. The former causes progressive evolution, the latter regressive evolution. They are opposed, but one would be quite inadequate without the other. They are warring forces, but their resultant is a near approach to perfection."

The force of inheritance is strongest in old and well-established pure breeds, but even among the best a very inferior animal (as the American "scally-wag" among cattle) may appear at times. This degenerate specimen should never be allowed to breed. It is by getting rid of all such inferior or even moderately good animals that our breeds are improved. "Fashionable pedigree" without the skilful elimination of inferior specimens has in every instance led to disaster, alike to the breed and to the breeders. Weeding, or "artificial selection," acts much in the same way among domesticated animals as the law of the "survival of the fittest" does among wild ones. A well-bred, though plain-looking bull, if he has no deformity, or no very objectionable points, usually breeds much better and more uniform stock than a handsome one without a pedigree. In selecting, it is much more important to have the sires than the females good, because strongly bred sires often get their best stock from cows not bred in line, and one bad sire may affect a large number of offspring, whereas an inferior female influences only her own young, which are comparatively limited in number. The belief was entertained by Darwin, and accepted universally for years after his death, that **"the influence of the first male** by which a female produces young may frequently be seen in her future offspring by different sires." The evidence accepted in support of the assumption

has not proved sufficiently reliable, and Professor Cossar Ewart's extensive telegony experiments at Penicuik with zebra hybrids (zebrules), dogs, and numerous small animals, including pigeons, although supplying only negative evidence, all point in a diametrically opposite direction. He has completely undermined the relevance of the often quoted case of Lord Morton's pure-bred chestnut Arab mare,—which first bred to a quagga, and subsequently by a black Arab stallion, gave birth to two dun colts with striped legs,[1]—by pointing out that similar bandings occur naturally, without crossing, in certain breeds of horses, notably a Norwegian breed; and by breeding many zebra hybrids—the progeny of a great variety of virgin horse and pony mares, followed by foals from the same mares by an Arab stallion—not one of which showed any marking or other characteristic which could be traced to the zebra.

The best bred animals are often, nay usually, far from perfect in some point. It is most important, if a bull (or sire of any breed) with a **special defect** has been used, that succeeding sires should be strong in that particular point, whatever it be, else there might in time be a general defect established in the whole race of descendants, such as the hollow or weakness behind the shoulder of many otherwise grand Shorthorns of Bates descent. Males are, in some cases, more variable than females; for example, in certain breeds of sheep, it is much easier to select a large number of ewe lambs than of ram lambs good enough to be exhibited in a showyard; and, when breeds of cattle are small in number, it becomes a difficult task to find a bull to mate with the cows good enough to maintain the standard of quality.

Animals with constitutional weaknesses amounting to unsoundness should not be used for breeding.[2] It is still believed by a limited number of biologists that defects

[1] Darwin's *Animals and Plants under Domestication*, chap. xi.

[2] "In France all entire horses, whether kept at the Government *haras* or by private persons, must be examined and passed as fit for service, and no others can be used. The percentage of unsound stallions in France has fallen from 5.84 per cent. in 1880 to 2.93 in 1890, the continuous decline, accompanied by an increase in the number of entire horses, proving the wisdom of the system of inspection." But for the weakness of our system of Government, no stallion would be permitted to travel in this country without a certificate of soundness.

resulting from accidental injuries are sometimes, although very rarely, transmitted to the young — especially when disease follows an injury—and may, or may not, be hurtful. The tendency to bony exostoses on the leg bones of a horse from the parents contracting these through hard work on the road, would be a case of the first kind. The following is an illustration of the second :—A black spaniel bitch, belonging to Commander Harrison, R.N., had the tip of her tail caught in a door ; white hairs grew from the injured part, and she bore various puppies with white-tipped tails afterwards, though she had never done so previous to this time.

Imagination is believed to come into play in breeding, especially with regard to colour. The colour of any object at which an animal looks while conceiving, or during the early stages of pregnancy, may sometimes govern the colour of the young, as the following examples go to testify :[1]—(*a*) About 1860, William Park, Balquhanran, Dalmuir, Dumbartonshire, had a black Clydesdale mare that worked alongside a chestnut gelding, and as long as she was associated with him, her foals were all chestnut. When he died the new mate was grey, and the first foal born after the change was grey. (*b*) It is recorded of M'Combie of Tillyfour that he succeeded in preventing his black Polled Angus cows from breeding red or broken coloured calves by putting up a high black fence round the paddock in which he mated them as they came in season, thus preventing their seeing the parti-coloured cattle of his neighbours. (*c*) One of the most remarkable cases of the influence of imagination on the colour of cattle was a few years closely studied at Glamis in **Lord Strathmore's Polled Angus herd,** numbering about thirty cows of the most highly prized strains of blood. As the results of the experiment are interesting, we give them in detail.[2] The cows with bull-calves were annually separated from the

[1] This influence was known to the ancients (see the thirtieth chapter of Genesis, in which appears a description of Jacob's practice of peeling rods of green poplar, hazel, and chestnut to produce white strakes, so that the flocks conceiving before the rods might bring forth cattle ring-straked, speckled, and spotted). It is interesting to note that it was the time of conception that was considered the important time in those days.

[2] Compiled in 1893 from information supplied by A. Ralston, factor on the Glamis estate, by whose instructions the experiment was carried out by Henry Lindsay, bailiff, Earl of Strathmore's home farm.

cows with heifer-calves when turned out in May, and the herd was thus grazed in two divisions of about equal numbers (which for convenience we shall term A and B); but from year to year the cows forming these divisions varied with the sexes of their calves. It was observed for a number of years that about 20 per cent. of the calves produced by the cows of division B were "badly marked" in colour—viz., red or black-and-white—while the colour of the calves of division A was uniformly black, as it ought to be. The same well-bred bulls were put to the two divisions, and changed from one to the other from time to time. The field in which division A grazed was located so that no cattle of broken colours could be seen by the animals at pasture in it, while the field in which division B was kept adjoined two other fields, in one of which up till 1890 were pastured black steers, and in the other Ayrshire cows, displaying a great variety of broken colours. The black polled cows of division B were within smelling distance and within full view of the cattle in the two fields in question (being separated merely by a wire fence), and, in consequence, from two to four badly-marked calves were born annually. In 1890 both of the fields adjoining division B were occupied by red-and-white cattle, with the result that six pure-bred Polled Angus calves came badly marked, some being black-and-white, and others red. Some of the cows which bore badly-marked calves were three or four months gone in calf before they were brought in contact with cattle of other colours than their own, from which it may be inferred that the influence of imagination is not confined to the period of conception. One of the red calves had a black fringe round his muzzle, and a black stripe along the back. This red calf developed into a pure black bull, with a reddish fringe round the muzzle, and a reddish stripe along the back. In 1891 the adjoining fields were intentionally stocked with black cattle exclusively, and all the calves of 1892 were for the first time for several years of pure Polled Angus colour, like the colour of the sires and dams and of the calves of division A, which bred always true to colour. Only one calf had a small patch of white upon it; and this is a common occurrence in the best-bred black polled cattle. The fact that the sires of the badly-marked calves of 1891 were

the same as the sires of the black calves of 1892 makes the results of this experiment all the more interesting.

In the case of the **colour of the crosses** derived from two or more distinct breeds, reversion to some ancestral form plays an important part. Certain colours, as a rule, can be depended upon to produce in the young other and altogether different colours from those of the parents; for instance, a black Galloway cow and a pure white Shorthorn bull almost constantly throw a very dark roan or a blue-grey. A light roan bull might give the same result as a white; but a dark roan or red will generally get either black or red calves, which are not so much desired. In the same way, when Ayrshire cows are crossed with a Shorthorn, a light-coloured bull, as compared with a dark one, throws more of the Shorthorn character into the colours of the calves, and these bring the highest prices, as they are usually reared for fattening purposes. All constancy in colour is lost in crosses other than first crosses. The second and later calves by the same bull and cows that produce blue-greys as first calves are sometimes not so uniform in colour.

Crossing and In-and-in Breeding.

"The presence of **free crossing** and the intentional matching of individual animals are the corner-stones of the breeder's art. . . . Free crossing has in all cases played an important part in giving uniformity of character to all the members of the same domestic race and of the same natural species, though largely governed by natural selection and by the direct action of the surrounding conditions.[1] . . . The half-wild cattle in each of the several British parks are nearly uniform in character; but in the different parks, from not having mingled and crossed during many generations, they differ to a certain small extent." (Warfield.)

The crossing of families not related to each other usually gives increase of vigour and of size to the offspring, though sometimes the distance between the characters of those families is so great that the immediate result is somewhat like a cross between two distinct breeds, and consequently the full benefit is not at first realised, but is deferred to a

[1] This is the first function of crossing; the second or opposite results are dealt with later.

second or later generation. For this reason many breeders at one time objected to mingling the blood of Booth and of Bates Shorthorns, but the benefits resulting from the commingling of Booth, Bates, and Cruickshank strains of blood, when skilfully carried out, have been found to outweigh the disadvantages.

Close in-and-in breeding, "incestuous breeding," or the pairing of animals very closely related to each other, ultimately causes great loss of constitutional vigour, loss of size and fertility, and sometimes malformation—as in the case of a pig bred at Twiglees, Lockerbie, which at birth lacked a number of the vertebral segments. Pigs show the bad effects of consanguinity sooner than any other farm animals. This is perhaps on account of their comparatively solitary habits when in a state of nature. Gregarious animals do not suffer so much; they have been more accustomed to it, and Nature has accommodated herself to the circumstances.

Darwin says, in no hesitating manner:—"The gain of constitutional vigour derived from an occasional cross between individuals of the same variety, but belonging to distant families, has not been so largely or so frequently discussed as have the evil effects of too close interbreeding; but the former point is the more important of the two, inasmuch as the evidence is more decisive. The evil results from close interbreeding are difficult to detect, for they accumulate slowly and differ much in degree with different species; while the good effects which almost invariably follow a cross are from the first manifest."

He summarises, in conclusion, as follows:—"The crossing of animals and plants which are not closely related to each other is highly beneficial, or even necessary, and interbreeding prolonged during many generations is highly injurious."

Shorthorn cattle have proved to be not so much the worse for in-and-in breeding as most other stock, although injury has been done, as will be mentioned subsequently. The distinct type peculiar to them has undoubtedly been formed and fixed by in-and-in breeding. The most prominent advantage of in-breeding is this stamping of family characters or types, and it cannot well be dispensed with in the formation of new breeds or the improvement of old ones. But it is neither a weapon to be handled with safety by the novice or amateur, nor of service to the practical breeder who produces

a commercial animal. **Warfield describes the results** in a sentence which is curiously descriptive of the position attained by Bates with his unrivalled Duchesses:—

"A few men for fancy and fashion's sake may prefer to breed animals uncertain and irregular as breeders, short-lived and delicate in constitution, producing many dead-born and sickly calves, for the sake of now and again one of extraordinary excellence which, perchance, may never produce a calf to perpetuate her own phenomenal excellence."

Line-breeding is a modified modern form of in-breeding which is steadily becoming more popular as the evil results of close-breeding become better understood. Animals belonging to the same "line" of descent are bred together, but close relationships are strictly avoided. By this means constitutional vigour is maintained, and uniformity of type given to the progeny. The advantages of in-and-in breeding are secured without the ultimate correlated disadvantages, but the rate at which a desired type can be reached by line-breeding is slower than that of in-and-in breeding. Only the impatient and the inexperienced are now found to follow the more dangerous headlong course.

Natural breeding is one of several human methods of attempting to rise above the natural average in one or more directions. The law of the survival of the fittest is that which has produced Nature's average or dead-level. The struggle for life, which is the great guarantee of constitution, being eliminated, natural breeding is resolved into the selection of the fittest or best animals to breed from for a given object, the attainment of which would be to rise above Nature's average. The keynote of the system is individual merit, not necessarily restricted to pedigree or any other artificial, imaginary, or ideal standard. It is the method adopted in the breeding of the American trotting horse, where the quality of "performance" alone ranks in determining merit. It is also applied with marked success in the breeding of the milch cattle of Australia, where only heifers from the best milking cows, tested for quality and quantity of milk, are reared for breeding, and where all inferior milking animals are spayed, so that, while they may continue to milk for a year or two, they can no longer produce inferior offspring. **Out-crossing** becomes the safe rule by which constitution is

maintained and the imminent dangers of close-breeding are averted. An occasional in-cross is not avoided and does no injury. The aim is excellence in a particular direction, and, if only superior specimens be employed, the law of "like begetting like" is a sufficient guarantee of the ultimate results. **Warfield,** discussing this important question, says :—

"In a long acquaintance with cattle breeding and familiarity with methods pursued in many herds, I have seen much which has led me to thorough persuasion that the correct system was to breed the best to the best and to avoid close affinities. Close study of the results in the show ring lead me to the conclusion that, while an occasional animal of great merit is found to be the result of in-and-in breeding, a large proportion of winners are descended from winners, particularly on the sire's side, and mainly out of families of cattle bred in promiscuous manner. . . . Out of every ten celebrated prize-winners in recent years, nine have been miscellaneously bred."

While this pronouncement voices the general though not universal opinion of Shorthorn breeders of the present day, it must not be forgotten that the statement does not cover the entire field, as the reference is to American cattle, which were intensely in-bred, after a high level of excellence had been reached by the disparaged system, before they crossed the Atlantic.

In dealing with the **modification of old** and the **formation of new breeds** by crossing, we find that most of our modern breeds of sheep have been formed or improved by crossing old types with breeds specially adapted for communicating desirable qualities to them, aided by generations of rigid selection in definite lines. All the Down breeds, other than the South or Sussex Down, are indebted to that breed for much of their quality as butchers' animals. The Oxford Down breed was formed about 1830 by crossing Cotswold rams with Hampshire ewes, and in some cases with South Downs. Many of the Longwool breeds are indebted in wool and in early maturity to the English Leicester. And our modern breeds of pigs are descended from the progeny of ancient British forms repeatedly crossed with imported Neapolitan and Chinese types.

The Dexter-Shorthorn (p. 93) was formed by the repeated use of Shorthorn bulls on Dexter cows and their

female progeny; and the Yorkshire coaching horse is the result of crossing the old Cleveland Bay with the thoroughbred.

Darwin, quoting Spooner, says: — "Nature opposes no barrier to successful admixture; in the course of time, by the aid of selection and careful weeding, it is practicable to establish a new breed. After six or seven generations the hoped-for result will in most cases be obtained; but even then an occasional reversion or failure to keep true may be expected." The recently formed Romney-Lincoln sheep of New Zealand is an example.

Certain distinct breeds of sheep are **not sexually attracted** to each other. This is most observable when a ram is put to a mixed flock of ewes, half of which belong to another breed than his own. He attends first to those of his own kind, and either wholly or, more frequently, partially neglects the others. In certain instances the difference of the habits of mountain and lowland sheep run in one flock does to some extent account for the difference of results, but not so when the animals mingle freely in confined areas.

Crosses between two distinct breeds mated the proper way make the best fattening animals. The sire should be of the more improved breed as regards early maturity qualities, unless both are equally good; for example, the Shorthorn bull breeds well with cows of milking breeds, or of slow maturing sorts, as Kerry, Dexter, Ayrshire, West Highland, or Galloway. Crossing in any other way is usually unsuccessful. Of late years, since the Polled Angus breed has been so much improved, farmers cross Shorthorn cows successfully with Angus bulls (p. 169).

In farm stock it has been fallaciously but very generally believed that the male contributes specially to the external shape, the female more to the vital and internal organs, in spite of the fact that a calf has often a very strong likeness to its mother in expression and in form.

With a thoroughbred horse on a mare of another breed, the resulting offspring has generally a symmetrical appearance. A cross bred the other way is often strong and useful, but plain, usually about the hind quarters and head.

Sheep come under the same rule as cattle. Rams of any of the improved varieties of Leicesters or Downs may be used with advantage, under certain conditions, to put to

ewes of the various mountain breeds to produce feeding sheep.

The first cross between two breeds is, in character, usually intermediate between them; but after the first cross it cannot be predetermined how the tendency may run. The first cross is the strongest: after-crosses get smaller and weaker, and the more so the longer crossing is continued, especially if close-breeding be practised, necessitating the going back now and then to one of the pure breeds for a sire to infuse new vigour. This so far explains the success of crossing mongrel cows with a pure Shorthorn bull.

Atavism (from *atavus*, an ancestor), or "throwing back,"

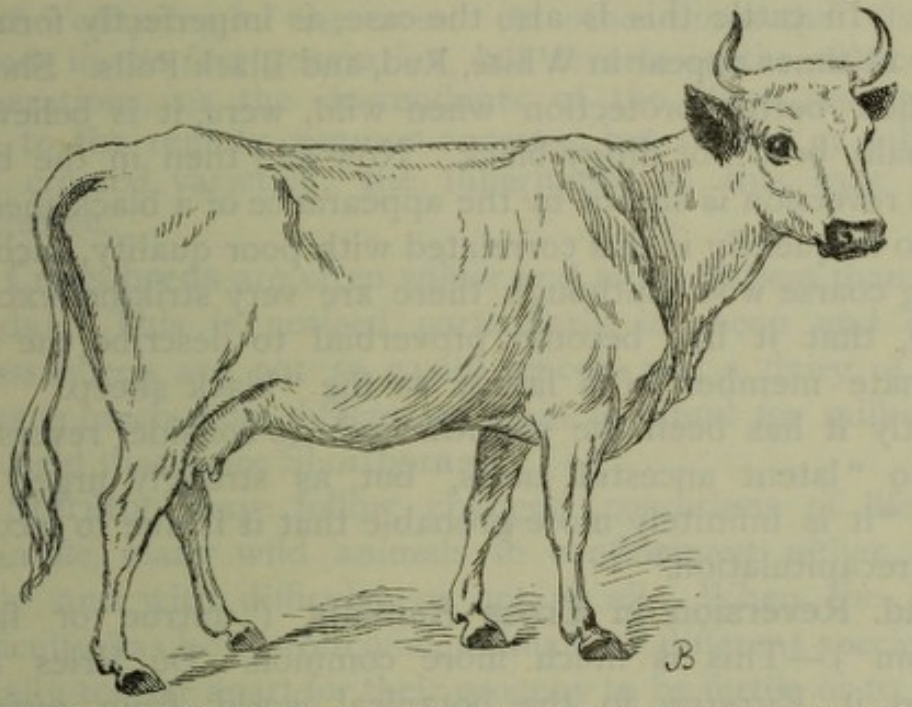


FIG. 1.—Cross-bred Cow, showing reversion in colour to that of the ancient wild cattle: *Drawn by Mrs Blackburn.*

or "reversion," is the appearance in an animal of some character which the immediate parents had not, but which existed in its ancestors. A striking instance, for example, was reported to the Author by Professor Blackburn in 1893:—

"About thirty years ago Mrs Blackburn got, at Roshven, Moidart, N.B., a pure Brittany bull and cow, but after some years there was a difficulty in securing a pure Brittany bull to keep up the stock, and a young bull—a cross between a Brittany and a Shetland—was bought. A very considerable proportion of the progeny of this bull by the pure Brittany cows were pure white, with black ears and points like the wild white cattle—not albinos."

As white with black points is a combination of colour unknown in either of the pure breeds from which the cattle sprang, its repeated appearances can best be explained as instances of reversion to an early ancestor.

Atavism may occur in two classes—(1.) In Pure-bred Stock. (2.) In Cross-bred Stock.

1st. Reversion in Pure Breeds (caused by an innate latent tendency).—The aboriginal species of domestic cattle and sheep no doubt had horns for defence and attack; now many are without them, though they yet exist in the cases of most mountain breeds of sheep at home and abroad. Sometimes a ram of a polled breed, such as the Cheviot, develops horns. In cattle this is also the case, as imperfectly formed horns at times appear in White, Red, and Black Polls. Sheep, for their better protection when wild, were, it is believed, originally brown or dingy black. Now and then in the best flocks reversion is shown by the appearance of a black sheep; and so frequently is this correlated with poor quality, such as strong coarse wool (although there are very striking exceptions), that it has become proverbial to describe the unfortunate member of a family as the "black sheep." Till recently it has been the scientific rule to consider reversion due to "latent ancestral units," but, as strongly urged by Reid, "it is infinitely more probable that it is due to incomplete recapitulation."

2nd. Reversion in Cross Animals ("untrue or false atavism").—This is much more common. De Vries has named it *Vicinism* in the botanical world, from *vicinus*, neighbour, "to indicate the sporting of a variety under the influence of others in its vicinity." When two distinct, improved breeds are crossed, the offspring has a strong tendency to revert to one of the pure forms, or rather to an inferior ancestor of one of them; and this lasts for generations. The young often assume the colour of one parent, and in time change it for that of the other. The calf from a black cow by a red bull is often born red or brown, becoming black afterwards; and the mouse-coloured foal of a chestnut mare may become chestnut.

"**The act of crossing** in itself gives an impulse towards reversion," as seen by characters appearing in the young that had not been seen in either pure breed for generations (see

the fig. of Mrs Blackburn's white cow on p. 19). Calves are sometimes produced white with dark ears, like the ancient wild cattle, when a red Shorthorn bull is put to West Highland cows, or when a white Shorthorn is put to blue-grey cows.

Reid says, in discussing bi-parental reproduction:—"*If we cross varieties or species, the general tendency is ever towards great reversion.* All that distinguishes the one variety or species from the other—all the special characters which have arisen along the diverging lines of evolution—tend to disappear. The ancestral form common to both varieties, even if it be separated from the crossed descendants by thousands of generations, tends to appear. Sometimes the reversion is direct; the ancestral form reappears immediately in the offspring of the cross. At other times the offspring blends in the first generation, but reverts in the subsequent generations, or the descendants of the blend may revert, not to the remote common ancestor, but to one or other of the crossed varieties; the inheritance in this case being exclusive."

Cross-breds are often wilder and more restless than pure-breds.[1] This is noticed particularly in sheep and cattle. Cross sheep are not so easily fenced, and a dairy of cross cows is much more difficult to train to stand for milking in the field than pure Shorthorns.

Sterility may follow changed conditions of life: for example, many wild animals in confinement either breed early and with difficulty or not at all. When the initial difficulty has been overcome, animals of different species are usually too far apart for their progeny to be fertile or to breed freely. Mules from zebra and donkey stallions mated with horse or pony mares are uniformly infertile.

"With all highly-bred animals there is more or less difficulty in getting them to procreate quickly, and all suffer much from delicacy of constitution." "Half-wild British cattle which have long interbred within the limits of the same herd are relatively far less fertile" than ordinary animals.

Domestication increases the fertility of animals, if they are properly bred and not overfed. By bringing sheep into an improving condition at the time of conception, the number of

[1] This rule refers to pure breeds of the same degree of wildness. If a wild and a docile breed are mated, the progeny will be intermediate in wildness.

doubles or triplets is increased. In a flock of ewes the largest number of twins is "got" the first few days the ram is let out. The first-born of most farm animals are believed to run slightly more to the female than to the male side.

Barrenness or uncertainty may be induced by the following causes:—**1st.** Over-feeding in the case of either sex, thus loading the reproductive organs with fat. The remedy in the case of over-fat animals is judicious starving, and plenty of exercise or work in the case of cattle and horses. Some foods induce uncertainty in breeding more readily than others. Sugar, molasses, and linseed are amongst the worst; but these are, nevertheless, often used to prepare beasts for show or sale, because they produce a smooth and glossy coat of hair, as well as lay on fat. These foods would not do damage if given in moderation with hay or straw; it is when supplied in addition to a full feed of other concentrated food that they do injury. Foods for breeders should be particularly rich in phosphates, and should have more albuminoids to fat-formers than in the case of fattening animals; such food ingredients are beans, peas, lentils, and gram. Very fat animals do not come often in season, and, consequently, cattle settle better and feed faster as they become what the butchers designate "fat-ripe."

2nd. Too low condition, especially if associated with exposure to cold and wet, as in the case of cattle wintered in the open air on poor food, or of heavy milking cows "sucked down" by a large calf or perhaps by two calves.

3rd. Constitutional weakness from in-and-in breeding.

4th. Being a free-martin or dumb-martin, that is, a heifer born one of a pair of twins, the other being a bull. In this case the external as well as the internal organs of generation are imperfectly formed and contracted, and there is usually also more or less of a masculine appearance noticeable. Robert Colling's famous "white heifer that travelled" was a free-martin by "Favourite" (252), her full brother being "North Star" (459). Highland cattle are said, at times, to produce free-martins that breed.

Horses do not conform to this rule, but twins from a mare are very rarely seen—because when they do occur they are usually, although not invariably, prematurely born, or die if they come to full time. The female twin sheep is fertile.

Latent Characters in the individual animal are well illustrated by secondary sexual characters lying dormant in the opposite sex but under certain circumstances tending to develop. Various male mammals have been induced to secrete milk by the sucking action of the young. With age a mare often assumes the arched masculine neck of a stallion, and old hens have been known to crow like a cock and to assume male plumage in part. In virtue of this law of Nature a good milch cow can transmit her good qualities to her progeny through her male offspring. The close study given to the size and position of the rudimentary teats of a bull of a milk-producing breed is evidence of the common belief in the principle. The tendency and power to produce rich milk runs in families, and is transmitted through both male and female, as the tendency to produce much milk is acknowledged to be. Apart from the sexual connection, it is "admitted that certain characters, capacities, and instincts may lie latent in an individual, and even in a succession of individuals, without our being able to detect the least sign of their presence." The inventive faculty in man—a rare and very distinct characteristic in certain families—will skip one or more generations again to reappear.

Gregor Mendel's Laws of Inheritance, illustrated by experiments on peas, were communicated to the Brünn Society in 1865 and published 1866. It having been asserted that Mendel's laws are equally applicable to the cross-breeding of live stock, it is necessary briefly to explain them (although botanical examples of their application are most complete and best for the purpose), and to state that at present we are unable to discover any relation they bear to the Animal Kingdom which could be of practical utility to the farmer. They completely break down in the results got by crossing such conspicuous polled breeds as the Galloway and the Aberdeen-Angus with white Shorthorn bulls. No animal was ever produced from such a union that assumed the leading characteristics of any one of the breeds named. Over 90 per cent. of the cross-bred progeny are hornless; when horns appear they are generally loose scurs, and the colour is with rare exceptions a blend, "blue-grey," or varied by atavism.

Mendel's attention was directed not to the plant as a whole, but to its individual characters—colour, shape of seed,

etc. He followed in detail the conduct of each character in crosses derived from different forms, and the history of each individual cross through several years of its growth. He stated as a result that the gametes,[1] the egg-cells and pollen grains, "are pure with respect to the characters they carry": in a cross between a smooth and a wrinkled pea the gametes are either round or wrinkled, not blended. He found **two distinct groups of characters,** which he called **Dominant** and **Recessive,** and he thought he could see the ratio in the second growth of crosses (F_2) of three dominant ($3D$) to one recessive ($1R$). The first growth of a hybrid $= F_1$.

R. H. Biffen, M.A., Botanist, Agricultural Department, Cambridge University, experimenting with wheat (1900-4), confirms Mendel's views. He grouped pairs of unit characters as follows, mostly shown in the second growth (F_2) of a cross, but some—seed characters—not till the third growth, cross, or generation (F_3). The following are examples:—

Dominant.	Recessive.
Broad leaf.	Narrow leaf.
Hollow stem.	Solid or pith.
Rough leaf.	Smooth leaf.
Red chaff.	White chaff.
Red grain.	White grain.
Velvet or hairy chaff.	Glabrous chaff.
Beardless.	Bearded.
Hard grain.	Soft grain.
Susceptibility to rust.	Immunity from rust.
Keeled glumes.	Rounded glumes.

The self-pollinated second growth of cross wheats (F_2 generation) produces plants either beardless or bearded in very nearly the ratio of $3D$ to $1R$. Of the beardless or dominating grains produced in F_2 generation, only $\frac{1}{3}$ will produce the purely beardless character, while $\frac{2}{3}$ produce both beardless and bearded offspring in the proportion of 3 beardless to 1 bearded. The recessive or bearded plants of the F_2 generation breed true. In 100 grains taken at hazard from the cross-bred progeny F_2, we do not find 75 pure dominants and 25 recessives; but of the former only 25 are pure dominants capable of breeding true to type, and 50 are similar to the F_2 parent, and will, as F_3, produce "the same type of offspring

[1] "Gamete, a protoplasmic body that unites or conjugates with another to form a zygote."



A. Wild White Cattle in Chillingham Park.



B. Wild White Cattle in Chillingham Park, Northumberland.
The property of the Right Hon. the Earl of Tankerville.



A. Young Chillingham Park Wild White Bull.
Taken to Cadzow Park, Hamilton, to regenerate that herd.



B. The Chillingham Park Bull taken to Hamilton, after reaching Maturity.
[*C. Reid, Wishaw.*

[*pp.* 24 *and* 25

in the same proportions" $= D - 2DR - R$. The *D's* and *R's* in future generations breed true indefinitely, as their gametes possess only dominant or only recessive characters.

Neither of the two men who possess by far the greatest experience in plant breeding—**John Garton** in England, and **Luther Burbank** in the United States — has any belief in the application of Mendel's laws to their work.

Garton says:—"From observations, extending over 25 years, Mendel's laws have been generally disproved in Composite crossing, while in Simple crossing they have only been applicable when there has been extreme tendencies in the progeny to revert to parental types. In practice, they have proved to be of no advantage whatever for general application."

William S. Harwood, in a second "Authoritative Account of Luther Burbank's Unique Work in Creating New Forms of Plant Life," in *The Century Illustrated Monthly Magazine*, April 1905, says:—

"Take merely for one illustration among the many which might be brought forward, the results which have been noticed in the breeding of the Walnut-tree. Here the laws of Mendel were absolutely disproved at every point. The new trees followed no known laws. 'Dominance' and 'recession' were absolutely inoperative factors."

In the present state of our knowledge, Mendel's laws do not appear to have any practical application to the stock-breeding industry.

CHAPTER II

WILD WHITE CATTLE

Aboriginal Cattle of Great Britain—*Bos urus* or *primigenius*—*Bos longifrons*—Relationship of *Bos urus* to Wild Park Cattle—Authorities quoted: Storer, Harting, Low, Boyd Dawkins, McKenny Hughes, T. A. Smith, Robert Knox, Sir Chas. Lyell, and Rütimeyer—The Breeds at Chillingham Park, Hamilton or Cadzow Park, Chartley and Woburn Parks, Vaynol Park, and the Crosses in the Zoological Society's Gardens, London.

THE **Aboriginal Cattle**[1] **of Great Britain**, in common with those of the continent of Europe, belonged to a colossal ox, the *Bos urus* of Cæsar, or, to use the more recent and more common name, the *Bos primigenius*. Although it is generally accepted that the original colour of cattle was black or mouse-brown, or a combination of these, with a lighter shade forming a stripe along the back, it is as generally believed that the colour of the wild forest cattle of Great Britain was white, with black or brown (red) points, such as may be seen in the more or less degenerate representatives of the species in the parks of Chillingham, Hamilton, Chartley, and Vaynol—the only places in the United Kingdom, with the exception of Woburn Park (to which a remnant of the Chartley herd was removed in 1905) and the Zoological Society's Gardens in London, where pure wild cattle exist. The latter sprang from a Chartley bull and a Vaynol Park cow. Whatever may have been the origin of the white hair and skin, the frequent appearance of black or dark

[1] See *The Wild White Cattle of Great Britain*, by the Rev. John Storer, Cassell & Co.; Part II. of *British Animals Extinct within Historic Times, with some Account of British Wild White Cattle*, by James Edmund Harting, Trübner & Co.; the "Report of the Committee [of ten scientific men] appointed by the British Association to report on the Herds of Wild White Cattle in Great Britain," *The Zoologist*, vol. xi., November 1887.

red-brown calves in white herds many years after animals of dark colours had been shut out from breeding with them probably indicates a connecting link between the more ancient dark and the modern white. The white of the wild cattle has no resemblance to the white of an albino—the dark points, which are universal, being incompatible with albinism.

Storer says:—"The universal colour was **white,** in general pure, approximating, however, in a few instances, to **cream-colour**, but with certain points otherwise coloured, and these points generally black. The tips of the horns, the muzzle, the circle round the eyes, the hoofs, were in all the herds black; in some the extremity of the tail (the switch or brush) was of the same colour; while the ears in all were either black or brownish-red inside, and wholly or partially of the same colour outside the ear also. In most of them the front part of the fetlock, particularly of the forelegs, was marked with black, and in all there were a few black hairs on the legs, a little above the hoof. In all of them, too, there was, I believe, a tendency, more or less slight, to produce small black or bluish-black spots on the neck, and even sometimes on the body (producing a 'flea-bitten' appearance). All were subject to occasional variations. Individuals were born, though somewhat rarely, with more than the average amount of white on the horns, ears, above the eyes, on the muzzle and hoofs, or on some of these parts; and in some, black or black-and-white calves now and then appeared; but these last were always destroyed when young, in order to preserve the original characteristics of the herd."

The only recorded possible exception is that of the wild **herd at Leigh Court** in Somerset, near Bristol, which were destroyed in 1806, "because they had become so wild the owner was obliged to have them shot." They were said to be "fawn, tending to yellow; very red towards the flanks horns tipped with black; hoofs black; inside of the ear red." The author of another account was equally persuaded that they were white, while Storer thought probably both accounts were correct, and that "the cattle dated back to monastic times, and varied from a white colour to a light dun—the variation being possibly produced by some cross," and if so, the cross might possibly have been from the red breed which originated the Devon cattle of the neighbourhood.

In his pristine form the *Bos taurus*, the wild bull of the primeval European forests, approached to the size of an

elephant, as may be gathered from the enormous dimensions of a considerable variety of prehistoric skulls and other remains dug up from time to time in many parts of the United Kingdom, but not in Ireland.

A collection of sixteen great skulls, not included in Harting's comprehensive list (1880), is now in the Harris Museum, Preston. It is a portion of an important find of remains (mostly antlers of red deer) made while excavating a dock near Preston (1884 to 1892).

Plate IV. (*a*), of a characteristic Scottish specimen, shows the sweep of the horns (which was round) and a part of the concave forehead. The girth of the horn core close to the root is here $13\frac{7}{8}$ inches, while, with hardly an exception, the English specimens in the British Museum girth 17 to 18 inches. This is an indication either that the wild bull of the North was smaller than that of the South, or, more probably, that the remains belonged to a later period, when the species had degenerated and decreased in size, having taken a step nearer the more modern progenitors of the wild white cattle.

Another distinct species, the *Bos longifrons*, has been misleadingly called the "Celtic Shorthorn." In almost every characteristic, except that of the length of horn, it differed from the modern animal to which the appellation is attached. It possessed a small and slender form, and hair of a dark colour. It is found to be the only domesticated bovine animal before and up to the date of the Roman Conquest, when Cæsar reported the "number of cattle great." Its descendants are now to be seen, after crossing to a greater or less extent with the *Bos urus*, in the smaller British and Irish breeds, for example, the Devon and the Kerry. Its remains are numerous in Ireland, in the English fens, and other places, always indicating domestication.

Storer says of it:—"The forehead, somewhat flat, has a very prominent ridge standing up along the middle, and a smaller, indenting backwards; the horns are much flattened and compressed, small, and directed outwardly upwards, and bent in one direction forwards. From the slender make of its bones, its body must rather have resembled that of a deer than our common tame ox; its legs at the extremities are certainly shorter and also thinner than those of a *crown* deer (full-antlered stag). The skull is long and narrow, even more so than that of a deer. The rest of the skeleton is much like

that of the tame ox, but each bone, in proportion to the length, more slender and thin."

A black race of semi-wild cattle, believed to be *longifrons*, at one time existed in Cornwall.

There is a strong presumption that the **ancient forest cattle,** the descendants of the *Bos urus*, were the immediate progenitors of the wild park cattle of the present time, and also of the many herds which in comparatively recent years existed in various parts of the United Kingdom.

The herd at Burton Constable in Yorkshire, which Bewick records to have been extinct a few years before 1790, were much larger than the Chillingham cattle, "many of them weighing 60 stones." And the extinct **Lyme Park cattle**, Cheshire, were reported to be

"larger than any breed of cattle now existing in the country; higher on the legs, more upstanding, and longer in the body —very large cattle, with strong bones, much substance, and a large amount of flesh about the neck and dewlap. They had abundance of long, rough hair, which in the male was very fully developed, curly and mane-like on the head and fore-quarters; and the hide was of immense thickness. They were very grand and symmetrical in appearance, and their movements were distinguished by a peculiar majestic stateliness."

This description gives a very credible picture of what might very well be the direct descendant of the gigantic wild white bull of Cæsar's time, and of the monstrous bovine wonders of the palæolithic and neolithic ages, when, as we have ample evidence to show, *Bos urus* was contemporary with man, though not as a domestic animal.

What appears to be, from internal evidence, a most reliable notice of the appearance and character of the great Caledonian Forest bull about the time of his disappearance from the open forests of the North is **Bishop Leslie's description** quoted in Robertson's *History of Scotland*:—

"In Caledonia there was formerly common, but now more rare, a kind of forest bull, which, of the purest white in colour, carries a mane, thick and hanging down, like that of a lion. It is fierce and savage, abhors the human race; and anything that man has either touched or breathed upon, for many days it altogether avoids.[1] Besides this, so great was the audacity of

[1] Chartley cows are reported by their keeper to desert their calves if these are handled immediately after being dropped.

this bull, that not only would it when irritated madly overthrow horsemen, but even when provoked ever so little, it would attack all men promiscuously, both with horns and hoofs, and it would utterly despise the attacks of our dogs, which are of the most ferocious kind. Its flesh is cartilaginous, but of the sweetest flavour. It was formerly common throughout that most vast Caledonian Wood, but, destroyed by man's gluttony, it remains in three places only: Stirling, Cumbernauld, and Kincardine."

The Forest of Torwood connected the Royal Forest of Stirling with the Cumbernauld Forest. Strangely, no mention is made of Hamilton, where alone the white cattle now survive in Scotland, but they were there confined in a royal chase not in, but on the borders of, the Caledonian Forest.

As population increased and encroached upon the vast forests that covered the surface of the country, the numbers of wild cattle declined with those of wild beasts generally, and, to preserve them from extinction, the crown, the great lords, and the monastic bodies **enclosed** and protected the decreasing remainder. The small numbers and the confinement within restricted areas subjected them to an undue amount of in-and-in breeding, and the large majority of the herds in question "have bred themselves out" and disappeared; while in those that remain, by diminished size, refined bone, and in some instances a tendency to barrenness, show that whatever the cattle may have gained by protective measures they have also suffered from close consanguineous breeding.

Storer has produced ample evidence to prove that the few herds that survive most probably owe their existence to the **introduction of fresh blood,** carried on systematically for many years, after they were confined, in conformity with the general belief of all high authorities on breeding before Bakewell's time that in-breeding was wholly detrimental. At one time common cows were freely admitted to the wild bulls of both the Chillingham and the Chartley herds, and it is supposed to have been from the first crosses born of those animals that bulls were selected, as they generally possessed the colour and type of the wild sires. Some of the first cross females were excellent milkers.

Harting refers to twenty-two herds which are believed to have been enclosed at various dates by royal assent or charters from the herds of "wild beasts." **Storer** also gives

a list of "localities where wild white cattle or their domesticated descendants are proved to have existed." Forty are named, including the enclosures.

The **Forest Laws** enacted by William the Conqueror (1087) were very severe, and the wild animals were safe from disturbance. The punishment for killing the big game which formed the objects of the "chase" was to "have both eyes torn out." When in 1225, under Henry III., many of the previous forest areas were removed from the protection of the forest laws, the wild game of all kinds became the prey of the country people, and liable to extinction within a few years. About this time the Chartley and, probably, other herds were shut into well-fenced parks to live in a state of nature. They were there free from outside interference, for heavy penalties, including three years' imprisonment, were incurred for trespass. The forests of Scotland and the north of England, especially in hilly regions, formed the last resorts of the wild cattle of the country; and we consequently find the **enclosed herds** most numerously represented in the northern regions. Five herds were thus secured in Scotland and five in the county of Durham, two in Lancashire, two in Cheshire, and one in each of the counties of Cumberland, Northumberland, Northampton, Nottingham, Staffordshire, Oxford, and Somerset. There is little doubt that all were drawn from one original common stock, although local characteristics may have crept in even before the animals were enclosed. They had one common feature, in being, so far as is known, white with dark points. Nearly all had black ears and muzzles, brown or red being the exception.

Extreme **in-and-in breeding** was the universal rule latterly, if not at first, and the disappearance of the majority of the herds may be mainly traced to the weakened constitutions thus produced, though at times some untoward circumstance tending suddenly to reduce the numbers also came into play. The herds at Auchencruive in Ayrshire, and Leigh Court, Somerset, were destroyed owing to the animals becoming dangerous or troublesome. Some were exterminated during political troubles, and others, like those of Drumlanrig and Blair Atholl, were removed to other places. If tradition be correct, both these latter herds are represented in the still living remnants of the breed. The majority had horns

which varied extremely in length, in form and in set, at least among those that are left or of which there are records. No less than **five original enclosed herds had no horns**—those at Ardrossan and Cadzow in Scotland, Whalley in Lancashire, Somerford Park, Cheshire, and Wollaton Park, Nottingham. What remain of the progeny of the polled herds are all domesticated, and are cattle of good milking tendencies, but all have had other (domesticated) blood introduced.

No white wild **herd** was originally **enclosed in** any park in the **Principality of Wales,** but probably the **Welsh prototype** of the Scottish and English forest breed was **domesticated** instead, as it is recorded that "four hundred cows and a bull, all white with red ears," were sent from Brecknockshire to the court of King John as a peace offering. In consideration of the distance to be travelled, it is highly improbable that these were wild animals, impossible to control; and this conclusion is confirmed by the fact of the frequent appearance among Pembrokeshire cattle of white calves with black ears, bearing a very strong family likeness to the Chartley cattle. The Lamphey Court herd (Plate IX. [*a*]) has been developed from these reversions to a parent type.

Low confirms the view above adopted, that the origin of the wild white cattle was the remnant of the *Bos urus* which lingered in the 400 miles of primeval forest covering the north of England and Scotland. He says:—

"We have all the evidence which the question admits of, that no real distinction exists between the wild oxen of the parks and those which have for ages been subjected to domestication in the same country; and that these wild oxen are no other than the *uri* of the ancient forests of Europe."

Professor Boyd Dawkins[1] takes another view, against which there is a vast amount of negative evidence. He states that the sole aboriginal race of domesticated British cattle was the tiny, slender, dark-coloured, short-horned animal, *longifrons*, which "came from Central Asia by gradual migrations as a domesticated race." And he declares that the large long-horned race was introduced at the time of the English invasion, and that its early wild prototype had become extinct before the termination of the Bronze Age;

[1] *Transactions of the North Staffordshire Field Club* for 1898-9, vol. xxxiii.



A. Skull and Horn Cores of the *Bos urus* or *primigenius*.
In the Grierson Museum, Thornhill, Dumfriesshire. Width of skull below the horns, 12 inches; width of the crown, 8¾ inches; length of horn cores, 27 inches; girth close to the skull, 13½ inches.



B. Cows and Calves of the Wild White Breed in Cadzow Park.
The property of His Grace the Duke of Hamilton.
[*C. Reid, Wishaw.*



Wild White Cattle in Cadzow Park before the Introduction of Chillingham Blood.
The property of His Grace the Duke of Hamilton

consequently, the ancestors of the wild white cattle must have broken away from civilisation. In addition to the arguments which have been advanced against this view, it may be said that, had the wild cattle originated through animals escaping from domestication, they would certainly not all have been white in so many centres at such great distances apart; some of the numerous varieties of coloured cattle would surely have become established somewhere. That many coloured cattle escaped in an unfenced country and joined the wild herds in the woods before they were enclosed in parks is certain, but, weakened for "rustling" by domestication, no more of them would survive than would be easily absorbed by a great preponderating volume of wild blood. The occurrence (from time to time) in the semi-wild park herds of black, dun, blue, and sable specimens may be fully explained by the admixture of the blood of animals which escaped from domestication, if indeed they do not indicate what has been claimed repeatedly, that the original colour of the wild cattle was not white, but dark for protective purposes. It is inconceivable that protective colouring could be of any real value to the powerful animals which dominated all rivals in their forest haunts, especially in view of the fact, gathered from observation of the habits of the Chillingham cattle, that the calves following their mothers join the main herd very soon after birth.

If the reduced size and osteological differences on which Dawkins partially founds his opinion were realised on the continent of Europe as a result of evolution from the original gigantic ox, in the case of the cattle which he supposes to have been brought to this country and permitted to run wild, why could similar changes not have occurred here among the local representatives of the race? They were much more likely to alter in form and character than to become extinct under the conditions that prevailed, which, if Storer be correct, led through degeneration to diminished size.[1]

Professor T. M'Kenny Hughes[2] takes a similar view to

[1] Important light is thrown on this debatable question by a find at Stone of the bones and skulls of the *urus*, described by W. Wells Bladen (President) to the North Staffordshire Naturalists' Field Club, 20th Nov. 1895, and recorded in vol. xxx. of its *Transactions* (1895-6).

[2] In the *Proc. Soc. Ant.*, London, 14th June 1894, and in the *Journal of the Royal Agric. Soc. of England*, Sept. 1894.

that of Boyd Dawkins, also on negative rather than positive evidence. He says :—

"There is no record of the *urus* being found in Great Britain associated with Roman objects or any remains that would show that it lived on later, at any rate, than the Bronze Age. . . . The *Bos longifrons* or *brachyceros*, a small ox about the size of a Kerry cow, with small horns sharply curved forward and a considerably elevated ridge between them, was the ox which the Romans found in Britain. Their middens are full of its bones."

It was most natural that the middens should contain the bones of the domesticated breed, but neither that fact nor the failure to find remains of the ancient wild cattle associated with traces of human existence so as to fix the period of their deposition can discredit the belief in the possibility of the existence of the wild cattle in the forest-clad mountain fastnesses of Scotland, which were never under Roman control.

Professor Hughes says of the skull of the *urus* :—

"The forehead is flat or slightly concave, and the horn-cores bend first out, then forward and downward, and finally the points approach one another with an upward curve. One measured 36 inches in length."

He holds that the Romans introduced a new breed which modified the small Celtic Shorthorn, and produced some at least of the ancestors of the wild and of the domesticated breeds of later times ; but the argument, based largely on the evidence of Roman coins and on the size (relative length) of the skull and the shape of the horn, is not conclusive to the practical breeder of cattle. As great differences in the length of the face and in the shape of the horn as those which he indicates, and on which he founds his argument, have occurred within the Ayrshire breed within the short space of the last century. The assertion that "in form, the Chillingham and the Highland cattle can hardly be distinguished," is so far from being correct that it alone is sufficient to shake the confidence of those who are unable of their own knowledge to judge of the more subtle and scientific part of the reasoning.

The suggestion he made in *The Times* of 3rd December 1904, that the white of the wild cattle may have originated from domesticated albinos being let loose among them, is equally irrelevant, as no such thing as an albino appears in

any of the remaining white breeds, and we have found no reference to that unmistakable condition in the history of any one of them.

The idea that the Romans introduced the progenitors of the white cattle is not new, for **Dr Robert Knox, the Anatomist**, speculates vaguely on the subject in the *Proceedings of the Royal Society of Edinburgh*, 2nd April 1838, and doubts their aboriginal character, "since they are not found in Ireland."

On the other side, **Dr J. A. Smith**, "the learned Vice-President of the Society of Antiquaries of Scotland," thinks "the *urus* may perhaps be considered to have still existed from the sixth to the ninth century." If so, why not till a later period, in the form of the wild white cattle of the country?

There is no sound foundation for the belief in the **untamable nature** of the wild cattle. Sir Charles Lyell, in his *Antiquity of Man*, says:—

"Professor Rütimeyer of Basle has shown that among the remains of *wild* animals dredged up from the ancient Swiss dwellings, there are those of the wild bull." It is also "beyond question that, towards the close of the Stone and beginning of the Bronze period, the lake dwellers had succeeded in taming that formidable brute the *Bos primigenius*. . . . In a tame state its bones were somewhat less massive and heavy and its horns somewhat smaller than in wild individuals."

Several specimens of at least three of the existing breeds, being handled quite young, have been successfully tamed and domesticated.

Tame domesticated white cattle, strongly resembling the wild breed, existed from very early times in a few localities in England, but mostly south of the Trent.

The wild cattle in Chillingham Park,[1] near Belford, in the wildest and most beautiful part of Northumberland, the property of the Earl of Tankerville, are said to be the

[1] Brought into public notice, first by Bewick's celebrated engraving, and subsequently by Landseer's famous picture of "The Death of the Bull." A description of the hunt, which ended in the death of the subject of the picture, together with many valuable details of the Chillingham herds, may be found in an interesting *brochure* by the Earl of Tankerville, *The Chillingham Wild Cattle: Reminiscences of Life in the Highlands*, 1891, printed at the *Surrey Comet* office.

most characteristic descendants of the forest breed,[1] though they differ only in minor points of detail from those in Hamilton Park. Storer expresses the strong opinion that these cattle were not so persistently **in-and-in bred** for hundreds of years as is usually supposed; but that until not very long ago fresh blood was brought from other herds, and that in this way their existence has been prolonged. Dr Ramage, in *Drumlanrig and the Douglases* (1876), quite unintentionally confirms this view by stating "there is a tradition that about 100 years ago the whole stock" (meaning the Drumlanrig herd of white cattle) "was sold and driven off to Chillingham." Hindmarsh gives the date as 1780, but does not record their destination. One of the visible indications of the close-breeding which has nevertheless taken place in this herd is the presence in certain animals of a "washed out" appearance, and of a rash or scurf on the skin. A tendency to barrenness points to the same cause. The annual increase of the breed is about one in five, but the rate is low, partly owing to the trampling of a good many young calves by the herd stampeding on the slightest provocation. It has recently been noticed that some cows live to a great age, one which died in December 1891 being eighteen years old; although the average age of the wild cattle generally is less than of those under domestication. At one period the bulls possessed a mane which developed with maturity but decreased with old age. It has been noticed that the tendency to show black or blue spots on the skin, especially about the neck and head (to a greater degree in the other three herds than among the Chillingham cattle), increases with age.[2] There is also less tendency to produce black or other off-coloured calves. The skins are thin, another result of close in-breeding, and under the white hair they are white in colour, and thus differ in a most important characteristic from the dark-skinned and white-haired animals belonging to

[1] Rütimeyer in *Domestic Cattle of the Ancients*, says of the Chillingham breed (after examining the bones from the Swiss lake dwellings, and comparing them with the skeletons of cattle of the present day), it is "the purest type that he has found of the original Bos."

[2] A possible parallel to this is to be noticed in the dark spots which develop on the ears of Border Leicester ewes as they grow old. But it may be that, owing to the hair becoming thinner, black spots on the hide appear or show more distinctly.

the Zebu race or humped cattle of India—the *Bos Indicus*—the skins of which are mostly jet black, though some coloured varieties are of a yellowish or nut-brown colour.

Storer says:—"The tongues of the Chillingham cattle are slate-coloured above, and of a reddish-brown colour on the under side; the teats of the cows, unlike those at Chartley, are white; and, although the muzzle is black, *the under lip* is white." And again: "Besides the red ears ('inside and about one-third of the outside from the tip downwards'), a faint line of red hair exists, as if drawn by a pencil, immediately above the dark and hairless muzzle." ["Formerly they had a very strong predisposition to have red or black ears indifferently; and the uniformly red ear which has of late years prevailed is solely the result of selection, the black-eared ones (as all others improperly coloured), having been destroyed."] Quoting from Lord Tankerville, he adds: "In form they are beautifully shaped. They have short legs, straight back, horns of a very fine texture, thin skin [coat of hair], so that some of the bulls appear of a cream colour; and they have a peculiar cry, more like that of a wild beast than that of ordinary cattle."

In 1891 Lord Tankerville wrote:—"These peculiarities of colour and markings are very uniform and distinctive in the wild herd. They are pure white when first calved and licked clean by their mothers, but become of a more creamy white colour afterwards. The horns are white, with black tips; the hoofs and noses are black; the eyes are fringed with long eyelashes, which give them depth of character; their bodies are symmetrically formed; and their fine shoulders enable them to trot like match horses with amazing rapidity."

The herd has been well and graphically termed **"an absolute Monarchy"** under the tyrannical and forceful rule of the "King bull," who, in virtue of his superior strength and vigour, holds office usually for a few (two or three) years, or, in other words, till he is challenged and, sooner or later, overthrown by a younger rival in a fierce encounter. These deposed monarchs often lead a solitary life afterwards, and, becoming ill-natured with age and adversity, are dangerous to encounter. As males and females roam uncontrolled, the cows calve at all periods of the year, and naturally most frequently in January and February. Twins are unknown. A calf lies concealed like a fawn for two or three days in a secluded place, where the watchful mother, leaving the others, visits it at intervals to suckle it. When it is strong enough to

follow, it joins the herd with its mother—a practice which, once a source of safety against predatory enemies in the forest, is a danger to the young under existing conditions. Superfluous males are castrated at three years, and shot like old bulls at six or eight years old.

The **average weight** of the cattle killed between 1862 and 1889 was: for bulls, 560 lbs.; for cows, 420 lbs.; and for steers, 570 lbs.; and the flesh was of specially fine flavour and quality—the lean muscle being mixed or marbled with fat. The proportion of offal to carcase was remarkably small.

The cattle are wild and timid, concealing themselves among the elms and natural wood of the park, and they try to escape from the presence of man when they find themselves under observation. They are, however, extremely ferocious and dangerous at close quarters and at bay. During winter, when they are fed on natural hay which is conveyed to them in a cart, the keepers can, under its protection, approach and observe the animals closely. Their instincts are essentially those of wild animals. Their keenness of scent and the habit they possess of hiding their young for a few days after birth are good illustrations of the fact. Domesticated cattle which have recently been reclaimed from the wild condition, such as West Highlanders and members of the South Wales breed, have retained this instinctive habit for generations.

The number of the pure herd has dwindled from 80 in 1838, to 73 in 1890, 66 in 1892, and 58 in 1903-4. Probably one reason why the breed still survives and maintains its uniformity is that it was not, like other wild herds, seriously reduced in number by the last rinderpest outbreak in 1866.

Experiments in crossing some of the wild cattle with pure-bred Shorthorns were begun in 1875. At first a wild bull was mated with two high-bred Shorthorn heifers, but, owing to the failure of the first female cross to breed, all subsequent crossing has been between wild females and Shorthorn bulls. A steer resulting from the latter union was exhibited at Smithfield in 1888, and was placed third in a good cross-bred class. He was sold at £65 when within six weeks of four years old, his live-weight being 16 cwts. 2 qrs. 24 lbs.; his dead-weight, 87 st. 10 lbs.; loose tallow, 11 st. 4 lbs.; and hide (very thin), 6 st. 4 lbs. He received no food but grass till within three or four months of the time he was exhibited.

In 1889 another cross-bred steer, three years and eight months old, gained the third prize in his class at Smithfield. He weighed 18 cwts. 2 qrs. 5 lbs., and his dressed carcase scaled 96 stones. The beef of both animals was pronounced to be of exceptionally good quality. Lord Tankerville says that:—

"The practical results which have been obtained by blending the blood of the wild cattle with high-bred Shorthorns has been, in both the first and second crosses, to materially improve the shape of the animal, and particularly to develop the loins and most valuable beef-producing parts, as well as to increase the size and weight. In addition to this, an increased aptitude to fatten and to attain early maturity is very pronounced. These are the qualities transmitted by the Shorthorn, while the contribution of the wild parent is seen in increased vigour and constitution, with lightness of bone, together with improved gait, which is due to the finely laid shoulders of the wild animal. The colour may be said to be unchanged, with the exception of the nose and ears. In the former the black has given place to the flesh-colour or mottle, whilst the latter shows a broader fringe of red."

The foregoing note was penned before 1903.[1] After that time the mating of the female crosses with pedigree Shorthorn bulls went on until in 1905 the female Shorthorn herd on the wild foundation numbered 13, but some have since been sold for killing. The fifth cross by the pure Shorthorn bull had then been reached, and soon after the beginning of the century entries had been made of females in Coates's Herd Book. The wild bull had not been used on the cross-bred females. The males were steered and killed fat off the grass at eighteen to twenty months old, and no more house-feeding experiments had been conducted. The two best steers sold in 1903, under two years, weighed 56 st. 2 lbs. and 48 st. 8 lbs., and sold at 8s. 9d. per stone of 14 lbs. (clean carcase). The Shorthorn crosses retain their white colour and hardiness, but have assumed the Shorthorn shape, and the noses are gradually becoming clear of the early staining or mottling.

The Hamilton cattle in Cadzow Park[2] numbered 44 in the spring of 1889, and 38 (22 cows, 11 bulls, and 5 one-year-

[1] Indebtedness to J. Noble, Shipley (Farm), Alnwick (for twenty years, *i.e.*, till 1903, bailiff at Chillingham), for recent information is acknowledged.

[2] Cadzow Park (about 200 acres) is on the outskirts of what was once the great forest of Caledonia, where Bruce in 1320 and James VI. in 1500

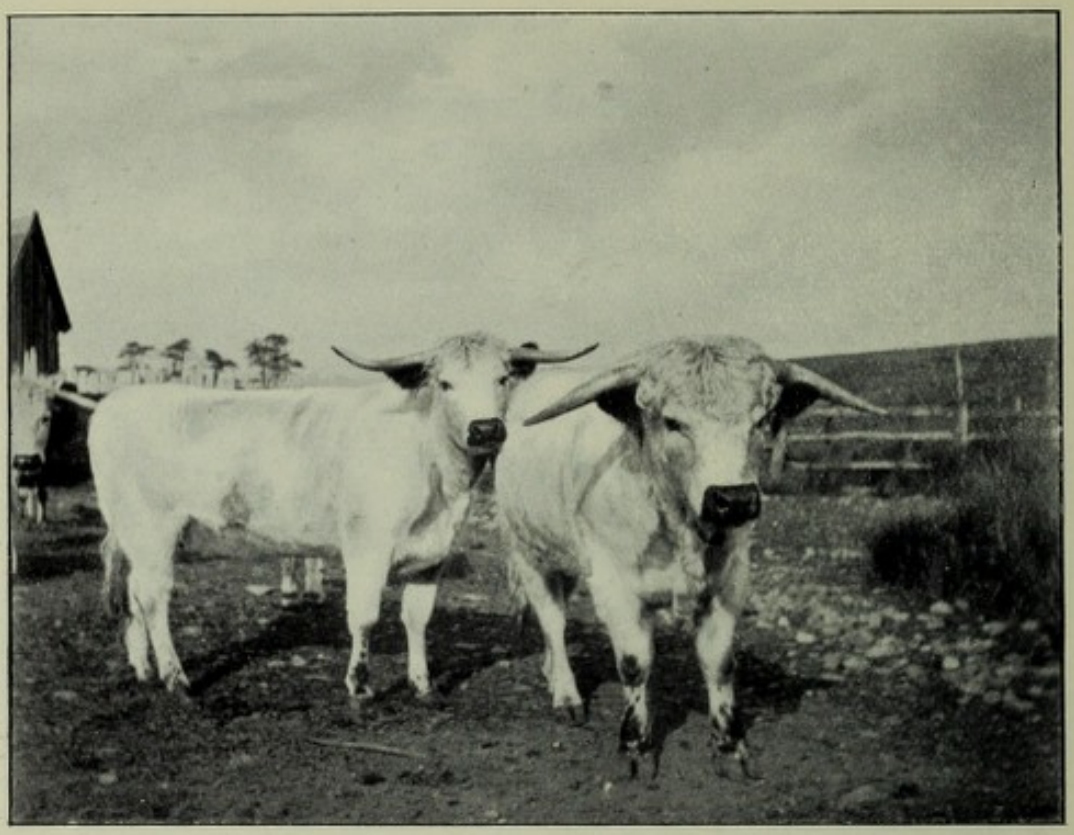
old queys) in June 1892. They are less timid than they were a generation ago, and are not nearly so shy as those at Chillingham; nevertheless, they cannot safely be driven from one place to another, but have to be trapped within a narrow space shut off by folding gates when they require to be moved. When seriously disturbed they at one time showed nervous excitement by passing fæces of an abnormally liquid character, and, if the cows were suckling calves, by the illness or death of a number of the calves, due to the poisonous milk produced under the influence of fear.

When the animals are shot, the carcases dress to about the same weight as those at Chillingham, both being smaller than an average specimen of the Ayrshire breed. The smaller-sized cows, killed in their natural condition after breeding, weigh as little as 16 stones.

In contrasting the two breeds, it is found that the Hamilton cattle, as compared with those at Chillingham, stand higher on their legs; their faces are longer and narrower; their horns are lower set on the head, and mostly inclined downwards through a part of the length, lessening the space between the ear and the horn; and the hair on the body of adults is purer white, or less creamy. The jet-black tips of the horns, the dark eyes and black eyelashes, the black tongue, roof of mouth, and muzzle, the surrounding ring of black hair, and the black knee-caps, hoofs, and stockings almost reaching the knee in front, give a more definitely marked appearance to the animals than the less prominent and less varied and extensive red-brown points of the Chillingham breed. It is well authenticated that till quite recently (1842) the Hamilton cattle were without horns. Youatt's book on "cattle" refers to them as "The Polled Cattle," and Dr Robert Knox says:—

"They seem to him to bear the strongest resemblance to the Galloway breed, and the cranium of the wild ox of Hamilton differs very much from that of most domestic oxen, particularly in the breadth of the forehead, shortness of the nasal bones, and configuration of the interior of the nostrils. Many of the bulls have horns, whilst others are polled."

hunted the wild bull. Its primæval oak trees, well past maturity, are shrinking, dying, and falling to decay, all the more quickly because of the pollution of the atmosphere with smoke and fumes from chimney stacks of the western Scottish coal and iron district.



A. Wild White Bull and Heifer, Chartley Park.



B. Wild White Cattle, Chartley Park.
From the *Transactions* of the N. Staff. Field Club, by permission.

[*Photos by Rev. C. F. L. Barnwell.*







WILD WHITE CATTLE, CHARTLEY PARK.
Sold to the Duke of Bedford by Earl Ferrers in 1905.
The Bull and the Cow guarding the dead Calf were subsequently secured by Col. Congreve, and retained at Chartley.

[*Photos by Rev. C. F. L. Barnwell.*

[*pp.* 40 *and* 41

A complete skeleton of an excellent polled specimen of the breed, obtained from Dr Knox's collection, is preserved in the Anatomical Museum of Edinburgh University. One old servant, as recently as 1889, recollected that the late Duke Alexander would not allow any calves that tended to grow horns to be preserved. There is sufficient evidence indeed to show that the points and characteristics of the herds of wild cattle have been kept constant or altered to suit the wishes of individual owners by artificial selection, viz.,—by destroying those that did not conform to a certain standard. The uniformity in colour and the extent of the dark points have been regulated by this means. There is a tradition that a West Highland bull broke into the park, and that through his descendants, by selection, the cattle reacquired horns. Harting makes the statement with regard to the transition period that "the cows seldom have horns." The numbers were reduced to thirteen cows and a bull by the last epizootic outbreak of rinderpest. In breeding up the existing herd, it was impossible to kill off all animals with imperfect markings, so that in appearance the cattle became less uniform in type. The herd also suffered on account of closer in-and-in breeding, due to the reduction of the numbers. This is to be inferred from the low condition of its members during winter before the introduction of a Chillingham Park bull (Plate II.). The constitution in this instance suffered more in the matter of hardiness required to resist the inclemency of the weather than in the powers of breeding, as in 1888 no fewer than twenty-one cows out of a total of twenty-seven brought forth calves. The bulls are usually put to the cows in July, and the calves come in April. The calves are weaned when frost appears, and after Hallowe'en (October 31st) the herd is fed on the best of hay (50 tons being required for forty cattle); Swedish turnips are given for a time, and the bulky food is supplemented by a daily allowance of 3 lbs. of linseed cake for a full-grown animal. Feeding with hay has been practised for many years, but cake is a comparatively new addition to the rations.

On 23rd March 1901, the herd consisted of twenty-six cows, twelve bulls, five yearling queys, and seven newly-born calves. Eighteen calves were also expected. A bull is used only for three years; and, as a goodly number of spare bulls

is kept to guarantee no lack of sires, he is sometimes four years old before being put to breed. Fights of a savage character take place from time to time among the spare bulls, which are kept apart from the other cattle. Two animals died of injuries received in one of those mêlées which occurred in January 1904. Some old bulls have a good covering of curly or wavy hair on the forehead, the neck, and the front of the shoulders, like the Chillingham bull shot by His present Majesty when he was Prince of Wales, and the white Welsh bull in Plate XLIII. Blackleg is a scourge of the Cadzow Park herd—four one-year-olds having died in 1900. The wet spots that form when the roofs of old mine-workings underneath fall in cannot fail to be a source of undesirable germ and parasitic infection to the cattle. The application in 1897 of 130 tons of lime to a few acres of high dry land has, it is thought, tended to increase the strength of bone in the herd and make them healthier. The draining of the land and the destruction of the rabbits have also been beneficial.

Chillingham and Vaynol Crosses.—For the purpose of infusing new blood, a **Chillingham** bull was introduced at Hamilton in 1886, and put to a selected number of cows. The products of the cross showed points of great interest to breeders of stock. Of six calves, the first product of this connection, four were almost pure white. In place of the black or the red markings of their parents, they had extremely small fringes of coloured hairs,—not more than a quarter of an inch broad on the tips of the ears. These four animals were in consequence destroyed as unsatisfactory.[1] One of the two remaining had black points, and the other red points like the sire. In the following year, 1888, two well-marked bull calves were produced, and they immediately exercised a salutary influence on the herd. So successful was the result that in 1891 all the cows, nineteen in number, were put to a half-bred Chillingham bull. Fifteen calves were born of this union, but only six possessed the characteristic markings of the Hamilton breed. Of the remainder, eight were white, or nearly so, and one was all

[1] The defective udders (blind quarters), not uncommon in the herd, are due to inflammation resulting from "stocking" of the udders, as badly-marked calves are shot early in the season, when their mothers are in full milk.

black. The half-bred Chillingham bulls did not throw red markings in their progeny, and though one heifer calf came fourteen years later with red ears—all the intermediate parents having had black points—even she has bred well-marked calves. The crosses that appeared in 1893 indicated a marked development of constitutional vigour and hardiness. They showed a decided increase in size, and also in the amount and quality of hair, as compared with the pure-bred cattle. The faces were shorter, the foreheads broader, and the horns stronger and more upright.

A Vaynol Park bull was procured in 1896 to aid in the substitution of "line-breeding" for "in-and-in breeding," and a record of the herd is now kept in three sections—(1) the Hamilton-Chillingham, (2) the Hamilton-Vaynol, and (3) the multiple crosses resulting from a combination of the two. Six out of seven of the Vaynol Park crosses in 1904 were properly marked. The progeny of the Vaynol bull is more fleshy than the others—heavier behind and lighter in front than the old breed, which had a massive neck and shoulders. They have the reputation, also, of being quieter and of feeding more easily, although their disposition is more treacherous. Two barren heifers of the Vaynol Park cross were killed by a butcher in Hamilton at four and five years old. The beef was said to be the finest that had been seen in his shop for twenty years. This cross has a greater tendency to black spots on the body (both skin and hair) than the rest of the herd, only a few of which have black spots, generally obscured by white hair in winter. In October 1904 only three old cows remained of the original pure breed. The regenerated herd does not get so poor in condition in winter as the intensely in-bred cattle which preceded them, and the cows do not scour so badly on being excited. A crisis in the history of the herd has been got over without any trace of the occurrence of tuberculosis, and the original type, in form and colour markings, is being steadily worked up to.

There is little doubt that the step taken at Hamilton is one in the right direction, although the practice of killing off the badly-marked calves kept down the total number of the herd for some years. It may take longer again to breed up the true type of the cattle in respect of form than in respect of proper markings, but its achievement can be only

a matter of time and skill. There were two black calves dropped in 1904, and black-and-white, dun, and deep rich sable (but never red or brown) coloured calves often appeared before crossing was introduced. For some time before 1880 the average was three dark calves a year. The six heifer calves selected for keeping in 1903 were all well marked. They were the most typical lot seen since crossing had begun. Only one had Vaynol blood. Storer, after a careful study of the whole question of breeding, had excellent grounds for making the assertion, that "no wild herd, if imprisoned in a park, and interbred for several hundred years without a cross, could be in existence now."

In Chartley Park, near Uttoxeter, Staffordshire, there existed a wild breed, dating back for six and a half centuries to 1248-9, which till its sale in 1905 belonged to the Lords Ferrers. The herd numbered forty-one in 1852, and forty-three in 1893-5, although, before Storer wrote, reputed rarely to number thirty.

Under a charter of Henry III. permission was given to enclose a number of the wild white cattle ("Wild Beasts," as they have been called for 250 years) from the Royal Forest of Needwood in "the mighty large park" of over 900 acres—an elevated but broken tableland in a state of nature.[1] Much of it is wild waste, poor, light, sandy and shingly, as well as heavy clay and moory soil, growing bent and coarse grasses, bracken, and straggling Scotch firs, birch, and ancestral oak trees—the last, like the aged oaks at Cadzow, falling into decay.

The cattle have strong deep voices, and in form and general appearance they strongly resemble the Castle Martin variety of the black Welsh breed. The colour of skin and hair, including the udder and the brush or extremity, as well as the rest of the tail, is white. The upper side of the tongue and the teats are black, and so are the points corresponding to the points of the Hamilton cattle, but not quite so extended.

[1] *The Standard*, 5th April 1905, says :—"The enclosure of the cattle is believed to have taken place as the result of the passing of the Charta Forestæ (1225), which enacted that all lands afforested by Henry II., Richard I., and John, except the demesnes of the Crown, should be disafforested and freed from the various laws, so as to remit to former owners their rights."

Although more black or flea-bitten spots appear on the skin of the neck and shoulders when the hair is short, the summer spots and largest areas of black skin growing white hair are not so extensive as in the case of the Somerford cattle. Black is constant in the markings, and red is never seen. Some cows show a yellow tinge in the bare skin behind, which in the Ayrshire breed is indicative of superior milking qualities. The horns, which are long and white, with brown or black tips, descend in the manner of the horns of the South Wales breed. From the crown between the horns hangs down a top-knot.

Storer (edited) says :—" The lower part of the face is sleek and free from long hair, but on the top of the poll, reaching equally in all directions, and in front coming down nearly to the eyes, is a large, round, raised, spreading mass of long white hair, common to both males and females, and giving the faces a singularly demure, owl-like look."

Storer strongly expressed the view that the Chartley cattle were in reality the progenitors of the Longhorn breed, which were the common cattle of Derbyshire and Staffordshire less than 100 years ago. There may have been some features of resemblance, especially if Storer be correct in holding that the wild herds took in new vigour and an extended lease of existence from time to time by admitting selected crosses of their own blood with the cattle in their immediate surroundings. It will be seen by reference to the accompanying plates that any very striking resemblance has now passed away. John Thornton's description, written in 1874, at the time when Storer's opinion was formed, shows that it was rather extreme. Referring to some Longhorn heifers he had seen, Thornton wrote :—

" There was some similarity to the Chartley cattle ; there were, however, no animals at Chartley with the horns strongly curved backwards and downwards, as was the case with some of the brown and brindled Longhorns. I should call the Chartley cattle, as compared with Shorthorns, of good medium size. Some of the cows had the appearance of good milkers. The body is well-formed, on well-set short legs, the top and under lines being nearly parallel ; ribs fairly sprung, and reaching close to the hip-bone ; shoulders nicely laid into the back, with good breast and fore quarters ; fore-legs short, with large broad arm, but very fine below the knee ; loin good,

hips not very prominent; hind quarters long, with tail square behind, at nearly right angles to the back-bone, but from the hips to the "touch" slightly drooping. The thighs were rather light, but the flank good; neck slightly lower than the body. The bulls were deeper in the body, and perhaps shorter in the leg; but the head was still more strikingly different. The cows' heads were very long—the bulls' short, with a very broad forehead, almost triangular. The chin of the bull was thick, and there was a great deal of loose skin about the throat, neck, and dewlap. The different character of the male and the female is very striking. On the whole it would seem that these were a breed of Longhorn cattle with almost Shorthorn shapes. Although other breeds of cattle may have been brought to a state of earlier maturity, little or no improvement in conformation and symmetry has been made in them."

Low's opinion is also suggestive when he says "that the wild white Forest breed, though reared for ages in parks in the west of England and Scotland, never assumes the characters of the Longhorned race."

The cattle resemble those at Hamilton in not being so wild as the cattle at Chillingham; yet they refuse to be driven.

Till near the close of the nineteenth century the animals exceeded those of both the Northern breeds in size and substance, conspicuously in the weight of their fore quarters, but about that time they decreased rapidly in size and in constitutional vigour, as a result of intense consanguineous breeding, increasing in power for evil with decreasing numbers of animals. One fatal result is the serious loss of numbers by death from miliary tubercle since the closing years of the nineteenth century. Practically all the animals slaughtered have exhibited what butchers term "grapes"—the lungs appearing as if they had been peppered with yellow rice, and the unnatural growths also extending to the web-fat (great omentum) enveloping the bowels.

W. Carless, the veterinary surgeon from Stafford, who was in attendance during the last four years at Chartley Park, was summoned also in the seventies, when several animals died. In a letter to the Author, dated 5th February 1905 (indebtedness to which is acknowledged for the following technical information), he reports "that post-mortem examination then revealed tuberculosis." Those visibly affected were slaughtered,

and some acres of the park were drained to improve the pasture. The herd recovered and increased in number for a time. After more than twenty years a similar but more serious collapse occurred in 1901, when the numbers were reduced to twenty-four—a figure still further diminished to seven in May 1905, when all but a bull and cow were removed, on their purchase by the Duke of Bedford, to Woburn Park.[1] Isolation at birth and foster-mothers were tried, but the inherent wildness of the creatures even at this early stage was not overcome, and the effort failed. It is the opinion of this expert that tuberculosis was introduced into the wild herd, probably years before symptoms of disease were noticed, by "ley" cattle (for temporary grazing) admitted into the park, or by contaminated hay either bought from tenants for winter food, or grown in the park on land on which diseased ley cattle had recently grazed. Their herding together in or near the shelter sheds while consuming hay in winter provided ample opportunity for the spread of the disease, especially among cattle in poor condition suffering from constitutional weakness due to extreme consanguineous breeding. The cattle have for many years been fed during winter on meadow hay cut from the park, and about 1½ lb. of cake daily has been recently added. Since coming into close contact with the attendants they have been quite docile with them, except when with young calves; but several cows show suspicion of strangers, and clearly indicate that it would not be safe for anyone but a keeper to approach near, even at feeding time, when they are quietest. As the bulls have been shut out of the herd, the majority of the calves have come at a suitable time in spring. Few cases of abortion have occurred. Heifers usually breed when about two years old. The only barren cow in the autumn of 1904 (which took but would not stand to the bull) was lame, and showed strong indications of degeneration and weakness from close breeding and, no doubt, also tuberculosis.

Black (never black-and-white) calves are not infrequently dropped by cows of this breed; but with the exception of one female born in March 1892 (which gave birth to a beautifully

[1] On 8th December 1904, they were offered at auction by Walton & Lea in London—upset price, £1000. As only one bid of £100 was made, they were withdrawn, and subsequently sold privately.

marked white bull calf in 1904, and a black bull calf in 1905), they have been regularly destroyed, to preserve the characteristic colour markings. The black heifer (not distinguishable from one of the black South Wales breed) has a white udder and spotted teats. A local legend, which holds that the advent of a black calf in the herd prognosticates an impending disaster to the House of Ferrers, led to the chronicling of the appearance of one such off-coloured animal in 1266 and another in 1321, which, with others referred to above, are to all appearance striking and interesting cases of atavism. The parental instincts of a cow are strong while the calf is young, yet calves that have been handled by man are liable to be deserted by their mothers. After a few weeks a cow will permit any calf in the herd to suck her; a fact which is specially interesting, because domestic cattle rarely allow other than their own calves to suck promiscuously. The calves are weaned when about six months old. The average annual number of calves reared about 1890 was ten. Leadbetter, a butcher who bought some of the cattle, informed us in 1904 that for years after 1890 he killed four-year-old bullocks from the park up to seven and eight score (a score = 20 lbs.) per quarter—the weight mentioned by Storer thirty years ago. Old cows killed and dressed to five and six score per quarter.

Col. Congreve, the purchaser of the Chartley Park and part of the estate, secured from the Duke of Bedford two excellent specimens of the breed, in the cow standing over the dead calf shown in Plate V., and the bull seen in the foreground of the upper part of the same plate. The cow gave birth to a beautiful bull calf in 1905, and with a view to recruit the herd fifteeen additional cows were in 1906 put to the old bull. Most of them were white cross descendants of the old breed, or white varieties of the Welsh black breed, and four West-Highlanders.

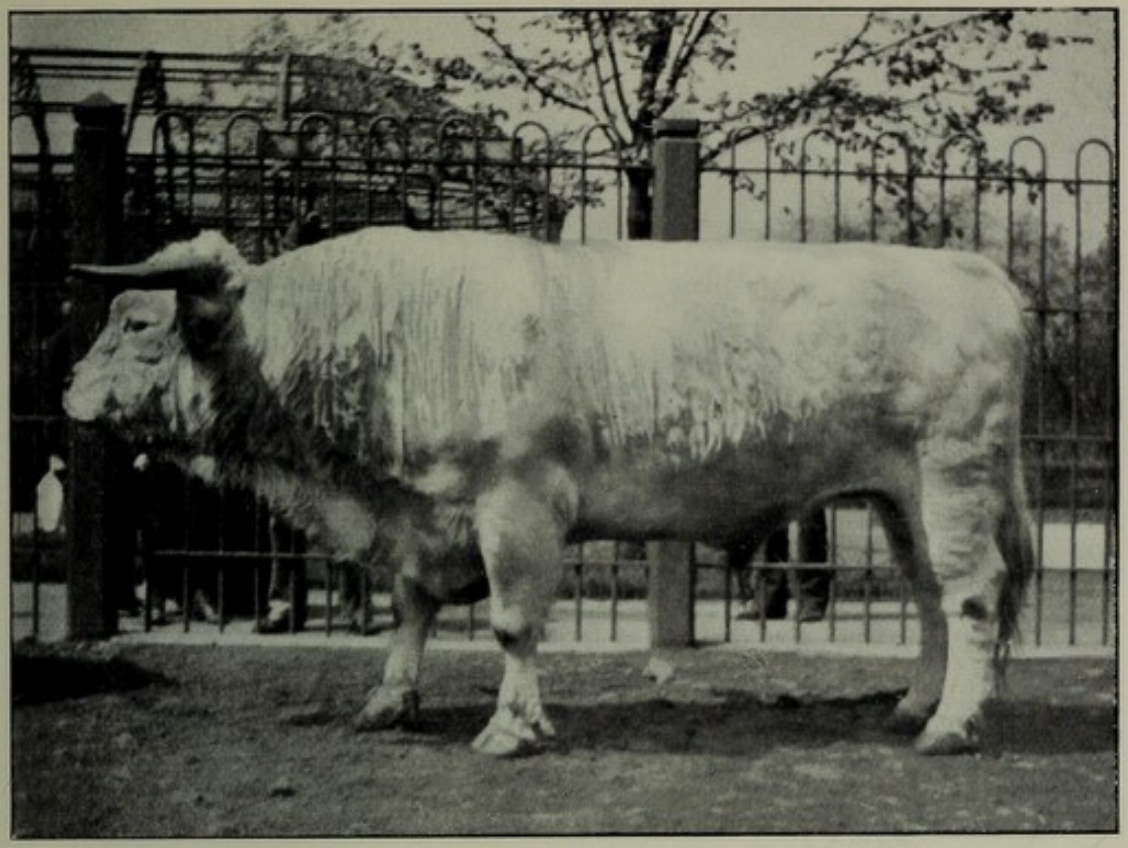
During the transit of the five animals by rail to Woburn, the litter in the railway waggon took fire, and two cows were so injured that they succumbed to the effects of the burning. The black cow and another, by no means a good specimen, were so weak from the effects of tuberculosis that they were considered unfit to put to the bull in 1905. The losses were compensated by one calf born in 1905, and a bull calf from the Zoological Gardens in London possessing 50 per cent. of



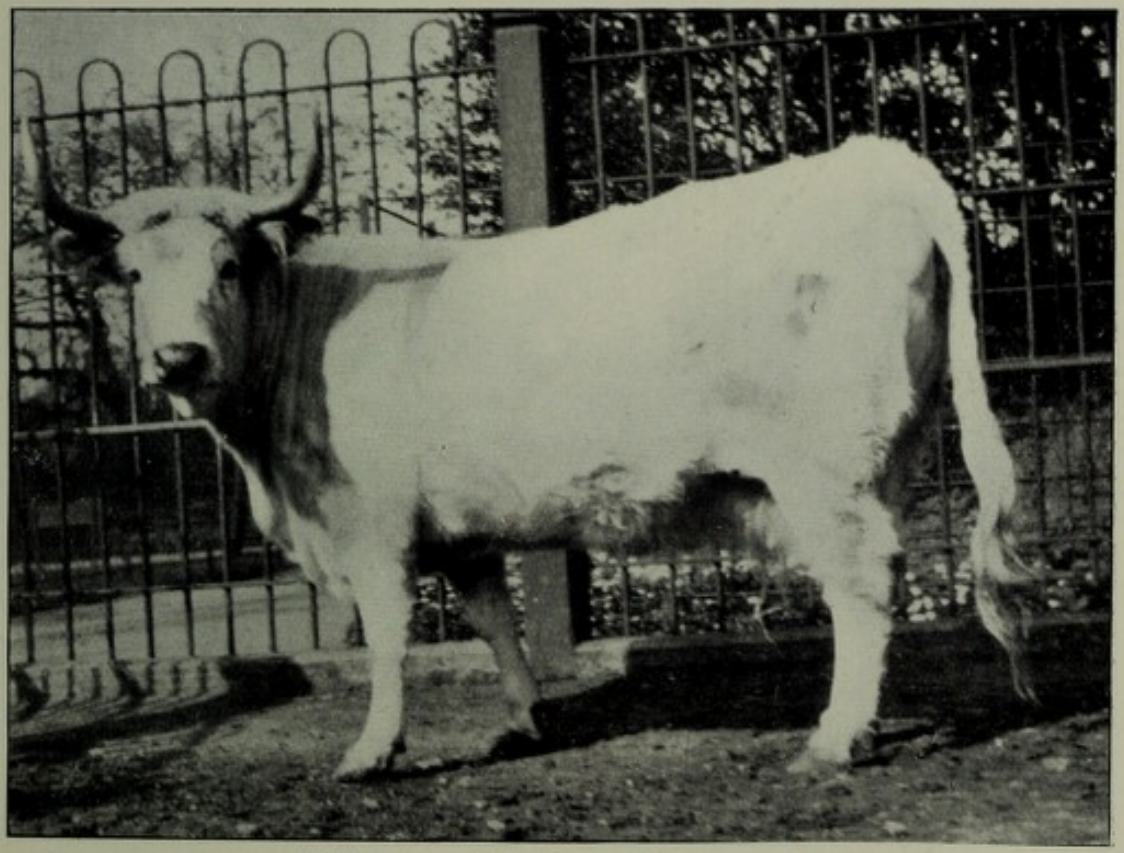
A. Wild White Cattle in Vaynol Park, near Bangor (of Scottish Origin).



B. Wild White Cattle in Vaynol Park, near Bangor (of Scottish Origin).
The property of Charles Garden Assheton-Smith.
[*Both by Wickens, Bangor.*



A. The First Wild White Bull in the Zoo.
From the Chartley Park Herd.

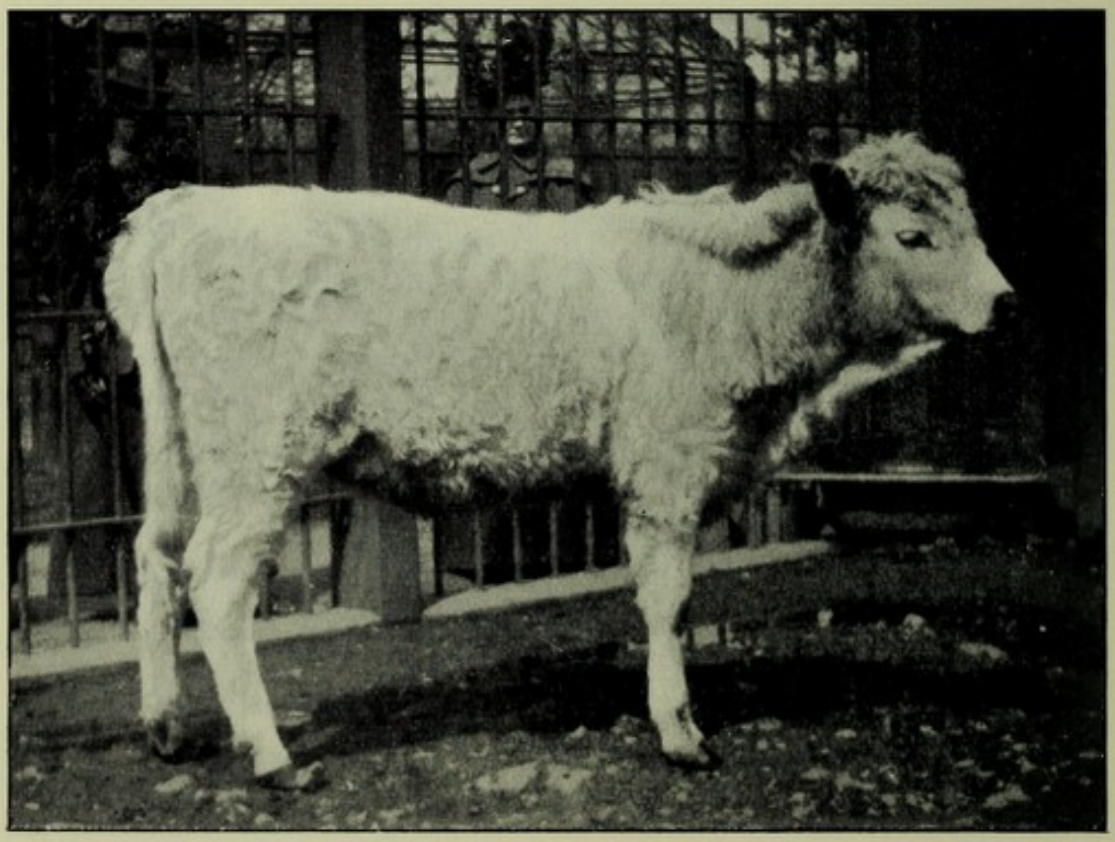


B. The First Wild White Cow in the Zoo.
From Vaynol Park Herd.
[*Both Photos from "The Field," per J. E. Harting.*

[*p.* 48



A. White Welsh Heifers. An offshoot of the Black breed of Wales.
Owned by C. Mathias of Lamphey Court, Pembroke.



B. Wild White Calf born in the Zoo.
From a Vaynol Park cow and Chartley Park bull.
[*Photo from "The Field," per J. E. Harting.*

Chartley blood. The bull broke both his horns during transit, leaving stumps about 6 inches long, which developed abnormal growths of great weight, causing a certain amount of discomfort and giving a curious appearance to the animal; but they did not lead to emaciation, which would have resulted had the condition been associated with much pain. The tumour on one horn, which Sir John Macfadyean diagnosed to be of a simple fibrous nature, grew so large that early in 1906 it was decided to remove both of the injured horns, but the animal died under the operation. It was then found that the largest growth weighed about 30 lbs.

The **position** and **prospects** of the Chartley cattle were discussed in *The Field* of 1st October 1904, by J. E. Harting, and by the present writer in *The Times* of 29th November 1904, when the introduction of fresh blood was strongly urged as a remedy against further degeneration—preferably South Wales blood, owing to its probable nearest relationship.

In Vaynol Park, near Bangor, is another herd of wild white cattle with black points, which in 1892 numbered *fifty-five*, including twenty calves and two bulls, and in Jan. 1899 *fifty*, consisting of twenty-four cows, seven bulls, three steers, twelve yearlings, and four calves. The following extract from *The Field* shows their origin to be Scottish:—

"The herd at Vaynol Park, belonging to Geo. W. Duff Assheton-Smith, was introduced there by him in 1872, when he purchased a portion (twenty-two) of the herd then owned by Sir John Orde of Kilmory, Argyllshire, from whom, in August 1886, he purchased the remainder, thirty-two more. This stock was originally at Blair-Atholl, Perthshire, and in 1834 was sold to the Marquis of Breadalbane, Taymouth, and to the Duke of Buccleuch, Dalkeith." (See also Storer.)

The Atholl herd of the Duke of Atholl were genuine wild white cattle with black points. The cows that went to Taymouth would not breed to the pure white bull; but both male and female are said to have crossed with Highland cattle, and to have produced calves which were exhibited as Highlanders at the Highland Society's Show "without a white one amongst them." This circumstance is evidence of

the close relationship of the West Highland breed to the wild white cattle of the country. The Dalkeith section

"consisted of six cows and two cow calves, one bull, and five oxen. They were all white—pure white—and they had all black muzzles; but the black was confined to the muzzle itself, and did not affect the skin around it, which bore hair. The orbits of their eyes were black, and the hoofs black or striped with black. The ears were generally tipped with black, and in many there was also more or less black inside, but in a few the black hairs on the ears were scarce, though in none altogether wanting. Their horns had black points, and were very sharp. Some had dark specks on the skin, which, however, grew white hairs; sometimes, however, calves showed black hairs mixed with the white when new-born and wet, but these did not show afterwards. They resembled ordinary Highland cattle, being short-legged, straight-backed, and having long silky hair."

The breed was semi-domesticated at Dalkeith, as the cows were kept in the house and milked, and the calves reared by hand till they were turned out to grass, when they sucked and milking ceased. The whole of the Dalkeith herd was slaughtered in 1838, except one pure young Atholl bull purchased by Sir J. Powlett Orde to found the Kilmory herd, which was carried on for nearly fifty years. About half a dozen pure white West Highland (Kyloe) cows with black points, like wild cattle, were purchased and successfully mated with the bull. Some years later he was exchanged for Lord Breadalbane's bull, which also bred well in the Kilmory herd till 1851 or 1852, although he failed to breed with the too nearly related Breadalbane cows. A pure white West Highland bull calf with black points followed the two wild bulls which had been the sires of the herd for the first fourteen years of its existence. He did much good, and introduced into the herd more substantial hind quarters, as well as the curly neck—not an uncommon feature among wild cattle. No black or coloured calf has appeared in recent years. At first, after crossing began, there was a tendency in some calves to have defective black points; but these calves were not kept for breeding.

In 1878, nine 2½-year-old white heifers bred by Sir John Orde were bought by Joe Brown of Hermitage, Dalbeattie, for

10 guineas each, and sent through Burrell of London to the manager of the Royal Shaw Farm, **Windsor.** They were used for crossing with a Shorthorn, but they remained so wild and untractable, and the calves were so far from coming up to expectation, that after two years they were fattened and sold to a local butcher.

No fresh blood has been introduced since the transfer of the ancestors of the herd to North Wales, with the exception of the bull which was got by exchange from the Hamilton herd in 1896.[1] The number of calves is an indication that the cows are now normally fertile, although Sir John Orde, writing in June 1887, says that because he believed the herd had slightly declined in fertility, and had deteriorated in bone and horn, he once attempted, but without success, to introduce the Hamilton blood through two bulls, which met with accidents, and were incapable. The Vaynol Park cattle are distinctly of the West Highland type, with a substantial, well-formed body on short legs. The horns are of medium length. Though the members of the herd trot a long way off, should any one attempt to come to close quarters with them, they are not nearly so wild as the Chillingham cattle, and make no attempt to escape from the view of people at a distance. These animals are fed with hay during severe weather in winter. No case of warble-fly attack has ever been observed among them. The herd numbered forty at G. W. Duff Assheton-Smith's death in 1904. Indebtedness to V. P. Lort, who up till that time had the white cattle and numerous other unique animals in the park under his charge, is acknowledged for recent information.

In the end of 1890 a heifer of this breed was captured after considerable difficulty, and sent to the **Zoological Society's Gardens** in London, where she was mated with a young bull from the Chartley herd. A fine strong bull calf was the first result of this union, perfectly white, with jet-black nose and ears. A. D. Bartlett reported that "both the adults and the calf are wonderfully tame, and will lick or feed from the hand, or allow any one to pat or stroke them without exhibiting fear or anger."

From 1892 till 1903 inclusive, twelve calves were produced

[1] See a Report by Laisters F. Lort on the Vaynol White Cattle in the *Transactions of the North Staffordshire Field Club*, 1898-9, p. 55.

—six heifers and six bulls. The 1903 calf was still-born, and the cow was too fat to breed in 1904. The breeding stock of two animals has been kept up by preserving the male calf of 1892, the first born in the Gardens (which was bred to his mother), and that of 1898 (the present bull), and the heifer calf of 1900 (the present cow). All the others born alive before 1905 (we say it with regret) were slaughtered, in accordance with the conditions imposed by the donors. This embargo having been removed, the bull calf dropped in April 1905 was sent to the Duke of Bedford to mate with the remnant of Chartley Park cattle that reached Woburn that year. The old bull is reported to be wild and rather dangerous, but not to appearance more so than bulls of tame breeds often are at his age. The cow is tame, and submits willingly to be scratched about the neck through the iron railings, but she is not to be trusted in the box unless the attendant holds a fork in his hand for defence. Both have abundant coats of hair—the bull very curly about the neck.

In the report of the **Committee** appointed by the **British Association** to investigate the herds of wild white cattle in Great Britain (*Zoologist*, November 1887), the following important suggestion was made, which, it is to be hoped, may yet be carried out:—

"It would be extremely interesting if the noble owners of the three [*sic*] ancient herds would co-operate with some other owner of a large park—if haply such could be found—willing to undertake the following experiment, namely,—that all calves which would ordinarily be converted into veal or steers, should instead be sent to build up a new herd, which, combining the blood of the only remaining ancient herds, and with no artificial selection exercised, might be expected to revert more nearly to the aboriginal wild type than could be achieved in any other manner."

CHAPTER III

CATTLE—SHORTHORNS

General Points of Beef-producing Cattle—Historical Sketch of Shorthorns—Descent from the Old Teeswater Breed—Colour—Milking Qualities—Charles and Robert Colling—Historical Shorthorns—The Hiring of Bulls—In-and-in Breeding—Two great Branches of Shorthorns, "Booth" and "Bates"—The Booths and their Cattle—Thomas Bates—Bates' Bulls and Tribes—Comparison of Booth and Bates Cattle—Other Early Breeders—Recent Breeders.

BRITISH **Cattle** in common with other European cattle are scientifically classified under the designation *Bos taurus*. Some of the **old writers** use the **term** "Cattle"[1] to designate horses also; and bovine animals are sometimes called "horned cattle," "black cattle," or "neat cattle," although the animals referred to may be polled, of a red or any other colour, and coarsely bred.

Before describing the distinguishing characteristics of the different breeds, it will be well, in order to avoid repetition, to briefly state the general points applicable to those kept for beef production.

General Points of Beef-producing Cattle

The *masculine* or the *feminine characteristics* naturally represented in individual specimens of each sex.

General appearance stylish, and showing quality; *figure* compact and well-proportioned, deep, broad, and low-set as opposed to being leggy.

Head broad between the eyes, flat across the *crown* (with

N.B.—For a list of the various live stock societies, see Appendix D.

[1] As the term "cattle" is only another form of the word "chattel," and like the still older form "capital" meant originally "stock" in general, the older English writers naturally employ it in various senses, some of them applying it specially to horses, and some even making it refer to bees.

exceptions in polled breeds) and down the *face*, which should be neither "dished" nor Roman, but short, or of medium length, with a quiet expression; *forehead* broad and full; *muzzle* broad, full, distinct, and dewy; *mouth* large; *jaw* wide; *nostrils* large; *eyes* large, placid, and clear; *horns* none, or varying in length, colour, and strength, according to breed, fine and symmetrical, set on the crest of the head; *ears* full and sensitive, of fine texture, well covered with hair, and varying slightly in position in the different breeds.

Neck medium length, full at the "neck-vein," or "shoulder-vein," where it joins the body, broad (muscular and crested in the male), but fine, and tapering towards the head—to which it should join without thickness or chokiness—and straight from the shoulder top to the roots of the horns, excepting when it rises into the crest of a bull.

Body long and deep, equally balanced before and behind; *back* broad throughout its length, smooth and even, and straight from the top of the shoulders to the tail-head; the *frame* well and equally covered with firm flesh, especially in the regions of the best cuts, not patchy on the hooks, tail-head, rump, shoulders, or other parts (when prime fat, a little pit may be felt on the point of each hook). The *trunk*, looked at from any point, should resemble as nearly as possible a parallelogram; the under and upper *lines* straight and parallel; *brisket* projecting well forward, and wide, making the fore-legs stand well apart; *loin* thick and broad; *flank* full and deep, even with the underline; *fore-flank* to correspond, well filled; *tail* thin, set on well back (but not too high), and falling perpendicularly.

Skin moderately thick (not papery), pliable, and mellow or mossy to touch; *hair* soft and abundant, covering all parts well.

Shoulders well covered with flesh and laid back over the ribs, so that the natural depression behind them in the region of the heart or girth line should not be too pronounced, broad, and compact on top; the *shoulder blades* adhering closely to the trunk; *shoulder points* fine, "snug," and well covered.

Chest, viewed from before or from behind the shoulder, full, wide, deep, and massive; *girth* large; *crops* full.

The fore-arm and leg straight and short; *muscle* large and broad; *leg-bones* dense and strong, though smooth, fine,

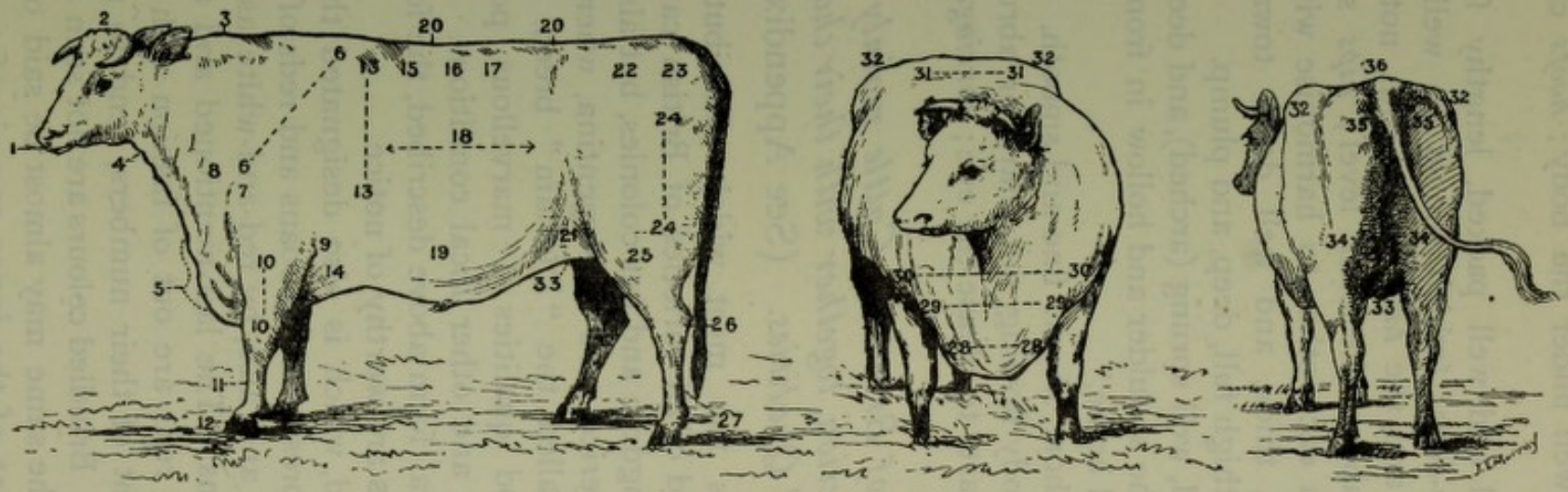


FIG. 2.—ILLUSTRATING THE POINTS OF AN OX. (AFTER THOMSON.)

1. Muzzle.
2. Poll.
3. Crest.
4. Throat.
5. Dewlap.
6. Shoulder.
7. Shoulder Point.
8. Shoulder- or Neck-[Vein.
9. Elbow.
10. Arm.
11. Shank.
12. Hoof.
13. Crop.
14. Fore Flank.
15. Fore Ribs.
16. Mid Ribs.
17. Back Ribs.
18. Barrel.
19. Belly.
20. Spine.
21. Flank.
22. Plate.
23. Rump.
24. Hip.
25. Thigh.
26. Hock.
27. Hind Leg.
28. Brisket.
29. Bosom.
30. Chest.
31. Loins.
32. Hooks, Nachles, or [Hip-bones.
33. Purse.
34. Twist.
35. Pin-bones, Catch, or [Nache.
36. Tail-head.

N.B.—See Appendix E for a list of the champion cattle at Smithfield Show since its initiation.

and flat (abnormally small bone shows tendency to diminished size); *legs* short and well under the body; *hoofs* clear and oily looking.

Hind quarters full and well packed, lengthy from the *hook-bones* to the *pin-bones* (which should be well apart); *rump* wide and even, and the *tail-head* smooth, not patchy, and no part rising above the back level; *hips* smoothly covered, distance from each other to harmonise with other parts; *thighs* broad, thick, and well down towards the hocks; *twist* or inner thigh full, deep, and plump.

Ribs thickly fleshed, well sprung (arched), and deep, filling up deficiency behind the shoulder and hollow in front of the *hooks*, *i.e.*, "well ribbed home."

Legs straight and short, *shanks* fine and smooth.

The lines of the body flowing, not sharp or abrupt, with a general balance of parts to please the eye; *carriage* stylish.

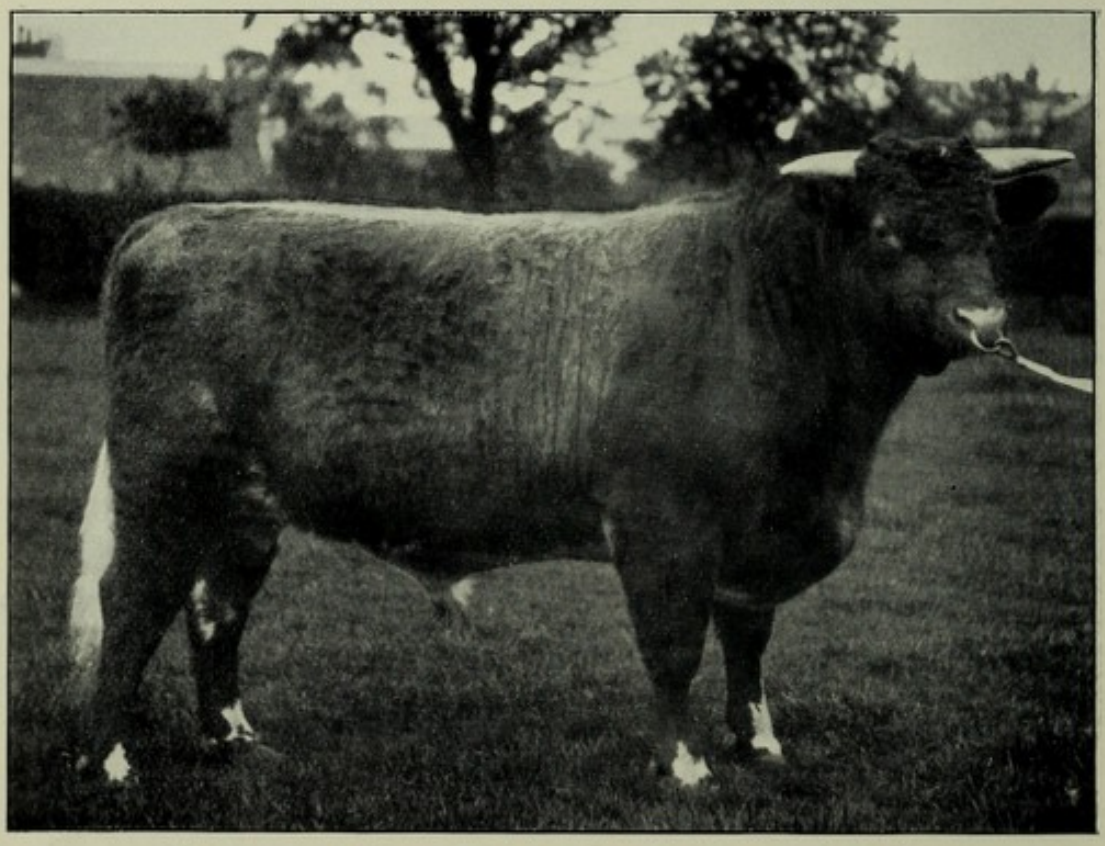
Historical Sketches of Breeds of Cattle mainly valued for Beef Production, together with their characteristic Points and Qualities. (See Appendix E.)

The Shorthorn is the most widely distributed and numerously represented of all varieties of British cattle, not only in the United Kingdom and her colonies, but also in the United States of America, and in Argentina, where, as in France, it is often called the "Durham" breed. It has among its many good qualities a marvellous power of adaptation to climatic and other local conditions. In connection with the general form above described, the following **special characteristics** are worthy of notice.

In **colour** the breed, which is also designated the "red, white, and roan," is represented by roans and reds of various shades, light and dark, and also, by red-and-white as well as wholly white specimens. The last-mentioned and also the light or yellowish-light reds are out of fashion with foreign buyers, who, on account of their numbers, tend to regulate custom in such things. Brindled colours are not seen in pure-bred Shorthorns, and the same may almost be said of black. The skin, including that of the inner ears, is of a creamy-white or yellow colour. The nose, palate, lips, and eyelids should be flesh-coloured, and free from dark markings or

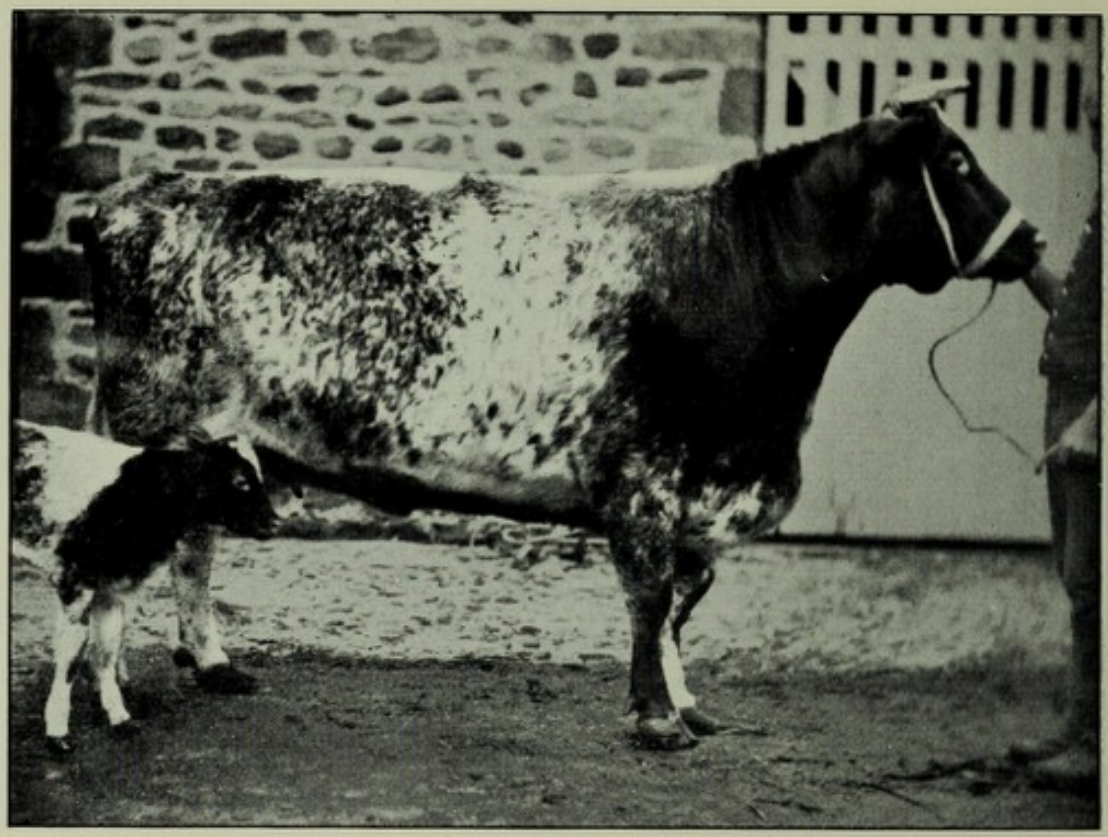


A. Shorthorn Yearling Bull, "Broadhook's Champion" (91059).
Sold at Perth for 1500 guineas in 1906.

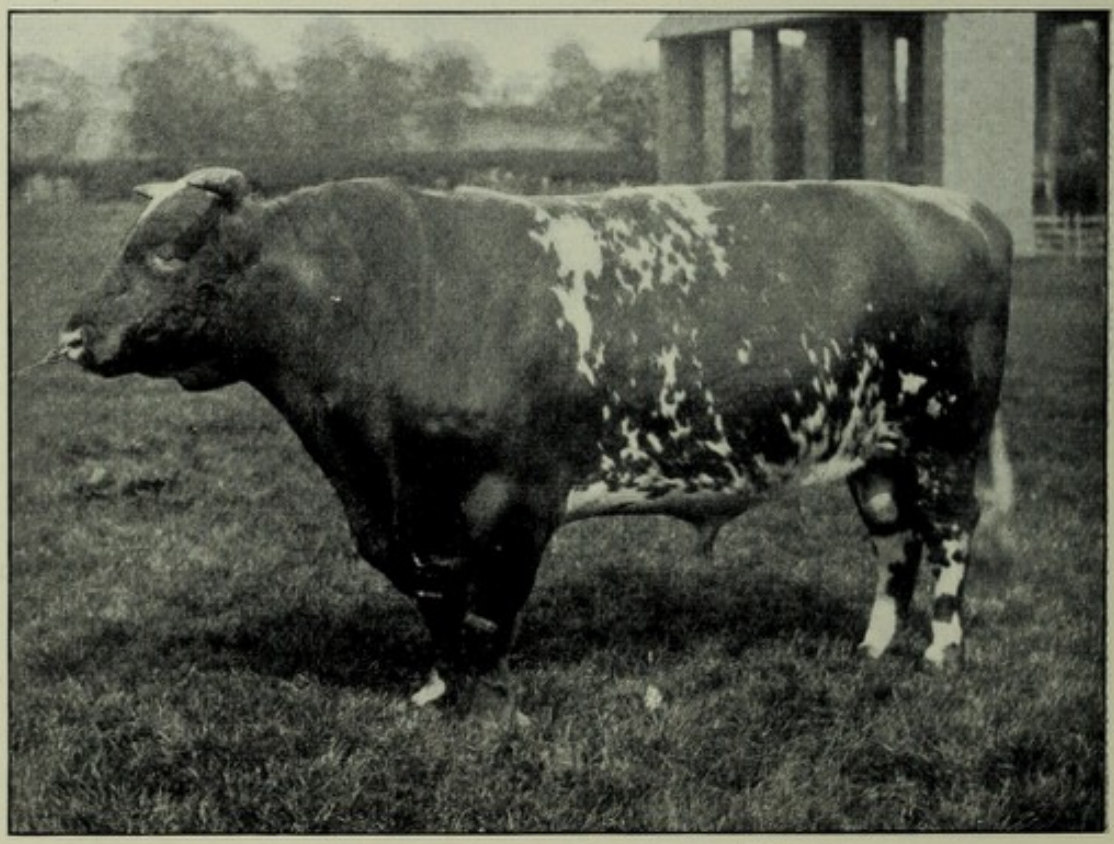


B. Shorthorn Bull, "Ruddington Prince Christian" (899.7).
Sold at Ruddington Hall for 1100 guineas.

[*Both by G. H. Parsons, Alsager, Cheshire*



A. Typical Booth Shorthorn Cow and Calf.
Owned by T. H. Hutchinson, The Manor House, Catterick.
[*J. Rane, Richmond, Yorks.*



B. Shorthorn Bull, "Royal Stuart" (40646).
Bred by T. C. Booth of Warlaby, Northallerton.



A. Booth Shorthorn Cow, "Lady Aline Studley," at 7 Years
(d. of "Royal Renown"; first yearling bull, "Park Royal," 1905).
The property of the Duke of Northumberland.



B. Booth Shorthorn Cow, "Lady Fera Studley," at 11 Years.
Purchased as a Yearling by the Duke of Northumberland at Warlaby Sale for 175 guineas.

[*pp.* 56 *and* 57



(1) "St Ursula," at 8½ Years (2) "Rose of Devon." (3) "St Monica."

Shorthorn Cows at Alnwick Castle, of mixed Booth and Bates blood.

(1) "St Ursula," descended from old "Alnwick Cowslip" (about 1830), a famous prize-winner, which gave 32 quarts of milk a day and 16 lbs. of butter a week; d. of "St Monica."

(2) "Rose of Devon," a typical Shorthorn of the old Cambridge Rosebud family; also related to many prize-winners, per John Patten, Park Farm, Alnwick.

Opp. 56 *and* 57.

cloudiness. A white nose is indicative of delicacy, just as black is considered to denote impurity,—this, too, in spite of the acknowledged fact that black or dark noses existed in some of the best strains of blood mentioned in the early records of the breed. "Foljambe," a descendant of the famous bull "Hubback,"[1] had, on the authority of Bates, a dark nose; and another good bull was designated the "black-nosed." It is also further recorded by Allen that at one time "farm stock was nearly all black-nosed." One of the prominent results of the recent mingling of distinct types of Shorthorn blood has been an increase of dark or smudged noses, due to atavism.

The characteristic horns are short and blunt, more or less curved in a downward direction, of a waxy yellow throughout (free from black tips), laterally flattened (or oval in section), and set on wide apart.

Shorthorns are descended from the old North-East of England breed, variously designated the "Durham," "Tees-water," "Yorkshire," or "Holderness."[2] It is reputed to have been formed less than two centuries ago, by crossing British cows of a superior stamp with large-framed bulls imported from the Continent—Holland and Denmark.

Low says:—"The breed formed by the mixture [of native stock with very superior imported Continental cattle] became familiarly known as the Dutch or Holstein breed, under which name it extended northward through Northumberland and became naturalised in the south of Scotland."

The dark noses referred to were no doubt due to their relationship with the ancient white cattle of the country. Early Shorthorns were good milkers, and it may be presumed they in part inherited that quality along with the shortness of horn from their Continental ancestors.

[1] Twenty-five grand cattle (eleven Shorthorns, including "Hubback," seven Aberdeen-Angus, six Herefords, and one Galloway), are interestingly described by Chas. S. Plumb, Professor of Animal Husbandry in the Ohio State University, in *Little Sketches of Famous Beef Cattle*, printed by the author, Columbus, Ohio, 1904.

[2] In 1744 Wm. Ellis wrote:—"I think of all the cows in England none comes up to the Holderness breed for their wide bags, short horns, and large bodies, which render them, whether black or white, the most profitable beasts for the dairyman, grazier, and butcher. Some of them have yielded two or three gallons at a meal."

The "Alloy" strain, represented by thirteen animals of good appearance which "sold at enormous prices" at the retiring sale of Charles Colling, was descended from the produce of a very fine Shorthorn cow, "Lady," by a bull which was a second cross from a selected red Galloway cow. The distinct Galloway characteristics rapidly disappeared in the full flood of Shorthorn blood; still the animals retained a roundness of form, roughness of coat, heaviness and uniformity of flesh, and deficiency in milking powers not usually found in the Shorthorns of that time.

The colours of the early Shorthorns were much like those now prevailing. Among red varieties the yellowish-red is waning before the deep or darker red colours, although the latter are often hard to the touch. The first Duchess was a "massive, short-legged animal of a beautiful yellow-red flecked colour." This yellowish tint seems to have been more or less correlated with **good milking** qualities possessed by early Shorthorns, and to have disappeared with the increasing tendency in the breed to produce fat, acquired at the expense of their milking powers, as a result of the preference of breeders for beef types and consanguineous breeding. The fact that the light red non-pedigreed Shorthorn cow with a slightly orange tinge is, as a rule, more highly appreciated by dairymen than the dark red, goes to support this view. **The milking Shorthorns** (not with recorded pedigree, though well bred) necessary for the milk supply of Edinburgh and other large centres of population in the north of the kingdom, are largely drawn from Cumberland, Westmorland, Yorkshire, and Lancashire. They are heavy milkers, and possess, in many cases in a marked degree, the light red or yellowish-red which is held to be associated with milking powers. The famous breeding Princess bull "Belvedere" (1706), which Bates bought to regenerate his Duchesses, was a yellow roan, and "soft as a mole to the touch." Thornton's "Circular" says that in the Lake district "the yellow roan and red were" (in the early part of this century) "looked upon as the pure breed, the dark red being held in no favour." The colour of "Hubback," the famous bull from which all the best Shorthorns have been bred, was "yellow-red and white;" and Carr, writing of the first of the Strawberry tribe (bred from a cow bought by Thos. Booth in the Darlington market about 1797), says they were

"of that *yellow-red and white hue*, which, though out of favour at the present day, *was then the prevailing colour* of the Shorthorn": and not of the worst type either, for the Stanwick cow, of a beautiful yellowish flaked red colour, bought by Chas. Colling in 1784 for £13, was, by his own admission, "better than any he ever produced from her, though put to his best bulls, which improved all other cattle." And she was the origin of the Duchesses.

That colour is to some degree an indication of milking qualities is beyond reasonable doubt. A careful inquiry among "town" dairymen, whose cattle are treated by forcing in a manner calculated to try the weak points of all constitutions, shows that it is a pretty widely accepted belief that white Shorthorns are not so hardy nor so good as milkers as those of other colours.[1] The fact that a white cow may in a rare and special case be second to none in a whole herd as a milker, does not interfere with the general belief in the principle laid down. It is a parallel to the old story of the black sheep of a flock being either conspicuously good or exceptionally bad. The practical dairyman settles the question by declaring that "a good cow is never a bad colour."

This point is of special interest when considered in connection with a statement made in *Thornton's Circular* (1869) in reference to the effects of the Collings' system of breeding, that "in all cases of close affinity there was a tendency to white, with red ears and spots." Is it possible that many of the pale cattle of the present time are suffering not from the effects of close-breeding of recent date, but from the effects of it in the past, in virtue of the relaxation of the intensive accumulation of good qualities which are associated with judicious in-breeding as recently carried out? If this be so, we have one explanation of the decided preference of American and other purchasers for roan or for dark colours. It may also be that light-skinned cattle are more liable to suffer from sunburning in countries which lie nearer the equator, where solar influences are more powerful than in this country.[2]

[1] Storer, writing of the cattle of Britain and Ireland, says:—"The white cow is despised and charged with delicacy." The experience of J. Deane-Willis with "White Heather" (Plate XX.) and other cows is quite contrary.

[2] The importance of the natural colouring of the skins of cattle is exhaustively dealt with in the author's works, *Indian Agriculture*, and *Farming Industries of Cape Colony*.

Little is known of the breed, except from the uncertain authority of **tradition,** down to the early part of the eighteenth century, though it is only right to infer that long before this time great care, and even skill, had been bestowed upon it. The earliest records show that purity of breed was fully appreciated, and this important fact could not have been universal without previous experience and attention, although the fashionable types of the breed have been recently formed. **Low** says in the *Domesticated Animals of the British Isles* (1845):—

"Up to the period of the American War (1812-5) the Teeswater breed had not gained greatly in public estimation beyond the district to which it had early extended. Great size seems to have been chiefly aimed at by the breeders; and the animals, though valued on this account, were of forms comparatively coarse, great consumers of food, and deficient in many of those points which are now regarded as essential in a well-formed ox."

The first volume of **Coates' Shorthorn Herd Book** was not published till 1822, yet, for well-nigh half a century before that date, pedigree records, of a more or less imperfect kind, had been kept of a few of the best bulls. "Very few pedigrees can now be traced by names on the female side beyond the year 1780, and but comparatively few beyond 1800" (*Sanders*).

Charles and Robert Colling,[1] of Ketton Hall and Barmpton, near Darlington, who have been called, rather misleadingly, "the founders of the Shorthorn breed of cattle," soon after 1780 did much to improve the quality and to extend the fame of this hitherto local breed by what may be termed Bakewell[2] of Dishley's method of breeding, which might be briefly defined as a persistent system of "in-and-in breeding" with specially selected and carefully mated animals of good blood. The brothers, though admittedly excellent judges and managers of stock, yet owe, in a great measure, their success and the name they have handed down to posterity to their methods of bringing their animals to the notice of the public. Two famous beasts—the "Durham Ox," born 1796,[3] with a live-weight of 1½ tons, and the

[1] Charles, the greater though the younger brother, 1750-1836; Robert, 1749-1820.

[2] Robert Bakewell, born 1725, died 1795.

[3] A son of "Favourite" by a common black-and-white cow bought

"White Heifer that travelled," a free-martin, born 1806, which scaled over 1 ton—were carted about the country, and exhibited as marvellous specimens of the wonderful breed with which the name of Colling became familiarly associated.[1] Nevertheless, in carrying out their breeding operations the Collings, conforming to the practice of Bakewell, seem to have regarded size as a secondary and subordinate quality to those which they desired to cultivate, and to have directed special attention to utility and beauty of form, and to the development of early maturity and flesh production.

Low says (1845):—"The Durham or improved Teeswater breed differs nearly as much from the older cattle of the Tees as the Dishley (Bakewell's) breed of Longhorns from the older race from which it was derived. The height is less, but the trunk is more round and deep; the limbs are shorter in proportion to the depth of the body, and the chest, back, and loin more broad; so that, with less apparent bulk of body, the weight is usually greater. The skin is light-coloured, and the hair reddish-brown or white, either separate or mixed. The muzzle is flesh-coloured and rarely black, the appearance of which colour on the skin indicates the revival of a character of the older varieties, which modern breeders study to exclude. The horns are shorter than in the former breed, light-coloured, blunt, and sometimes laterally flattened. The skin is soft to the touch, the general form square and massive, the shoulders upright, and the hind quarters large. . . . Although Colling preferred cattle of a medium size, yet the breed being derived from one of great bulk of body, there is a constant tendency to the production of large animals. The breed communicates its characters readily to all others, and the first progeny, even with races the most dissimilar, is usually fine. The female retains in a considerable degree the properties of the Holstein race, in yielding a large quantity of milk. . . . In the property of yielding milk, however, the new breed is inferior to the older and less cultivated one, showing that refinement in breeding and greater tendency to produce fat are unfavourable to the secretion of milk."

William Carr, the historian of Booth cattle, says of the

for £14 in Durham Fair. He dressed 165 st. 12 lbs. of beef from a total dead weight of 2620 lbs., after the loss resulting from two months' suffering from a broken leg.

[1] John Day bought the ox in 1801 for £250, and travelled with him nearly six years through England and Scotland.

best specimens of the old Teeswater stock from which the Shorthorn sprang :—

"They were generally wide-backed, well-framed cows, deep in their fore quarters, soft and mellow in their hair and 'handling,' and possessing, with average milking qualities, a remarkable disposition to fatten. Their horns were rather longer than those of their descendants of the present day, and inclining upward. The defects were those of an undue prominence of the hip and shoulder points, a want of length in the hind quarters, of width in the floor of the chest, of fullness generally before and behind the shoulder, as well as of flesh upon the shoulder. They had a somewhat disproportionate abdomen, were too long in the legs, and showed a want of substance, indicative of delicacy, in the hide. They failed also in the essential requisite of taking on their flesh evenly and firmly over the whole frame, which frequently gave them an unlevel appearance. There was, moreover, a general want of compactness in their conformation."

Nevertheless, it was from a common Darlington market cow, no doubt of special merit, that Richard Booth, by three crosses with quality bulls, produced at Studley the so-called "perfect" cow "Isabella," which introduced "the massive yet exquisitely moulded fore quarters into the herd, and the straight underline of the belly, for which the Warlaby cattle are remarkable."

The hiring-out of bulls, an uncommon practice now, though new and in favour at their time, kept the Collings in communication with the best breeders. Intent upon the improvement of the external form and the increase of fattening powers in their stock, they were no doubt satisfied with the results of the cross with the in-and-in-bred Colling bulls, that had acquired, in virtue of consanguinity, an intensified power of impressing their qualities upon the ordinary Shorthorn cattle of the country. And, finally, the sales[1] held respectively by the brothers circulated their names and distributed their famous strains of blood among the important breeders of Shorthorns.

Though **in-and-in breeding** has admittedly done much to raise the standard of the Shorthorn breed, there is a strong

[1] That by Charles, at Ketton in 1810, and that by Robert, at Barmpton Farm in 1818, besides a displenishing sale at the latter place in 1820, after Robert's death. (See *Thornton's Circular*, vol. i., for prices.)

presumption that close-breeding of itself, apart altogether from its tendency in this case to develop flesh, has to do with the acknowledged lowering of the power of milk production. It is a well-established fact, that persistent in-breeding leads to impotency in the matter of conception. It is true that Shorthorns are not so liable to suffer in this way as some other classes of stock ; yet Charles Colling must have felt the tendency when, after trying his cow "Phœnix" with good bulls without success, he fell back, as a "last resort," on a bull which was one-fourth Galloway and three-fourths Shorthorn, and attained his end. This was at one with the common custom of putting a good country or common bull to a well-bred stock of cows which have through close-breeding become weak in their powers of reproduction. It is admitted that close-breeding lowers the power of animals to produce young, and it is not wonderful to find it also impairing the power of providing sufficient milk to support them should they come into existence. It would be extraordinary if the reproductive system were seriously affected as regards its first functions, and left in a normal condition as regards those of a later period.

There were several circumstances in the management of the early Shorthorns which made it possible to carry in-breeding to its greatest length with the minimum of bad results. Animals were kept in moderate condition and in a natural state. Their food was mostly grass in summer, and hay or straw in winter. The system of letting bulls out on hire lent renewed vigour of constitution through change of air, food, and general surroundings. The influence of such change as a precaution towards the preservation of health is universally admitted in the human species ; and in the matter of consanguinity, it has been shown that the offspring from the marriage of cousins is not associated with either mental or physical weakness if the individuals in question have been reared in parts geographically distant from each other. The shipment of cattle to America and other countries, and the return of their progeny, has unquestionably increased the constitutional vigour of the stock. The same remark applies to the more frequent transfer and return of Shorthorns between Scotland and Ireland. The influence is not one which shows itself merely in the members of a

race of descendants, but it is conspicuous in the individual. Numbers of highly-bred barren cattle, exported to America at low prices, have been found to conceive without difficulty after the change.

It may be safely asserted that nearly all the well-bred Shorthorns which have become famous within the period of which there is any written history[1] of the breed, have been descended more or less directly from a few bulls. The "Studley Bull" (626), calved in 1737, is one of the earliest recorded of the famous sires that formed the foundation stock of the improved Shorthorn. "He was red and white, of wonderful girth and depth of fore quarters, very short, neat frame, and light offal." But still more notable was his great-great-grandson "Hubback,"[2] the father of the improved Shorthorn, and his much in-bred descendants "Favourite" (252) and "Comet" (155).[3]

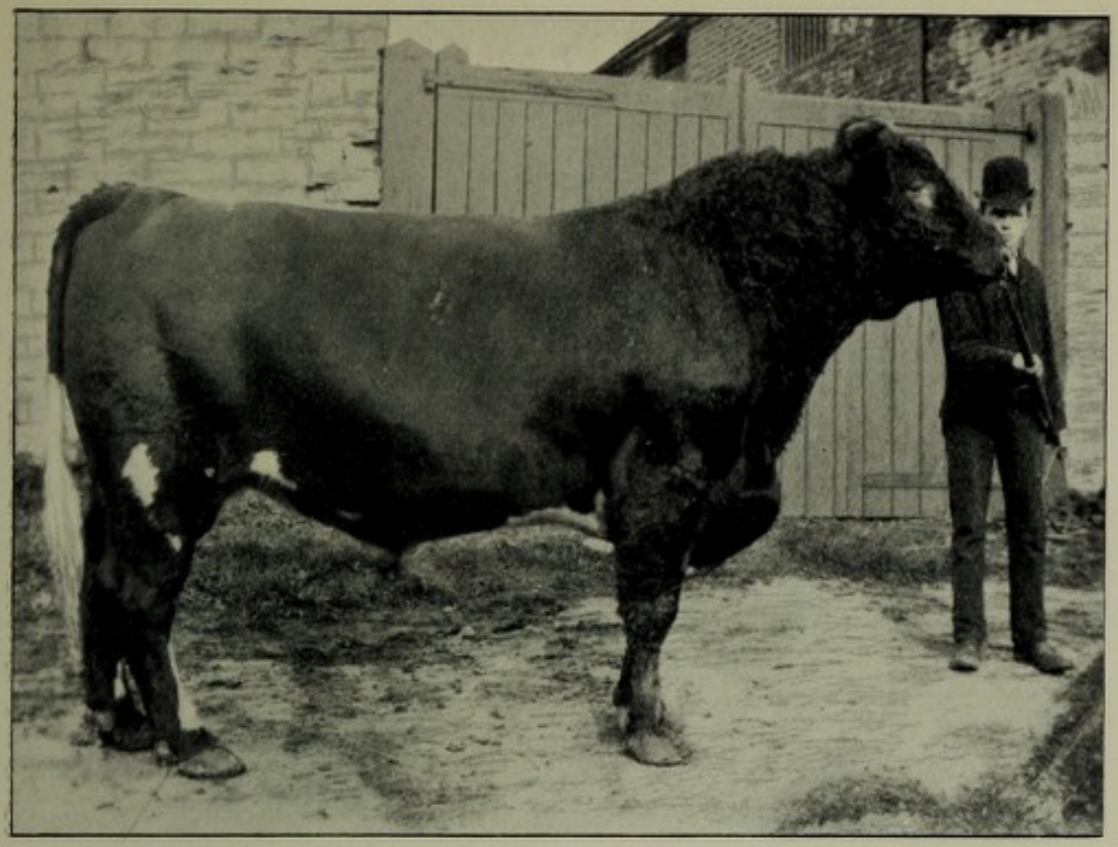
"Hubback" was a small yellow-red bull with some white; bred about 1777 by John Hunter, a bricklayer, who had as a small farmer been a Shorthorn breeder. The mother was also small but very handsome, "of fine symmetry, with a nice touch, and fine, long mossy hair"—qualities "Hubback" inherited from her. But the Collings had, before realising the greatness of his merit, parted with him at ten years of age, in 1785, to Hubback, of North Seton, in Northumberland, by whose name he is known in history.

In *Animals and Plants under Domestication*, Darwin says of "Favourite" (a light roan dropped in 1793, who was himself the offspring of a half-brother and sister from "Foljambe," and said to be "a grand beast") that he "was matched with his own daughter, granddaughter, and great-granddaughter, so that the produce of this last union, or the great-great-granddaughter, had fifteen-sixteenths, or 93·75 per cent., of the blood of 'Favourite' in her veins."

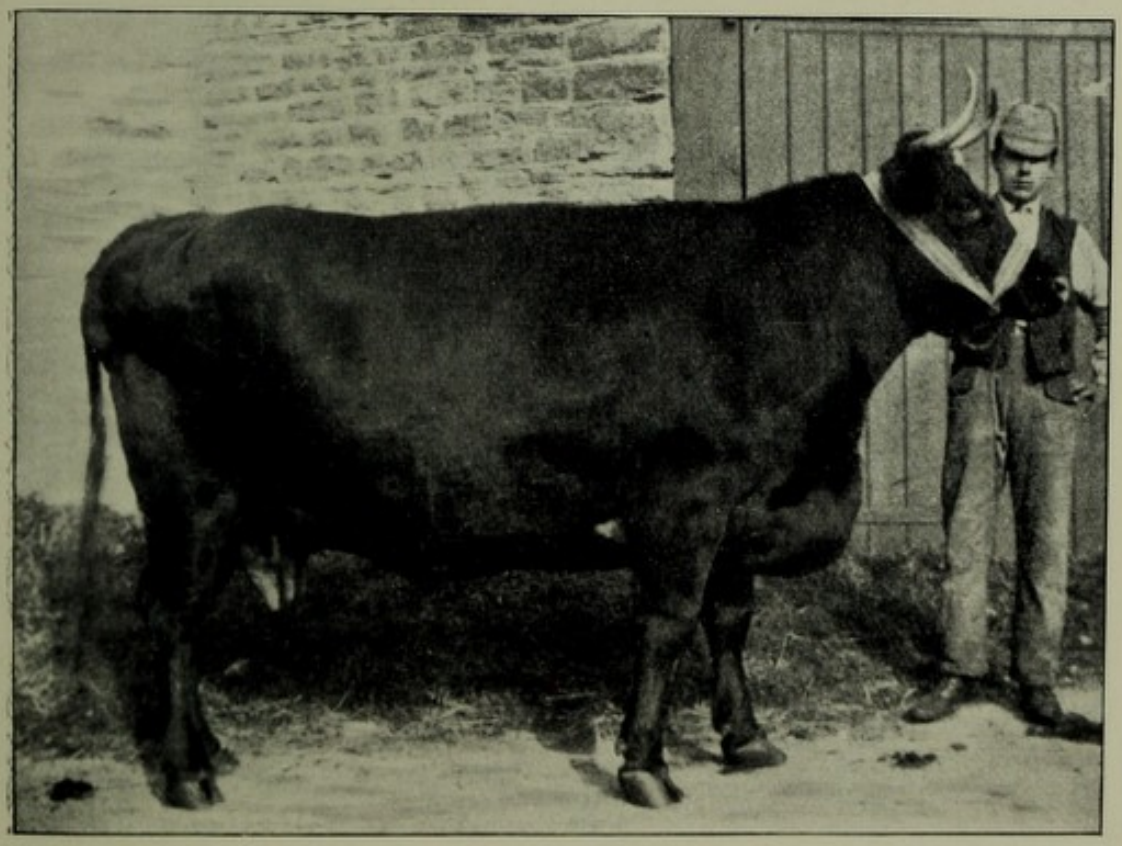
[1] George Culley, who wrote on the agriculture of Northumberland, and also *Observations on Live Stock*, 1786, is one of the first historians of the breed. He was an intimate friend and adviser of the Collings, and an enthusiastic pupil of Bakewell.

[2] Sanders says:—"It was at one time alleged that there was Kyloe blood in 'Hubback's' veins on his dam's side, but this is not substantiated."

[3] These were all descended from "Studley Bull." "Comet" by "Favourite" out of "Phœnix," was sold at Chas. Colling's sale in 1810 for 1000 guineas.



A. Bates Shorthorn Bull, "Duke of Barrington 15th" (52745).
Bred by H. J. Sheldon, Brailes, Shipston-on-Stour, and bought by T. Holford, Castle Hill, Cerne.



B. Bates Shorthorn Cow, "Duchess of Leicester II."
Bred by T. Holford, Castle Hill, Cerne.



A. Shorthorn Cow and Calf, "Lady Summerton," at 12 Years.
First, Royal Agric. Soc. of Victoria, 1904.
Owned by Geo. Tweddle, Green Park, Brisbane, Victoria.



B. Shorthorn Cow, "Lady Charlotte," and Calf, "Lady Courtly."
Owned by the late Philo L. Mills, Ruddington Hall, Nottingham.
[*C. Reid, Wishaw.*

"Foljambe" (263), "white, with a few red spots," the sire of "Bolingbroke" (86), said by Coates to be "the best bull he ever saw," was a grandson of "Hubback" by the cow "Haughton," bred to a large, well-shaped, but coarse, wiry-haired beast with a black nose."

The two great branches of the Shorthorn breed which originally possessed the highest order of merit, the **Booth** and the **Bates,**[1] had a common ancestor in "Hubback." This animal had a marvellous power of stamping his special characteristics upon his offspring, and, moreover, was possessed of certain qualities, now highly appreciated in Shorthorns, which were not prominent features of Shorthorns before his time, viz., low legs, compact form, and moderate size;[2] a wonderful aptitude for laying on flesh, which he seems to have inherited from his dam; and, to the touch, a superior quality of skin and hair. His stock had a reputation for: "capacious chests, prominent bosoms, thick, mossy coats, mellow skins, with a great deal of fine flesh spread evenly over the whole carcase."

The name of Booth has been associated with the breeding of Shorthorns since 1777 in the person and in the descendants of Thomas Booth, of Killerby, the father of Richard and of John Booth, and, through the latter, grandfather to Thomas C. Booth, of Warlaby, Northallerton, and great-grandfather of Richard Booth, the present representative in the direct line. It was not till some time after the Collings' career that the name assumed the importance which it ultimately attained in the Shorthorn world. Killerby, Warlaby, and in earlier times Studley, were the centres from which the various members of the Booth family distributed near and far their surplus stock. The Booths, like the Collings, continued the Bakewell system of in-and-in breeding, and also

[1] Though not here dealt with in detail, there are other important branches of Shorthorn blood in the United Kingdom: for example, Collings families of Shorthorns exist, which neither Bates nor Booth ever possessed. There are also the Wilkinson Shorthorns, well known in Scotland; the Mason families, highly appreciated in Scotland, England, and Ireland; and the Knightley strains, famous for their milking qualities; and others which will be mentioned later.

[2] Various records of the weights of large-boned and coarse-fleshed early Shorthorns, prior to the days of high pressure in feeding, put the dressed carcases at over 150 imperial stones.

that of letting bulls out on hire for a season or more, according to contract, to distant parts of the British Isles—a practice which has been acknowledged to be of much advantage when the system of close-breeding is adopted. It also gives a breeder a chance of keeping for his own use bulls that develop qualities on maturing which they do not show at the early age at which they are usually sold.

Thomas Booth, the originator of the Booth group of Shorthorns, made one essential difference in his practices as compared with Bates and some other earlier improvers. He selected the best types of ordinary non-pedigreed Shorthorn cows, which he found in Darlington market, to mate with his moderate-sized, strongly bred Colling bulls of Hubback descent. They were described as "fine cattle; good dairy cows, and great grazers when dry; somewhat incompact in form and steerish in appearance, but of very robust constitution." He put "substance ahead of points of less practical importance, and from the first regarded flesh-making capacity and breadth of back and loin of more value than a persistent flow of milk." Richard Booth, who leased Studley in 1814, declared that "four crosses of really first-rate bulls of sterling blood upon a good market cow of the ordinary Shorthorn breed should suffice for the production of an animal with all the characteristics of the high-caste Shorthorn."

Admirable judgment akin to genius was displayed in mating the various units of the herd to secure the ideal which Thos. Booth, like every other successful breeder, aimed at. Defects were gradually eliminated and desirable characteristics established. Uniformity of type came with the later concentration of blood by the use of home-bred bulls. The breeding animals were fed in an ordinary way at pasture in its season, and on natural hay during the winter months. The herd was kept well before the public by numerous prizes taken at public shows. At that time the wasteful methods of overfeeding show and sale cattle did not drain, as it does now, too much of the best female blood from the stocks of successful exhibitors, and endanger or weaken the breeding power of many of the males. The Colling bulls he used at first demonstrated the fact among Booth cattle that strongly-bred sires often get their best stock from cows not bred "in line." The Booths maintained they got their best results by

"inter-breeding their own established tribes," their in-breeding at a more advanced stage in the history of the breed than that of the Collings being fraught with greater danger and demanding greater caution.

The following are the names of a few of the most celebrated of the **families of Booth Shorthorns**:—The Red Rose, Blossom, Bright Eyes, Strawberry, Bracelet, Isabella, Farewell, Broughton, Charity, and Dairymaid or Moss Rose.

The unsurpassed **showyard career** of the Booth cattle at the Royal and other leading shows began under John and Richard Booth, and lasted for many years, until it became a serious drain upon the best blood of the type through the overfeeding in training for shows which took place, to the injury of the breeding-power of many of the best animals, and led to the extinction of some of the leading tribes, *i.e.*, the Blossoms and the Charities.

"Bracelet" was the most distinguished of the early Booth females — being famous as a prize-winner and also as a breeder of high-class stock. She was the dam of three famous and now historic animals—"Birthday" by "Lord Stanley" (4269), and the two prize bulls, "Hamlet" (8126) by "Leonard," (4210), and "Buckingham" (3239) by "Mussulman" (4525). It was through "Buckingham" that the Booth section of the Cherry blood came into the herd. The greatest of all the Warlaby bulls, "Crown Prince" (10087), was descended from "Buckingham."

John Booth died in 1857, but he practically retired from active participation in breeding Shorthorns, in which he so conspicuously excelled, in 1852, when the first Killerby dispersal sale took place.[1] It came at a depressed time for agriculture, and, although it was attended by many breeders, the forty-four lots averaged but £48, 12s.

Under **Richard Booth** at Warlaby (formerly of Studley), the Booth strain gained its greatest excellence and highest reputation, and developed a great trade in the hiring of bulls in all parts of Great Britain and Ireland. Although Bates cattle were more favoured abroad, they did not appear much

[1] The second Killerby herd was sold off in October 1886, after the death of its owner, J. B. Booth; and we may be excused for adding, from personal experience, on one of the wildest days of wind and rain experienced in recent years.

in public at home, and Booth had it practically all his own way at the leading shows of this country. The most **perfectly finished female**, typical of many of his grand, thick-fleshed cattle, is described as follows by **Carr**:—

"Of 'Charity,' who so long graced the Warlaby pastures, it is sufficient to say that she was the personification of all that is beautiful in Shorthorn shape. Such was her regularity of form that a straight wand laid along her side, longitudinally, from the lower flank to the forearm, and from the hips to the upper part of the shoulder blades, touched at almost every point; her quarters were so broad, her crops and shoulders so full, her ribs so boldly projected, and the space between them and the well-cushioned hips so arched over with flesh as to form a continuous line. 'Charity' won every prize for which she was shown save one, when she was beaten as a calf by another of the same herd, after which her career was one of unvaried success. She was thrice decked with the white rosette at the Royal and thrice at the Yorkshire meetings."

The famous stock bull "Crown Prince," already mentioned, was a son of "Charity," and was primarily responsible for the high degree of excellence attained by Booth cattle.

Richard Booth died in 1864, aged 76, and the Warlaby herd, for which £15,000 had been offered, passed to his nephew, T. C. Booth, who upheld its reputation and, through "Commander-in-Chief" (21451), extended its fame internationally.

Thomas Bates (1775 to 1849) of Kirklevington[1] (1830), in the Vale of Cleveland, began about 1800 his extraordinary career as a Shorthorn breeder, which lasted for half a century. He procured the progenitors of his best cattle from the Collings. He was a man of means, and had an education superior to that of his farmer neighbours.

In 1810, after occupying for nine years Halton Castle farm, a mile north-east of Aydon Castle, he became, at the age of thirty-five, for two years a student of Edinburgh University, with the object, says one record, of going in for the Church. He studied Moral Philosophy, and attended the class of Agriculture under Professor Andrew Coventry

[1] See *Thos. Bates and the Kirklevington Shorthorns*, by Cadwallader John Bates, 1897, Robert Redpath, Newcastle-upon-Tyne; and *The History of Improved Shorthorn Cattle, from the Notes of the late Thomas Bates*, by Thomas Bell, *N.E. Farmer* Office, Newcastle-upon-Tyne.

(1790-1831), working with great enthusiasm. In his after-career every important detail was made the subject of rigid experiments. Bates possessed many friends, but he was not without enemies, made in some instances by his, at that time, unparalleled world-wide reputation as a breeder of fashionable Shorthorns, but also on account of the assertive, "arrogant" way in which he detailed the merits and sounded the praises of his animals, and backed his own methods and beliefs as if they were infallible. The circumstances were all the more irritating to his rivals because there was such a strong foundation of truth underlying much of what he said. The position arose, in a great measure, on account of his infatuation about the Duchess strain, and its asserted monopoly of the purity of Shorthorn blood. An unconcealed keenness for success, even to the discomfort of his neighbours, is not a rare quality among successful prize-winners, and with some modern members of the class it resolves itself at times into a question of money. This could not be said of Bates, as the statement of Cadwallader John Bates is freely admitted, that "the national improvement of Shorthorns as paying farm stock, and not the conversion of his own particular herd into the most money possible, was the unswerving aim of Bates' later life"; and further, it may be said in palliation of his manner, that "a considerable sportive element was mingled in his caustic criticisms of man and beast," and "that his eye had the light of decided genius."

His opinion of his merits as a judge may be gathered from his assertion that "a hundred men may be found to make a Prime Minister to one fit to judge of the real merits of a Shorthorn."

His name is most familiarly associated with the **Duchess** tribe, for which was claimed all the qualities, including that of milk production, which the Shorthorn breed possessed.

The original Bates "Duchess" by "Daisy Bull" (186), bought in calf to "Favourite" for 100 guineas, from Chas. Colling in 1804, was "a deep, rich milker, making as high as 14 lbs. of butter per week, and when fed off at seventeen years of age she is said to have made an excellent carcase of beef."

She was grand-dam to "Duchess 1st," the nominal origin of the family under Bates—"the highest priced and most widely sought after tribe known in Shorthorn history." It was only

when Bates had by intense in-breeding reduced the power of reproduction in the females to the vanishing point, that he introduced the Princess bull "Belvedere" (1706)—one of a number of successful and historic bulls associated with his name. "He had up to 1831 bred but thirty-two Duchess cows in as many years," and of fifty-eight Duchess cows in the herd at his death, twenty-four had never borne a calf. By the Princess and Duchess union Bates almost, if not quite, fulfilled his boast that he "would produce Shorthorns such as the world had never seen." Before this time Sanders says: "The breeding of bulls to their own dams or daughters was a common occurrence" in Bates' practice. Darwin says:—

"For thirteen years he bred most closely in-and-in; but during the next seventeen years, although he had the most exalted notion of his own stock, he thrice infused fresh blood into his herd; it is said he did this not to improve the form of the animals, but on account of their lessened fertility."

Bates' greatest bull was the "Duke of Northumberland" (1940), champion of England in 1842, a roan by "Belvedere" and his daughter "Duchess 34th," descended in the Duchess line from "Comet" (155) and "Favourite" (252), but like the Princess-and-Oxford blend, he retained but little, only 25 per cent., of blood descended from the early Duchess.[1] His live-weight at three years and eight months was 2520 lbs.

The **Oxford** tribe formed the second most important branch of the Bates blood; and the two branches were most intimately related through frequent intercrossing by bulls taken from the one to the other.

The name "Oxfords" originated out of the conspicuous success obtained at the Oxford Royal Agricultural Society's Show in 1839, when Bates carried off four 1st prizes with the "Duke of Northumberland," two Duchess cows (42nd and 43rd), and what was afterwards known as the "Oxford Premium Cow," which gave the name to the tribe. This last was a heifer bred from the historic "Matchem Cow," bought as a four-year-old for £15, 10s. She was got by a Mason-bred sire, which contributed a share of blood to both the Booth and Bates herds. The two Cleveland Lads (3407) and (3408),

[1] "The Princess-and-Oxford crossed stock that acquired fame under the Duchess name in the Shorthorn world were in truth **Bates** cattle, but had only a small percentage of the old Duchess blood."—*Sanders.*

from the "Matchem Cow" by "Short Tail" (2621), were kept as stud bulls, and "constituted the Oxford outcross upon the Duchesses." The "Oxford Premium Cow" and "Oxford 2nd" were kept as ancestresses of the tribe. The "Oxford Premium Cow" was beaten by Thos. Booth's "Necklace" at the Highland Society's Show at Berwick in 1841, being "deficient in girth and gaudy behind"; but in the following year the honour of the Bates herd was retrieved at York by the dam of the "Duke of Northumberland," "Duchess 34th," carrying 50 per cent. of Princess blood. Bates wrote of her merits:—

"As a proof that they have improved under my care, I may mention that the 'Duke of Northumberland's' dam consumes one-third less food than my first Duchess, purchased in 1804, and that her milk yields one-third more butter for each quart of milk, while there is also a greater growth of carcase and an increased aptitude to fatten."

It will be recognised from the foregoing references to **consanguinity** that even a more perfect system of in-and-in breeding was followed by Bates, and continued by his successors, than in the case of the Colling or of the Booth cattle.

Other Bates tribes that call for special mention are:— The Waterloos, distinguished for their thick mellow flesh and furry coats, which contributed one female to the herd of Amos Cruickshank when the Bates cattle were dispersed; Wild Eyes, descended from a roan heifer calf bought in 1832 for £3—the most numerously represented tribe at the dispersion sale; Cambridge (Red) Roses, from the Cambridge Royal Premium Rose Cow; The Foggathorpe family, descended from Charles Colling's "White Bull" (151); Blanche or Roan Duchesses, a famous tribe; The Secrets, creditably represented in the Sittyton herd; The Bell-Bates tribe, bred by tenants of Bates from his stock. At the **Bates sale** in 1850, the year after Bates' death—a very depressed period for British agriculture—only five families were represented. Fourteen Duchesses sold on an average for £116, 5s.; thirteen Oxfords for £68, 16s.; twenty-five Wild Eyes, £48, 2s.; six Waterloos, £59, 10s.; three Cambridge Roses, £49; and seven Foggathorpes for £46, 19s.

The **Bates cattle** were described in the *Farmers' Magazine* as follows:—

"Magnificent size, straight and broad back, arched and

well-sprung ribs, wide bosom, snug shoulder, clean neck, light feet, small head, prominent and bright but placid eyes, were features of usefulness and beauty which distinguished this herd in the very highest degree."

The colours of Bates cattle were originally red, red and white, and roan, but "the concentration of the blood of the light-coloured Belvedere and of the white Matchem Cows' sons—the Cleveland Lads—modified the original Duchess colour," so that at the dispersal sale thirty-eight animals out of sixty-eight were roan and five white. Twelve were red and fifteen red and white. The **Stanwick** cow, which was the mother of all the best of the Bates breed, was a yellowish-red roan. Though good milking power has always been considered a point of importance in Bates cattle, the fact that the common non-pedigreed Shorthorns surpass them in this particular quality, is probably an indication of the influence of close-breeding on the alimentary section of the organs involved in reproduction.

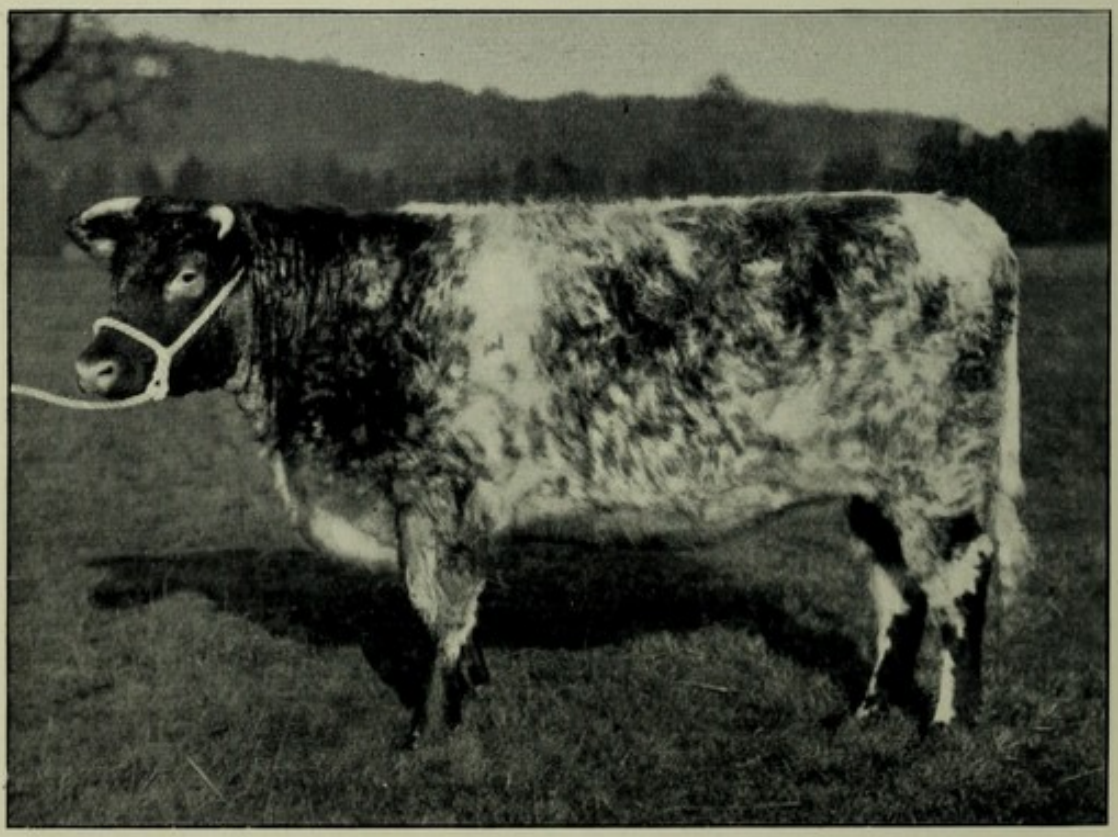
In comparing latter-day Booth with Bates cattle, we find that the Booth breed exhibited a greater number of light-coloured specimens—white, and light roan; a thicker and less silky skin; a more substantial and massive frame, more deeply covered with flesh; the head and neck set on lower, and the style and expression more sombre, than in the case of its stately rival. The best specimens of the Bates bulls possessed a wonderful presence, given by the arched crest and stylish head. The breed was particularly liable to the defect of a hollowness, or falling away, at the heart girth; this was made all the more apparent by the high neck and the frequently perpendicular shoulders. These differences are now mainly of historical interest, as very few pure specimens of either line now exist.

In America, in the early days, the prices paid for Bates cattle were exceptionally high.[1] There, as in our Australian colonies, Bates cattle were much preferred to Booth, but in

[1] In Canada in 1879, the Author saw in the possession of the Hon. M. H. Cochrane, Compton, Prov. Quebec, the famous "Duchess" cow, which at that time had (speaking from memory) bred stock that had sold for £27,500, and lived to add £2508 to that figure. At the New York Mills Sale, in 1873, ninety-three cows and heifers averaged £791, 8s., and sixteen bulls averaged £403, 16s., making a total of £80,061, 9s. Fifteen specimens of the Duchess tribe of T. Bates averaged £3679, 18s.



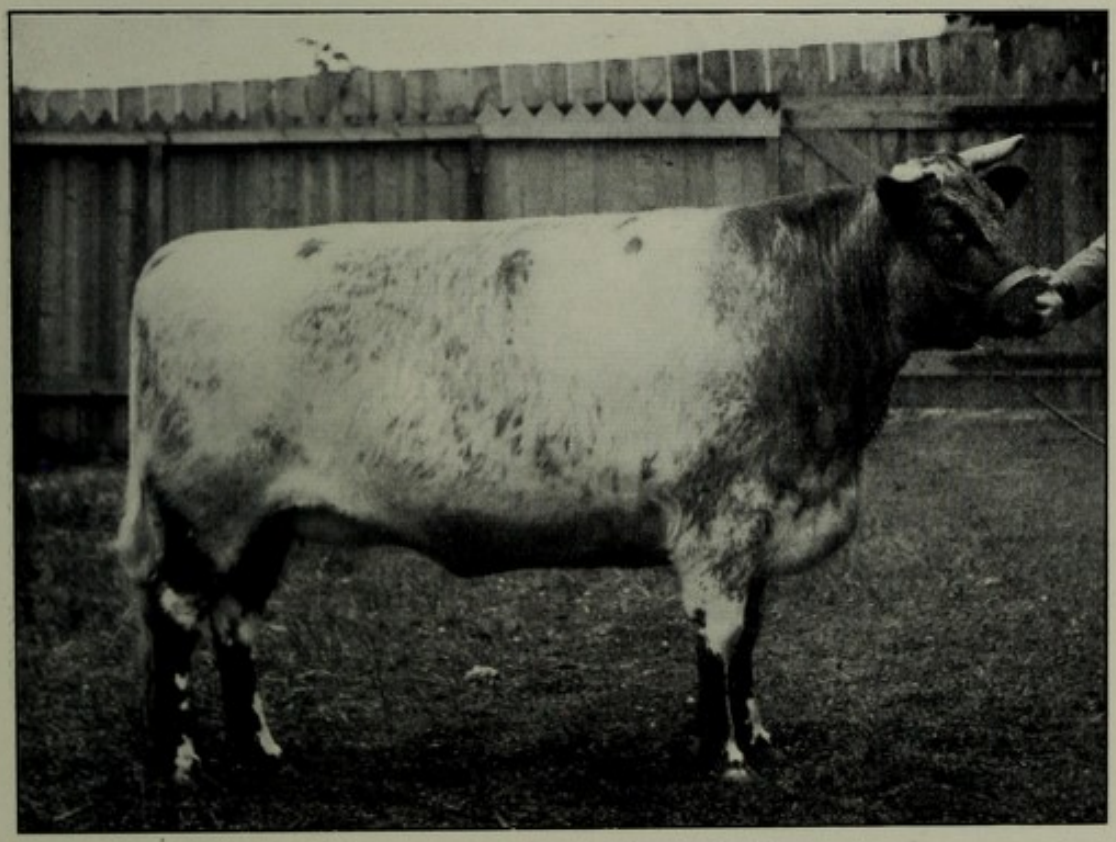
A. Shorthorn Bull, "King Christian of Denmark" (86316).
Of the Townley-Farewell family (three crosses of Cruickshank on Bates blood).
Champion and Challenge Cup winner at Grimsby, 1904, etc. etc.



B. Shorthorn (Scotch) Heifer, "Lady Broadhooks 3rd."
Champion at Oxford Show, 1904, etc. etc.
Both owned by the late Philo L. Mills, Ruddington Hall, Nottingham.
[*Both by C. Reid, Wishaw.*



A. Shorthorn Bull, "Royal Dalesman" (66193) (Milking Type).
Bought by the late Major Barton, Straffan, Co. Dublin, for 150 guineas, at Alnwick Park Sale, 1894.
[*J. Robson, Alnwick.*



B. Shorthorn Heifer, "Flora 6th."
Sixteen times Champion (including the Royal and Highland Shows), and thirty-seven times 1st prize in 1902-3. Owner, Geo. Harrison, Gainford Hall, Darlington.
[*G. H. Parsons, Alsager, Cheshire*

[*pp.* 72 *and* 73

recent years Cruickshank cattle have come into high favour as beef-producers at home and abroad.

Shorthorn breeders other than the Collings, the Booths, and Bates were numerous; they reared good cattle, and some of them from time to time supplied animals to the great masters in the art of breeding. Some even took the lead—Mason and Whitaker for example—in the trade of exporting their own and other favourite and pure-bred Shorthorns to America. The following is a short list of names of early breeders well known in the history of English Shorthorns:—Dobinson; Christopher Mason of Chilton; Earl Spencer; Wetherell of Aldborough, and his two sons, Wm. of Holme House, Darlington, and John of Field House, Yarmouth; Jonas Whitaker, near Otley, Yorkshire; the Joblings; Millbank of Barningham; Maynard of Eryholme; Watson of Manfield; Appleby of Stanwick; Wm. Torr of Riby, Lincolnshire; John Brown of Nunstainton; Sir Chas. Knightley of Fawsley Park, Daventry; Samuel Wiley of Brandsby, Yorkshire; Fawkes of Farnley Hall, near Otley, Yorkshire; and hundreds of others.

CHAPTER IV

SHORTHORNS—*continued*

Introduction of Shorthorns into Scotland — Early Breeders — Amos Cruickshank—Families of Sittyton Shorthorns—Famous Bulls used—Sittyton Sales—Other Early Scotch Breeders—The Herds of Mar and Duthie—Commingling of Cruickshank Blood with that of Booth and of Bates—Average Prices at Auction Sales—Shorthorn Herd Book Differences — The **Dairy Shorthorn (Coates' Herd Book) Association**—Milk Records of Shorthorn Herds—List of Prominent Shorthorn Breeders—**Dexter**-Shorthorns—**Lincoln-Red** Shorthorns —Burton Milk Records—**The Non-Pedigree** Shorthorn—The **Polled Durham** in America.

LOW says of the introduction of improved Shorthorns, Holsteins or Teeswaters, **into Scotland** early in the nineteenth century :—

"This highly cultivated breed extended from the district of the Tees, as from a centre, as soon as its value became known. It quickly spread northwards all through Durham and Northumberland into the valley of the Tweed, and, in later years, it had extended northward through the eastern lowlands of Scotland to the Pentland Firth."

The introduction was carried out by two men, who were contemporaries and intimates of the Collings and other early breeders of repute. The first was **Robertson of Ladykirk,** Coldstream, Berwickshire; and following him, came **John Rennie of Phantassie,** in East Lothian. Rennie contracted an interest in and knowledge of Shorthorns as a farm pupil in Berwickshire, and bought his first cattle from Robertson. The foundation stock of both herds was carefully selected on their individual merits from the country cattle, reared in the original home of the Shorthorn, and mated with bulls got from the Collings and other progressive breeders. Neither would record pedigrees in the *Herd Book*, holding that registration would restrict the choice of breeders to a limited number of animals and put a ban upon an immense number of good cattle. The soundness of judgment of these pioneers is not yet fully realised, although, during subsequent times of

intense consanguineous breeding and pedigree domination, the value of the descendants of their unregistered cattle suffered in consequence. Rennie had the distinction of having sent the first Shorthorn bull to the Aberdeenshire region, now acknowledged to be the fountain-head from which the most highly prized specimens of the breed have been derived during recent years.

Captain Barclay of Ury, on the banks of the Cowie, Aberdeenshire, "the father of Shorthorn breeding in the North," was an all-round sportsman, who took a comprehensive view of country matters and grasped the necessity and the possibility of developing agriculture and with it the great cattle industry of the country, which he exhaustively discussed with Hugh Watson of Keillor and William M'Combie of Tillyfour, of Polled Angus fame. With rare judgment he purchased for £150, at the displenishing sale of Mason of Chilton, "Lady Sarah," the originator of one of the most famous of all Shorthorn strains, to become the progenitor of many of the best Scotch-bred Shorthorns. In 1838 his herd of about eighty cattle, of "great scale and substance," was sold, and realised £3000. This wide distribution among many purchasers of animals of the highest merit at moderate prices gave a wonderful stimulus to the breeding of Shorthorn cattle in the north of Scotland. About two years later, a second herd was started, and his old bull, "Mahomed," was put to selected English cows and heifers. At the time of his dispersal in 1847, it numbered ninety-one, and sold for £2825. It passed into the hands of the Cruickshanks of Sittyton, Campbell of Kinellar, Hutcheson of Monyruy, Hay of Shethin, and buyers of similar type, and exercised no little influence on subsequent Shorthorn history.

To **Amos Cruickshank** (1808-95) **of Sittyton** (12 miles north-west of Aberdeen), aided to some extent by his younger brother Anthony (died 1879), remains the credit of giving the best of the Shorthorn cattle of Scotland a world-wide reputation. **The first essential** of an animal with this "canny Scot" "was a good middle," as an indication of digestive power and vigour of constitution. "A broad, full chest, wide back, and deep ribs were his all-and-all," and no other merits could condone defects in these points. He began, like Robertson and Rennie, with a contempt for

pedigree, and if the animal suited his purpose he paid no heed to strains of blood or lines of descent. He was influenced by no prejudices in favour of Duchesses or any other fashionable or speculative strain, but deliberated exclusively on what would conform best to his circumstances and surroundings. On December 24, 1888, **J. W. Cruickshank** supplied the following note to the Author :—

"What the Aberdeenshire breeders of Shorthorns have always aimed at has been to keep close to the practical object for which cattle are produced. They have always believed that purity of descent and regularity of form and type are absolutely necessary to success, but they have always recognised that no purity of descent and no mere conformity to certain canons of fashion, however desirable they may be in themselves, can in any degree make good the want of individual merit in the most essential points of beef and milk production. The singleness of purpose with which practical usefulness has been kept in view has led to a slightly different valuation of the most desirable qualities in an animal. One hears little about a waxy horn or a noble carriage—though these attributes are not overlooked—because the qualities which denote vigour of constitution and a tendency to mature early are held to be of higher importance. Aberdeenshire breeders have in nearly all cases been tenant farmers who are dependent on their skill and success for their daily bread—their customers have generally been their own neighbours who are raising cattle for the butcher, and hence the breeders have been pulled up in any course which has been proved to be an error of judgment by the most imperative of all necessities."

Diligent search was maintained by Amos Cruickshank, during numerous periodical personal visits, for animals of the type wanted, and his frequent purchases of both males and females were drawn from many of the available sources in distant parts of England as well as from his immediate neighbours. For over twenty years he paid no heed to the methods of breeding introduced by Bakewell and followed by the Collings, Bates, and the Booths, but adopted the system of "Natural Breeding," mating by intuition and foresight, the result of extensive experience, animals suitable for his purpose drawn from the Colling, Booth, Bates and other herds, irrespective of their line of breeding or family connection.

Up till 1860 **the policy** was to purchase stock bulls; consequently the uniformity of type derivable from in-breeding was not a characteristic of the herd, which, however, did not lack robustness of constitution nor quality. The good results which followed the use of one of the most famous of the Cruickshank bulls, "Champion of England" (17526), are said to have altered the policy in favour of the use of **home-bred bulls,** but consanguineous breeding was adopted only with moderation and to a degree which secured benefits without such evil consequences as have followed the excessive practice of it among Booth and Bates cattle.

The following are some of the Shorthorn families which are closely associated with the Sittyton herd, and many of them are names to conjure with in the sale catalogues of the present day: viz.—the Avalanches, Broadhooks, Butterflies, Brawith Buds, Barmpton (and other) Roses, Clippers, Cicelys, Duchess of Gloucesters, Ladies, Lancasters, Lovelys, Lavenders, Nonpareils, Orange Blossoms, Secrets, Spicys, Violets, Venuses, and Victorias.

Bulls were at times **hired** for a season or more, in conformity with the common practice among Shorthorn breeders, and cows and heifers were at one time sent to neighbouring bulls. The first bulls used at Sittyton came from Barclay of Ury.

The following are the **most famous bulls** used by Cruickshank in the order adopted by A. H. Sanders,[1] who also recorded the fact that Cruickshank recognised the great importance of studying the qualities of the dam and granddam of a bull:—"Fairfax Royal" (6987), a rich dark roan, from W. Torr, said to "rank with the famous bull 'Forth' as one of the best bulls ever owned in Aberdeenshire"; "Hudson" (9228), a yellow red, from W. Linton, Sheriff Hutton, Yorks; "Report" (10704), a roan, from S. Wiley of Brandsby; "Velvet Jacket" (10998), a roan, from J. Douglas of Athelstaneford, East Lothian; "Matadore" (11800), a dark roan, from W. Smith, West Rasen, Lincolnshire—a famous bull-getter and own brother to the red roan "Mazurka" cow, which was sold to the United States for $3050; "Plantagenet" (11906), a red and white, from Col. Towneley, through "Douglas," the sire of the heavy milking twin heifers "Virtue" and

[1] *Shorthorn Cattle in the United States and Canada*, by A. H. Sanders. (Sanders Publishing Co., Chicago.)

"Verdure," dams of "Champion of England" (17526) and "Scarlet Velvet" (16916)—two of the greatest sires of Scotch Shorthorns; "Doctor Buckingham" (14405), a red of pure Booth blood, which cost 400 guineas, exported to Kentucky after establishing the Orange Blossom family; "The Baron" (13833), a red, from Richard Chaloner in Ireland, famous as a prize-winner and as a sire of heifers which grew into fine cows but went off early and showed indications of disease or delicacy of constitution; "Baronet" (1614), and "Lancaster Royal" (18167), both sons of "Baron," with more constitution than their sire; "Lord Bathurst" (15173), a roan with white legs, which bred remarkably well—being through his daughters "Violet" and "Vintage" grandsire of "Village Rose" and "Village Belle"—the two best cows by "Champion of England," and in the front rank of the best ever bred by Cruickshank; "Master Butterfly 2nd" (14918)—which was a son of flash show parents, cost 400 guineas, but left stock of little credit to him; "John Bull" (11618), a very long bull, but too high on his legs, which left only two really good cows, "Cressida" and "Jubilee"; "Lord Raglan" (13244), a very valuable bull, bred by Mark Stewart of Southwick, described as "large, stylish, but rather high standing, fertile as a yearling, useless as a two-year-old, and unusually prolific ever after"—sire of three famous cows, "Butterfly 5th," "The Gem," and "Golden Days," this last "the best milker of her time in the herd"; "The Czar" (20947), a red who has, through his daughter "Carmine," become grandsire of the noted "Princess Royal"; "Lancaster Comet" (11663) which came from the superior stock of Wilkinson of Lenton. He was eight years old, and had a large head and "horns of great length," and of almost uniform thickness throughout. Even with these defects he was a good bull. "He stood near the ground, had a beautiful coat of hair, straight top and bottom lines, level quarters, nicely filled thighs, carried plenty of flesh, and was active on his feet." He was in-bred, as his sire and dam had been got by the same bull. He left few calves, but among them was the epoch-making roan bull "Champion of England" (17526), the most successful sire of all the Sittyton sires.

Sanders says of this last:—"One after another of the sons and daughters of this, the greatest stock bull Scotland has

ever known, grew up into cattle of the real rent-paying sort. Pages might be filled with the names, pedigrees, and performances of his descendants in the showyards and breeding-pens of Britain and America, but space will not here permit. Such cows as 'Village Belle,' 'Village Rose,' 'Princess Royal,' 'Morning Star,' 'British Queen,' 'Carmine Rose,' 'Silvery,' 'Mimulus,' 'Surmise,' 'Circassian,' 'Violante,' 'Finella,' and 'Victorine,' would alone suffice to make the reputation of the most ambitious breeder. These and others were retained in the herd. They were robust, thick-fleshed, near to the ground, and possessed a propensity for putting on flesh such as had not been shown by the get of any of his predecessors in service."

"Windsor Augustus" (19157), a roan of Booth blood bred by W. Carr, and used during 1863 and 1864; "Forth" (17866), a light roan, from Sir W. Stirling-Maxwell of Keir, said to be "individually the best bull ever bought for Sittyton," and "the grandest Shorthorn of his time." Although a larger and more finished specimen than "Champion of England," he was not his equal as a sire. But he did good service indirectly to the herd by becoming the sire of "Violet's Forth," an animal that "first drew prominent attention to Cruickshank's breeding in the United States." "Allan" (21172), a red son of "Forth," bred at Keir, which did good work in the herd; "Lord Privy Seal" (16444), a roan sired by a Booth bull and bred at Windsor, which left a few good progenitors; "Prince Albert" (27107) which died of foot-and-mouth disease, and was a serious loss to the herd, as the few heifers he left were of superior excellence. **Other bulls** used that were not bred in the herd between 1866-77 were, "Rob Roy" (22740), "Count Robert" (30812), "Scotch Rose" (25099), "Knight of the Whistle" (26558), "Master Darlington" (37067), "Meridian" (38748), "Ravenshope" (22681), and "General Windsor" (28701).

Among the **home-bred bulls** which were kept to intensify the "Champion of England" blood in the Sittyton herd were—1862, "Caractacus" (19397), a red; 1863, "Grand Monarque" (21867), a roan, sire of "Scotland's Pride," and grandsire of "Pride of the Isles," two of the best of Sittyton sires; 1864, "Royal Oak" (22792), a roan, and "Prince Imperial" (22595), a red; 1865, "Lord Byron" (24363), a red; 1867, "Cæsar Augustus" (25704), a red, of exceptional

merit in the showyard and the herd—some of his daughters, for example, "Azalea," dam of "Field Marshal," being most valuable breeding cows; 1868, "Grand Duke of Gloster" (26288), a roan, considered the best of all the sons of "Champion of England," and sire of the excellent red stock bull "Royal Duke of Gloster" (29864), the most closely bred bull in the herd up to his time. The "Royal Duke" coupled with "Princess Royal"—also a Champion of England cow—produced "Roan Gauntlet" (35284), a pear-headed bull of extraordinary quality and breeding potency, the sire of "Field Marshal"[1] (47870), and, through him, grandsire of "Mario"[2] (51713). "Brampton" (37763) was a son of "Royal Duke of Gloster," who became the sire of "Baron Victor" (45944), a bull which earned a great reputation in Kansas; "Cumberland" (46144), born in 1880, a roan, grandson of the "Royal Duke" by a related Clipper cow, Custard, was also employed in concentrating the Champion blood in the herd. 1868, "Lord Lancaster" (26660), a roan; "Master of Arts" (26867), a roan; and, 1871, "Viceroy" (32764), a roan.

Discussing the success of certain of the progeny, Sanders says (1901):—

"Those representing the cross of 'Champion of England,' upon cows carrying the blood of 'Lord Raglan,' 'Lord Sackville,' and 'Lord Bathurst,' including 'Grand Monarque,' 'Cæsar Augustus,' and 'Grand Duke of Gloster,' were potent factors in bringing the herd to its best estate."

Sanders gives the following **Summary of Sittyton Sales**:—

"During a period of thirty-five years, extending from 1842 to 1876 inclusive, there were sold for breeding purposes, from Sittyton, 1030 bulls at an average of £36, 12s. 9d., and 321 cows and heifers at an average of £32, 14s. 9d.—a total of 1351 animals for £48,247, an average of £35, 14s. From 1877 to 1889, practically the entire surplus of young bulls was sold to the United States and Canada, after the wants of a few regular customers had been supplied. The surplus

[1] "Field Marshal" was a massive 2500-lb. bull, with a good head, wonderful back, ribs, loins, and quarters, but rather bare below; and he and his stock lacked a little of that soft, mellow covering of flesh so highly prized by so many judges.

[2] "Mario," champion of the English Royal in 1888, was, like his sire, hard to the touch. His dam was "Mina 3rd" by "Border Chief" (37874).

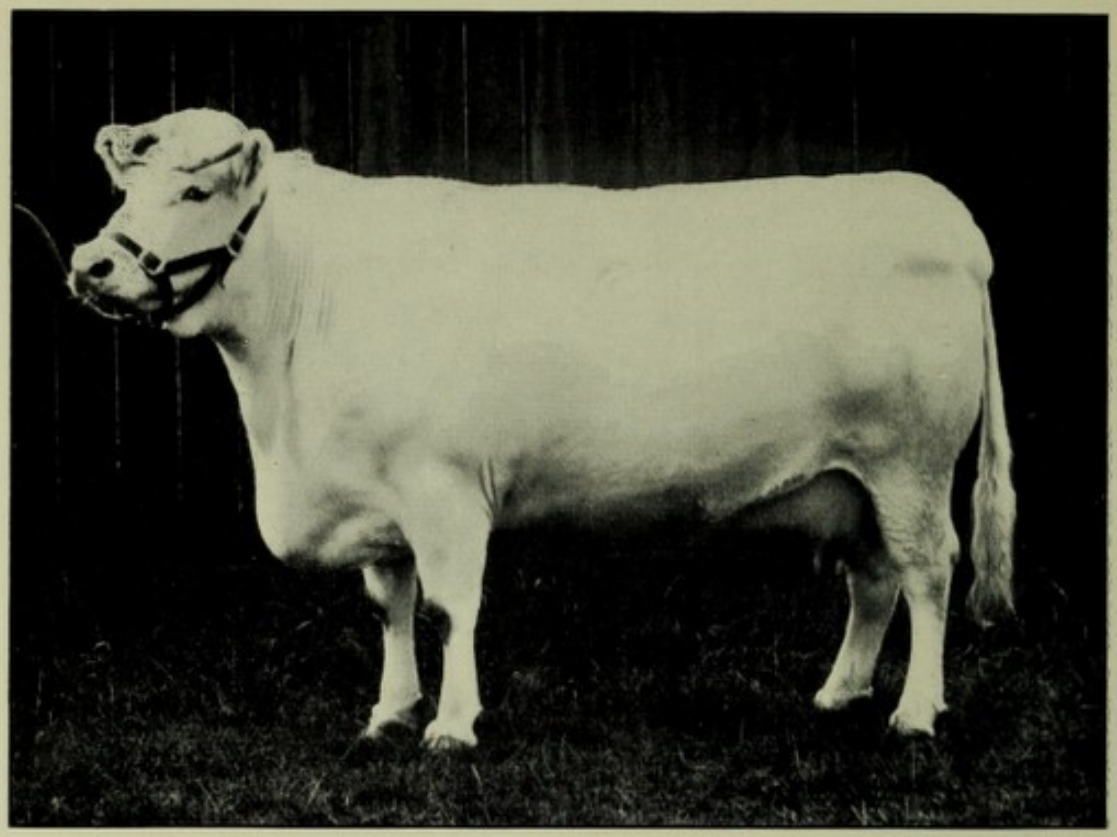


A. Shorthorn Bull, "Field Marshal" (47870).
"The grandest of the latter-day Cruickshank bulls."
Used in the Windsor Herd of Her late Most Gracious Majesty Queen Victoria.
[*G. P. Garland, Windsor.*

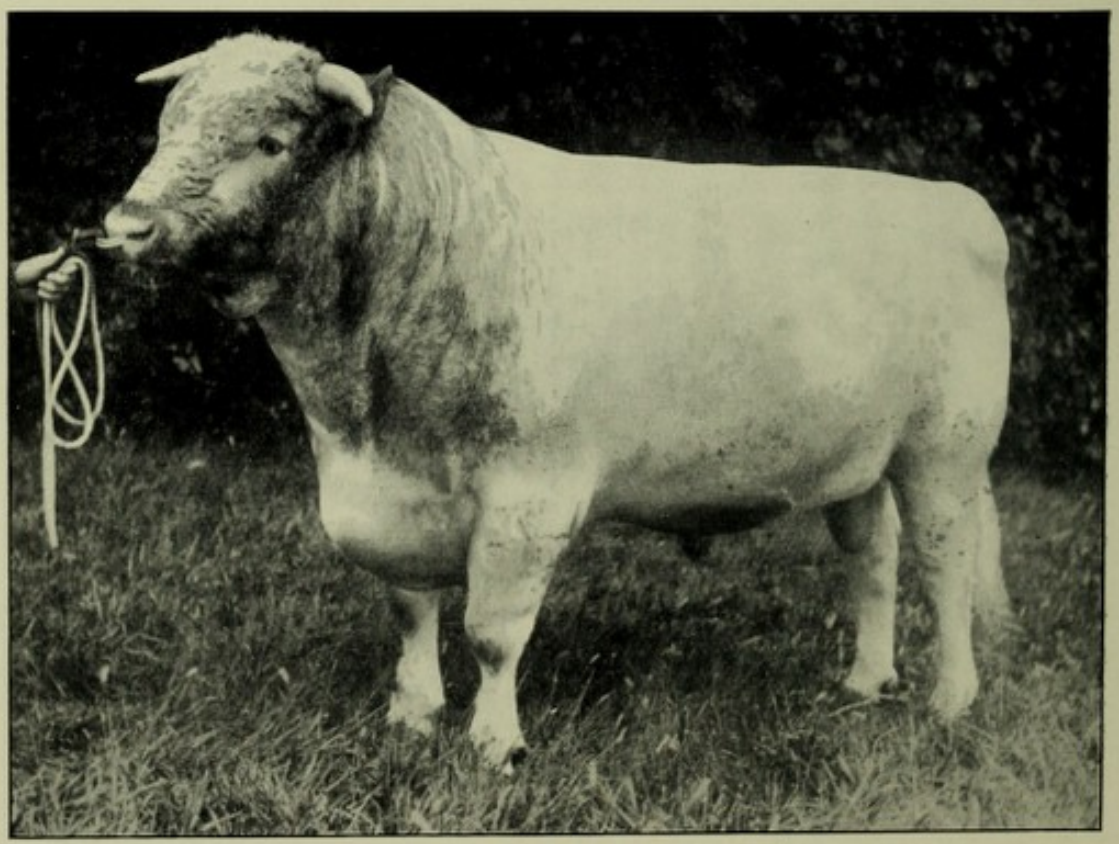


B. Shorthorn Bull, "Star of Morning" (58189).
Bred by W. Duthie, Collynie, N.B. Bought by A M. Gordon of Newton, N.B.

[*p.* 80



A. Shorthorn Cow, "White Heather." Born 1896.
Four times First, and twice Champion, R.A.S.E., winning over £1000 in prizes.
Bred by J. B. Manson, s. "Merry Mason," d. "Beauty XXIV."
Owner, J. Deane Willis, Bapton Manor, Codford St Mary, Wiltshire.
[*G. H. Parsons, Alsager, Cheshire.*



B. Shorthorn Bull, "Mario" (51713).
Champion, R.A.S.E. Show, 1888. Bred by W. Duthie, Collynie, Aberdeenshire.
[*J. Laing & Co., Insch.*

heifers were mostly exported during these same seasons. A close estimate of total sales made from the herd for breeding purposes for the forty-seven years ending in 1889 includes 1912 animals, for which there was received over £68,000."

Among many **other Scotch breeders** who drew their inspirations and much of their change of blood from Sittyton, a few names deserve special mention:—Wm. Duthie, Collynie; W. S. Marr, Upper Mill; Sylvester Campbell, Kineller; J. Bruce, Inverquhomery; The Duke of Richmond, The Duke of Montrose, Lord Lovat,[1] Sir Wm. Stirling Maxwell of Keir; Mark J. Stewart of Southwick; Jas. Douglas, Athelstaneford; Syme of Red Kirk; Mitchell of Alloa; John W. and Edward Cruickshank of Lethenty.

The first **two herds** on the list require more than a passing notice, as through them the main stream of Scotch Shorthorn blood has flowed during recent times. **Marr's handiwork** is still conspicuous in the progeny of tribes of cattle which are of high repute among good Shorthorns, viz., the Maudies, the origin of which was an English cow; the Missies, descended from the old Scotch Barclay type, which is in much demand by many of the best breeders in this country as well as in America; the Princess Royals, a vigorous and strongly represented tribe, also much sought after; the Alexandrinas, from which sprang "Gay Monarch" (92411), the great American champion show bull; the Roan, or Red, Ladies; the Bessies, to whom another remarkable show bull, "Sign of Riches" (60324), belongs; the Claras, "one of the soundest of the old local sorts"; the Emmas, that hold a very high place in the estimation of American breeders; the Goldies, bred from "one of the best Shorthorn cows of her time"; and Sittyton sorts.

Among the **stud bulls** should be mentioned "Heir of Englishman" (24122), a Seraphine bull from G. R. Barclay, and a renowned show champion which brought the Upper Mill herd into popular notice; and "William of Orange" (50694), a very famous bull of Sittyton origin.

William Duthie inherited the mantle of Amos Cruickshank by securing 18 useful Sittyton cows at the breaking up of the

[1] Lord Lovat bred "New Year's Gift" (57796), which was first sold to H.M. Queen Victoria, and bought from the Royal Herd at Windsor by Lord Feversham for 1000 guineas.

herd, which numbered 154 in 1889. James Nelson & Sons of Liverpool bought the herd privately from its owner in his eighty-second year, intending to export it to South America. Duthie secured the animals which were considered too old to ship, and the financial troubles of the time, with which Baring Brothers were associated, resulted in other sections of the herd being kept at home. J. Deane Willis, of Bapton Manor, Wiltshire, for example, bought 33 yearling heifers, or all except 5 Violets, which went to Sutton Nelthorpe of Scawby, Brigg, Lincolnshire. Owing to the success of the progeny of the animals thus retained, Shorthorn breeders of the Old World have reason to be thankful that the intended wholesale shipment was not realised. The Collynie herd had been previously strengthened by the use of the famous Sittyton bull "Field Marshal" already referred to, a bull which, as a calf-getter in Scotland and for some time in the Royal Herd at Windsor, did much to bring Scotch Shorthorns into favour with English breeders.

Commingling Booth and Bates Blood was not generally productive of the immediate results that breeders usually desiderate, and it has been practised to but a limited extent. It is acknowledged that the Booth bull and Bates cow is the most useful combination, though most authorities assert that the two strains have become so divergent that satisfactory progeny are not as a rule to be expected, and that results akin to those to be derived from the mating of two distinct breeds are liable to appear—black noses, for example.

The introduction of Cruickshank blood into both of the old and fixed types has been productive of much more useful consequences, although it has given rise to a great diversity of opinion as well as diversity of experience. The practice is so modern that the full measure of success has not yet been generally realised or attained. It will be sufficient at present to state what appear to be the partially crystallised opinions of leading breeders who have favoured us with their views and experiences. It would appear that the ultimate results of the cross are generally satisfactory with both Booth and Bates lines of blood—the second and third crosses being better than the first. Cruickshank cattle have good appetites, and fatten well. With Booths they produce better bulls and with Bates better females. It is asserted that these Scotch

cattle have remade the constitution of English Shorthorns, and, while shortening their legs, have added to their depth, substance, and wealth of flesh. On Bates cows, with their beautiful heads and stylish carriage, the springing ribs and ample girth of the Cruickshank bulls remove the tribal defect of deficient heart measurement, and the progeny of three Scotch crosses on pure Bates families are in great request for export to the Argentine. The Booth cross brings a very strong quarter from the hook to the tail—a favourite measurement with the butcher. The following are examples of the **criticisms** which are freely made of crossing with Cruickshank blood. It improves the middle, but "puts the animal wrong at both ends." "It has shortened the hind quarters and spoilt the once beautifully chiselled head and curved horns (of Bates cattle), and substituted a mean and 'cocky' horn." Owing to their mixed breeding, "many Scotch bulls are irregular getters and not very impressive sires."[1] "Their hind quarters are short, their bellies big, and their crops defective, and it is necessary to be careful to test for tuberculosis." Scotch crosses are all for flesh, and of little repute as milkers. It is said "the first cross with a West Cumberland cow (widely known for deep milking qualities) takes away the front half of the bag, and the second cross destroys the remainder."

Average Prices at Auction Sales of Shorthorn Cattle in Scotland, twenty-four Years, 1882-1905, from the "Banffshire Journal." (See Appendix F.)

Year.	No. Sold.	Average Price per Head.	Year.	No. Sold.	Average Price per Head.
1882	749	£25 19 6	1894	1,227	£21 6 0
1883	554	29 8 4	1895	1,140	22 9 9
1884	895	28 10 2	1896	1,011	27 9 0
1885	865	24 19 5	1897	1,145	25 17 0
1886	986	21 10 8	1898	1,071	25 18 4
1887	753	21 5 9	1899	1,106	32 16 3
1888	883	21 7 7	1900	915	31 3 5
1889	713	24 6 6	1901	1,079	29 6 10
1890	1,153	25 7 3	1902	1,060	30 16 3
1891	1,172	24 4 1	1903	1,064	33 13 6
1892	815	22 9 2	1904	1,105	51 15 1
1893	881	20 5 6	1905	1,202	43 0 5

[1] J. Deane-Willis has pointed out that "these mixed-bred Scotch bulls are often called Cruickshank, and the latter often bear the blame for the former's deficiencies."

The average for bulls in 1904 was £41, 7s. 7d., and in 1905, £41, 18s. 7d. The difference of £8, 14s. 8d. between the total averages of these two years was mainly due to the decrease in the average price of cows from £79, 14s. 11d. to £39, 18s. 7d.

In Coates' Shorthorn Herd Book—the British record—"no bull is eligible for insertion unless it has *five crosses*, and no cow unless it has *four crosses* of Shorthorn blood, which are, or are eligible to be, inserted in the Herd Book." In the French Herd Book the last sire in the pedigree must have been born in 1830, or before it. In the North-American Shorthorn Herd Book it is necessary that the pedigree of every sire can be traced back to 1872. In the Argentine Shorthorn Herd Book it is essential that the pedigree be traced to 1850, or earlier; *i.e.*, the last sire and the last dam inscribed and named in the pedigree must have been born in or before the year 1850. A great many of the best cattle in this country cannot trace so far back in the female line, as among pure Shorthorn breeders it was not the custom in the early days to record all the female connection. The resulting so-called "short pedigrees" restrict the choice of foreign buyers or exporters to the cattle with long pedigrees, and have been the means of elevating the prices of animals with long pedigrees.

The Dairy Shorthorn (Coates' Herd Book) Association was formed in June 1905, when the following promoters, Sir O. Mosley, Bart., Right Hon. Lord Crewe, C. R. W. Adeane, Richardson Carr, Walter Crosland, R. W. Hobbs, F. Punchard, C. A. Scott-Murray, Rd. Stratton, and G. Taylor, with J. P. Cross and F. N. Webb added, were elected to form a temporary council to draw up the rules of the association which then took being, with Lord Rothschild as president, F. N. Webb as hon. secretary, and a membership of fifty breeders, all members of the Shorthorn Society. The chairman of the inaugural meeting (C. R. W. Adeane) explained that—

"It was necessary something should be done to maintain the position of the Shorthorn as a dairy cow. The farmer required an animal which would yield a large amount of milk, and which was capable at the same time of carrying

flesh; the Dairy Shorthorn was the ideal animal for the purpose. The association would, by offering prizes for milk tests, by securing classes for Dairy Shorthorns, and by recommending judges, do their best to sustain and popularise the Shorthorn for dairy purposes—a breed which had for many years been so justly famous for beef. There was no question of starting a separate Herd Book, and they had the approval of the Shorthorn Council."

That a considerable number of the prominent Shorthorn breeders in the United Kingdom are devoting attention to milking qualities, may be seen from the relative footnote attached to the foregoing list of breeders.

The following **pioneer registered dairy herds** deserve special mention :—

(1) That of James T. Hobbs, at Maisey-Hampton, Fairford, Gloucester, founded 1849, in which the following records were picked from the Herd Register of 1903: "Orange Blossom," 7605 lbs. of milk in 280 days; "Fanny," 8718 lbs. in 280 days; "Bessie," 7003 lbs. in 254 days; "Chorus," 8099 lbs. in 266 days; and "Harmony," 8043 lbs. in 280 days.

(2) The Underley Hall Herd, founded in 1868, the property of Lord Henry Bentinck, near Kirkby Lonsdale (F. Punchard, agent). In the annual records appear the following yields, which were made in 1899: "Daylight 2nd" gave, in 45 weeks, 7503 lbs. of milk; "Moss Rose 2nd," in 47 weeks, 7384 lbs.; "Heroine 3rd," in 50 weeks, 7356 lbs.; "Hully," in 49 weeks, 6692 lbs.; and "Sweet Rose," in 45 weeks, 6805 lbs.

(3) The Babraham Herd of C. R. W. Adeane, Cambridge (F. N. Webb, agent). The annual milk records show the following outstanding yields among twelve pedigree cows between October 1902 and October 1903: "Carrissima 2nd," 6522 lbs. of milk in 39 weeks; "Darlington," 7522 lbs. in 37 weeks; "Lady Darlington," 6679 lbs. in 37 weeks; "Lucy," 7825 lbs. in 46 weeks; and "Princess Raglan," 8566 lbs. in 38 weeks. During 1905, "Lucy," (aged), gave, October 29, 1904 to August 25, 1905, 7963 lbs. of milk—maximum for one day, 37 lbs.; "Dora Darlington," (aged), gave 7091 lbs. of milk, in one day 38 lbs.; "Wild Eyebright 4th" gave, from June 28, 1903 to February 29, 1904, 804 gallons of milk; "Lady

Crystal Bates" gave 6626 lbs. of milk, in one day 44 lbs.; "Beryl" gave, after her third calf, from April 19, 1905 to April 24, 1906, 10143½ lbs. of milk, in one day 57 lbs.; "Oxford Ada" gave, after her third calf, from May 24, 1905 to April 21, 1906, 7442 lbs. of milk, in one day 62 lbs.

The following heifers after their first calf gave:— "Princess Pippin," 4626 lbs. of milk, in one day 25 lbs.; "Lady Coquette," 5711 lbs. of milk, in one day 22 lbs.; "Lady Lucy," 5085 lbs. of milk, in one day 26 lbs.; "Priceless Princess," from January 11, 1905 to February 21, 1906, 8505½ lbs. of milk, in one day 33 lbs.; "Countess Babraham," 5602 lbs. of milk, in one day 30 lbs.

(4) The herd of C. A. Scott Murray, Hambleden, Bucks, gave the following average yield of milk for four years:—

Years.	1901.	1902.	1903.	1904.
	lbs.	lbs.	lbs.	lbs.
Cows after three or more calves . .	7040	7386	7338	7167
Cows after two calves . . .	5201	5053	5587	5969
Cows after one calf		5386	5140	6105

The best cow in the herd is "Maplewell Daisy 2nd," bought at Chester's sale in 1898, after having had two calves. Her record is as follows:—

Date of Calving.	Milk Yield.	Date of Calving.	Milk Yield.
	lbs.		lbs.
May 16th, 1898 . .	8,580	May 7th, 1902 . .	11,444
June 15th, 1899 . .	6,990	May 18th, 1903 . .	8,411
May 17th, 1900 . .	8,250	May 18th, 1904 . .	10,333
April 17th, 1901 . .	10,308	June 23rd, 1905 . .	10,944*

* Her record for 1905-6, up till August 11th, was 10,332 lbs.

(5) The Tring Park Herd of Lord Rothschild (Richardson Carr, agent) was started in 1899 by "buying the best pedigree Shorthorns that could be found," judging by dairying appearances. The record of one year is here given in the same order as published in the *Live Stock Journal* of September 26, 1903, but numbers have been substituted for the names of the cows:—

Shorthorn Cows in the Herd the whole of the Year ending September 26, 1903.

No.	Date of Birth.	Date of last Calf.	Calves.	Total yield in lbs.	Days in Milk.	Average per day in lbs.	Days dry.
1	Oct. 1892	May 1903*	8	7,739	308	25.12	56
2	Dec. 1898	Nov. 1902	2	3,953	345	11.45	19
3	April 1894	May 1903	7	10,063	256	39.30	108
4	Oct. 1898	Sept. 1903*	4	4,196	297	14.12	67
5	Feb. 1895	Aug. 1903	7	8,453	291	29.04	73
6	Oct. 1899	Sept. 1903	2	4,820	329	14.65	35
7	„ 1896	„ 1902	4	9,031	364	24.81	...
8	April 1895	March 1903	6	9,903	339	29.21	25
9	Jan. 1897	April 1903	5	8,767	357	24.65	7
10	Oct. 1897	Feb. 1903	4	10,552	292	36.13	72
11	May 1897	Sept. 1903*	4	4,752	319	14.89	45
12	Nov. 1895	July 1903*	7	7,437	305	24.38	59
13	April 1892	Dec. 1902	8	10,930	291	37.56	73
14	Jan. 1892	Feb. 1903	9	5,497	350	15.70	14
15	April 1897	June 1903	4	6,497	266	24.42	98
16	Feb. 1897	Aug. 1903	2	4,354	343	12.69	21
17	Jan. 1895	„ 1903	6	7,466	316	23.62	48
18	March 1894	Oct. 1902	6	8,365	315	26.55	49
19	Dec. 1890	June 1902	8	8,133	364	22.34	...
20	June 1894	April 1903	6	10,553	284	37.15	80
21	Oct. 1895	Oct. 1902	5	2,295	197	11.64	167
22	April 1893	Aug. 1903	7	7,279	284	25.63	80
23	March 1896	Dec. 1902	5	7,300	296	24.66	68
24	Feb. 1897	June 1903	4	8 017	291	27.54	73
25	Nov. 1898	Jan. 1903	2	5,852	301	19.44	63
26	Feb. 1897	„ 1903	4	6,086	249	24.44	115

* Twins.

Twenty-six cows yielded 188,290 lbs., or an average of 7,241$\frac{3}{4}\frac{1}{0}$ lbs.

8 "Darlington Cranford 3rd" has been in the herd five years, and given a total of 42,026 lbs., or an average of 8,405$\frac{1}{5}$ lbs. per annum.

10 "Darlington Cranford 5th" has been in the herd three years, and given a total of 30,115 lbs., or an average of 10,038$\frac{1}{3}$ lbs. per annum.

13 "Lady Rosedale" has been in the herd five years, and given a total of 46,854 lbs., or an average of 9,370$\frac{4}{5}$ lbs. per annum.

20 "Reverend 4th" has been in the herd six years, and given a total of 59,095 lbs., or an average of 9,849$\frac{1}{6}$ lbs. per annum.

22 "Viscountess Jersey 7th" has been in the herd six years, and given a total of 51,108 lbs., or an average of 8,518 lbs. per annum.

If milk secretion be forced past a certain point, although difficult to fix for any given breed, it is usually done at the cost of the flesh and the constitution, and consequently of the life of the animal, which becomes so thin and prematurely worn that the capital loss, owing to the decrease in value of the cow, is not compensated for by the extra amount of milk produced. Men of experience among milking Shorthorns in breeding dairies have suggested a limit of sixteen quarts a day, but

to this rule there are individual exceptions; for example, the champion Dutch cow at St Louis All World's Fair, which gained 54 lbs. while yielding 13 quarts of milk daily for a period of 120 days. The ideal pedigree Dairy Shorthorn is a general utility or dual-purpose cow, capable of producing 600 to 700 gallons of milk in the season, and when dry, of covering her frame with level flesh so that she may finally sell for a satisfactory price to the feeder or butcher.

The following is a list of names of prominent recent or present Shorthorn breeders. Milking herds are indicated by an (m.); herds in which pure Bates cattle linger, with (Ba.); and Booths by (Bo.):—

His Majesty the King, Windsor Castle and Sandringham (Ba.); Henry Abbot, Thuxton, Norfolk; A. D. Acland, Danesbury, Welwyn (m.); C. R. W. Adeane, Babraham Hall, Cambridge, per F. N. Webb (m.); Albert Agricultural College, Glasnevin, Co. Dublin; John Alexander, Milford, Co. Carlow; Stephen H. Allen, Eastover, Andover (m.); George Anderson, Fingask, Old Meldrum, N.B.; T. A. Anderson, Ballachraggan, Alness, Ross-shire; William Anderson, Saphock, Old Meldrum, N.B.; Daniel Arkell, Butler's Court, Lechlade (m.); W. Arkell, Manor Farm, Kempsford, Fairford (m.); Lord Armstrong, Cragside, Rothbury (Ba.); R. W. Ashburner, Conishead Grange, Ulverston; Alfred Ashworth, Horsley Hall, Gresford; Thomas Atkinson, Redvales, Bury, Lancashire; William Atkinson, Overthwaite, Milnthorpe; E. Baillie, Filleigh, Devon; Hugh Baker, Chedglow, Malmesbury; Lawrence J. Baker, Ottershaw Park, Chertsey, Surrey; Right Hon. Arthur James Balfour, M P., Whittingehame, Prestonkirk, N.B.; Colonel J. W. Balfour, Balfour Castle, Shapansey, Kirkwall, N.B.; Viscount Bangor, Castle Ward, Downpatrick, Co. Down; Lord Barnard, Raby Castle, Darlington; John W. Barnes, Aikbank, Wigton; Joseph Barnes, Baurgh Syke, Wigton; William Barnes, The Street, Wigton; B. L. Barrow, Sydnope Hall, Matlock; Lord Barrymore, Fota Island, Queenstown, Co. Cork; Richard Barter, St Ann's Hill, Cork; Bertram H. Barton, Straffan House, Straffan, Co. Kildare (m.); W. A. Hamar Bass, Byrkley Lodge, Burton-on-Trent; A. F. Basset, Tehidy, Camborne, Cornwall; William Bateman, Beaumont Grange, Halton, Lancaster; Noel Baxendale, Allington, Eastleigh (m.); Earl Beauchamp, Madresfield Court, Malvern; Captain Clive Behrens, Swinton Grange, Malton, Yorks, (m.); Charles Bell, Norley Hall, Norley, Cheshire; G. J. Bell, Standingstone, Wigton; William Bell, Ratcheugh, Alnwick; Lord Henry Bentinck, M.P., Underley Hall, Kirkby Lonsdale; Peter Blundell, Ream Hills, Weeton, Kirkham; Major-General W. D. Bond, Dullerton, Londonderry; Richard Booth, Warlaby, Northallerton (Bo.); William Botterill, Yedingham, Heslerton, York; Hon. D. P. Bouverie, Coleshill House, Highworth; Albert Brassey, M.P., Heythrop Park, Chipping Norton; Arthur Britten, Great Billing, North-

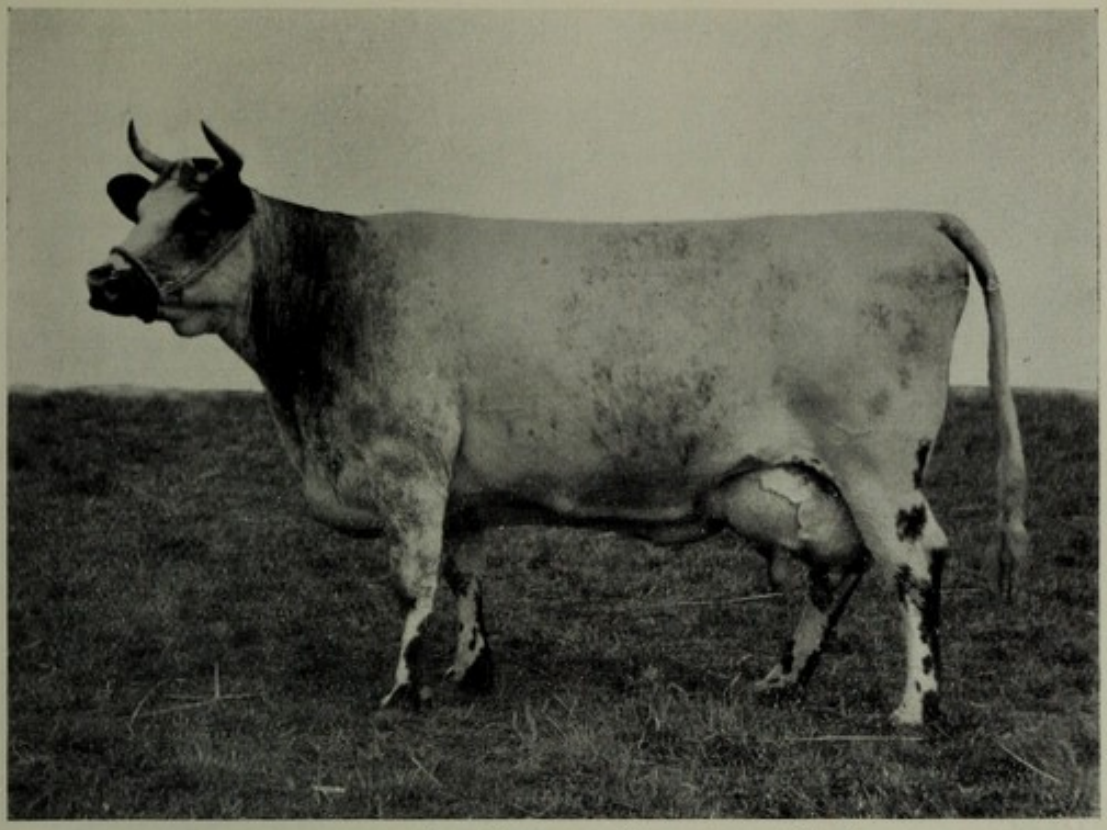


A. Shorthorn Pedigreed Dairy Cow, "Comely Lass."
Won the Shorthorn Society £10 Dairy Prize, Cheshire Show, 1904.
Owner, Sidney Ford, Rose Free Farm, Barthomley, Cheshire.

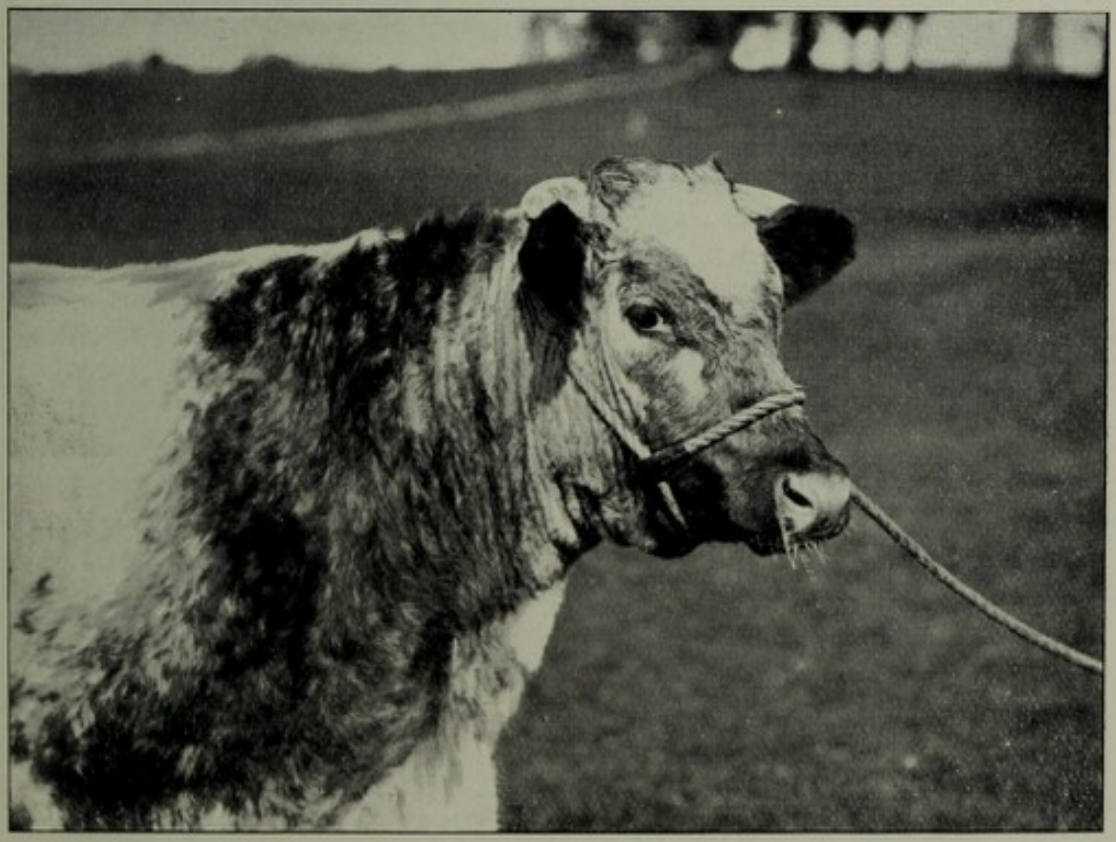


B. Shorthorn Non-Pedigreed Dairy Cow.
First prize in milk, Cheshire Show, Nantwich, 1903.
Owner, J. Hobson, Moss Hall, Audlem.

[*Both by G. H. Parsons, Alsager, Cheshire.*



A. Shorthorn Non-Pedigreed Dairy Cow, "Dot."
Many prizes, including £50 Cup, Royal Lancashire Show, in 1904 and 1905.
Owned by S. S. Raingill, Altrincham.



B. Head of Typical Shorthorn Heifer, "Ada 3rd."

[*Both by G. H. Parsons, Alsager, Cheshire.*

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ampton; John Britten, Little Billing, Northampton; Rev. C. H. Brocklebank, Bartlow House, Bartlow, Cambs (Ba.); Colonel J. F. Brocklehurst, Ranksborough, Oakham; Sir Douglas Brooke, Bart., Colebrooke, Brookeboro', Co. Fermanagh; Lord Brougham and Vaux Brougham, Penrith; David C. Bruce, Byres Farm, Fochabers, N.B.; Robert Bruce, Heatherwick, Inverurie; Henry Bruen, Junr., Oak Park, Carlow, Ireland; Duke of Buccleuch, K.G., K.T., Dalkeith Park, Edinburgh (A. Pearson, agent); Harry Butler, Badminton, Chippenham, (m.); James Byrne, Wallstown Castle, Castletownroche, Co. Cork; Earl of Caledon, Caledon, Co. Tyrone; Lord Calthorpe, Elvetham Park, Winchfield; Archibald Cameron, Westside, Brechin, N.B.; Colin M. Cameron, Balnakyle, Munlochy, Ross-shire; Alexander Campbell, Deystone, Kintore, N.B.; George Campbell, Harthill, Whitehouse, Keig, Aberdeenshire; Sylvester Campbell, Kinellar, Kinaldie, Aberdeenshire; R. G. Carden, Fishmoyne, Templemore, Co. Tipperary; Lord Carew, Castle Boro, Enniscorthy, Co. Wexford; Joseph Carson, Ballydawley, Coagh, Moneymore, Co. Londonderry; J. E. Casswell, Laughton, Folkingham; Lady Cathcart, Cluny Castle, Aberdeen; Victor C. W. Cavendish, M.P., Holker Hall, Cark-in-Cartmel, Carnforth (Ba.); A. Loftus Cliffe, Bellevue, Wexford, Ireland; Jeremiah Colman, Gatton Park, Reigate, Surrey; Henry Theodore Cookson, Sturford Mead, Warminster, Wilts; John Cooper, East Haddon, Northampton; Sir R. P. Cooper, Bart., Shenstone Court, Lichfield; W. C. Cooper, Whittlebury, Towcester; Major R. W. Cradock, Derryc, Roscrea, Co. Tipperary (m.); Major S. Cradock, Hartforth, Richmond, Yorkshire; Walter R. Crawford, The Priory, Tullyhogue, Dungannon, Co. Tyrone; Earl of Crewe, Crewe Hall, Crewe (m.); Alexander Crombie, Woodend, New Machar, Aberdeenshire; late J. P. Cross, Catthorpe Towers, Rugby (m.); W. D. Cruddas, Haughton Castle, Humshaugh, R.S.O., Northumberland (Ba.); A. E. W. Darby, Adcote, Little Ness, Shrewsbury (Bo.); Earl of Dartrey, Dartrey, Co. Monaghan; Richard Davidson, Swinnie, Jedburgh; John Henry Dean, Heath House, Nocton, Lincoln (Ba.); Right Rev. John Delany, Mount Melleray Abbey, Cappoquin, Ireland; Denis Brothers, Charlton House, Wantage (Ba.); Sydney Dennis, Latton, Cricklade, Wilts; E. H. M. Denny, Bore Place, Chiddingstone, Edenbridge, Kent; Frederick A. Denny, Bore Place, Chiddingstone, Edenbridge, Kent; John Dent, Kaber Fold, Kirkby Stephen, Westmorland; Miss Alice de Rothschild, Waddesdon Manor, Aylesbury; Leopold de Rothschild, Ascott, Leighton Buzzard; Viscount de Vesci, Abbey Leix, Queen's County; F. E. C. Dobson, Dromonby House, Stokesley, Yorkshire; Marquis of Downshire, Easthampstead Park, Wokingham (Ba.); C. M. Doyne, Wells, Gorey, Co. Wexford (Bo.); Henry Dudding, Riby Grove, Stallingborough; Walter H. O. Duncombe, Waresley Park, Sandy; James Durno, Jackston, Rothie-Norman, N.B.; James Durno, Westertown, Warthill, N.B.; William Duthie, Collynie, Tarves, N.B.; Alexander Dyke, Coombeslade, Sibford Gower, Banbury; Thomas B. Earle, Aldbro' Hall, Darlington; William Ekin, Ballymoil, Coagh, Moneymore, Ireland; J. A. K. Falconer, Long Sutton House, Winchfield,

Hants; Earl of Feversham, Duncombe Park, Helmsley (Ba.); Lord Fitzhardinge, Berkeley Castle, Gloucestershire (Ba.); Earl Fitzwilliam, Coollattin Park, Shillelagh, Co. Wicklow; Hon. H. W. Fitzwilliam Wigganthorpe, York (Bo.); James Douglas Fletcher, Rosehaugh, Avoch, N.B. (Ba.); Right Hon. F. J. S. Foljambe, Osberton Hall, Worksop; John Edgar Footman, Hafodwen, Carmarthen; George Freeman, Sherborne, Northleach; George Mason Gale, Atwick, Hull; W. T. Garne, Aldsworth, Northleach; George Gerrard, Offerton, Hindlip, Worcester (m.); Sir John Gilmour, Bart., Lundin and Montrave, Leven, Fifeshire (m.); A. M. Gordon, Newton, Insch, Aberdeenshire; Alexander T. Gordon, Combscauseway, Insch, Aberdeenshire; James A. Gordon, Arabella, Nigg Station, N.B.; J. W. Gordon-Oswald, Aigas, Beauly, N.B.; A. G. Graham, Maxtone, Redgorton, Perth; William Graham, Eden Grove, Kirkbythore, Penrith; Sir Arthur H. Grant, Bart., Monymusk, Aberdeenshire; G. Smith Grant, Minmore and Auchorachan, Glenlivet, Banffshire; F. W. Graves, Pound Farm, Newington, Hythe (m.); D. Abbot Green, Fingringhoe Hall, Colchester (Ba.); Walpole Greenwell, Marden Park, Woldingham, Surrey; G. G. Gunter, Wetherby Grange, Yorkshire (Ba.); Alfred A. Haley, Whitewall, Malton, Yorks; A. C. Hall, The Manor, Great Rollright, Chipping Norton; Charles O. Hall, Settrington House, Malton, Yorks; Major W. J. Hamilton, Castle Hamilton, Killeshandra, Co. Cavan; John Handley, Green Head, Milnthorpe; Dr Vaughan Harley, Walton Hall, Bletchley, Bucks; Joseph Harris, Brackenburgh Tower, Carlisle (Ba.); George Harrison, Gainford Hall, Darlington; John W. Harrison, Underpark, Lealholm, Grosmont, Yorkshire; Captain W. B. Harrison, Aldershaw, Lichfield; J. R. Hay, Little Ythsie, Tarves, N.B.; Walter Hazell, Walton Grange, Aylesbury; William Heaton, Lostock Junction, Bolton, Lancashire; Sir Alexander Henderson, Bart., M.P., Buscot Park, Faringdon (Ba., m.); William Henderson, East Elrington, Haydon Bridge; Alfred Hewlett, Haseley Manor, Warwick; Sidney Hill, Langford House, Langford, Somerset; Charles A. Hirst, Crake Hall, Allerston Marshes, Pickering; A. Hiscock, Junr., Manor Farm, Motcombe, Shaftesbury (m.); James T. Hobbs, Maisey Hampton, Fairford (m.); R. W. Hobbs, Kelmscott, Lechlade (m.); T. L. Hodgins, Brookvale, Maryborough, Queen's Country, Ireland; James Horlick, Cowley Manor, Cheltenham; Robert Hornsby, Hovingham, York; W. J. Hosken, Pulsack, Hayle, Cornwall (Ba.); Alfred Hughes, Packwood Grange, Dorridge, Birmingham (m.); David Hume, Barrelwell, Brechin, N.B.; R. H. P. Hutchinson, Husbands Bosworth, Rugby (m.); T. H. Hutchinson, Manor House, Catterick (Bo.); Mrs W. F. Inge, Thorpe, Tamworth; William James, Barteliver, Grampound Road, Cornwall; Frederick H. Jennings, Cockfield Hall, Bury St Edmunds (m.); Colonel C. J. Johnston, Lesmurdie, Elgin, N.B.; C. H. Jolliffe, Newbus Grange, Darlington; C. W. Kellock, Highfields, Audlem, Cheshire; Colonel Sir Nigel Kingscote, G.C.V.O., K.C.B., Kingscote, Wotton-under-Edge (Ba.); A. M. Kirker, Craigavad, Co. Down; John Langham, Stroxton, Grantham; Earl of Lathom, Lathom House, Ormskirk (Ba.); Arthur W. Law, Mains of Sanquhar, Forres, N.B.;

C. E. Law, Holl Farm, Boharm, Keith, N.B. ; late Sir Wilfrid Lawson, Bart., M.P., Brayton Hall, Carlisle ; Joseph Lee, Congalton, Drem, N.B. ; Thomas Leefe, Fryton, Slingsby, York ; Herbert Leney, Smith's Hill, West Farleigh, Kent ; H. S. Leon, Bletchley Park, Bucks ; T. E. Lewis-Bowen, Clynfiew, Boncath, Pembrokeshire ; Lord Lilford, Lilford Hall, Oundle ; Lord Lovat, Beaufort Castle, Beauly, N.B. ; J. D. Lumsden, Huntingtowerfield, Perth ; C. R. Lynn, 3 Castlegate, Grantham ; M. M. McCausland, Drenagh, Limavady, Co. Londonderry ; T. A. McClure, Rose Lodge, Killylea, Co. Armagh ; Horatio R. Macrae, Clunes, Inverness ; James McWilliam, Garbity, Orton Station, N.B. ; William T. Malcolm, Dunmore Home Farm, Larbert, N.B. ; J. B. Manson, Kilblean, Old Meldrum, N.B. ; Earl Manvers, Thoresby Park, Ollerton, Notts ; John Marr, Cairnbrogie, Old Meldrum, N.B. ; Albert J. Marshall, Bridgebank, Stranraer ; Edward Mason, Watercrook, Natland, Kendal (m.) ; W. B. Meatheringham, Holbeach Marsh, Holbeach, Lincolnshire ; James Merson, Craigwillie, Huntly, N.B. ; Lord Middleton, Birdsall House, York (Ba.) ; T. S. Minton, Montford, Shrewsbury ; W. A. Mitchell, Auchnagathle, Whitehouse, Aberdeen ; Lord Moreton, Sarsden House, Chipping Norton (Ba., m.) ; C. Morgan-Richardson, Morgenau, Rhos Hill, R.S.O., Pembrokeshire ; James Morrison, Phingask, Fraserburgh, N.B. ; John Morton, Skelsmergh Hall, Kendal ; Sir Oswald Mosley, Bart., Rolleston Hall, Burton-on-Trent (m.) ; J. J. Moubray, Naemoor, Rumbling Bridge, N.B. (Bo.) ; Anketell Moutray, Killybrick, Favour Royal, Aughnacloy, Ireland ; Charles Munro, Aberfeldy, Perthshire ; Alexander Murray, Old Manse, Boyndie, Banff ; C. A. Scott Murray, The Manor House, Hambleden, Henley-on-Thames (m.) ; Henry B. Murray, Ardnaveigh, Antrim, Ireland ; James Murray, Touchadam and Polmaise, Stirling, N.B. ; John Murray, Mains of Lessendrum, Huntly, N.B. ; Captain D. H. Mytton, Garth, Welshpool ; late John Naylor, Leighton Hall, Welshpool; S. F. M. Nevett, Yorton Villa, Harmer Hill, Shropshire ; A. F. Nichol, Bradford, Belford, Northumberland ; J. T. Nickels, The Day House, Shrewsbury ; Earl of Northbrook, Stratton Park, Micheldever Station ; Duke of Northumberland, K.G., Alnwick Castle (John Patten, agent) (Bo.); William Parkin-Moore, Whitehall, Mealsgate, Cumberland ; Sir W. J. Paul, Bart., Ballyglan, Waterford ; Thomas Pears, Dorrington, Lincoln (Bo.) ; Lord Penrhyn, Penrhyn Castle, Bangor ; H. F. Perkins, Hadnock Court, Monmouth ; W. D. Petch, Smylett Hall, Pocklington ; James A. Peter, Brown's Mill Farm, Berkeley, Gloucestershire (Ba.) ; William Peterkin, Dunglass, Conon Bridge, N.B. ; Frederick Phillips, Manor House, Shipton Sollars, Andoversford ; late R. Pinder, Whitewell, Oakham ; Frederick Platt, Barnby Manor, Newark ; Lord Polwarth, Mertoun House, St Boswells, N.B. (Bo.) ; Edmund Potter, Lowfields, Kirkby Lonsdale ; Earl of Powis, Powis Castle, Welshpool ; John Adney Preece, Drayton Home Farm, Thrapston ; Lord Rathdonnell, Drumcar, Dunleer, Co. Louth (Bo.) ; Benjamin Read, Church Farm, Cam, Dursley, Glos, (m.) ; J. L. Reid, Cromleybank, Ellon, N.B. ; Frederick Reynard, Sunderlandwick, Driffield ; Francis Rhodes, Brockhampton Park,

Andoversford, R.S.O., Glos. (m.); Duke of Richmond and Gordon, K.G., Gordon Castle, Fochabers, N.B.; Alexander Robertson, Haugh of Ballechin, Ballinluig, N.B.; Miss G. Rose, Mullaghmore, Monaghan, Ireland; H. F. Rose, Holme Rose, Fort George Station, N.B.; Thomas F. Roskruge, Tehidy Barton, Redruth, Cornwall; John Ross, Millcraig, Alness, N.B.; Lord Rothschild, Tring Park, Tring (Richardson Carr, agent) (m.); R. R. Rothwell, Moss Farm, Hoole, Preston; Earl of Sefton, Croxteth, Liverpool; Lord Sherborne, Sherborne House, Northleach, Gloucestershire; T. B. Silcock, Thornton Hall, Poulton-le-Fylde (m.); Francis Simmers, Whiteside, Tullynessle, Alford, N.B.; Sir Hugh H. Smiley, Bart., Ardmore, Larne, Co. Antrim; Henry Smith, Junr., The Cottage, Cropwell Butler, Nottingham; Hon. W. F. D. Smith, M.P., Greenlands, Henley-on-Thames (m.); William Snowball, Knapton Carr, Knapton Station, York; Sanders Spencer, Holywell Manor, St Ives, Hunts; John James Stamper, Highfield House, Nunnington, Yorkshire; Miss K. A. Staples, Dunmore, Durrow, Queen's County; Sir A. C. Stepney, Bart., The Dell, Llanelly; F. J. Stewart, White Hall Farm, Brigstock, Thrapston; Duncan Stewart, Millhills, Crieff; Captain Archibald Stirling, Keir, Dunblane, N.B.; C. H. Graham Stirling, Strowan, Crieff; Thomas Stokes, Warmington, Oundle; Herbert Straker, Hartforth Grange, Richmond, Yorkshire; R. Stratton, The Duffryn, Newport, Mon. (m.); J. M. Strickland, Warren House, Brandsby Easingwold; Earl of Suffolk and Berkshire, Charlton Park, Malmesbury; Sir John Swinburne, Bart., Capheaton, Newcastle-on-Tyne (Ba.); Lindsey Talbot-Crosbie, Ardfert Abbey, Ardfert, Ireland (m.); George Taylor, Cranford, Middlesex (m.); Robert Taylor, Carlogie, Carnoustie, N.B.; George M. Thompson, Bellaghy, Co. Londonderry; R. Heywood Thompson, Nunwick Hall, Penrith; Dr R. N. Thompson, Kindlestown, Delgany, Co. Wicklow; H. J. C. Toler-Aylward, Shankill Castle, Kilkenny, Ireland; J. C. Toppin, Musgrave Hall, Skelton, Penrith; Lord Tredegar, Tredegar Park, Newport, Monmouthshire; W. H. Tremaine, Sherborne, Northleach, R.S.O., Gloucestershire; Robert Turner, Cairnton of Boyndie, Portsoy, N.B.; G. W. Tyser, Oakfield, Mortimer, R.S.O., Berkshire (m.); John Waind, Ankness, Kirkby Moorside; George Walker, Tillygreig, Udny, Aberdeenshire; Miss Walsh, Cootehill, Ireland; Marquis of Waterford, Curraghmore, Portlaw, Co. Waterford; Alexander Watson, Bruceland, Elgin; Herbert Webb, Melton Ross, Barnetby Junction, Lincoln (Ba.); Thomas R. Wilkins, The Grove, Longton, Preston; George C. Williams, Llanrumney Hall, Cardiff; Henry Williams, Moor Park, Harrogate; J. D. Willis, Bapton Manor, Codford St Mary, Wilts; Sir W. H. Wills, Bart., Coombe Lodge, Blagdon, R.S.O., Somerset; John Wilson, Castle Park, Huntly, N.B.; H. B. Wilson-Slator, Whitehill, Edgeworthstown, Co. Longford; Thomas Winter, Lotherton Park Farm, Aberford, Leeds; C. E. Wodehouse, Woolmers Park, Hertford (m.); Rowland Wood, Clapton, Thrapston; R. G. Wordsworth, Duffcarrig, Gorey, Co. Wexford; Robert Wright (R. and W. Wright), Nocton Heath, Lincoln; Lord Wrottesley, Wrottesley, Wolverhampton; James G. Young, Cadboll,

Fearn, N.B. ; John Young, Tilbouries, Maryculter, N.B. ; Wm. Young, Fenaghy, Cullybackey, Co. Antrim.

The Straffan herd of **Dexter-Shorthorns** was originated about 1860 by Major Barton, on his estate in Ireland, when a Dexter heifer was put to a pedigree Shorthorn bull. For many years all the male calves were castrated, and a well-bred Shorthorn bull of a short-legged compact type was used. About thirty-five years after this experiment began, Shorthorn bulls were discontinued ; but the progeny of the crosses then eligible for the *Herd Book*, which had tended in succeeding generations to become shorter in the leg, were mated together with satisfactory results. The type has been retained and perpetuated, and the cows continue to be excellent milkers, with a wonderful tendency to put on flesh if a short time idle. If an occasional calf comes rather long in its legs, it is not bred from. There is a curious blending of certain distinguishing characteristics of the two originally very distinct breeds. Cows yield 18 to 22 quarts of very rich milk daily. This property and the stature remain Dexter, but the great substance and the faculty for beef production are unquestionably of Shorthorn origin. The colours are those of the darker Shorthorn strains : the black of the Kerry on the one hand, and the white of certain types of Shorthorn on the other, are both absent. Indebtedness for those facts is acknowledged to Thomas Milne, who manages the herd at Straffan, Co. Kildare.

Lincolnshire Red Shorthorns. Low's statement in *Domesticated Animals of the British Isles* (1845), under the heading "Shorthorned Breed," appears to throw light on the origin of the Lincoln Reds and their well-known aptitude as dairy cattle :—

"In the fens of Lincolnshire, and the other tracts of alluvial country towards the Wash, the cattle were of great bulk and coarse figure, and had usually a dingy colour of skin, and short blunt horns. More inland, and following the course northward of the Vale of Trent, and thence across the Ouse, through the central plains of Yorkshire, to the river Tees and beyond it, the cattle assumed a less gross and unwieldy form, but were still a very tall race, of varied colours, with horns of medium length, but which might be

termed short with relation to the same parts in the Long-horned breed.

"In comparing these varieties of cattle with the races of the opposite continent, the large dingy breed of the fens may be compared with the native black cattle of the flats and marshes of Holland; and the more varied kinds north of the Humber with those of Holstein and Jutland, whence the finest cattle of the North of Europe have been derived. . . . But at a long subsequent period, near our own times, it appears that cattle were frequently brought from the opposite continent, and mingled with the native varieties. They were chiefly imported from Holland, the cows of which country were the most celebrated of all others in the North of Europe, for the abundance of milk and their uses for the dairy."

It has been already shown that the refining of the Shorthorn breed and concentrating the characteristic known as "quality," began in Durham and North Yorkshire, and that, from this fountain flowed in many directions the best Shorthorn blood. Three bulls were secured at the Collings' sale in 1810 for Lincolnshire; and, following the common practice of the time, the service of many other bulls were no doubt hired from leading Shorthorn breeders to run for a season among the old Lincolnshire herds.

Thomas Turnell, Beasley, Wragby, before the beginning of the nineteenth century owned, on the authority of Arthur Young, a very excellent herd of cattle of medium size, which "originally came from the neighbourhood of Darlington"—the centre of the home of the improved Shorthorn. Turnell may be credited with leading the fashion for a deep cherry-red colour of hair, now so much appreciated among export cattle. Other early successful breeders were—Baumber of Somersby, Cartwright of Tathwell, Oliver of Eresby, and Lord Willoughby de Eresby—the last introducing them to the extreme south of the county.

"The Lincolnshire type of Shorthorns (says the preface to the *Lincolnshire Red Shorthorn Association Herd Register*) is now distinguished by its length of frame, good constitution, great hardiness, capacity for milk, and great weight of carcase; 8 to 10 cwts. being usual weights for grass-fed three-year-old bullocks, and up to 24 cwts. for stall-fed cattle."

There is an **annual sale of bulls** at the **Lincoln** April Fair, held under the auspices of the Association where the

uniform type of the breed can be studied. Although in the early days of Shorthorn **registration** the Lincolnshire breeders prided themselves in refusing to enter their cattle in *Coates' Herd Book*, still records of the leading herds have been privately kept for over a hundred years. The necessity for a Lincolnshire **herd register** arose from the fact that a large proportion of the best animals of unmixed blood were not eligible for *Coates' Shorthorn Herd Book* — although a limited number of Lincoln Red cattle are eligible for both records. The strain is rapidly developing into one of the best lines of **milking cattle** in England, in spite of the milk-degenerating effect of the long established custom of allowing the cows to rear their own calves.

The Burton milk records relating to the registered Lincoln Red Shorthorn Herd of John Evens, Burton, near Lincoln, are the most complete we have been able to find of this breed. The records of the cows that calved during 1904 are reproduced *in extenso*, as an inducement to others to follow the good example. The milk is weighed twice daily.

Notes relating to Milk Records on page 96

a "Quality III.," 2nd, Saxilby, 1903; 1st, Saxilby, 1904; 2nd, Newark, and 2nd, Lincolnshire, dairy cows, 1905.

b "Young Cherry," 3rd, milking, Dublin; 1st and challenge cup, milking, Belfast, 1904.

c "Star II.," 2nd open class, and 1st Tenant Farmers' class, milking trials, Oxfordshire, 1905.

d "Dolly II.," 2nd, milking test, Royal Counties, 1905.

e "C. Star III.," 1st and chalienge cup, milking, Dublin; 4th, milking, Belfast; 2nd, milking (Tenant Farmers), Oxfordshire, 1902.

f "Maud," 1st, group class, London Dairy Show, 1901; 2nd, milking, Dublin; 2nd, milking, Belfast, 1903; 4th, Dublin, 1904.

g "Dairymaid V.," 1st, milking, Royal Counties (Guildford); 1st, dairy cow, Royal Show of England, 1904; 3rd, Peterboro', dairy cows, 1905.

h "Dairymaid III.," 1st and challenge cup, milking trials, Royal Dublin, 1904.

i "Spotted III.," 1st, open class milking trials, Oxfordshire, 1904.

j "Buttercup," 1st, Tenant Farmers, Oxfordshire, 1904; 1st, milking test, Tring, 1905; 2nd, Tenant Farmers' butter test, Tring, 1905.

k "Rose IV.," 4th, dairy cow, Lincolnshire; and 3rd, Newark, 1904; 1st, dairy cow, Lincolnshire, 1905.

l "Primrose," 1st, group class, London Dairy Show, 1900, and same also in 1901.

m "Pansy III.," cup, best dairy cow, Clumber; H.C., butter test, Royal Show, 1904.

n "Spot II.," 1st, open class, milking trials, Oxfordshire (Bicester), 1903.

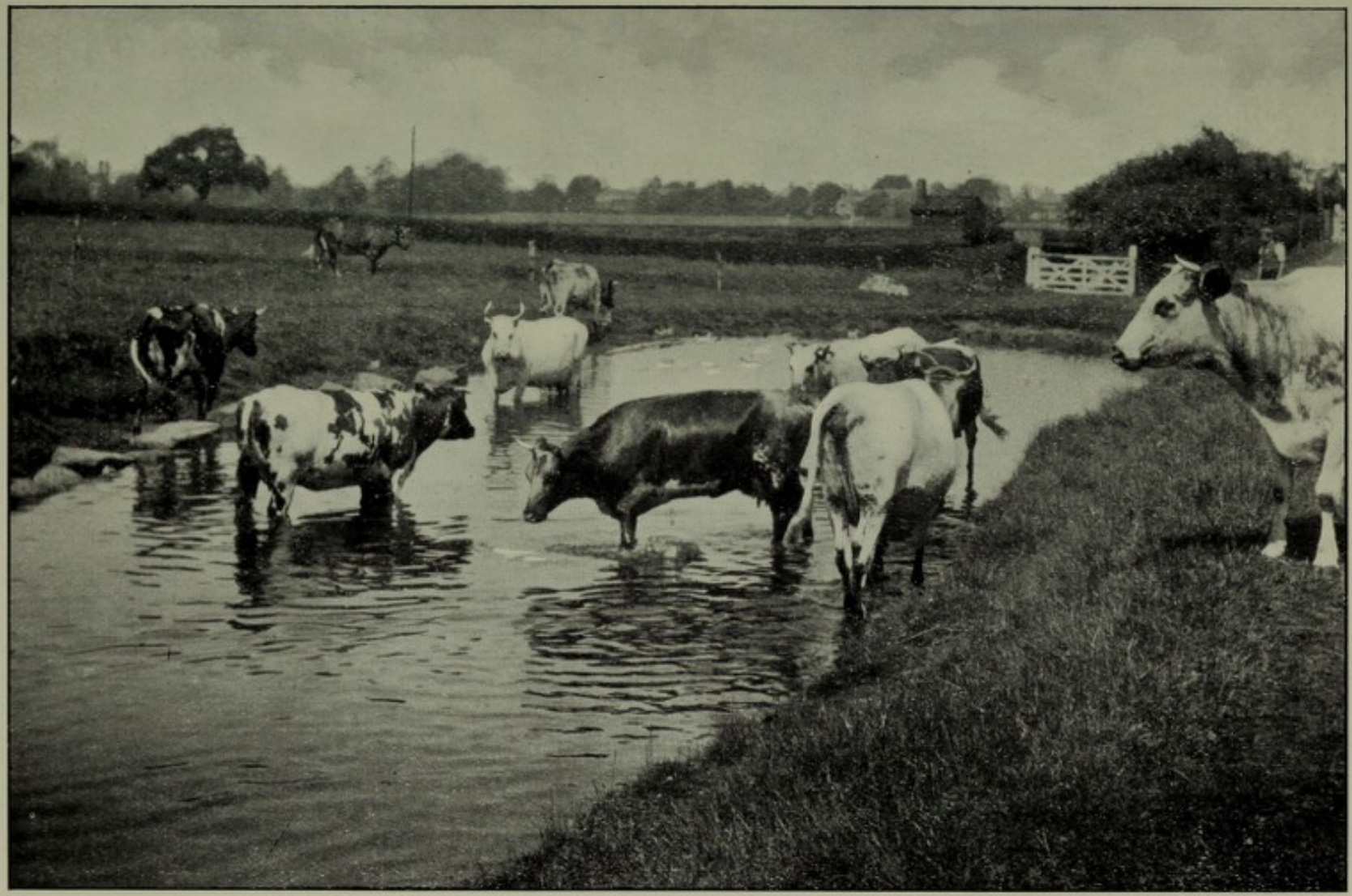
Table of Burton Milk Records

Cow's number in stall.	Name of Cow.	Date of Calving, 1904.	Calf.	Total yield in lbs.	Days in Milk.	Average per day in lbs.
14*a*	"Quality III."	Jan. 7	1st	4,285	217	19.7
9	"Chance II."	Feb. 5	4th	9,860	280	35.2
3*b*	"Young Cherry"	,, 27	2nd	14,464	350	41.3
1	"Lady Burton"	,, 28	5th	10,044	294	34.1
33*c*	"Star II."	Mar. 1	2nd	7,303	266	27.4
34	"Cork II."	,, 4	4th	9,014	322	27.9
16*d*	"Dolly II."	,, 9	3rd	7,688	280	27.4
25*e*	"C. Star III."	,, 14	5th	8,186	266	30.7
32*f*	"Maud"	,, 14	4th	7,141	217	32.9
30*g*	"Dairymaid V."	,, 17	3rd	8,065	238	33.8
2	"Iris"	,, 21	4th	8,560	301	28.4
4*h*	"Dairymaid III."	,, 27	5th	10,848	322	33.6
19*i*	"Spotted III."	,, 28	3rd	7,079	266	26.6
3*j*	"Buttercup"	April 16	3rd	11,848	350	33.8
20*k*	"Rose IV."	,, 20	1st	4,340	189	22.9
7*l*	"Primrose"	,, 21	4th	8,629	294	29.3
23*m*	"Pansy III."	May 7	3rd	7,971	259	30.7
26*n*	"Spot II."	,, 14	4th	9,328	280	33.3
18*o*	"Ruby IV."	,, 20	4th	11,588	378	30.6
22	"Ruby Spot II."	June 2	1st	5,399	266	20.2
15*p*	"Profitable II."	,, 6	3rd	7,893	308	25.6
24*q*	"C. Star II."	,, 7	5th	7,050	224	31.4
21*r*	"Vic II."	,, 16	3rd	11,714	385	30.4
5*s*	"Fleet II."	,, 25	6th	10,512	357	29.6
29*t*	"Creamy"	,, 20	5th	6,674	217	30.7
8*u*	"Cross II."	July 5	5th	10,715	322	33.2
10	"Carnation III."	,, 7	1st	6,964	280	24.8
11*v*	"Jessie V."	,, 31	2nd	6,601	259	25.4
28*w*	"Cowslip II."	Aug. 2	5th	5,151	224	22.9
14	"Chance"	,, 9	6th	6,755	252	26.7
26*x*	"Marjorie"	,, 12	6th	6,584	294	22.3
17*y*	"Ruby Spot"	,, 22	5th	7,765	266	29.1
20*z*	"Beauty II."	,, 28	1st	12,348	420	29.4
6	"Prophetess II."	Sept. 10	3rd	9,352	329	28.4
2	"Ruddy V."	Oct. 9	1st	7,972	315	25.3
9	"Nancy II."	,, 13	3rd	10,874	336	32.3
27	"Carnation II."	,, 24	2nd	6,806	266	25.5
5	"Fleet III."	,, 25	2nd	4,758	231	20.5
32	"Peony III."	Nov. 12	1st	9,133	336	27.1
33	"Brownie"	,, 13	4th	9,105	280	32.5
31	"Ruby VI."	,, 18	2nd	8,950	329	27.2
38*	"Profit"	Dec. 7	7th	11,716	315	37.1
35	"Molly Fox VI."	,, 11	1st	5,115	252	20.2

Forty-three cows yielded 362,147 lbs. of milk, or an average per cow of 842 gallons (including eight first calf heifers).

o "Ruby IV.," 1st, dairy class, Lincolnshire, at Lincoln; 1st, special best Lincoln red dairy cow, Lincolnshire; "Ruby IV." and "Nancy," Pearks' silver bowl for best pair of dairy cows, Lincolnshire, 1903; 2nd, milking, Royal Counties at Guildford, 1904.

p "Profitable II.," 4th, dairy class, Lincolnshire, and reserve for Pearks' bowl, 1903; H.C., butter test, Royal Show, 1903.



CHESHIRE DAIRY CATTLE.
Owned by T. Cotton, Hole House, Alsager.

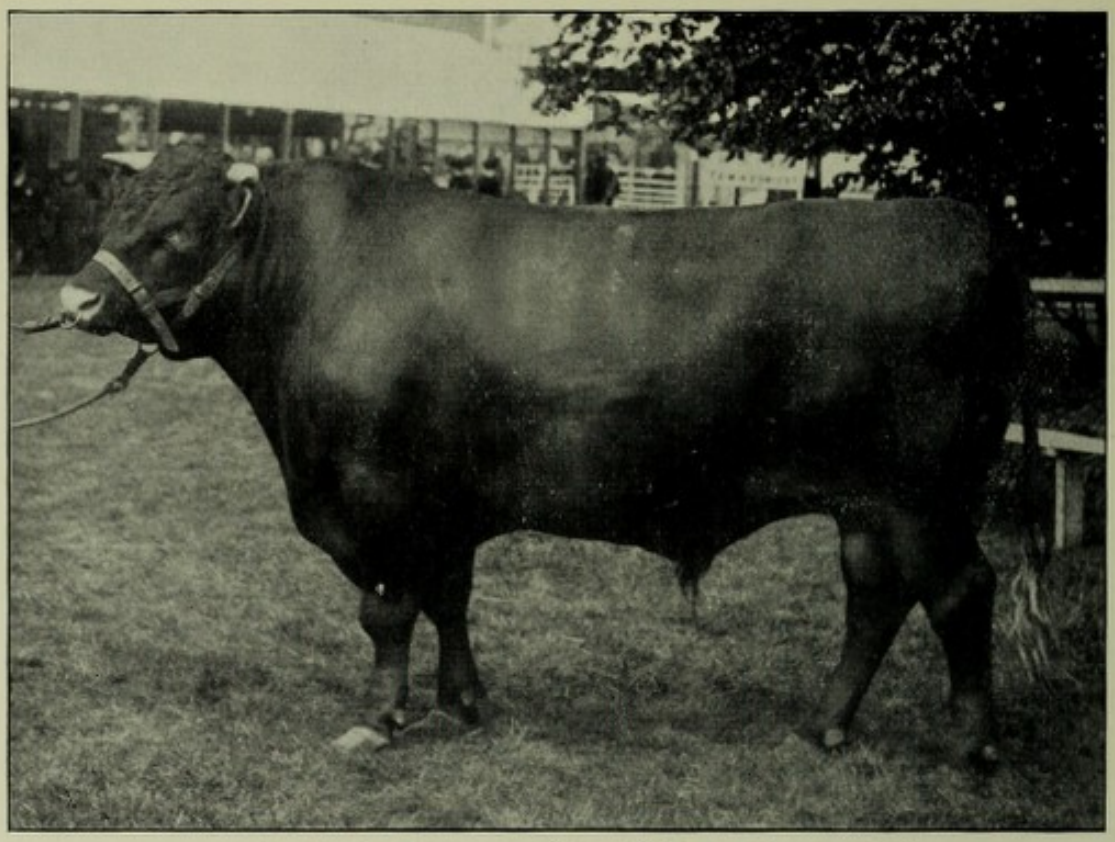
G. H. Parsons, Alsager, Cheshire.



A. Dexter-Shorthorn Heifer.
Three years old. Five Crosses from a Dexter Cow by Shorthorn Bulls.



B. Dexter-Shorthorn Bull, "Tiny Tim."
Fifth Cross by Shorthorn Bulls from a Dexter Cow. Height at shoulder, 4 ft. ½ in.; length, shoulder-top to tail-head, 4 ft. 3 in.; girth, 7 ft. 3 in.; dewlap, 13 inches from the ground.



A. Lincoln-Red Shorthorn Bull, "Weston Monarch II."
First, B. and W. Show, 1905. Owned by S. Crawley, Hemington, Oundle, Northants.
[*G. H. Parsons, Alsager, Cheshire.*



B. Lincoln-Red Shorthorn Cow "Stenigot Violet II."
Bred by R. & R. Chatterton.
[*C. Reid, Wishaw.*

q "C. Star II.," 1st, milking, Royal Counties, Southampton ; 2nd, dairy class, Lincolnshire ; 3rd, Lincoln red cow class, Lincolnshire, 1903 ; H.C., butter test, Royal, London ; 3rd, Lincolnshire dairy class, 1904.

r "Vic II.," 1st, milking (Tenant Farmers), Oxfordshire, 1903.

s "Fleet II.," 2nd, open class milking, Oxfordshire, 1902 ; 1st and challenge cup, milking, Dublin ; 1st and challenge cup, milking, Belfast, 1903 ; 4th, milking, 3rd, inspection, Tring ; 1st, Shorthorn butter test, London Dairy Show, 1904 ; 4th, London Dairy Show, and H.C., butter test, London Dairy Show, 1905.

t "Creamy," 1st and challenge cup, milking trials, Belfast ; 4th, milking trials, Dublin ; 3rd, Tenants Farmers' butter test and milking trials, Tring, 1902 ; 1st, dairy class, Lincolnshire, 1905.

u "Cross II.," 2nd, dairy class, Lincolnshire ; 2nd, milking, Tring ; 2nd, butter test, 4th, inspection, London Dairy Show, 1904 ; 2nd, inspection, 2nd, milking test, 2nd, Tenant Farmers, London Dairy Show, 1905.

v "Jessie V.," 3rd, heifers, London Dairy Show, 1903.

w "Cowslip II.," 2nd, Saxilby, 1903.

x "Marjorie," 1st, milking (open class), Oxfordshire, 1901.

y "Ruby Spot," 1st, milking (Tenant Farmers), Oxfordshire, 1901 ; 1st, milking, Bath and West of England, Plymouth, 1902 ; 2nd, butter test, Bath and West of England, Plymouth, 1902 ; 4th, milking, Tring ; 3rd, inspection, Tring, 1903 ; 4th, milking trials, 4th, butter test, 4th, inspection, London Dairy Show, 1904.

z "Beauty II.," 1st, heifers, London Dairy Show, 1904.

* "Profit," 2nd, inspection, 2nd, butter test, 1st, milking, Lord Mayor's champion cup and Barham challenge cup, London Dairy Show, 1897.

Also won in 1905 :

"Primrose II.," 1st and challenge cup, at the Royal Dublin Society's Spring Show milking tests, with a total of 110 points : her yield of milk on the first day being 57 lbs. 4 ozs., and on the second, 60 lbs. 12 ozs., with just over 4 per cent. butter-fat ; 1st, open class, milking, Oxfordshire ; 1st, Lincoln red, milking, Royal Show.

"Saltfleet Favourite," 1st, Royal Show ; 2nd, Lincoln red, milking, Royal Show ; 1st, Bath and West of England Show ; 2nd, Peterboro' Show.

"Rose V.," 1st, heifers, London Dairy Show.

"Violet II.," 2nd, heifers, London Dairy Show.

"Dolly III.," 1st, milking heifers, London Dairy Show.

"Violet II.," 2nd, milking heifers, London Dairy Show.

"Peony," 2nd, cows, Saxilby.

"Spotted IV.," 3rd, heifers, Saxilby.

31	cows	calving	in 1890	averaged	740	gallons per cow.
35	,,	,,	1891	,,	720	,,
34	,,	,,	1892	,,	795	,,
38	,,	,,	1893	,,	732	,,
39	,,	,,	1894	,,	834	,,
43	,,	,,	1895	,,	867	,,
43	,,	,,	1896	,,	889	,,
36	,,	,,	1897	,,	881	,,
38	,,	,,	1898	,,	824	,,
34	,,	,,	1899	,,	860	,,
36	,,	,,	1900	,,	785	,,
48	,,	,,	1901	,,	758	,,
40	,,	,,	1902	,,	776	,,
42	,,	,,	1903	,,	780	,,
43	,,	,,	1904	,,	842	,,

BULLS USED IN 1904 AND 1905.

"Burton Rex" (2131), bred at Burton. His dam, "Coa-Fox," yielded over 5000 gallons of milk after her five calves.

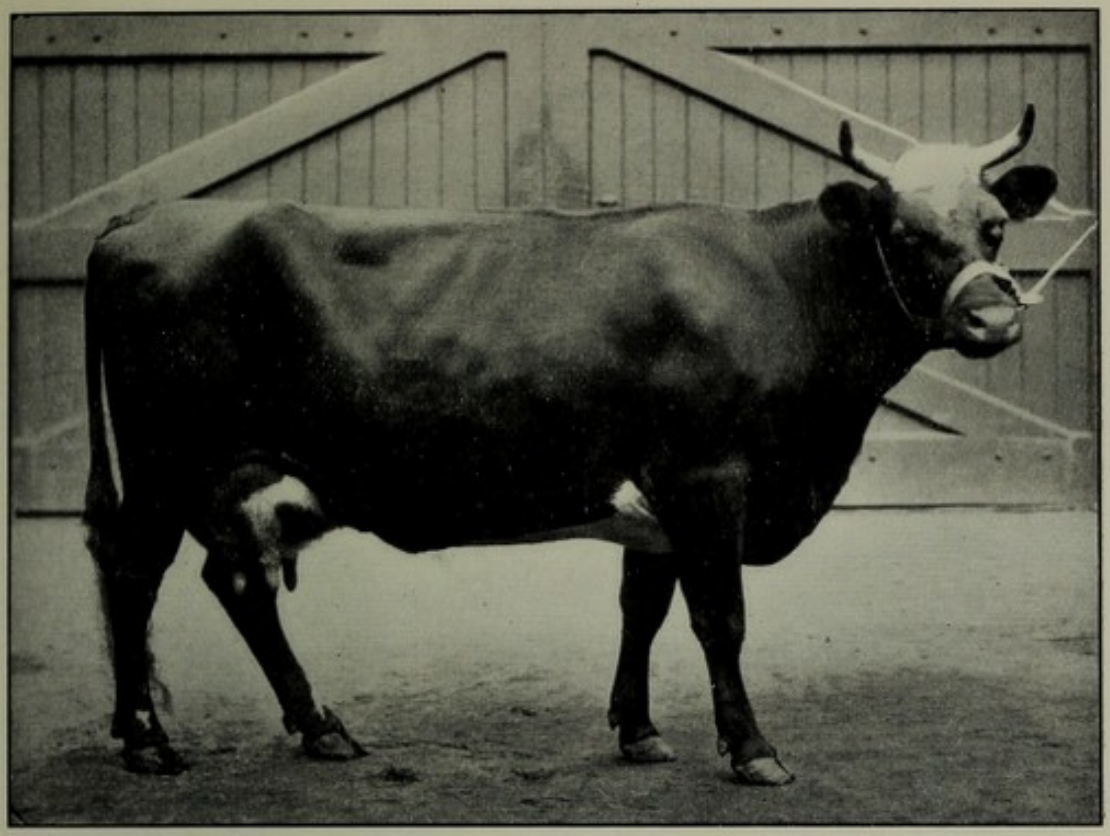
"Scampton Expansion" (4093), cost 130 guineas. A 1st prize Royal winner, from a fine Dairy Cow, and sold to Chili for 200 guineas.

"Burton Challenger" (3265). £150 refused for this bull when ten months old. Dam, "Burton Margaret": the biggest and best Dairy Cow ever owned in the Burton Herd. She holds the record for milk producing at Tring—7½ gallons in 24 hours—the largest trials in England. After her fourth calf she gave 1534 gallons of milk; after her fifth calf she gave 1258 gallons of milk: an average of over 4 gallons per day.

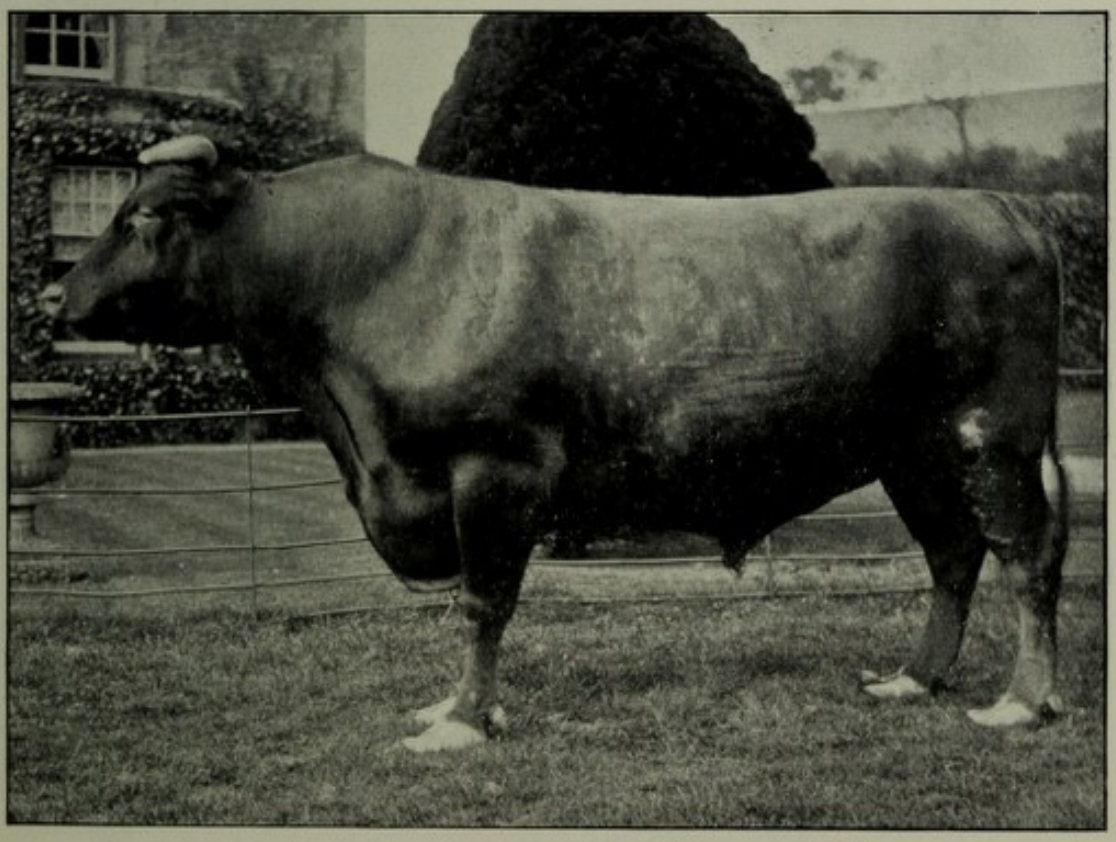
"Burton Carl" (3777). Sire, "Burton Rex"; dam, "Dolly II.," the best Show Cow in the Herd.

The non-pedigree Shorthorn is bred to greatest perfection on a large scale in the more sheltered dales and the lowland country of the North and West of England—chiefly Cumberland, Westmorland, Lancashire, and Yorkshire. Milch cows of the older type of Teeswater cattle are there reared and sold when at their prime, after the fourth or fifth calf, to supply the needs of town dairies such as those of Edinburgh and Leith, Glasgow, and other large centres of population in Scotland, the North of England, and London, where there is a ready demand for milk at high prices for immediate consumption. The Yorkshire cows are smaller than the West Country cows, but they show good Shorthorn quality, and are deep milkers. For animals of large size and strong bone the districts about Kendal and Preston are noted.

In the higher valleys, the recent home of the hardy Longhorn (see page 107), where the climate is too severe for the pure Shorthorn to give satisfactory results, crossing with Scotch West Highland cows has been very successful, but the progeny are more appreciated at home than in the town dairies, although a few are found there under the name of "half Scots." They are large framed and rough coated, and are good milkers, although the udders may be badly shaped. The dark-greys, which are often produced by a light-coloured Shorthorn bull on a black West Highland cow, are in favour on their merits as hardy general-purpose cattle. The progeny of the cross cows are not very reliable breeders about the second or third generation. As the bulls are selected from what have been recognised as pure Shorthorns for generations, and from heavy milking cows, the great



A. Lincoln-Red Shorthorn Cow, "Darling 12th."
The property of Hon. Lionel W. Rothschild, per Richardson Carr, Tring Park, Herts.



B. Lincoln-Red Shorthorn Bull, "Professor" (200).
Owned by John Evens, Burton, near Lincoln.

[*p*. 98

majority of the cattle are pure though not with pedigree record. Any connection with *Coates' Herd Book* is a very poor recommendation to the ordinary practical dairy farmer in the non-pedigree Shorthorn country, and reduces the value in the dairy cattle market of animals of both sexes. Many of the cattle are light in colour, and a favourite colour for a bull is a light mealy roan (Plate XVIII.). Cows of the best class are sold to go out of the district at or round £20; conspicuous specimens, to be trained for showing, fetch up to £30 and £35. There is an unlimited demand for heifer calves at £2 each—a white calf, not being in favour, may fetch only 25s. Heifers calve at three years old on the uplands, but at two in the vales, and are at that age most likely to develop into good milkers. The milking qualities of this section of the Shorthorn breed are dealt with at page 306.

The Polled Durham is an offshoot of the Shorthorn breed which originated in the State of Ohio about 1870, and which has been cultivated on account of the advantages derived from the absence of horns on the open range and in a country where both store and fat animals frequently travel far to market. (See footnote, p. 150.)

The breed consists of two distinct sections—(*a*) **double** standard, and (*b*) **single** standard. The first are pure bred Shorthorns eligible for registration in the *American Shorthorn Herd Book* and in the *Polled Durham Herd Book*. The second were bred from native "Muley" cows, crossed through succeeding generations with pure Shorthorn bulls until they are now practically pure by crossing.

Muley cattle are, according to H. F. Euren, the descendants of the hornless cattle taken from East Anglia to Virginia by colonists who, on settling, called the district Norfolk. At that time there was on the western borders of Suffolk a polled breed of heavy milkers of the Shorthorn type.

Professor H. W. Mumford, of Illinois University, confirms the Shorthorn relationship on the score of appearance, and adds to the authoritative record of the breed as follows:—

"All along the Potomac, in Virginia, 'muleys' are numerous, and they are found occasionally in other sections of the country. Just what the origin of these native muleys was, it is not our purpose to discuss, but a majority of them

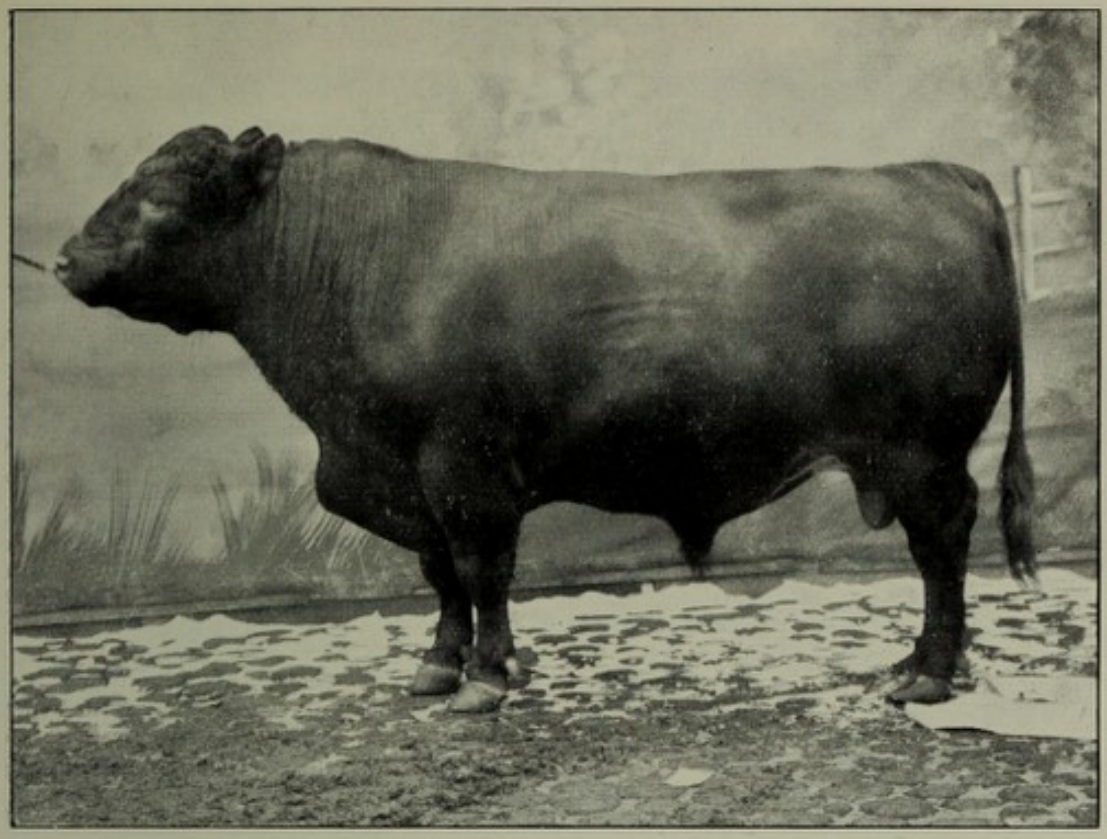
give abundant evidence of carrying high percentages of Shorthorn blood.

"'Native muley' cows were selected which conformed as closely as possible to the Shorthorn type. These were mated with registered Shorthorn bulls, and the female offspring if polled reserved for the breeding herd. This line of breeding was continued for from three to six generations, when the polled cattle thus produced were mated in order to fix the polled characteristic. Founders of the breed report that it was necessary to discard large numbers of the cattle produced in this way, as many did not compare favourably with the Shorthorn's individual merit. Many, too, were not polled. The plan, then, was grading up with the Shorthorn and not cross-breeding. The majority of Shorthorn breeders looked with much disfavour upon this venture of certain men to produce a hornless type of Shorthorn. A notable exception to this was that now venerable breeder of Shorthorns, William Warfield, of Kentucky.

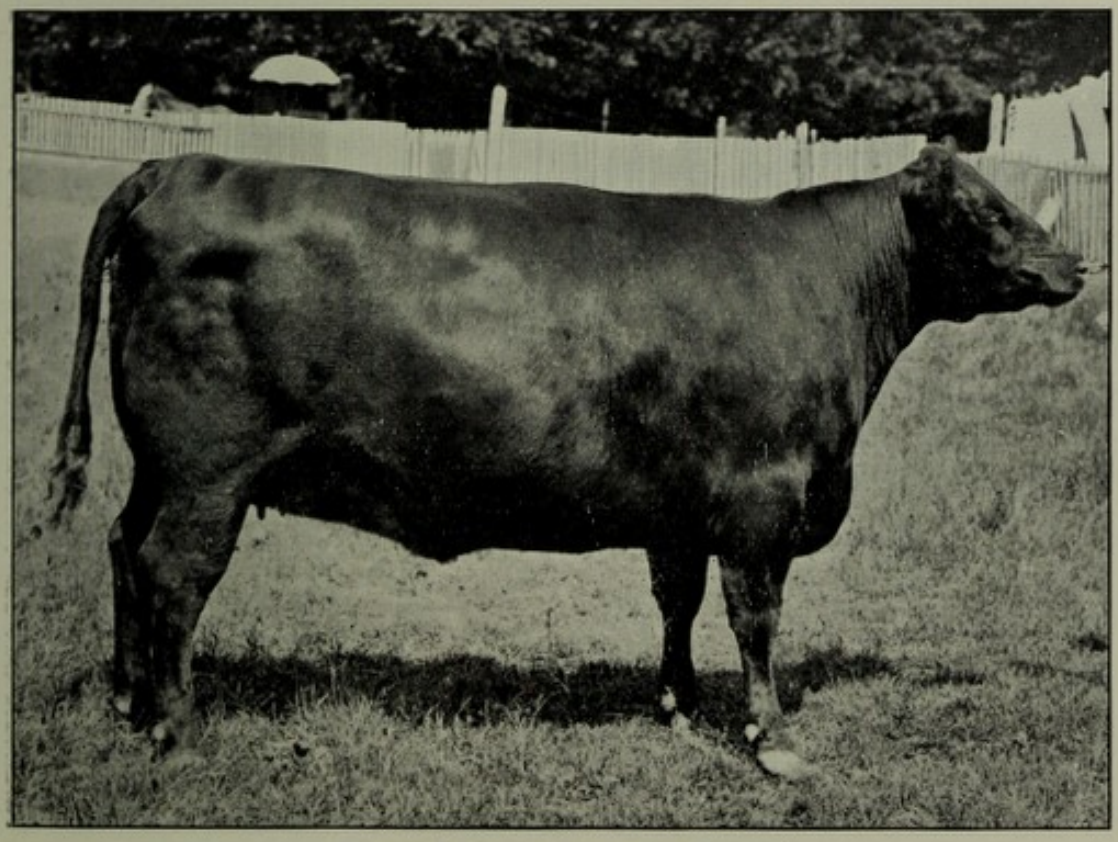
"In the early history of the breed, many outsiders suggested the use of cross-bred Shorthorn Red Polled bulls to hasten the fixing of the polled characteristics. These animals were, however, not used, nor were they admitted to the first volume of the record."

Regulation four of the *American Herd Book of Polled Durham Cattle* says:—"They must not have less than 87½ per cent. of Shorthorn blood after 1893, 93¾ per cent. after 1896, and 97⅞ per cent. after 1899." Also conditional upon the animal being one year old, without horns, and possessed of the "colour and markings characteristic of the Shorthorn."

The *Farmers' Tribune* (U.S.A.) explains that:—"The **pure-bred branch** of Polled Durhams has come of three families, viz., White Rose, Young Phyllis, and Gwynnes. The honour of founding a family of hornless Shorthorns rests upon 'Oakwood Gwynne 4th' (vol. xv., page 803). She was a roan cow of the Gwynne family, bred by W. S. King of Minneapolis, Minn. She had very light horns or scurs, yet she produced three calves (1881-83) that were entirely hornless, when bred to the '7th Duke of Hillhurst' (34221)—a superior animal and a pure Duchess, closely related to the cow that sold for $40,600 at the New York Mills Sale—the result was two heifer calves—'Mollie' and 'Nellie Gwynne' (vol. xxxiii., page 728)—both entirely hornless. She was then bred to 'Bright Eyes Duke' (31894), and the result was a polled red bull calf, recorded as 'King of Kine' (87412). **W. S. Miller of Elmore,** Ohio, bought 'Mollie' and 'Nelli' Gwynne' and 'King of Kine' (all descended from 'Medorae)



A. Polled Durham Bull, "Tolden Hero."



B. Polled Durham Heifer, "Lorna."
Both the property of the Miller Stock Farm (J. H. Miller), Pem., Indiana, U.S.A.

in the spring of 1888. Captain Miller added to his herd from the Kirklevington Rose of Sharon, Young Mary, and Phyllis families, and used 'King of Kine' at the head of his herd, for three years, and 90 per cent. of his calves from horned cows were hornless. Then for two years he used 'Ottawa Duke' (109292 or 185, P.D.H.B.), sired by 'King of Kine,' dam 'Nellie Gwynne.' He was bred to horned cows, but every one of his calves were hornless."

The American Polled Durham Breeders' Association was formed in Chicago in 1889, but not incorporated till November 1890, with William W. Crane, of Ohio, as president. It was not till 1893, at the Columbian World's Fair, that any leading exhibition recognised the breed by offering a full list of premiums.

Polled Durhams are claimed to be superior dual-purpose animals, good milkers and rapid fatteners, and the claim was well substantiated by "Young Hamilton" (114169), from Peru, Indiana, carrying off the sweepstakes prize in the General-Purpose Class against all comers. The first volume of the *Herd Book* was issued in 1894. A second edition in 1898 increased the register to 2100 beasts; and this third, issued in 1905, brought it up to 10,447 animals, with representatives from thirty states. The first **exportation** of Polled Durhams to the **Argentine** took place in 1894, but a check to the trade was given by the slaughter, owing to defective quarantine regulations, of a valuable bull, "Grand Victor" (150369 or 1685, P.D.H.B.), exported also from Peru, Indiana, by J. H. Miller.

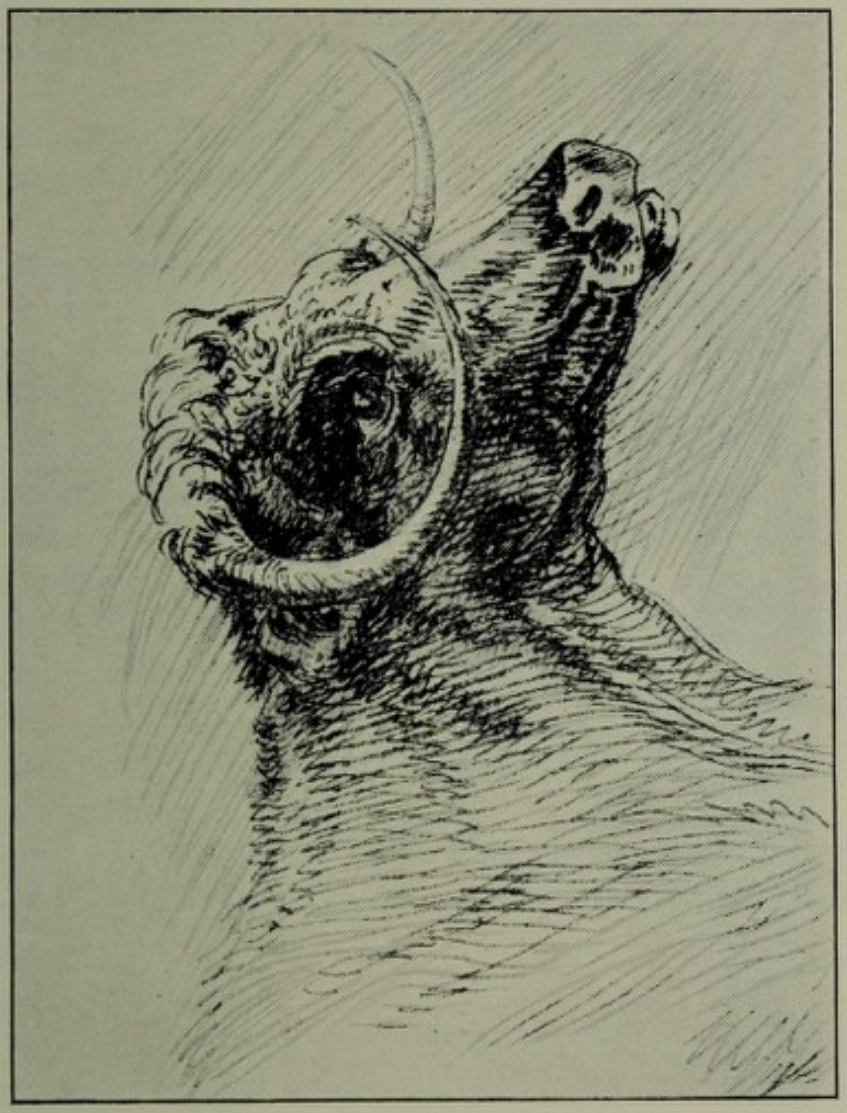
CHAPTER V

CATTLE—LONGHORNS AND HEREFORDS

The Longhorn Breed—Low on its Habitat—Gilpin's Observations—Bakewell—Other Early Breeders—Fowler and Chapman—Points of the Original and of the Improved Breed—Competition with the Shorthorn—Horn Dimensions, Shape and Origin—Colour—Crosses—As Dairy Cattle—The Longhorn Cattle Society and *Herd Book*—**The Hereford Breed**—Points of Interest—Tomkins and Hewer—Other Early Breeders—Youatt and other Authorities—Wonderful Records—Christison's Results at Lammermoor—William Tudge on Prominent Modern Herefords—Milking Properties—Working Qualities—**Polled Herefords**—Their Origin and Characteristics.

AS now seen in this country, the Longhorn is a remnant of a breed which during the eighteenth century and the first decade of the nineteenth century held a position of high importance as a milking breed and as a producer of large carcases of coarse beef. During that period, when the work of field cultivation was mostly done by oxen, it was said to be the most widely distributed and the most valuable British breed of cattle.

Professor Low's *Domesticated Animals* says: "The true Longhorns seem to have been the inhabitants of the western parts of the British Isles. They extended nearly over all the plains of Ireland and the greater part of the mountains, and yet (1845) form the prevailing race of that country. In England they occupied Lancashire, extended northward into Cumber-



LANCASHIRE LONGHORN HEAD.

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land and Westmorland (where many herds existed in the hilly country), and southward through Cheshire, Shropshire, to the districts on the Severn, and even into Somersetshire, where traces of them still exist in the higher country. From the mouth of the Severn they extended inland through the Midland Counties (the stronghold of the breed) even to Leicestershire (and one herd to Hampshire in 1780). They were also found in Derbyshire, but not, within the period of any records, in the South-eastern counties of the chalk. . . . Thus the breed appears to have been derived from the Western and more humid counties, and to have disappeared or lost its distinctive characters in the Eastern and drier."

History does not state definitely whether the Longhorn came from Ireland, where it has been "for a period of unknown antiquity," or was taken there from the West of England. The fertile pastures of Ireland produced "a great development of form and size in the animals." The herd on the Earl of Westmeath's estate at Pallas, County Galway, is said to have been bred pure for over 200 years—fresh blood being imported from England from time to time.

The rich district of Craven in Yorkshire has been specially referred to as the centre from which superior bulls were distributed to other parts of the country, although Lancashire got the credit of being "the nursery of the breed" in England.

William Gilpin, in his *Observations, made in* 1776, *on several parts of Great Britain and the Highlands of Scotland,* says, page 1810:—

"In Lancashire we frequently observed a breed of large cattle, which in the county is called the 'Wag-horn' breed, from the manner in which the horn bends under the eye. In other counties I have heard them called 'lough-horned'[1]; but throughout England they are commonly known by the name of the 'Lancashire' breed of cattle (also 'Leicestershire,' 'Warwickshire,' or the 'Dishley' breed). They are said to be fleshy, and more proper for the shambles than the dairy; though in Lancashire, we were told, they are esteemed the

[1] Probably a misprint for "bough," *i.e.*, "bent"-horned.

best milch-cows. Their twisted horns give them a peculiar and picturesque cast of countenance."

The horn shown in Plate XXVII.A, copied from Gilpin, is identical in shape with the ancient hunting horn;[1] but it differs materially from the modern horn of the breed. After hunting horns fell into disuse there would be no need to breed to a special shape of horn, and irregularity in the direction of the horn would follow as a natural consequence. The change of fashion in favour of the Shorthorn and, in some districts, the Hereford—the two breeds most responsible for supplanting the Longhorn—was no doubt largely due to the more rapidly maturing qualities of these breeds. The early hunting owners of Longhorns would depend more upon wild game than upon cattle for their meat supply, and the Longhorns, in comparatively limited numbers, would be kept by them and by the poorer classes who could not afford to eat meat, as milch-kine and as work-oxen, rather than as graziers for beef production.

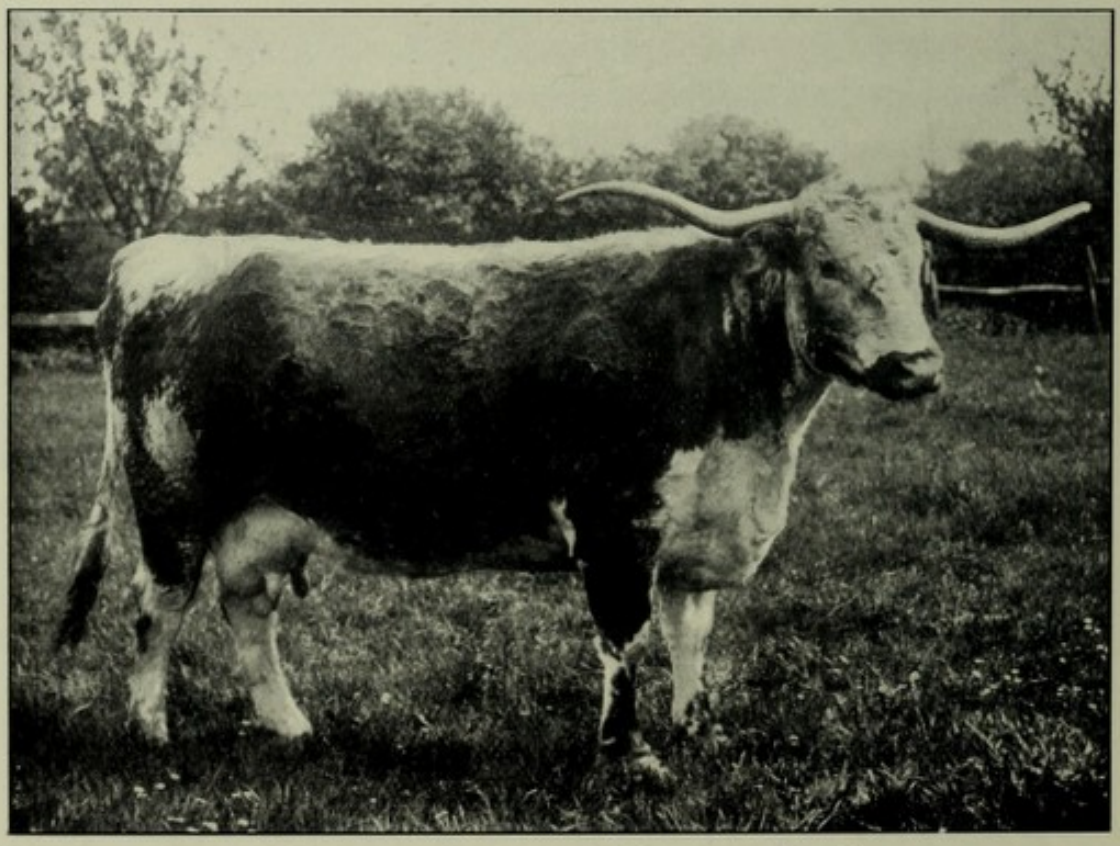
Robert Bakewell of Dishley, Leicestershire, accredited as the great originator of the system of improvement of live stock by in-and-in breeding, selected about 1750 or 1751 the Longhorn among cattle upon which to carry out his operations. He started his female stock with two heifers reared at Canley—a red and a yellow respectively. His object was to increase the rate at which they come to maturity, to improve the quality of flesh, and to reduce the size and coarseness of bone. In this, so far as his own cattle were concerned, he so far succeeded well, but at the sacrifice to some extent of constitution and the powers of milk production. He died at the age of seventy, in 1795, without transmitting the secrets of his system, or recording the lessons he had learned from the experiences of his extensive breeding experiments; and on this account it has been asserted that the work which he began was not carried to a successful issue.

But before Bakewell's time there were **early improvers** of the Longhorn as there were before the Collings in the case

[1] A similar horn for calling in cattle from the sands was found at the farm of Drumburgh, on the Solway, and is now in Tullie House museum.



A. Longhorn Bull, "Young Bow Horn."
Weight, a ton in store condition. Winner of prizes at good shows in 1902 and 1904.



B. Longhorn Cow, "Daisy's Fairest and Best."
Winner at Royal and other Shows, 1903.
Both owned by W. H. Sales, Atherstone.

[*Both Photos by G. H. Parsons, Alsager, Cheshire.*



LONGHORN HEIFERS, "FRADLEY QUEEN" AND "ARDEN LASSIE.'
Famous prize-winners. Owned by W. H. Sales, Arden Hill, Atherstone.
[*G. H. Parsons, Alsager, Cheshire.*

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of the Shorthorn; for example (in 1720), Sir Thomas Gresley of Drakelow House, near Burton-on-Trent, in Staffordshire, who "took such delight in keeping a dairy of cows similar in colour and shape"; Welby, a blacksmith in Linton, who imitated Sir Thomas; Webster of Canley, near Coventry, in Warwickshire, who bred the first famous historical sire, "Bloxidge"; and Sir William Gordon of Garrington, nea Loughborough. It is on record that it was from a cow bought from Gordon that Bakewell bred "Twopenny," the first of his famous stud bulls, about five years after the purchase of Webster's two heifers. "Twopenny" was hired to Fowler of Little Rollright, Chipping Norton, to mate with choice cows also from Webster's herd.

Of many breeders that followed Bakewell's example, **Robert Fowler** of Little Rollright, in Oxfordshire, was the most prominent. From animals of Bakewell's blood he produced "Shakspeare," a bull which occupied a position among Longhorns similar to "Favourite" and "Comet" among Shorthorns. He was by the famous Bull "D" out of a daughter of "Twopenny." At Fowler's sale in 1791, 51 animals, including calves and some old cows past breeding, averaged £85, 2s. 3d. The highest priced two-year-old bull, "Sultan," realised 210 guineas, and the highest priced cow, "Brindled Beauty," 260 guineas. The Rollright catalogue revealed in-and-in breeding to a dangerous extent. Bakewell's herd was valued to his nephew at from 20 to 70 guineas each.

Bakewell said that **George Chapman** of Upton had the best herd of Longhorns of about seven famous herds bred on Bakewell's plan. Of the owners of these the following lived within an hour's ride on horseback, viz., Ashley, Bakewell, Paget Knowles, Chapman, Stone, Wilkes, Taverner, and Green. Among the ten founders of the Smithfield Club in 1798 Ashley and Wilkes were numbered, and Wilkes proposed the formation of the Club.

"**The Longhorn breed,** . . . before the artificial improvements, . . . varied in size with the fertility of the districts to which it became indigenous, being larger in the richer plains and smaller in the mountains. The prevailing colour . . . was black and brown, and they had more or less of white on the body, a (white) streak always extending along the spine.

They had thick, dark skins, and abundant hair. Their horns were long, and bent downwards; a peculiarity, however, which seemed to give place to the influence of external agents, since, at the eastern and southern limits of the breed in England, their horns frequently turned upwards, in the manner of other cattle inhabiting these districts (differing from the Lancashire type, Plate XXVII.A). Their bodies were long [a present-day characteristic], their sides flat, and their shoulders heavy as compared with their hind quarters. They were hardy, capable of subsisting without shelter and on indifferent food, but they were **slow in arriving at maturity.** Their flesh was of a dark colour, and the fat of a yellow tinge. They were of docile temper, and steady in the yoke, though sluggish in their motions. They were with difficulty amalgamated with other varieties, retaining, with greater obstinacy than any other race, their distinctive characters. The females were suited to the domestic dairy, yielding good milk, though not in large quantities."

Low also indicated the more conspicuous of the **improvements** that were **effected by Bakewell** and his disciples.

"**The Dishley breed** (Bakewell's) is of good size, but generally inferior in weight to the old Lancashire Longhorns, the Shorthorns, and Herefords. . . . The shoulder is well formed, the neck remarkably thin, head fine, and the limbs are moderately short and small boned, in which respect the artificial differs from the natural breed. The skin, though thick, is soft, and the hair is usually reddish-brown, with more or less of white on different parts. The ribs are remarkably well arched, forming a fine cylindrical trunk; the loin is moderately broad, and the hind quarters are long. The animals are docile, easily maintained on ordinary food, and readily fattened. The flesh has never entirely lost that darkness of colour distinctive of the unimproved race, and the fat is less mixed with the muscular parts than in any other kind of British cattle. The tendency of the fat to accumulate on the rump is so great as to produce a kind of deformity in the fattened animal. . . . The fat, too, retains the tinge distinctive of the older race. . . . The cows are eminently deficient in the power of yielding milk. They are

in this respect greatly inferior to the older Longhorns, and are scarcely ever used for the purposes of the regular dairy."

It is not to be wondered at that the improved Shorthorn of the early days—a first-rate general purpose animal—should supersede this incomplete product of Bakewell's art of breeding. **Bakewell's method** weakened the constitution, and led to the loss of lean flesh or muscle as well as to the decline of the breeding and milking properties of cattle. Being overdone, in his haste to secure refinement and uniformity, it led directly to the disfavour of the breed early last century.

The Longhorn was seriously **worsted in competition** for public favour by its Shorthorn rival; but, after it had been driven from the richer parts of the country, except for a limited number of good standard herds, by the more rapid maturity, finer quality, animal, it lingered in the Fell districts of the north-west of England into the latter half of the nineteenth century. In the fifties, a wave of popular enthusiasm for the Shorthorn led to the practical extinction, within about ten years, of the Longhorn as a breed in that district of country. The change was effected in part by breeding the cows to Shorthorn bulls, and, as the progeny practically became "pure by crossing," it was realised when too late that in many respects the Longhorn was better suited than the Shorthorn to the local conditions. The author paid a visit to the district in 1905, and heard from men who had seen the change accomplished, their acknowledgment of the mistake. The local variety of the breed was said to consist of splendid cattle for the Fell districts. Many had the white ridge on the back and flesh-coloured noses, but the prevailing colour was dark roan with black ticks through it (brindled). The milk was rich, though not so abundant as that of the Shorthorn. The beasts were extremely hardy, and kept themselves fat in winter, going outside till snow fell. The hair was curly, like that of a spaniel, and the horns were so long that in entering a doorway the head had to be turned to one side and one horn introduced before the other. [Marshall states that the **horns** of the improved breed measured from 15 in. to 2 ft. for bulls, and from 2½ to 3½ ft. for oxen; while the cows' horns were nearly as long as those of the oxen, but

fine and more tapering.] The animals did not grow so quickly as the present cattle, but they were less dainty, required less food and less attention, and were heavier and better beasts in the end. An ordinary bull ran up to 20 stones of beef per quarter, but the beef was not so fine, being both dark and coarse. After the Longhorn blood was nearly bred out of the Fell cattle by the repeated use of Shorthorn bulls, it was found necessary to restore the hardiness of the progeny by the use now and then of West Highland bulls.

Curiously enough, a **connection** between the **West Highland** and Longhorn breeds is indicated by the progeny of Highland cows by a light roan Shorthorn bull, frequently assuming one of the recognised colours of the Longhorn, viz., a mealy-red roan with a broad white ridge along the back. Sir James Sivewright annually breeds a number of these and of Galloway crosses at Tallyallan Castle in Fifeshire. The hair of their winter coats is more ruddy and much harder than those of Galloway Shorthorn crosses, which are easily distinguished from them.

The historical preface to Vol. I. of the *Herd Book* says :—

"In 1864, the last remaining herd of Longhorns in Cumberland was sold, belonging to Isaac Fletcher of Riggs, Wythop, and the general opinion of the breed in that district was, that for hardihood of constitution, richness of milk, and small consumption of food, they were unrivalled; thriving well in the hardest winter without any roots; seldom requiring shelter, from their thick hides and strong coats; but they were considered slow growers in arriving at maturity."

In no important particular, except probably in mildness of disposition, do present-day Longhorns resemble Shorthorns. Their colouring is very different.

"The white line along the back, with a white patch or mark on the thigh, is looked upon as strictly orthodox; occasionally purely bred animals are found entirely self-coloured, whilst in others the sides of the body may be either red, brindled, a grizzly roan, or any of these colours intermixed with small white specks or flakes."

The colour most admired is the dark brindle with rather a bluish tint, and the white line along the back. At its best this coat has "a bloom like that of a ripe grape."

The long, irregularly shaped, sweeping **horns** form another

striking difference. It would seem that the Longhorn inherited its horn development from the *Bos primigenius*, through its more immediate ancestors the wild forest cattle, as represented in the Chartley Park breed—probably from a variety with exceptionally long horns. The position becomes more interesting in view of Low's emphatic pronouncement that "the Wild White Forest breed, though reared for ages in parks in the West of England and Scotland, never assumes the character of the Long-horned race." The Shorthorn, on the other hand, no doubt derived its characteristic form of horn from its imported European ancestors.

The Longhorn does not stand attempts at improvement by crossing. Its peculiar characteristics will not admit of assimilation with other breeds, but it is calculated to "form a heavy hybrid: for example, the Earl of Radnor's cross-bred heifer, Longhorn-Hereford, at Smithfield in 1847; at two years eight months it got the gold medal as the best cow or heifer of any breed in the yard, being the youngest animal that obtained the gold medal for a term of over fifty years."

In recent times "the breed has been in great demand for crossing with the Shorthorn, Aberdeen Angus, North Devon, and Jersey." The female crosses prove to be good milkers, while the steers attain heavy weights of prime beef. At the Dublin Christmas Show in December 1903, Longhorn steers were reserved for first place in competition with Angus, Shorthorn, and Hereford rivals; and the previous year they got the second prize in a very strong class." Whatever may have been the character of the beef of the Longhorn breed in Bakewell's time, both butchers and consumers now agree that the quality is excellent.

As dairy cattle, they frequently produce from 14 lbs. up to 17 and 18 lbs. of butter per week on ordinary pasture. Good cows will give on an average about eight quarts of milk twice daily. Greater attention is now paid to them owing to the relatively higher prices given for milking cows, especially for cheese dairies, than for butchers' beasts. They produce more cream and curd from a given amount of milk than a Shorthorn; and all classes of them, except calves and cows in full milk, do better if kept in the fields all winter than in byres or sheds, and they cost less to winter than housed cattle.

The first volume of the *Herd Book*, with an historical preface by John B. Lythall, Bingley Hall, Birmingham, was issued in 1878, but during the eighties the breed was threatened with extinction, and the Agricultural Societies dropped it out of their premium lists. The tide soon began to turn in its favour. The Royal Show at Birmingham in 1898 was re-opened to the breed, and the issue of Vol. II. of the *Herd Book* in 1900, with a preface by T. H. Weetman, the Hon. Secretary of the Longhorn Cattle Society, as one result of the success attained, along with a third and then a fourth vol. in April 1904, marked successive stages of a genuine revival of interest, based upon the recognition of the Longhorn's wonderful hardiness of constitution and other unique qualities for meeting present needs and what bid to be the requirements of the future. **A new Longhorn Cattle Society** inherited the first volume of the *Herd Book*. Present-day labour difficulties and narrow margins of profit call for a general purpose animal which will rustle for itself and call for little attention. People begin to realise the fact that the advantages to be gained by high pressure and early maturity in high-priced times become reversed under a state of agricultural depression, and that the man who can utilise the natural pasture and other crude products of his farm to the fullest and best advantage is the man who produces at least cost per unit of produce and turns loss into profit. The all-important factor is time. The slow or medium maturity animals then become his standbys, and he reaps the benefit of the greatly increased tendency to fatten, which develops with age, exhibited in the difference in this respect between a three-year-old as compared with a two-year-old steer. T. H. Weetman sent four steers of two years and a few months old, valued at £20 each, into Kent to be fattened in October 1903, which realised an average, when disposed of at Christmas 1904, of £36 a head. In weight for age, the Longhorn is equal to any other breed. That the Longhorn possesses, in a conspicuous degree, the capacity of rapid fattening after maturity is reached, is further instanced by the record of "Moss Rose," a cow of W. H. Sale, Arden Hill, Warwickshire. This animal calved in March 1899, and after yielding about 50 lbs. of milk daily, producing 2 lbs. of butter, she was dried off in September. Not proving in calf, she was fattened and

exhibited at Birmingham Christmas Show, when she scaled 17 cwts. 2 qrs. live-weight. "Rufus" (394), the bull which was first at Park Royal in 1904, weighed 25 cwts. when in ordinary condition. As an instance of the breed's acquired power of early maturity, a pure-bred steer, bred and fattened by the Hon. E. A. Fitzroy, West Haddon, Northampton, was exhibited at Christmas 1905, in the Northampton Market, and took first prize and champion against all breeds. He sold under the hammer for £40. His live-weight at three years and three months old was 19 cwts. 3 quarters and the dressed carcase 173 stones 8 lbs., and he only received ordinary feeding till within the last nine months of his development.

There are now about 400 **registered Longhorn Cattle** in the country, descended from what were considered the best herds in the palmy days of the breed, and they emerge from the long period of obscurity strengthened in the qualities that are now finding increasing favour in many centres far removed from each other. A good many of the best cattle can trace descent from "Emily," the reserve cow for the Queen's Gold Medal at Windsor Show in 1889. Her record was regularity in breeding and 17 lbs. of butter a week. At 15 years old she was sold at £15, butcher's price.

The Members of the Longhorn Cattle Society number thirty-three, but only twenty-two own herds. The most prominent are :—

John Cæsar Bacon, Seafield, Santon, Isle of Man; Stanes B. H. Chamberlayne, Witherley Hall, Alherstone; Mrs M. M. Cheape, Bentley Manor, Redditch, Worcestershire; Mrs R. D. Dering, Baddesley, Clinton, Knowle, Warwickshire; The Hon. E. A. Fitzroy, Fox Hill, West Haddon, Rugby; H. W. F. Garland, Hope Court, Hope, Shropshire; Lord Gerard, Eastwell Park, Ashford, Kent; Joseph Green, Whitley, Coventry; C. S. Hanbury Poles, Wane, Herts; Thos. Sammons Hands, Canley, Coventry; Thos. H. Harrison, Normanton Home Farm, Stamford; Henry Houghton, Narley House, Osbaston, Nuneaton; The Rt. Hon. Mary, Baroness Kinloss, Stowe House, Bucks; T. Basil P. Levett, Wychnor Park, Burton-on-Trent, Staffordshire; John Frederick Mayo, Friar Waddon, Dorchester; Thomas C. C. Morgan, The Pavilion,

Stowe, Buckingham; Nigel J. C. Neville, Dulverton, Somerset; Henry B. Parsons, Estate Office, Eastwell Park, Ashford, Kent; John Riley, Putley Court, Ledbury, Herefordshire; William Luke Riley, Wyken House, Coventry; William Hanson Sale, Arden Hill, Atherstone, Warwickshire; W. Cecil Salt, Willington Hall, Burton-on-Trent; Charles Tollemache Scott, Bosworth Park, Nuneaton; H. Jasper Selwyn, Rhyl Manor, Dulverton, Somerset; W. S. Shaw, Senior, Lodge Croft, Fradley, Lichfield, Staffordshire; W. S. Shaw, Junior, Fradley Old Hall, Lichfield, Staffordshire; W. Weston Swirmerton, Stivichal Grange, Coventry; George Henry Tanser, Bilstone House, Twycross, Atherstone; William Thirlby, Ibstock, Leicester; Edward Tingey, Dersingham, King's Lynn, Norfolk; John R. Watson, South Mosses, Lampleugh, Cumberland; Jonathan Watson, Ullock Farm, Cockermouth, Cumberland; Thomas H. Weetman, Atherstone.

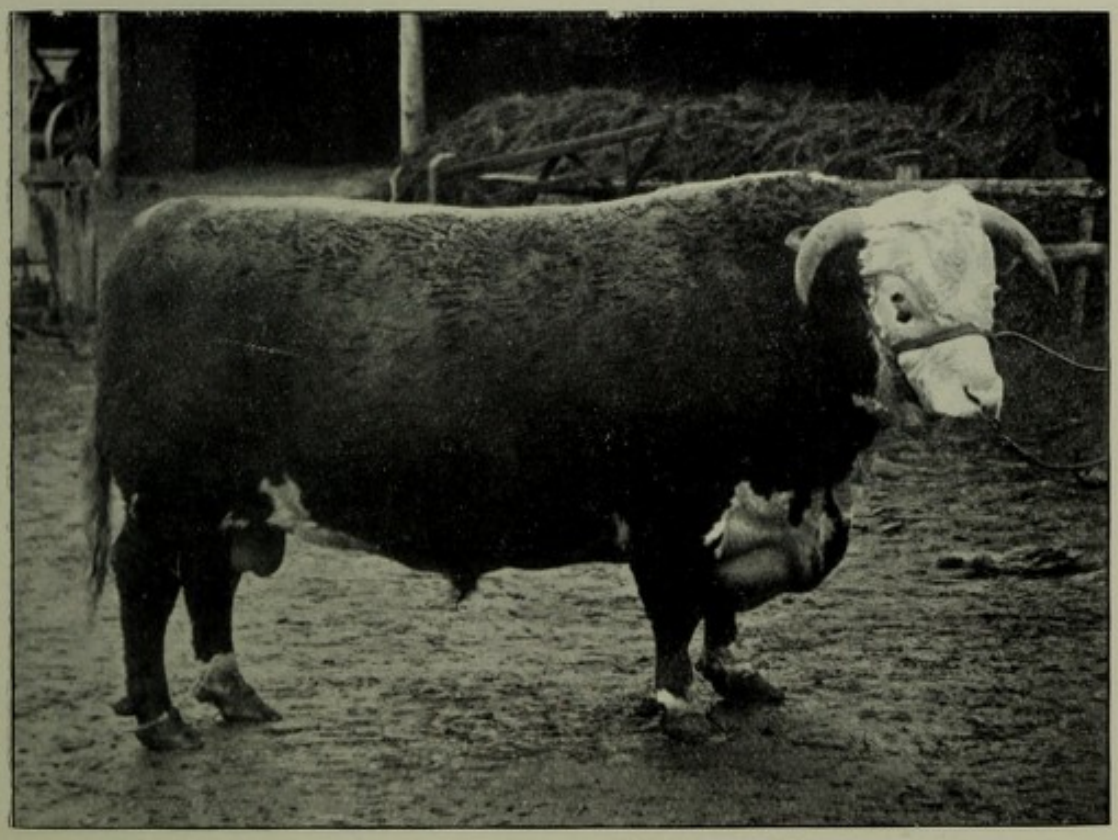
There is no export trade; but a **good demand** exists for bulls for crossing purposes, and for Longhorn females to form new herds. There is every indication that the breed will increase and become one of the standard general-purpose breeds of the country, and when its qualities are better known it cannot fail to establish itself in our cattle-rearing colonies and in other distant parts of the world. It is at present doing remarkably well in the Isle of Man.

The Hereford breed[1] is not only one of the most picturesque, but also one of the most valuable, and, in a cosmopolitan sense, one of the best known British breeds. Although in this country it is distinctly a local breed, in America and in Australia it has become widely distributed and highly and justly appreciated. It appears that all the highest authorities are agreed that, on at least one side of its ancestral descent, the Hereford is closely connected with other British breeds—such as the Welsh, the old Gloucester, the Devon, and the Sussex—which still possess certain characters in common with the breed under consideration; notably the orange-yellow colour of skin and the medium length of horn.

[1] All the more interesting points connected with the history of the breed have been focussed by Macdonald and Sinclair in *Hereford Cattle*, published by Vinton & Co., London, 1886.

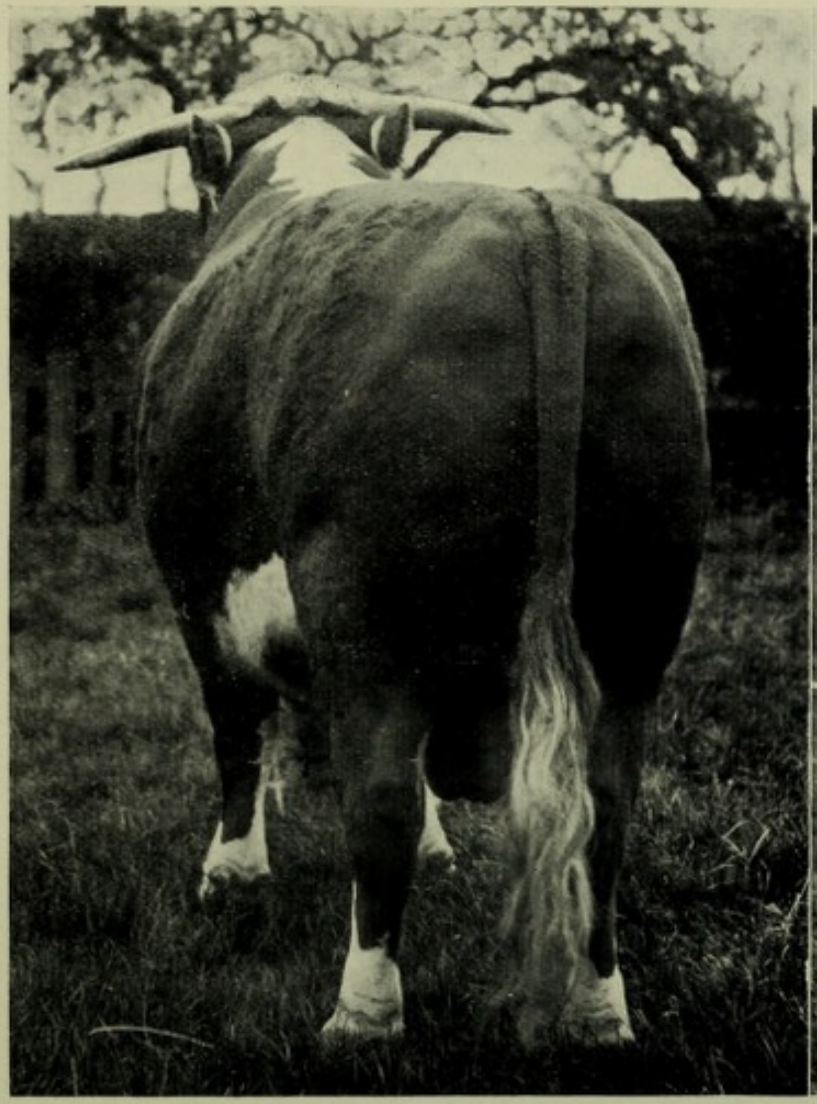


A. Hereford Bull.
[*From a Painting in the Low Collection in Edinburgh University.*



B. Hereford Bull, "Success," at 5 Years. Weight, 25 cwts.
One of the best bulls of the day, and winner of many prizes.
Owned by Captain Heygate, Leominster.
[*G. H. Parsons, Alsager, Cheshire.*

[*p.* 112



A. Hereford Bull, "Brigadier."
Owned by T Smith, Moncton, Hereford.
Exported by Messrs Hughes in 1905.



B. Hereford Bull, "Endale."
Champion at Hereford and Worcester, 1905.
Owned by Peter Coats, Sheepcote, Clifford, Herefordshire.
[*G. H. Parsons, Alsager, Cheshire,*

The points of special and peculiar interest in the Hereford are, that the face and the forward part of the back and mane, as well as the throat, belly, inside and lower parts of the legs, and the tip of the tail, are white, the greater part of the body red or brown, varying from a light to a dark shade, and "the hide thick yet mellow, well covered with soft glossy hair, having a tendency to curl." **William Tudge,** of Summer Court, Hereford (to whom indebtedness is acknowledged for much of the following historical information relating to individual animals of superior quality), says: "In a Hereford style and character should go a long way. A bad head or horn I do not like, and I much prefer a deep rich red in colour, not too light to be approaching yellow, or the very dark colour either. I would rather see a little extra white on the mane and shoulders than have no white there at all." The shoulder is particularly neat, and, like the rest of the body, well covered with "rich mellow" flesh; and the twist is also good. The defect of the Hereford breed has been generally though incorrectly believed to be a want of internal fat in proportion to its external appearance when ready for the butcher—*i.e.*, it is said to be deficient in internal "making-up." While this may be a correct description of some inferior strains of blood, it certainly does not apply to the best types of Herefords. The setting on of the tail is frequently defective as compared with that of the Shorthorn. The muzzle is white or flesh-coloured. The horns are yellow or white and waxy. In the cow they incline slightly upwards, but in the bull they spring almost horizontally from a broad, flat forehead, and are often proportionally much shorter. One special feature of the breed is its freedom from tuberculosis. It is rarely ever the case that a Hereford does not stand the tuberculine test. The beef, nicely mixed with fat and lean, commands top prices, frequently ½d. more than that of most other breeds. The Birmingham Fat Market report (February 1906) supports the assertion as to the superior quality of Hereford beef:—"Best Herefords, 6½d.; Shorthorns, 5¾d. to 6¼d.; bulls and cows, 3¾ to 5d. per lb."

There is a strong presumption that the original breed was "self" or "whole" coloured, being brown or red, shading off into black on the head and points. A breed (small in numbers) of this description has been associated with

Montgomeryshire. A number of these so-called smoky-faced Herefords were seen by the author in the possession of the Aylesbury Dairy Company, on a farm near Horsham, but they were disposed of by auction before 1890, to make room for a Sussex herd. They were handsome animals, and in all respects resembled Herefords, with the exception of the colour of their extremities, which were almost black.

Benjamin Tomkins (born 1745, died 1815) occupies in the history of the improvement of this breed a corresponding place to that assigned to Bakewell in regard to Longhorns, and to the brothers Colling in connection with Shorthorns. But before him there were members of his family distinguished for their interest in breeding good cattle, in the persons of his father, Benjamin Tomkins (1714-89), and his grandfather, Richard Tomkins, whose famous will, dated 1720, bequeathed to his son Benjamin (the elder) "one cow called 'Silver' and her calf," which are credited with being foundation stock of the Tomkins herd, and through it of the modern Hereford. That little is known of the contemporaries of these early improvers, such as William Galliers of Wigmore Grange, is due to the dearth of agricultural historians at that time. The most **important contemporaries** of Benjamin Tomkins (the younger) who acted a part in forming the breed were, William Galliers of Frogdon, Tully, Skyrme, Haywood, and Yeomans. Tomkins adopted Bakewell's system of in-and-in breeding. It is on record that the best of his famous herd sprang from two cows and one bull. He also followed Bakewell's plan of keeping his own counsels. He resembled Bates in some practices and characteristics. He would not expose his cattle at agricultural shows, although it is said he would have been safe to win. "He was a peculiar, proud, exclusive kind of a man, and regarded the cattle belonging to others as quite beneath his notice, considering his own to be beyond comparison the best." The herd of twenty-eight cattle sold by auction about four years after his death realised £4172, 6s., an average of £149. Other **prominent early breeders** who have not yet been named were, John Price, Smythies, three generations of Jeffries, Yarworth, Hewer, Walker, Hoskyns, Perry, Jellicoe, Smith, Lord Talbot, Sir F. Lawley, George Tomkins, and Weyman of Stocktonbury.

The modern Hereford is also pretty certainly related to

the ancient white forest cattle of Wales, from which it partially inherited the tendency to develop and perpetuate the "broken" coloured character exhibited in the white markings. The special form of these markings, according to what seems the best authority on the subject, was given by selection after Lord Scudamore, who died in 1671, had introduced from Flanders a number of white-faced Flemish cattle of superior size and quality; by a white-faced bull calf which appeared as a sport in the herd of an ancestor of P. Tully; and by a red Yorkshire bull with a white face, which was said to be imported by Wm. Galliers of Wigmore Grange, and used in the Hereford district soon after 1750. These historical instances, and also the natural tendency in the original red Hereford to sport back to the white ancestor—as is even now the case with such decidedly distinct and different breeds as the West Highland and Scotch polls—are sufficient to account for the bald head and white underline and extremities of the Hereford. The cattle of Tully of Huntingdon were probably the largest; and they had a greater proportion of white than animals of other herds. The **celebrated white bull** bred by T. A. Knight at Downton was believed to have descended from this strain. Tomkins put no store upon uniformity of colour, and for a time (as late as 1845, when the *Herd Book* appeared) the breed was subdivided into four classes—mottled faced, dark grey, light grey, and white faced. The latter alone are left among pure-bred cattle. **Youatt** (1835) throws some light on the question of colour:—

"Hereford oxen are considerably larger than the North-Devon, they are usually of a darker red, some of them are brown and even yellow, and a few are brindled, but they are principally distinguished by their white faces, throats, and bellies. In a few the white extends to the shoulders. The **old Herefords** were brown or red-brown, with not a spot of white among them. It is only within the last fifty or sixty years that it has been the fashion to breed for white faces. Whatever may be thought of the change of colour, the present breed is certainly far superior to the old one."

T. Rowlandson, in the *Royal Agricultural Society Journal* (1853), confirms Youatt's statement:—

"The old Herefords are said to have been brown or reddish brown, and it is only within the last eighty or ninety years that it has become the fashion to breed for white faces."

Of the three most **valuable strains** at the end of the eighteenth century the darker shades of red prevailed in the Tomkins herd, the pale red in the Skyrme herd, and grey in the Tully herd, from which descended the celebrated Knight Greys of the herd of Thomas A. Knight, founded about that time by selections from the three herds. Some strains of modern white-faced Hereford have a tendency to **delicacy in the eyes,** especially when exposed to the influence of a tropical or semi-tropical sun. Abnormal growths, which produce blindness and finally death, are found protruding from the eyes. Even in the home climate defective sight in the case of objects at a few yards distance, has been known to produce bad temper in the bulls, which, as a rule, are naturally docile and tractable. A brown patch on the eyelids and immediately surrounding parts is found to be the best preventive, and animals with this natural protection against the sun are much preferred for exportation to Jamaica and Argentina. Until North America set the fashion for absolutely pure white faces, to distinguish the pure from graded cattle, the brown ring was not objected to in this country, and some of the best strains are so marked, notably the celebrated Horace blood. Many of the winning cattle bred by Arkwright of Hampton Court years ago had brown-spotted eyes, and they were believed to be a heavier and better fleshed variety than others. North America has practically ceased to take Hereford cattle from this country, as there are over 70,000 pure-bred animals there. The American trade, while it lasted, raised **prices** to record point. "Lord Wilton" sold for 3800 guineas in 1883. Sir Jos. Pulley made £1200 for "Protector," and John Tudge sold "Albany" for the same price to C. A. Jameson of Illinois, U.S.A. The tide of export has in recent years set in the direction of South America. From June 1890 till the end of December 1903, 496 pedigree Herefords went out to Argentina and 139 to Uruguay; from 1903 to 1906, 570 Herefords were exported to South America. A larger number even went before 1890. At Richard Green's displenishing sale at Whittern in October 1903, the cow "Silkweed" made £315, and her yearling heifer, "Spirea," £472, 10s.[1]

[1] Indebtedness for recent information is acknowledged to G. C. Britten, Secretary, Hereford Herd Book Society.

The Hereford breed holds some **wonderful records** as grazing beef producers. B. T. Brandreth Gibbs, in his tabulated **statement of prizes,** has shown "that during the first fifty-two Annual Meetings of the Smithfield Club, when all breeds met in competition with each other, 185 prizes were awarded to Hereford steers or oxen, while only 190 fell to the lot of all the other breeds or cross-breeds put together."

Hereford cattle have always been in high repute **as grazing animals** throughout the midland and eastern counties of England. As range cattle, they are unsurpassed by any other breed, on account of the high quality of their marbled beef, the perfection of their feet and limbs, their activity, docility, and hardiness of constitution, together with their adaptability for crossing with other breeds of cattle. **The Shorthorn** being first among all breeds of cattle for early maturity, and moreover of a larger build, will, under favourable conditions, attain greater weights at two to three years old, but on many of the open ranges in the Western States of America the Shorthorn first introduced has given place as a utility animal to the Hereford; and in competition with the Shorthorn in Queensland the Hereford has proved "more prolific, and less prone to disease, while they mature earlier and travel better, and consequently pay better than Durhams, for the reason that the surroundings are better adapted to this particular breed.

Robert Christison's **Herefords at Lammermoor,** Queensland—bred from the herds of Frank Reynolds, Tocal, Australia, Sir James Rankin, Bart., M.P., William Tudge, and Lord Coventry—have carried off the honours for a dozen years at the State Pastoral Shows against all competitors. They also hold the premier position in the records of the Queensland Meat Export Company with the average ideal market weight of 820 lbs. for the dressed and chilled carcase of a grass-fed bullock at four years old—the hind quarters weighing 30 lbs. more than the "fores," with the usual quartering, which adds considerably to the value of the carcase. A bull bred by Frank Reynolds in Australia, was sold in December 1906 for £400.

The name of John Hewer, whose active career as a breeder extended over seventy years, from 1803 to 1873, will be for ever associated with the history of the improvement

of Hereford cattle. It has been correctly said "that the difficulty is to find a single animal of note at the present day that does not inherit Hewer blood." The influence of the Hewer cattle, which trace back to "Silver" (540), born in 1797, was exerted upon surrounding breeds by the system of letting out bulls, a practice which had then become prevalent among the owners of superior herds of various breeds.

It is to "Silver" the modern Hereford is largely indebted for its uniformity of colour and a good deal of the massiveness of flesh and the prominent eyes characteristic of the best specimens of the breed. Duckham, in the new edition of the first volume of the *Herd Book*, says he seems "to have laid the foundation of William Hewer's eminence as a breeder."

William Tudge thinks that the best Herefords of 1858 at the first Chester Royal were about equal in merit with the best Herefords of to-day. It was at that show that "Sir Benjamin" (1387), son of "Sir David," appeared and introduced an era of heavier scale animals: for example, "Stanway" (2790), by "Pilot" (2156), by "The Grove" (1764), a son of "Sir David," at the subsequent Oxford Royal Show girthed 9 feet 4 inches, the record measurement of the Royal Agricultural Society at the time. In the same line of descent was Lord Coventry's "Good Boy" out of "Giantess," a slightly in-bred cow by "Sir Roger" (4133), weighing 20 cwts. 3 quarters 2 lbs., which was bought at Adforton sale. "Good Boy" scaled nearly 26 cwts. His sire, "Fisherman," also descended from "Sir David," weighed 26½ cwts., and "Sir Benjamin" was even heavier. "Horace" (3877), a more impressive sire than "Sir Thomas," was of quite a different type, with a peculiar mellowness of touch. He had an extraordinary weight of flesh and quality. "Horace" has been pronounced "one of the monarchs of the breed." "Grove 3rd," one of the greatest sires of his day, and of the "Horace" type, was a descendant of "Horace" by a "Sir Thomas" cow. "Lord Wilton" (4740), (a famous bull bred by Wm. Tudge, senior), a son of "Sir Roger" (4133), and grandson of "Sir Thomas," was the most impressive sire. The blend with the "Horace" blood has been most successful, and has "helped to keep up the Hereford reputation in all parts of the world." "Lord Wilton" was as successful in the

showyard as he was as a sire, being a first-prize Royal winner, and twice champion of England. Ten of his sons and daughters and sixteen of his grandsons and granddaughters are first-prize Royal winners. He was a home-bred bull on the dam's side. At the first Stockton sale he was sold to an American for 3800 guineas, Sir James Rankin, M.P., for Herefordshire, bidding 3700 guineas. "The buyer failing to settle, he was resold at the next sale to W. Tudge and T. Fenn for 1000 guineas, the highest price ever given for a Hereford bull in England." A grandson of "Lord Wilton," "Royal Wilton," by "Viscount Wilton," a bull weighing 27 cwts., was sold to Robert Christison of Lammermoor, Queensland, and did splendid service in the herd.

"Winter De Cote" (4258) was another famous sire and prize-winner, descended from "Sir David." He was sire of a famous heifer, "Leonora," and her mate, "Beatrice."

The sire of "Winter De Cote" was "Leominster 3rd" (3211), a son of the "Sir Thomas" bull "Tomboy" (3546), from an Adforton cow, and the two invincible heifers were from "Tomboy" dams, so they had a close double cross of this son of "Sir Thomas."

"Albion" (15027), a grandson of "Good Boy," and much of the same type, but on a smaller scale, was the most successful sire of recent years. No Hereford bull except "Lord Wilton" has got so many Royal winners.

"Ancient Briton" (15034), was bred at Leinthall on the same lines as the two grand Adforton bulls, "Lord Wilton" and "Regulator," being by a son of the one, "Bourton," and his dam, "Bonnie Lassie," a sister from the same dam, "Belladonna," as "Regulator." He was sold to go to the World's Show at Chicago, and won there first prize and champion as best Hereford; and the next season he won first prize and champion of all breeds at the American Great Show at Illinois; first and champion at the Iowa State Fair; first and champion at Nebraska State Show; and champion at all the State shows of the U.S.A.

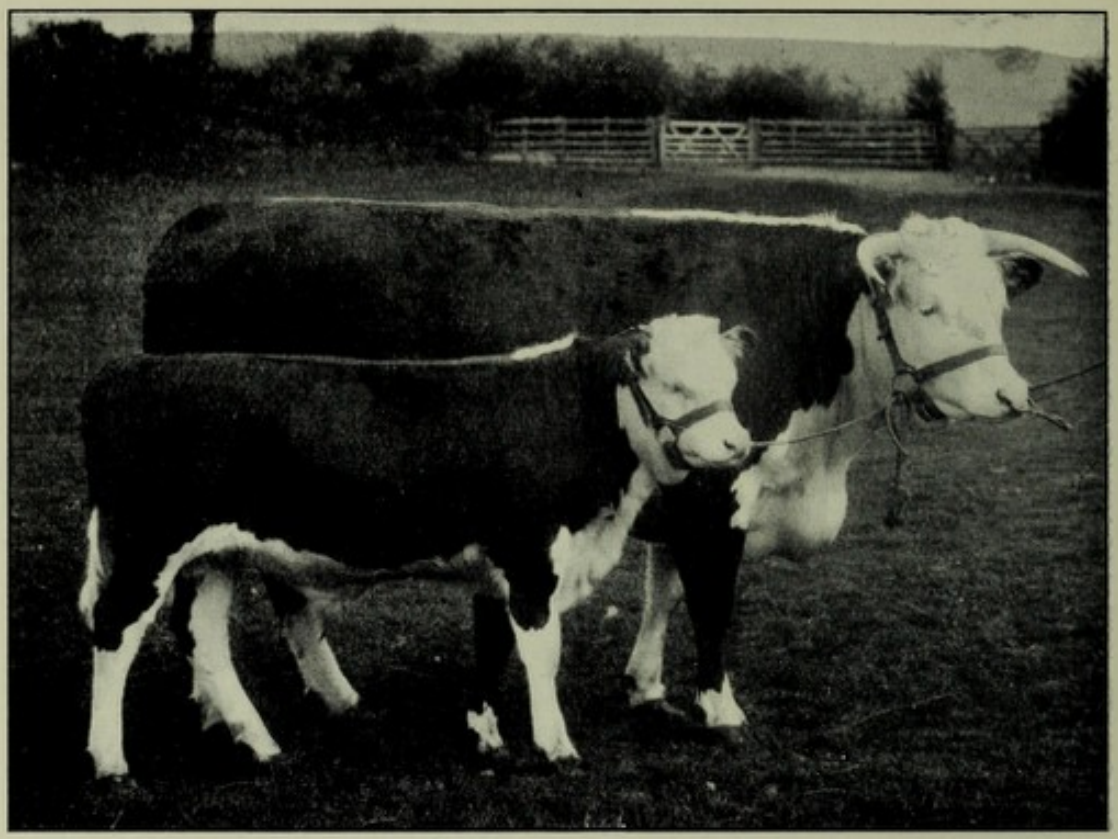
"Leinthall Beauty" was of a dark rich colour, with nice soft curly hair, very mellow to the touch. She was shown singly seven times, and took seven first prizes at leading shows, including the Royal shows at Maidstone and York. Her sire, "Rupert" (16366), was from the old Adforton-

Darling family, his dam, "Jubilee," by "Viscount Wilton" (11824). "Leinthall Beauty's" grand-dam, "Beauty," was also by "Viscount Wilton," and her own dam, "Barbara," by "Ancient Briton," by "Bourton" (11005), another son of "Lord Wilton"; she had thus united in her the three principal families of the old Adforton and Leinthall breed.

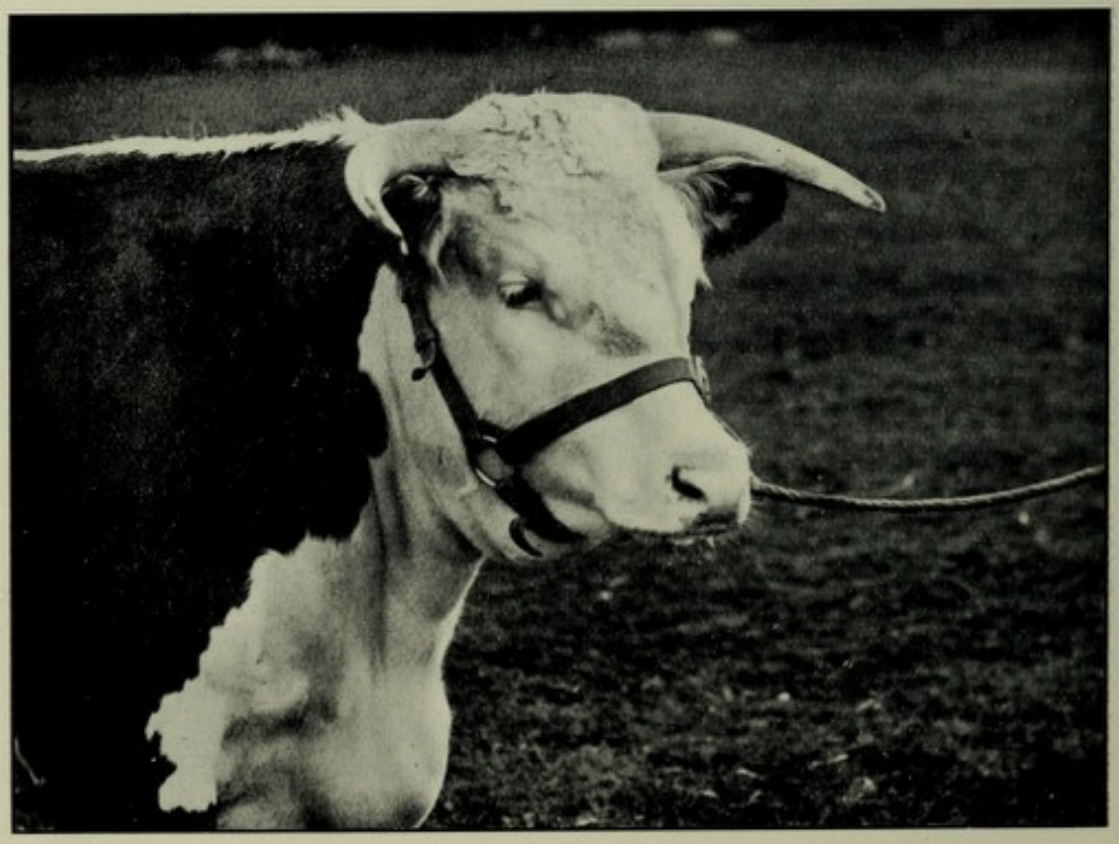
Several **herds** have been maintained **in Scotland** for longer or shorter periods, although the difficulty of marketing the produce and of supplying wants in the breeding stock at such a distance from the home of the breed has led to their being given up. Lumsden of Auchry House, Aberdeenshire, was the chief pioneer who introduced it in the thirties of the nineteenth century and bred for about fifty years a first-rate herd. For about five years (1869-74), the Earl of Southesk maintained a choice herd at Kinnaird Castle in Forfarshire. Herefords nick in crossing with the Shorthorn, West Highland, Galloway, and Polled Angus, and curiously enough the great majority retain their red colour (though there is often a grey hair through it) and the white face. Even in the crosses from the black poll the body colouring is red and the white head hornless. In the great breeding and grazing country of Ireland the breed has secured a permanent foothold.

Herefords as milkers have never been in the first rank, and they have not hitherto been classed as dairy cattle. The practice of allowing the cows to suckle their calves has prevented the improvement of the breed by the artificial selection of the best milking cows from which to breed bulls.

That the breed possesses excellent milking qualities has been fully demonstrated by Wm. J. S. White, Zeals Park Farm, Wiltshire, whose cows are hand milked—the calves being taken away quite young. The herd is mostly descended from "Prettyface," a cow bought from John Tudge, which gave 7 gallons of milk daily. In the **Dairy Herd Competition** of the Royal Counties Agricultural Society at Bournemouth in 1905, the herd gained the third prize against eighteen opponents, and was noticed in the Official Report as follows:—"W. J. S. White exhibited seventy-four of the best Hereford cows your judges had ever seen, and with an aptitude to milk seldom found in this very



A. Hereford Cow, "Shotover," and Calf, "Royal Shot."
Champion cow, Hereford, Worcester, and at the Royal, etc. etc., in 1904.
Bred by John Tudge, Duxmoor, Craven Arms, Salop.



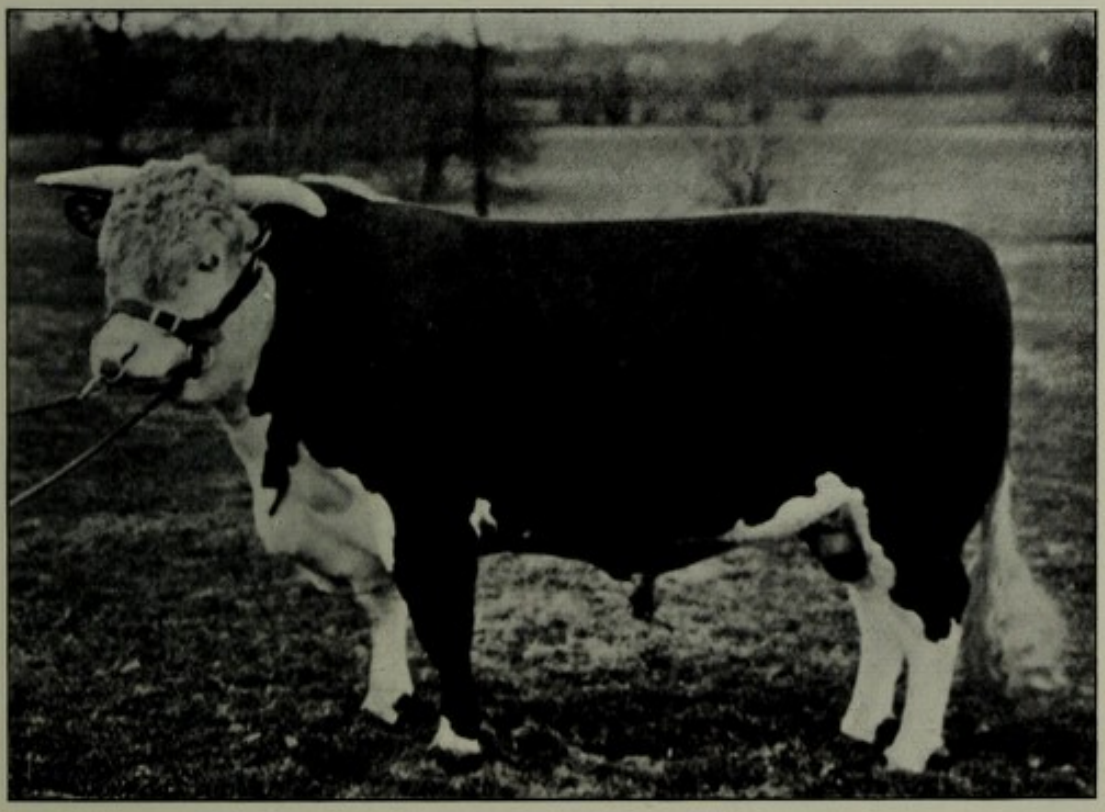
B. Typical Hereford Cow's Head, "Shotover."
Described above.

[*Both by G. H. Parsons, Alsager, Cheshire.*



A. Hereford Bull, "Royal Shot," at 1 Year and 3 Months.

[*Photo by G. H. Parsons, Alsager, Cheshire*



B. Hereford Bull, "Royal Shot," at 2 Years Old.

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handsome and fine grazing breed. This herd was established in 1819 by the present owner's grandfather, and there is a fair prospect of its going on. The cows are of a uniform type, large, and in high condition (though only moderately kept); and lastly, and of the most consequence, they are evidently good milkers, and have very well-shaped udders. Amongst the herd was a grand old cow, sixteen years old ('Prettyface'), from which many had sprung: she is, or rather was, an enormous milker. Your judges had much pleasure, mixed with surprise, at having to award a 'Dairy prize to a Hereford herd.' Extraordinary milking Hereford cows have appeared from time to time in the leading herds, and only care in selection is needed to in time develop milking tendencies of a high order."

The main object for which the breed was kept till well into the nineteenth century was the supply of work-oxen for land cultivation.

The type of cow to breed the best oxen was small and slender or feminine in character, and not more than about one-third of the weight of the mature ox, which grew to an immense size in height and bulk. A large cow, of masculine character and heavily loaded with flesh, produced a coarse and brawny ox which proved "unkindly and tedious in the process of fattening." Common work-oxen were, Marshall says, wastefully fed off about six years old in Gloucestershire. But as in the case of a present-day continental practice of killing milch cows when about a year or two older, it may have been after all economical owing to the greater value of the beef then produced than at a later period. The finest oxen were sold up to £70, and could be kept for effective work till twice or three times that age.

The chief function of the Hereford of the present day, viz., the production of the finest quality of grass-fed beef, was during the eighteenth century quite a secondary consideration. It was only during the latter years of it that breeding-cattle began to be recognised in the prize lists at local agricultural shows. In certain parts of Gloucestershire and the surrounding district, Hereford bullocks are kept as work animals, and though used mostly in cultivating they are occasionally employed on the farm in the cart. Earl Bathurst still uses a few selected Herefords in the working

of his home farm near Cirencester. When out of work they form a feature of interest in the Park.

Polled Herefords were originated and bred by the late W. W. Guthrie of Atchison, Kansas:—

"In March 1889 he had a bull calf dropped without horns, which he named 'Discovery.' It was sired by the pure-bred Hereford bull 'Grateful 3rd' (8001), bred by Messrs Raub & Earl, La Fayette, Ind., and out of a cow that was one-half Hereford and one-half Shorthorn. General Guthrie later on bred the polled bull 'Discovery' to a number of Hereford cows, and selected from this lot of calves a bull calf he named 'Dick,' which was out of one the best cows, and was in blood lines three-fourth Hereford and one-fourth Shorthorn. The grown bull was perfectly polled, and well formed, and possessed the colour, markings, and general conformation of the original pure-bred Hereford bull 'Grateful 3rd' (8001). At the same time the General selected six heifers — all hornless, and fairly well Hereford marked—and four pure Hereford heifers, and bred them to one of the polled bulls, with satisfactory results. All the calves were hornless, except one that had a scarcely noticeable scurf or button on one side of his head. The polled characteristic is so firmly established, that S. W. Anderson, Blaker Mills, Greenbriar Co., W.V. (from whose catalogue for 1905 the present notice is condensed), reports that 75 per cent. of the calves from polled bulls used mostly on horned cows are without horns. They grow large, mature early, and seem to lay on flesh at an early age, and possess the keeping quality that has made the standard-bred Hereford so popular all over the country. In December 1902, the registry known as the *National Polled Hereford Breeders' Association*, Chicago, Ill., was formed. The original herd is being maintained and improved; and a number of other herds are being started in different Western States."

CHAPTER VI

CATTLE—DEVONS AND SUSSEX

The Devon Breed—Two Branches—North Devon—Early History—Historians: Sinclair, Culley, Fraser, Marshall, Young, Polwhele, Lawrence, Parkinson—Period of Degeneration—Francis Quartly—Davy and Merson — Holker and other old Herds — Prominent Breeders—Somerset Type—**South Devon** or South Ham—Points—Origin and Milking Qualities—Prominent Breeders—**The Sussex Breed**—Points—As Work Oxen—As Steers—Introduced to Smithfield Club by Edward Cane—Fat Records—Low on their Geographical Position.

THE **Devon Breed** is primarily divided into—(1) North, and (2) South Devons.

The North Devon is the original true and hardy type belonging to the elevated region in the north of Devonshire. As represented by the best specimens, this division of the breed is unsurpassed for compactness and symmetry of form. It is smaller than the Hereford and the Sussex, two breeds to which it is allied. The colour of the hair is whole red with often conspicuous dappled markings, that of the skin is orange-yellow, but inside the ears from orange-red. The yellow tint is specially noticeable around the eyes and muzzle. A small patch of white hair is a common marking on the belly in front of the udder of the cow or the scrotum of the bull. At times it extends till it reaches the fore-legs, and may thus be recognised as corresponding to a limited extent with the white under-line of the distantly related Hereford. The white hairs, sometimes mixed with the natural red brush of the tail, and also in patches on the body, are further proofs of the tendency to develop white markings. The head is adorned, in the case of the female, with particularly elegant, creamy-white, sharp-pointed, black-tipped horns of medium length, having a good elevation at the junction with the head, and curving upwards. In the bull they are shorter in

proportion to thickness, straighter, and less raised. The shoulder is specially neat and well formed, the barrel joining on behind with scarcely a depression at the region of the heart-girth—a defective point in many breeds. The quality of the beef is excellent.

The early history of the breed is lost in obscurity. What is known is focussed by Housman and Sinclair in the *History of the Devon Breed of Cattle* (1893). Various hypotheses are there advanced:—(1) that it may have been descended from the aboriginal cattle of Britain, probably through the union of *longifrons* and *urus;* (2) that, in common with the Sussex breed, it may have been an offshoot of the red **Salers cattle**—a French breed which strongly resembles the Sussex "in the horn and general character," and which, in crossing with the Devon, produced "a perfectly harmonious blending"; (3) that they may have been a result, as asserted of the Hereford, of crossing the original cattle of the district with cattle from Flanders; (4) that they may be traced back to the period of the landing of the Phœnicians in search of Cornish tin, and thus be of Spanish or North African extraction.[1] An Irish record exists which shows that the Devon cattle taken to the South of Ireland were at that time red in colour. One of the most complete of the early descriptions of the breed is given in **George Culley's** *Observations on Live Stock* (1794 edition), condensed by Sinclair:—

"Devon cattle were then considered to be of the greatest purity, and of the best kind in the vicinity of Barnstaple (but other writers add North and South Molton). They were there of a high red colour, white spots (particularly if running into one another), being regarded as signs of impurity. He described them as having a light dun ring round the eye, and the muzzle of the same colour, fine bone, clean neck, medium length of upward bent horns, thin faces, fine chaps, wide hips, a "tolerable" barrel, but rather flat on the sides,

[1] Dr R. Munro, in *Prehistoric Scotland*, says there is a consensus of educated English opinion that there is no evidence of such a trade ever having existed, though the Phœnicians had for a long time a monopoly of navigation and trade in the Mediterranean. It is an interesting fact that the numerous cattle of the Islands of Andros and Tinos, and a few others in the Greek Archipelago, resemble North Devon cattle, and when crossed with them yield progeny of a similar type. The breed is very ancient; the animals are light red, longer legged, and narrower than Devons. Their many defects are doubtless due to in-breeding from time immemorial.

small and high-set tail, thin skin, silky handling, feeding early, maturing sooner than most other breeds; and by hardiness, quick movement, and the form of the shoulders, well qualified for use as working animals."

In the same year **Robert Fraser**, in his *General View of Devon*, remarks that the North Devon breed is remarkably fine, and perhaps the best in the Kingdom, many people preferring it to the famous Longhorns of Bakewell.

William Marshall, two years later, writes:—

"There are numberless individuals of the Devonshire breed so perfectly resembling the breed of Herefordshire, in frame, colour, and horn, as not to be distinguishable from that celebrated breed, except in the greater cleanness of the head and fore quarters, and in the inferiority of size. The cattle of Devonshire resemble those of Sussex, except in their greater symmetry of frame, and their being much cleaner in the fore-end, and everywhere freer from offal, than the ordinary breed of Sussex." The breed "varies very much in different districts of the country, both in size and mould. North Devonshire takes the lead in both these particulars, and its breed is, in both, nearly what cattle ought to be. . . . They are beyond all comparison the best workers I have anywhere seen."

Arthur Young in 1796 gives the most comprehensive account of the breed, from information derived from Lord Somerville. He thus, according to Sinclair, locates their home in North Devon, beginning at Barnstaple:—

"The length of the district to the western extremity, the mouth of the Barnstaple River, is 45 miles; the breadth from Tiverton to Minehead, 22 miles. Outside this district eastward was a 'mixture of Gloucester, Welsh, Upper Somerset, etc. . . . a varied dairy sample.' Beyond the western extremity, the Devon breed was found, but inclined to the Cornish type. . . . To the south were the South Hams Cattle, described as 'coarse, with a good deal of white and brown, and black and white mixtures, of uncertain properties'; and to the north the sea. . . . At Bampton, in North Devon, and at Wiveliscombe, in Somersetshire, both low-lying places in a comparatively warm climate, the breed was in great perfection. . . . The north-west of Devon and the hill part of Somerset produced stock to the utmost of their capacities to supply the demand in the vales of Taunton and Exeter, and 'a great foreign demand,' which had been added by the merit of the breed. . . . Handsomer bulls are

often to be found in other breeds, but they are the sires of oxen incomparably active in labour, full of that which in horses is termed 'blood,' and of that superior grain which gives Devon beef its high place in the market. . . . It is certain that this race, of which the *whole produce* is brought to view, stands the confessed favourite or among the very first at Smithfield, where 'prejudice cannot find the way. Generally speaking, the bulls are, relatively to oxen, not of a large size.' . . . The skin of the Devon is of the thinner rather than the thicker class, and the hair is seldom hard and wiry. . . . Great stress is laid upon colour, the mahogany shades being most admired. Those with curled hair are deemed excellent provers; and a very glossy skin, paler or lighter, with curls, like ripples of wind on a smooth mill-pond, is also in the highest estimation.' The paler shades, however, if the eye be good and clear, are second to none in bearing hard work and in proof."

The Rev. Richard Polwhele (1797) says of the Molton and Barnstaple cattle:—"These are the finest bullocks in the Smithfield market; they are a very healthy breed, and easily fed; they are fleshy, with small bones, and they 'bear the best weight' on the most saleable parts; they are of a cherry colour or bright red." As regards the wonderful prepotency of the bulls within the true home of the breed—a "space of about 15 to 20 miles in diameter"—he observes that, mated with Guernsey cows, they produce crosses indistinguishable from their sires, but that out of this space their descendants of the third or fourth generation show a falling off in quality. He herein expresses a very common but, as since proved, erroneous opinion of Devon people at the time, in face of his own declaration that "numbers of bulls are bought at high prices and sent even to Jamaica." He records the sale of a North Devon heifer at 30 guineas, a price "frequently commanded" by the best bulls of the breed.

John Lawrence, in *A General Treatise on Cattle, etc.* (1805), discussing Devons, says:—

"From these have descended the Hereford, Old Gloucester Red, and Sussex." . . . "The red cattle of North Devon are doubtless one of our original breeds, and one of those which have preserved most of the primitive form. The excellence of this form is best proved by the fact that the fashionable substitution of horses has made no progress in the district of these cattle, by their high repute as feeders, and by the

superior excellence of their beef, which has been acknowledged for ages. Robert Bakewell paid them the highest compliment they could receive, by declaring to an enquirer that the Devons could not be improved by any alien cross. . . . These cattle have generally, for a century past [200 years from the present date], commanded the best price at Smithfield. . . . The Devons are the speediest working oxen in England, and will trot well in harness."

Richard Parkinson's account of the breed (1810) gives the colour round the eye and muzzle as "light dun." This strengthens the conviction that whatever breeds of cattle were drawn upon to form the true type of the North Devon, the traditionary cattle brought by Cornish miners (page 124), played no insignificant part. The rings of light-coloured hair which have disappeared from the modern type of Red Ruby, but have been mentioned by several early writers, are a characteristic of certain of the cattle of the great European Peninsula (Plate LXV.), that have formed the foundation stock in North and South America and also in South Africa, where the breed is noted for hardiness and activity, and power of endurance in the yoke. The colour, as well as the head and forward part of the body, of the Africander cow is so Devon-like, that a speculative belief based on no trustworthy evidence exists that the Devon breed must have contributed to its formation.

Two periods of degeneration in the Devon breed occurred during the first half-century of its written history, "at one time from selling-off the best cows, and at another time from feeding-off the best calves;" but they seem to have entailed no permanent injury upon the latter-day representatives.

Francis Quartly of Great Champson, in Molland, North Devon, filled the position in the history of North Devon cattle which the Collings did among Shorthorns, and Tomkins among Herefords. Francis was the great-grandson of James Quartly, who migrated from Somerset in 1703; was grandson of Henry Quartly, who died in 1725; and son of James Quartly (born 1720, died 1793), who had two other sons, Henry George and William (a clergyman). These were all closely associated with the development and fame of the breed. Francis Quartly began his career as a successful breeder at a time,

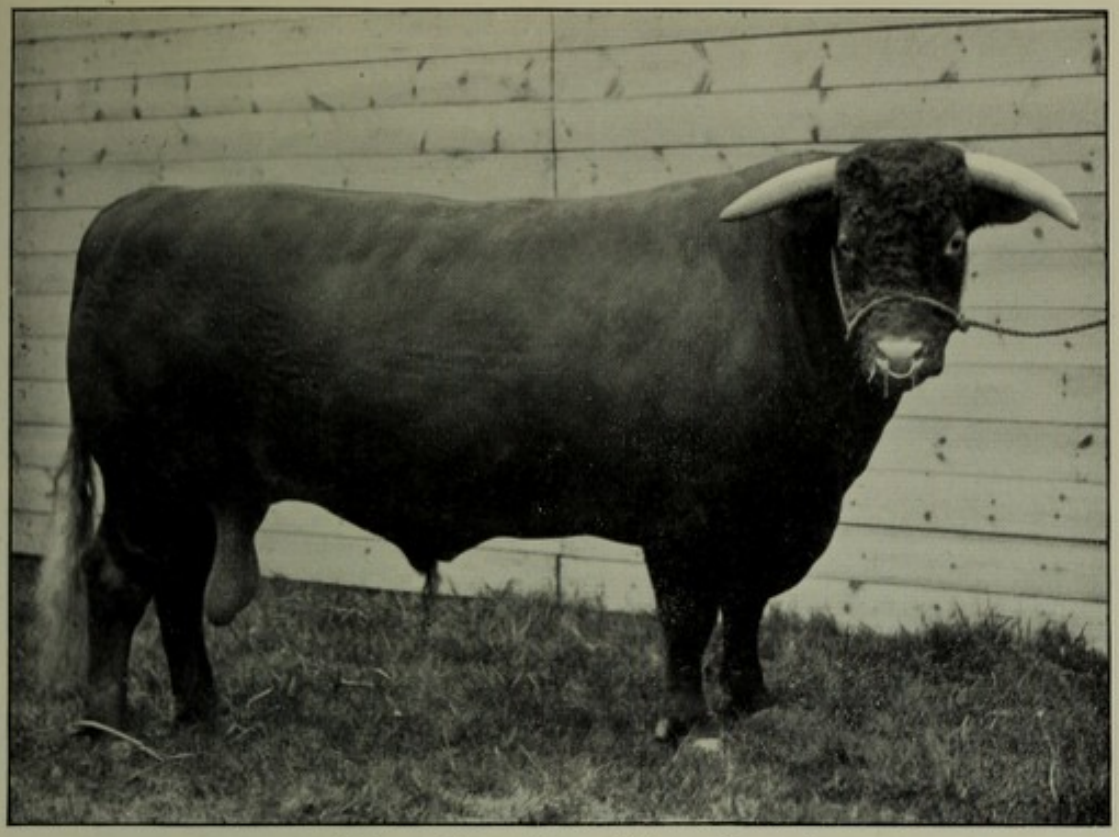
according to his own statement, when "the principal North Devon yeomen were all breeders, and every week you might see in the Molton markets animals that would now be called choice." Before 1831, when cattle-shows began at Exeter, there were no shows to test the relative merits of animals, and "the war-prices tempted many farmers to sell their best bulls and cows out of the district." Quartly saw that the breed was degenerating, and he "determined to buy quietly all the good stock" he could get. He continued thus for years (1793 to 1823) to "improve his stock till he brought it to perfection." The Champson herd thus became the fountain-head of the breed. Quartly practised the system of in-and-in breeding, using home-bred bulls, and purchasing females to improve his foundation stock. He retired in 1836, after forty-three years of activity as a breeder, in favour of his nephew, John Quartly, and died in 1856 at the age of ninety-two. The influence on the breed of the Quartly family may be gathered from the following quotation from **Sinclair**:—

"Henry Quartly was the breeder of the celebrated bull 'Forester' (46), and of the cow 'Lily,' or 'Lilly,' the direct ancestress of James Davy's 'Temptress' (1672), the famous winner of the gold medal of the Battersea International Show; and of his not less excellent cow 'Actress.' . . . There are recorded in Davy's *Devon Herd Book* more animals tracing descent on the dam's side from Francis Quartly's long-horned 'Curly' and Henry Quartly's 'Lilly' than from any other two cows of the Devon breed."

William Davy, at Flitton, and **Merson,** at Brinsworthy, in whose families herds of Devon cattle had been maintained for more than a century, were intimately associated with the evolution of the breed. There were many breeders whose names were not recorded, as well as others whose names are known, who ought to share the credit of its maintenance and restoration.

One of the most famous of the early herds outside the county of Devon was that of **Holkham**, in Norfolk, founded in 1791 by Coke, created Earl of Leicester in 1837. From Holkham, Devons were first exported to the United States.

Breeders of **other famous old herds** who deserve mention were George Turner of Barton, who gained numerous medals and prizes (on two occasions at Paris); two generations of

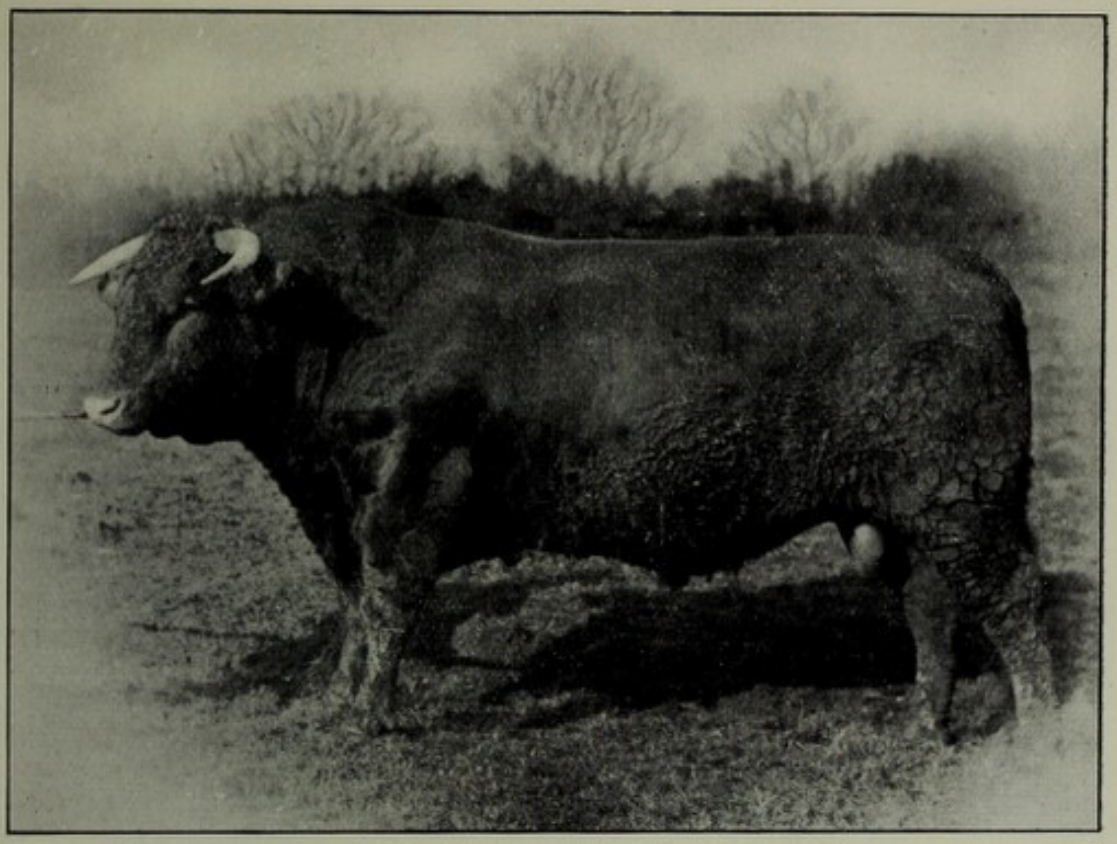


A. North Devon Bull, "Pound Mayor."
First, B. and W. Show, etc. etc., 1905.
Owned by T. S. Morgan, Whimple, Exeter.
[*G. H. Parsons, Alsager, Cheshire.*



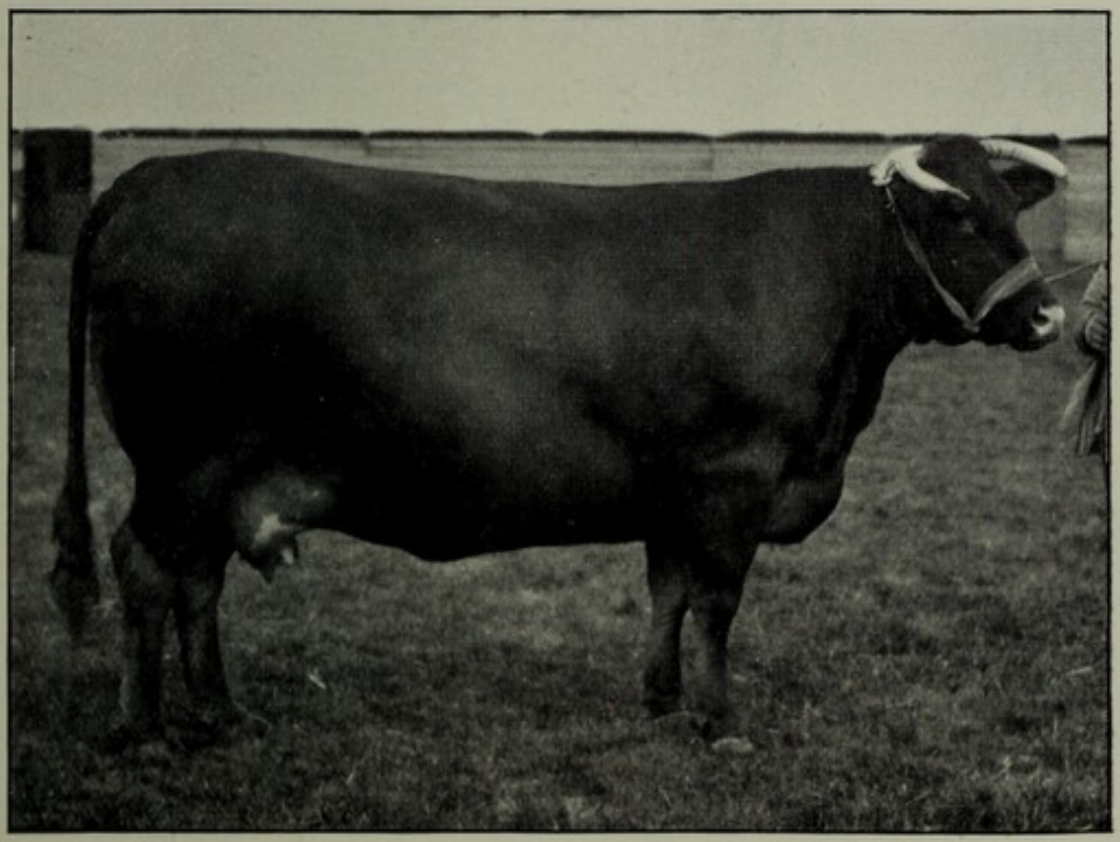
B. North Devon Cow, "Curley 2nd of Pound" (14771).
Eight months after calving. Special prize as best Devon, and Champion Dairy cow at Bath, etc. etc., 1905.
Bred by Alfred C. Skinner, Pound Farm, Lydeard.

[*p.* 128



A. South Devon Bull, "Saltram" (1220). Weight about 28 cwts.
First at the Royal in 1903, and later 50 Guinea Challenge Cup at Bristol B. and W. Show, etc. etc.
Owned by J. Wood, Bowton, Totnes.

[*Brinley & Son, Totnes.*



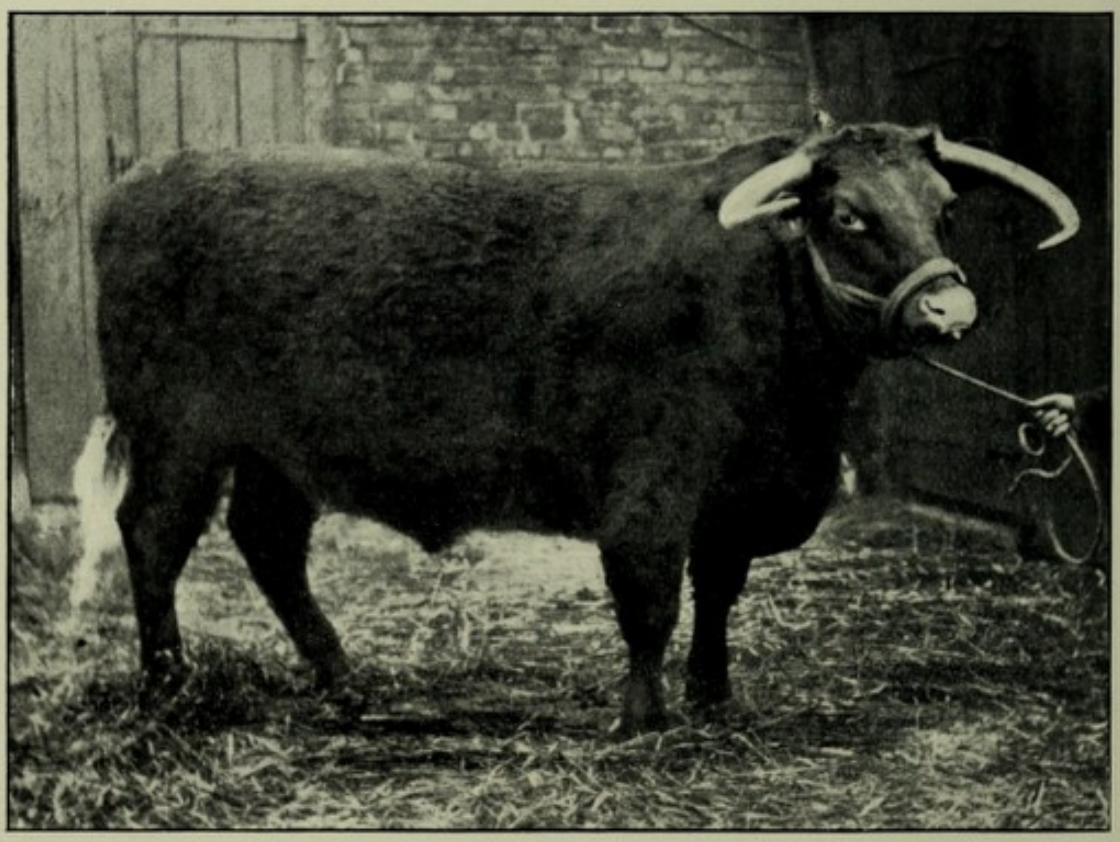
B. South Devon Cow, "Lorna Doone." Calved 1897.
Many prizes. Bred by J. S. Wroth, Aveton Gifford, King's Bridge.

[*G. H. Parsons, Alsager, Cheshire.*

[*p.* 128

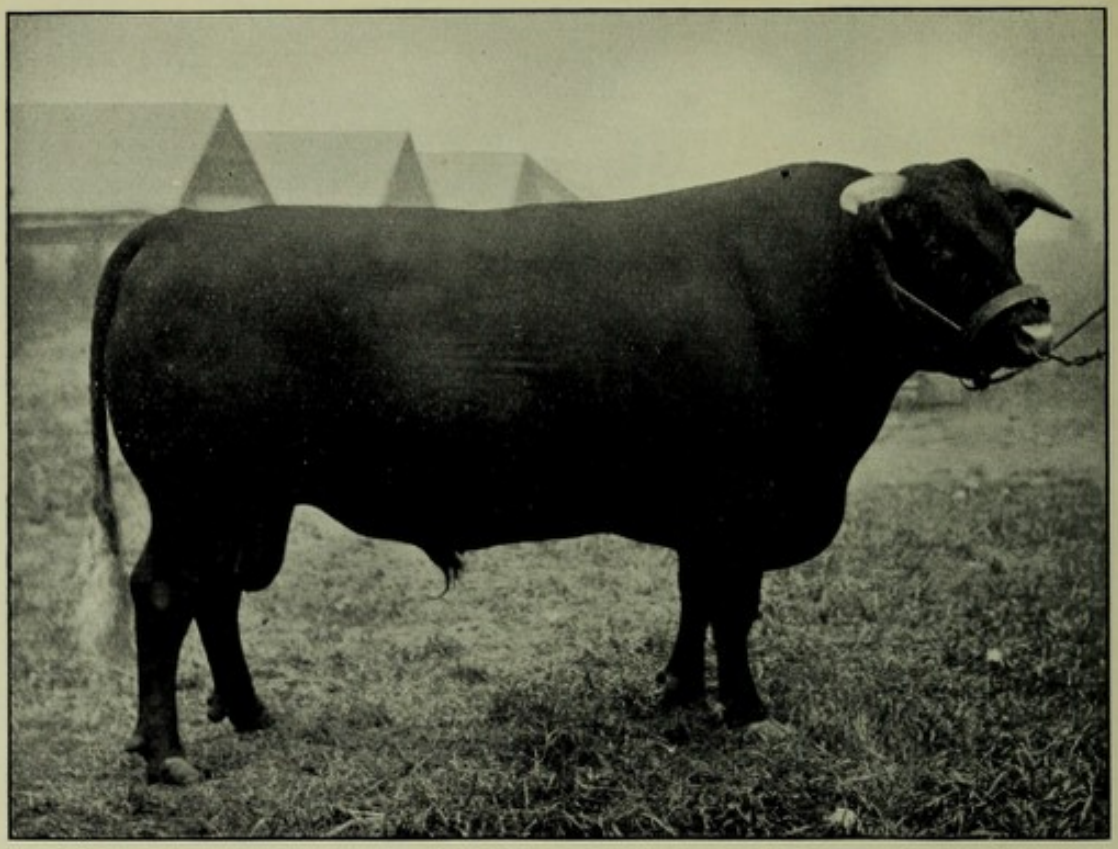


A. North Devon Steers.
Bred by Dr French, Cabaña Loraine, Paysandu, Uruguay.
[*Devon Cattle-Breeders' Society Herd Book.*

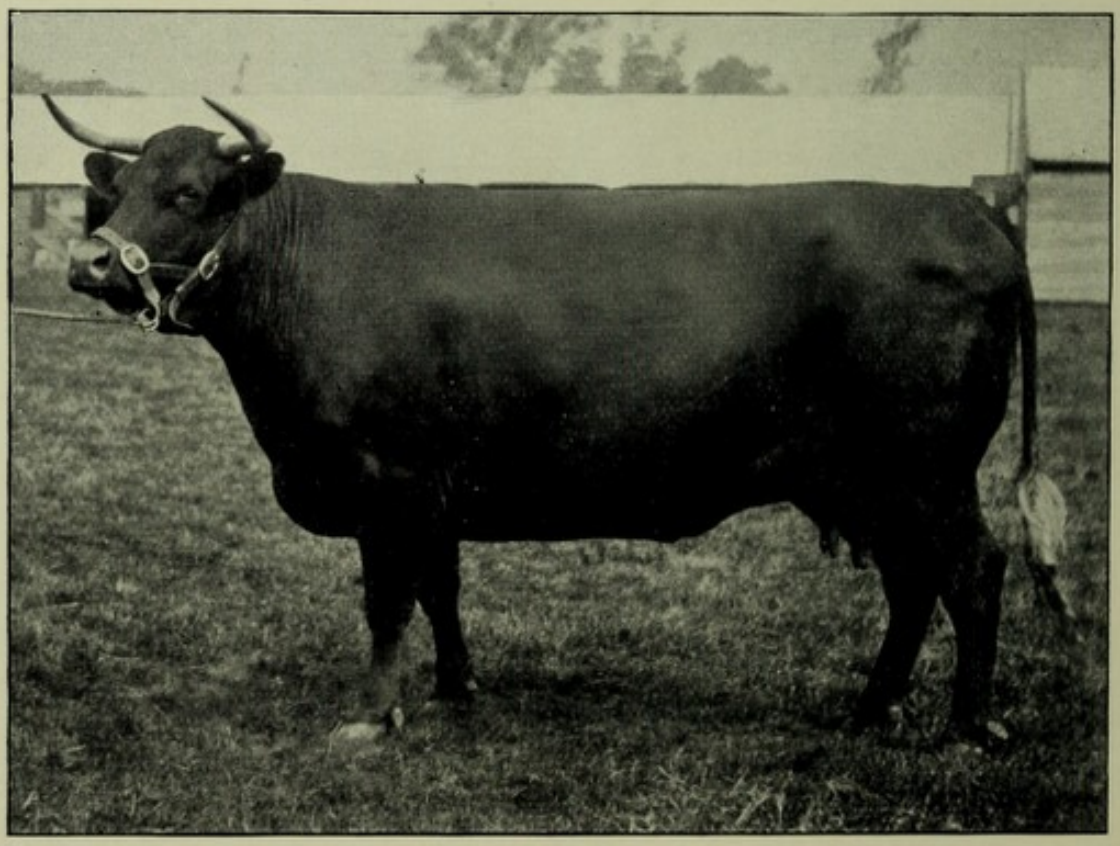


B. Sussex Ox, Grandsire "Gold Smith" (391).
Won the Breed Cup at Islington in 1886.
Bred by W. S. Forster, Gore Court, Maidstone.

[*p.* 129



A. Sussex Bull, "Lord Comp" (1778).
Champion, B. and W. Show, 1904, and Champion at Park Royal and Sussex County Shows in 1902 and 1903
Owned by Hon. Ralph Pelham Neville, Birling Manor, West Malling.
[*C. Reid, Wishaw.*



B. Sussex Cow, "Fancy."
First, B. and W. and Royal Counties Shows, 1905, etc. etc. Owned by Earl of Derby.
[*G. H. Parsons, Alsager, Cheshire.*

[*p.* 129

Mersons at Brinsworthy; W. M. Gibbs of Longlands, near Taunton, and his brother, George Gibbs, who held the adjoining Portman Farm, and whose herds were in the front rank from 1850-80; Walter Farthing of Stowey Court, near Bridgwater, who succeeded to his uncle's herd of seventy years' standing, and took many prizes for cattle bred from pure North Devon bulls on large-framed Somerset-Devon cows; Viscount Falmouth of Tregothnan, Truro, who had a herd of seventy-six animals, sold off in 1890 at an average of £61, 2s. 6d.; Bodley of Stockley Pomeroy, Crediton, who kept a pedigree record of his herd years before John Tanner Davy, himself a successful breeder, started the *Herd Book;* William Umber of Wappenbury, Warwickshire, who began in 1810, and was the first of a family of noted Devon breeders; John Tapp of Twitchen, Devon, who owned one of the oldest and best herds, although unknown in the show-ring; John Joyce of Allercott Farm, Timberscomb, Somerset, who, by the judicious use of North Devon bulls, bred a herd of Somerset-Devons that "showed in an extraordinary degree the size and substance of the Somerset with the symmetry and quality of the North Devon"—the herd of forty head averaging £38, 0s. 6d. at the sale in September 1875; the Webber family, of Halberton Court, who fortified their herd by the purchase of "Hundred Guinea" (56), and many other good sires, and took many prizes; W. H. Punchard, of Bourton Hall, Totnes, Devon, who blended the style and quality of the North Devon with the great size and heavy flesh of the Somerset-Devon—one of the Myrtle tribe from the Pound herd, while in his possession, being declared the second best dairy cow at the London Dairy Show in competition with all breeds; the Cecil Smiths, father and son, of Lydeard House, Taunton, who gained many prizes, including one at the Paris Exhibition, with superior animals bred from the most fashionable strains of Devon blood; John Walter (proprietor of *The Times*), of Bearwood, Berks, who on several occasions gained premier positions at Smithfield, and in 1879 at the International Show at Kilburn; the Earl of Dartmouth, who had a herd at Patshull, Wolverhampton; and Edward Pope of Great Toller, Dorset, who inherited a herd which had been maintained in the family for at least three previous generations, and which carried off many prizes at the Royal, Bath and West, and Smithfield Shows.

The **most prominent breeders** of North Devon cattle since the beginning of the twentieth century have been:—

H.M. King Edward VII., at the Royal Farms, Windsor; Wm. Brent, Clampit, Callington, Cornwall; B. J. Bucknell,

Holcombe Barton, Wellington, Somerset; Earl Cawdor Stackpole Court, Pembroke; John Chick, Compton Valence, Maiden Newton, Dorset; W. J. Chick, Stratton, Dorchester; E. Clatworthy, Cutsey, Wellington, Somerset; Lord Clinton, Heanton Satchville, Beaford, North Devon; Robt. Cook, Chevithorne, Tiverton, Devon; C. L. Hancock, Cothelstone, Taunton, Somerset; H. C. Hancock, Milverton Court, Taunton, Somerset; R. D. Hancock, Halse, Taunton; Samuel Kidner, Bickley, Milverton, Somerset; William Kidner, Kingston, Taunton; Wm. Lethbridge, Wood, Okehampton, Devon; T. S. Morgan, Whimple House, Exeter, Devon; J. F. R. Morris, Prixford, Barnstaple, Devon; E. C. Norrish, Gays, Copplestone, North Devon; Hon. E. W. B. Portman, Hestercombe, Taunton; Viscount Portman, Bryanston, Blandford, Dorset; George Risdon, Dunster, Somerset; B. C. Shepherd, Knowle Hall, Bridgwater; A. C. Skinner, Pound, Bishop's Lydeard, Taunton; Hon. Mrs Tremayne, Sydenham, Lew Down, Devon; Abraham Trible, Halsdon Barton, Cookbury, Brandis Corner, Devon; Wm. Tuckett, Stockleigh Pomeroy, Crediton, Devon; J. C. Williams, Werrington Park, Launceston, Cornwall; Sir F. Wills, Bart., Northmoor House, Dulverton, Somerset.

The type of North Devons peculiar to Somerset has in recent years been coming to the front and growing in favour, on account of its large size, due to the richer and deeper soil and better climate prevalent in that region. With increase in bone, there is a tendency to coarseness of figure, and Somerset breeders strive to counteract this by using bulls reared in the north of Devonshire. A parallel example to this is to be seen in numbers of the Ayrshire breed reared away from their home conditions and highly fed. The horns of the Somerset type are more inclined to droop than those of the original North Devon. There is a growing foreign demand for these cattle.

Being originally a mountain breed, the Devon is hardy, strong, and active. It was long famous for supplying useful oxen for farm work, but its employment in this way is now much restricted. As a breed for **milk production,** it has been and still is inferior. The cows give but a small quantity of rich milk, and tend to go dry early; yet many of the dairies in the counties of Somerset and Dorset are filled with Devon cows of the larger type, and excellent milking animals now and then appear in herds not specially bred for

milk production, to indicate that when wanted the North Devon is capable by selection of being transformed into a good dairy breed. A heifer of Thomas Dyer of Tencreek, in 1905 gave 3½ gallons of milk daily, yielding 4.9 per cent. of butter-fat in the morning and 4.4 per cent. in the evening—an average of 4.65 per cent.—equivalent to 2 lbs. of butter per day; and William Kidner of Kingston had a cow which gave 1100 gallons of milk in 11 months. Milch cows retain their lean flesh well, and fatten into good beef "after dropping their fourth or even fifth calf."

The cattle belonging to the **South Devon** division of the breed differ materially in form from the North Devon types, South Devons being larger, coarser, and not so deeply coloured. They perhaps acquired these differences to some extent, and also their greater milking powers, by crossing long ago with Channel Islands cattle. This, however, is by no means regarded as an established fact or accepted among South Devon breeders. These now publish their own *Herd Book*, the subscribers to Vol. IX. of which (1905) numbered over 250.

Youatt refers (1834) to the practice of crossing the English South Coast and Isle of Wight cows with Alderney and Norman cows, but it is believed that the South Devon breed existed long before that time:—

"The dairy stock has been occasionally mixed with the Guernsey or Alderney cattle, and with success, so far as the quantity and quality of milk go. . . . The Alderney is a favourite breed; a cross between it and the Devon has produced some very good cows, well adapted for the dairy, and not unprofitable for the butcher."

Since the end of the eighties in last century, the South Devon cattle have been steadily asserting themselves as a distinct breed. They have been growing in favour as general purpose animals for the production of both meat and milk, and their development in type and quality has been a subject of remark at the leading shows. They have extended in considerable numbers into the counties contiguous to their home centre and into the Midlands, and they have been increasingly shipped to South Africa, South America, and the United States. Their powers of milk and beef production may be estimated from instances cited by **Alfred Michelmore,** *Live Stock Journal Almanac*, 1903:—

"Six cows from the herd of R. E. Cocks of Ranleigh, near Plymouth, produced during one period of lactation an average of over 969 gallons per animal, whilst another cow from the herd of J. Sparrow Wroth of Coombe, near Kingsbridge, in 261 days produced 1047 gallons of milk, being an average of just over 4 gallons per day." A steer from Coombe, sold at £32, 4s. at Smithfield, "under two years of age, was 1190 lbs., showing an increase of 1.78 lbs. per day."

Among the most prominent of present-day **breeders of South Devon** may be included the following :—

Butland Bros., Leigham, Plympton; R. E. Cocks, Ranleigh, Plymouth; Edward Cornish, Charleton, Kingsbridge; W. J. Crossing, Woodford, Plympton; J. S. Hallett, Sherford Barton, Plymouth; Ben. Luscombe, Langston, Kingsbridge; John Luscombe, Coarswell, Ivybridge; W. Merry, Great Woodford, Plympton; W. H. Pain, High House, Kingsbridge; J. M. Peeke, Hernaford, Totnes; F. W. Rowe, Trevego, Lostwithiel; B. Trant, Trethawle, Liskeard; W. P. Vosper, Merafield, Plympton; John Wood, Bourton, Totnes; John Sparrow Wroth, Coombe, Kingsbridge.

The Sussex Breed ranks among the largest classes of British cattle. It belongs to the old race which gave origin more or less directly to the West Highland, the various Welsh breeds, the Hereford, and the Devon. To the last it bears a very striking resemblance, and no doubt it possesses this in virtue of a collateral descent from the "red cow" that at one time occupied the southern districts of England. Low says (1845): "The same race of cattle which exists in the mountains of North Devon yet survives in the Wealden." The influence of the soil and climate of the weald country has considerably modified the form and character, which, it may be presumed, were at one time similar to those of the Devon breed. The skins . . . are covered with short hair, which has not usually the unctuous feel of the true North Devons. The horns are longer, stronger, and more irregular in form, with a strong similarity to the style of many of the horns of the Longhorn breed. The colour is dark red—at times even "cherry-red," deeper than that of the North Devons. Formerly both light and dark shades were met with; the latter are in certain instances almost black. The Sussex, though superior to the Devon in size and strength, lacks something

of the neatness of the smaller animal. The cows have not been developed as milkers.

The bullocks, which combined in a marked degree strength and activity, supplied an excellent class of animals suitable for working the heavy land of the weald of the breed in Sussex and the adjoining counties.

Aged oxen used to be sold at the local fairs, and after grazing for a year were resold to the butchers, "weighing from one hundred and eighty to two hundred stones. . . . The famous ox from Burton Park, near Petworth, was 16½ hands in height, 8 ft. from the back of the horns to the tail; and from hip-bone to hip-bone across the back, 2 ft. 8 in.; the depth of shoulder, 4 ft. 7 in.; girth behind the shoulders, 10 ft., and weight, 287 st. 4 lbs."

It is not at all certain that it was an improvement in practice altogether to discontinue the employment of oxen in favour of horses in working some of the heavier classes of soils. Such land under the plough suffers much more from the trampling of horses than from that of draught cattle, and in consequence there are some clayed districts where cattle may yet be seen at field work. The steers are great favourites with the graziers, butchers, and consumers, and they are said to be "second to none as regards early maturity and weight for age." At three years well-fed specimens weigh twelve to fourteen score of lbs. per quarter. It has been tritely and accurately stated by W. C. Young, secretary of the breeds Herd Book Society, that "for beef-production, draught purposes, hardiness, early maturity, beautifully fine-grained flesh, and ability to thrive on poor fare, few breeds can equal the Sussex."

Edward Cane of Berwick Court was one of the most successful of the early improvers of the breed: he introduced it to the notice of the Smithfield Club, a circumstance which greatly influenced breeders to adopt much-needed methods for its advancement.

It was a Sussex steer that in 1867 was one of the chief competitors for the celebrated Smithfield Award carried off by M'Combie's "Black Prince." It was a complaint against the Royal Agricultural Society about 1875, fifteen years after the *Sussex Herd Book* had been established, that it was too slow to recognise and to encourage at its annual shows the

developing importance of the breed. Owing to a great many good cattle having been left out of the register, the *Herd Book* was in 1902 most successfully reopened for animals of pure blood, subject to inspection, such being destined to take a position of increasing importance among our old-established British breeds. The breed's record as a beef-producer is excellent. At Smithfield Show in 1902 the first-prize steer under two years gave the highest average daily gain of any animal in the show, *i.e.*, 2 lbs 8.34 ozs., with 68.02 per cent. of carcase to live-weight—a weight in excess of that of any other specimen of the same age present. Owing to the colour and hardiness of the breed and its suitability for draught purposes, thirty head of Sussex cattle were sent, after the termination of the war in South Africa, to the Experimental Farm near Bloemfontein, where, however, they and their progeny have to run the gauntlet of tick fever and other bovine diseases prevalent in the country.

Low aptly explains why representatives of the **cattle** belonging to the ancient **Celtic inhabitants** of these islands were preserved in certain parts. Wherever the region was difficult of access to the invaders, as in the case of mountainous tracts or large areas of forest, there the original inhabitants found shelter and safety for themselves and their cattle. Thus in hilly localities have been preserved the Scottish West Highland, the Welsh, and the Devon; and in the instance before us, the dense forests of the weald afforded the necessary security for the ancestors of the Sussex breed. The cattle of the accessible parts of the interior of the country were either supplanted altogether, or much altered in form and character by imported blood.

In India exactly the same condition of things exists, where the small, dark-haired, and inferior breeds have been driven away into remote and out-of-the-way corners; and the more valuable tracts of country, the highways of conquering armies, and more recently of trade and commerce, have been supplied by probably repeated importations of the larger and finer white-haired varieties. The parallel is not quite complete, as in some of the breeds in this country emerging from obscurity (and notably among these is to be found the Sussex) are animals of great size and substance and wealth of constitution.

CHAPTER VII

CATTLE—THE WEST HIGHLAND, WELSH BLACK, GLAMORGAN, OLD GLOUCESTER, AND ORKNEY AND SHETLAND

The West Highland—History—Improvement or Development—Bullocks—Falkirk Trysts—Breed Points—Colour—The Atholl Herd—Crosses with other Breeds—**Black Welsh Cattle**—Breed Societies—Historical Authorities: Harvey, Marshall, Low, and Youatt—South Wales Type—North Wales Type—Welsh "Runts"—**White Belted**—**White Breed**—Lamphey Court White Herd—**The Glamorgan Breed** and its Extinction—**The Old Gloucester Breed**—Historical Authorities: Morgan, Evans, Youatt, and Marshall—Present Breeders—**Orkney and Shetland Cattle**—Origin—Youatt and Low.

THE **West Highland Breed** belongs to the Western Islands of Scotland (the Outer and Inner Hebrides) and to Argyllshire and the adjoining counties.

It is the remaining selected representative of the different varieties of Scottish mountain cattle, the domesticated descendants of the ancient breed of the forests.

The historical preface to Volume I. of the *Highland Herd Book*[1] (1885) says:—

"Various classes of the breed have been made, but it is thought that there are really only two distinct classes (which have since been merged in one breed), namely, the West Highland and the Highlander, or Mainland Highlander."

The West Highland, or **Kiloe,**[2] was originally black, and smaller and shaggier than the Highlander, being kept in more exposed and altogether harder circumstances. The

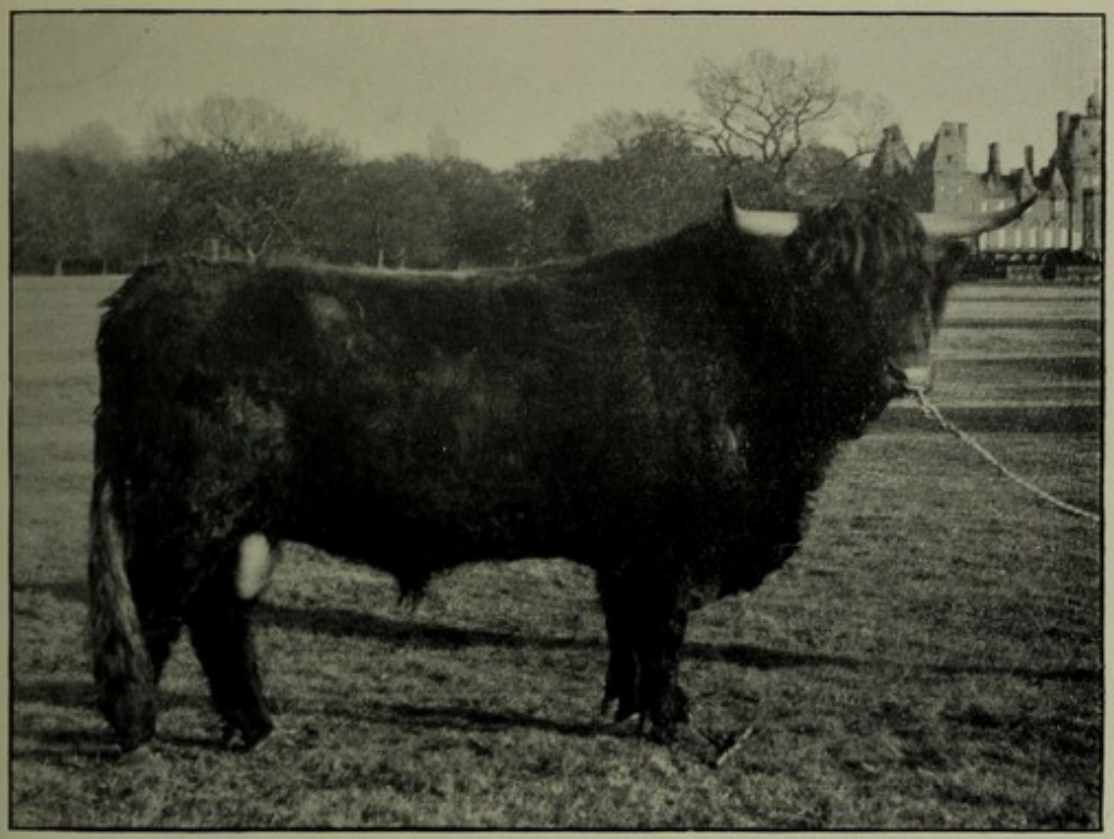
[1] First suggested by the Earl of Dunmore in the Highland Society showyard at the Centenary Show in Edinburgh in 1884.

[2] Two explanations are given of this word. The more plausible derives it from the kiloes, or ferries, that separated the islands from the mainland, and the second from the Gaelic for "Highland."

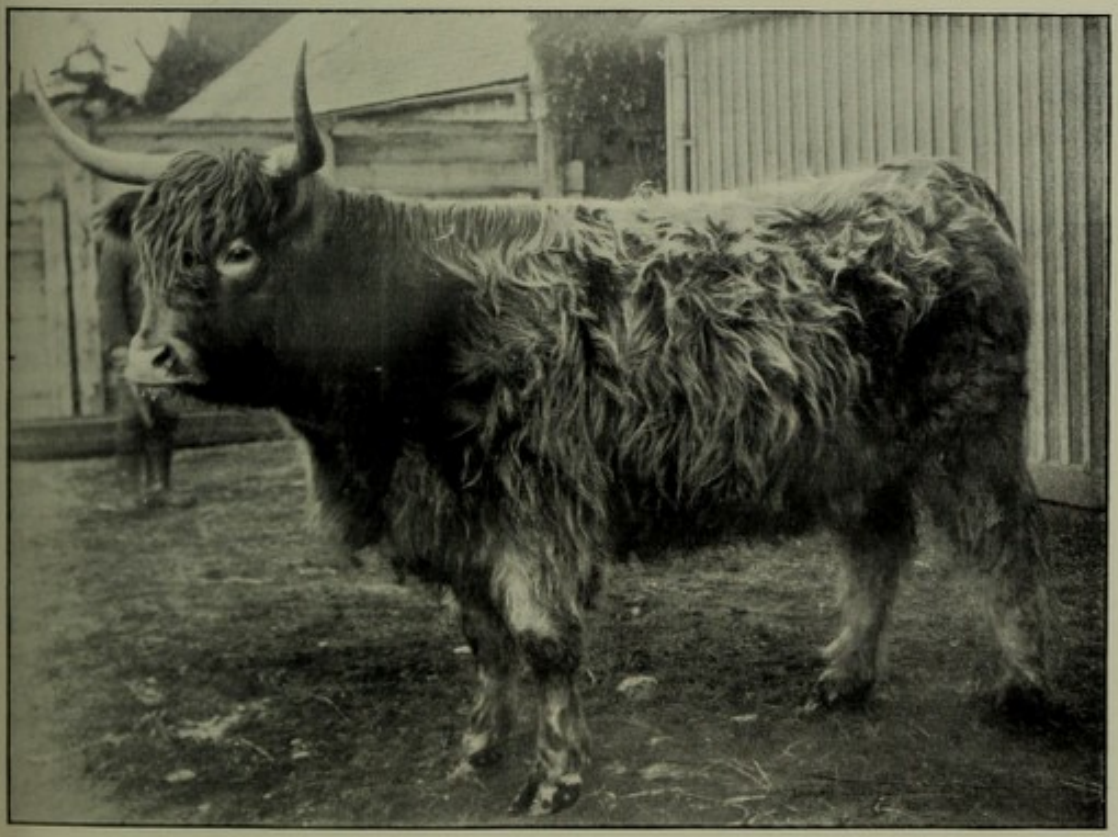
light colours now in fashion were introduced into Harris by Donald Stewart of Luskentyre from Perthshire, through picked specimens of the "Highlanders" common to the Northern Mainland and Argyllshire. **Improvement** in Skye was effected by Mackinnon of Corry, John Stewart, Duntulm, and afterwards of Eusay, and on the Mainland by the Duke of Sutherland in the North, the Earl of Seafield in Inverness Malcolm of Poltalloch in Argyllshire, and the Duke of Atholl in Perth. "One of the oldest and best known breeds in Perthshire was that of Glenlyon, and from it all the principal folds in the country got their best blood." There was **no Bakewell** or Colling of the West Highland Breed, and the system of in-and-in breeding was eschewed for selection of the best or "natural breeding," and the natural selection of the survival of the fittest. **Youatt** says that at one time through the whole of the Hebrides "one-fifth of the cattle, on an average, used to perish every winter of starvation," and also that "it was the uniform experience that attempts at crossing only destroyed the symmetry of the Kiloes, and rendered them more delicate and less suitable to the climate and the pasture."

At one time, before the stocking of the land with mountain sheep, which began in Argyllshire in 1760, "black cattle" occupied the wild pastures of the true Scottish Highlands. The mild or "open" character of the climate of the extreme west, along with the careful selection in breeding practised from time immemorial by the Macneils of Barra, the Macdonalds of Balranald on the Long Island, and others, tended to foster that superiority of quality which has enabled it successfully to supplant the inferior sorts inhabiting the inland uplands. Superior cattle were produced in "Islay, the southernmost of the range of the inner Hebrides," the Isle of Skye, and Argyllshire. The West Highlander is the hardiest of all British breeds, and from an artistic point of view the most picturesque.

The bullocks, when three or four years old, are highly and justly appreciated as park cattle in all parts of the kingdom, where their long and elegant horns, variously coloured hair, and long, silky, shaggy, and uncommon-looking coats render them objects of universal interest and admiration. When gently handled, they are quiet and tractable, and even



A. West Highland Bull, "Seummas a Ghlinne" (482).



B. West Highland Heifer, "Lady Flora."
Both bred by the late Rt. Hon. the Earl of Southesk, K.T.



A. West Highland Heifers at Kelton House, Dumfries.
Kept to breed with a Shorthorn bull.
[*Miss Waterhouse, New Zealand.*



B. West Highland Bull, "Saladin."
Bred by the late Rt. Hon. Earl of Southesk, K.T., and the property of the present Earl.



A. West Highland Four-Year-Old Heifers of the Blair Atholl Herd, two being descended from a swan-white cow with black points.
The property of His Grace the Duke of Atholl.

[*Photo by the Author.*



B. West Highland Cows and Calves.
The property of the Earl of Southesk.

[*pp.* 136 *and* 137

when "raised" by fear they will not charge unless cornered or cut off from escape. As beef-producers, they are slow in coming to maturity—about a year longer than most other British breeds—but the ultimate product is unsurpassed in quality in the leading meat markets of the kingdom. It has been remarked that their breed-defect is a tendency to flat ribs and a slight want of depth through the heart, but these defects are being eliminated.

In the old droving days the great mart for Highland cattle required for England was Falkirk, where trysts were held in August, September, and October. While the demand has continued, the numbers marketed have so gone down, that West Highland "tores" are usually dear in comparison with those of other breeds.

John Robertson, late agent to the Duke of Atholl, in John Coleman's *Cattle of Great Britain*, says:—

"A well-bred animal, of almost any species, is a pleasant object; but there are perhaps few animals familiarly known to us so graceful in form, colour, and movement as a thoroughly well-bred Highland ox or heifer. In form it possesses all the characteristics so much and so justly prized in the Shorthorn — the straight back, the short legs, the broad chest, the breadth of loin and depth of rib, and, in short, the squareness and solidity of form which always imply weight, whether in man or beast; while the noble expanding horns, the fine, full, and fearless eye, the short, broad, well-bred muzzle, the shaggy coat of richest black, or red, or dun, or brindled colour, impart a picturesqueness which is still further enhanced by that grace and deliberation in movement so distinctive of all animals reared in perfect freedom."

Additional characteristic points are the "*forelock* between the eyes, wild, long, and bushy," and on the neck a hairy fringe or *mane*:—

"In the bulls the *horns* should be sappy and substantial, and come level out of the head, slightly inclined forwards, and also slightly rising towards the points," a dropping between the crown and the commencement of the curve is "a very bad fault," and some prefer that there should be no rise. The horns of the cow usually "come squarer out from the head than in the male, rise sooner, and are somewhat longer, though they preserve their substance and a rich reddish appearance to the very tips"; at times the

horns "come more level from the head, with a peculiar back-set curve, and very wide sweep which is more graceful in appearance. The *neck* should be clean and without dewlap; from behind the shoulder, the *back* fully developed and beautifully rounded, any slight sinking or hollow being most decidedly objectionable. . . . Viewed generally—the *quarters* are square between the hips and the tail, and from between the tail right down to between the hind feet; the *legs* short and strong; the *bones* strong, broad, and straight; the *hoofs* well set-in and large, and the *legs* well feathered with hairs"; the *hair* in great profusion (especially in the unhoused islands cattle), long and wavy, a curl being faulty.

In addition to the *colours* already named, there are fawns (resembling certain shades of Guernsey cattle) and dun whites; and occasionally pure whites with black points like wild cattle occur, which enhance the value of a whole drove of cattle in a market, owing to the amount of attention they attract from observers. The brandered or brindled cattle, Youatt defines as "showing a mixture of red and brown in stripes," which usually run perpendicularly.

The white relationship in West Highland cattle is further seen by the occurrence of a pure white hair through the coats of a very large number of them. Though not more frequent in the black and reddish-brown than in other colours, yet owing to the contrast it is more easily observed in them; but in all cases one requires to examine within two or three yards to find it. Parallel instances are to be seen in the white hair through the coats of a great many Galloways and Black Welsh cattle.

The Herd of the Duke of Atholl, numbering about 50, was established in 1863 by animals got from Breadalbane some time after the wild white cattle (also Highland, page 49) had been got rid of. Two-thirds of the prize-winners in recent years have been of the Atholl blood. In the herd there is a strain, which at intervals has produced eight swan-white animals. It originated in a white cow, with a little black round the eyes and muzzle, and a few black hairs in the ear, that the late Marquis of Breadalbane got as a wedding present from the Duke of Argyll. No white bull has been kept, but when a white calf appears it comes usually of light-coloured parents. Some white cows produce coloured calves, and some white ones by coloured bulls. The coloured

cattle descended from the white cows have a greater proportion than others of white hairs in their coats, among the long as well as the short hairs. Two of the three animals, a light dun and a light reddish-fawn, shown in Plate LXV., are examples. The fawn one, that in the centre, had hair in the lower part of the fringe of the ears 16 inches in length. The colours that are in greatest favour are brindles, reds, and light duns. Some of the various shades of red have a very faint brindle through it, when looked at closely. Dark duns are not in favour, being often short and deficient in hair. The swan-white cows, with their black muzzles and black fringes, none of which were albinos, are distinct from the light creams, which are nearly white or at times smoky or dun-white, with the muzzle smoke or dark flesh-coloured, its depth of tint corresponding to that of the hair, but with no black fringe. The cast of bullocks is annually sold to Blair Drummond at six quarters old at about £12 a-piece, rising, according to the markets, to £16. The second-prize Highlander at Smithfield-Edinburgh fat-stock shows in 1904, weighing over 17 cwts. at four years old, was a white bullock from Blair Drummond. Black, although not now in favour, has been thought to indicate hardiness, but some of the lighter-coloured animals with tendency to an orange tint of skin feed better under forcing or artificial treatment.

The calves that are allowed to follow their mothers and are not handled or subjected to close contact with man develop wild instincts and practices, but it is usual to shut up those that are born before the grass comes, and let them suck three times daily, so as to tame them by handling while they are young and tractable. The cows do not excel as producers of large quantities of milk, yielding not more than one-third of that given by Ayrshires, although the quality of milk and butter is excellent. When they are milked by hand the flow of milk does not continue late in the season.

The Highland breed had also an animal "that travelled," like the famous White Shorthorn Heifer (p. 61). D. D. Dixon's *History of Upper Coquetdale* records that a **celebrated West Kyloe ox,** bred by Donald Campbell in Mull, and fed by Robert Spearman, Rothbey Park, Northumberland, was carried about in a large caravan, and exhibited at Kelso, Berwick, and other border towns free of charge. When

slaughtered, on 6th March 1835, the gross weight was 200 st. 6 lbs. George Stephenson, of Newbiggen Farm, Ewesbey, Morpeth, possesses an oil painting of the ox, which indicates the colour to have been roan.

West Highland cows cross admirably with bulls of most British breeds. Full advantage can thus be had of the good qualities of the breed without necessitating the sacrifice of the native hardiness of constitution, invaluable in a mountainous country, in the endeavour to induce early maturity. Unless the constitution is maintained, advantage cannot be taken in an upland country of the supply of natural food, which costs little and cannot be utilised except for such hardy animals. The outlay to produce a four-year-old Highland bullock reared on his natural food is very much less than that for a two-year-old stall-fed beast of the same weight, because the food of the latter is costly to grow and costly to buy. To substitute the early maturity animal, either by importation or by modifying the existing breed by in-and-in breeding, for the real West Highland ox in his home quarters, would lead to a loss of profit to the farmer, and the loss to the community of the natural cattle-food of the district.

In the restriction of entries the *Herd Book* Committee wisely reserve (in the Preface to Volume IX.) power to admit, for double the ordinary fee, meritorious animals that are known to be of pure blood, although their parents or grandparents have not been entered. In this way a mistake made by several other Breed Societies, *i.e.*, that of closing the breed record too soon and shutting out really first-class animals, will be avoided.

An effort has been made to get a share of the **Argentine export** business in breeding-stock, as it is highly probable that the hardy Highlanders would withstand better than any other European cattle the piercing cold of the south-west winds of the Pampas.

Welsh Black Cattle.[1]—The registration of the one remaining important breed of Welsh cattle is now made under the **Welsh Black Cattle Society,** which united the North and South Wales Herd Registers in 1904.[2]

[1] See Appendix, "Welsh Cattle and their Relatives," *Wall.*

[2] (a) *The Welsh Black Cattle Herd Book*, containing the pedigrees of

Morgan Evans attempted in 1867 to form a Herd Book, but breeders were not fully alive to its value, and he did not receive the necessary support: the knowledge of the value of registration is now widespread.

Harvey says:—"The Black Cattle are natives of the counties of Pembroke, Carmarthen, and Cardigan (not of Radnorshire or Breconshire), and are more generally known as Pembrokeshire Blacks, subdivided into Castlemartin and Dewsland breeds. They also extend along the North Wales coast up to Anglesea, and are then called the North Wales or Anglesea breed. . . . The breed of Black Cattle is generally supposed to be descended from the *Bos primigenius*, and is allied to the wild cattle in Chillingham Park, and also to the Devons. . . . It may be described as a horned breed, generally of black colour, and frequently with white marks on the udders of the cows, also a few white hairs at the end of the tail. Sometimes a few white hairs are mixed up with the coat, but this is not always hereditary, and only comes out occasionally. A brown-black approaching chocolate is considered a good colour. Occasionally there are some cows striped red and black, also some quite white, with black ears, muzzles, and feet. . . . The horns should be of a rich yellow; they are generally tipped with black, and do not come out yellow to the very end like the Herefords. . . . A bull's horn should be low and well spread, the cow's narrower, and the pitch more upright. A really good animal of the black breed should approach very closely in shape to the modern fashionable breeds, and by careful and judicious crossing this has sometimes been attained. . . . The special characteristics of the blacks, which make them so valuable, are (1) hardihood of constitution, (2) aptitude for dairy purposes, (3) docility."

Although the cattle of North and of South Wales are acknowledged to form but one breed, and to be so closely allied to each other as to freely mingle blood without the results usual to cross-breeding supervening, still there are differences in the two types which will for a time attract the attention of a close observer.

Marshall (1782) says, *Rural Economy of Gloucester*, page 212:—"Welsh cattle are extremely various: every province of the principality seems to send out a separate

animals of the Castlemartin, Dewsland, and Anglesea breeds, with an introductory article by Richard Hart Harvey, of Slade Hall, 1874; and (b) *The South Wales Black Cattle Herd Book*, of animals of the Castlemartin and Dewsland breeds, 1874.

breed. They are invariably of the Middlehorned species, but in regard to size they vary, in regular gradation, from the largest ox to the lowest Welsh runt."

Low (1845) records:—"The other races of the Welsh mountains have more or less of an affinity with the **Pembroke**, and exhibit the traces of a common origin; but they are most of them smaller in size, etc. . . . The yellowness of the skin appears as a deep orange, nearly black, on the inside of the ears, the mammæ, and other naked parts. This is deemed an important indication of the milking properties of the cow. . . . They have naturally a light hind quarter, a character common to other mountain breeds. . . . A mixture of foreign blood takes from its hardiness and fitness for a country of mountains and scanty herbage.

"The native cattle of the island of **Anglesea,** 'this last stronghold of British liberty and druidical worship,' are allied in their essential characters to the Pembroke breed, and manifest a common origin; but they are of larger size and coarser form, having acquired the characters suited to a lower country. They are distinguished by the upright position of the horns, and the orange-yellow colour of the skin. This breed has been much mixed with Longhorns from Ireland; and various attempts have been made by individuals to improve the breed by crossing of different kinds. They have produced no beneficial effect upon the cattle of the country, the best of which are manifestly those which approach the nearest to the ancient type."

Youatt adds:—"If they are longer in preparing for the market, they pay more at last; and, like the Scots, they thrive where an English beast would starve. . . . They are eventually brought to the market from 60 to 80 stones, and sometimes even 100 stones, and their meat will always bear a superior price to that of the larger cattle. In Anglesea and in the greater part of North Wales, the black cattle were formerly used extensively for the plough, and even on the road; they were docile and hardy. . . . The oxen have a peculiarly noble appearance" [due to castration being delayed till they were a year old], "and a haughtiness of countenance—a striking contrast with the mild intelligence of the Devon, and the quiet submission of the Hereford."

The South Wales Black cattle in some respects resemble West Highlanders; the coat is long but wavy, or at times curly, not straight like the Highland hair. They have no great aptitude for fattening at an early age. When allowed to come to maturity they finish admirably, both as regards

internal fat and external condition. They are superior **dairy cattle**, but capable of improvement by selecting and breeding from the male and female progeny of the best milkers. The instinctive practice of hiding their young they inherit from the white forest cattle. Calves, as a rule, are left with their mothers only for a few days, or in special cases a few weeks, when they are weaned and reared on skim milk, with supplementary food.

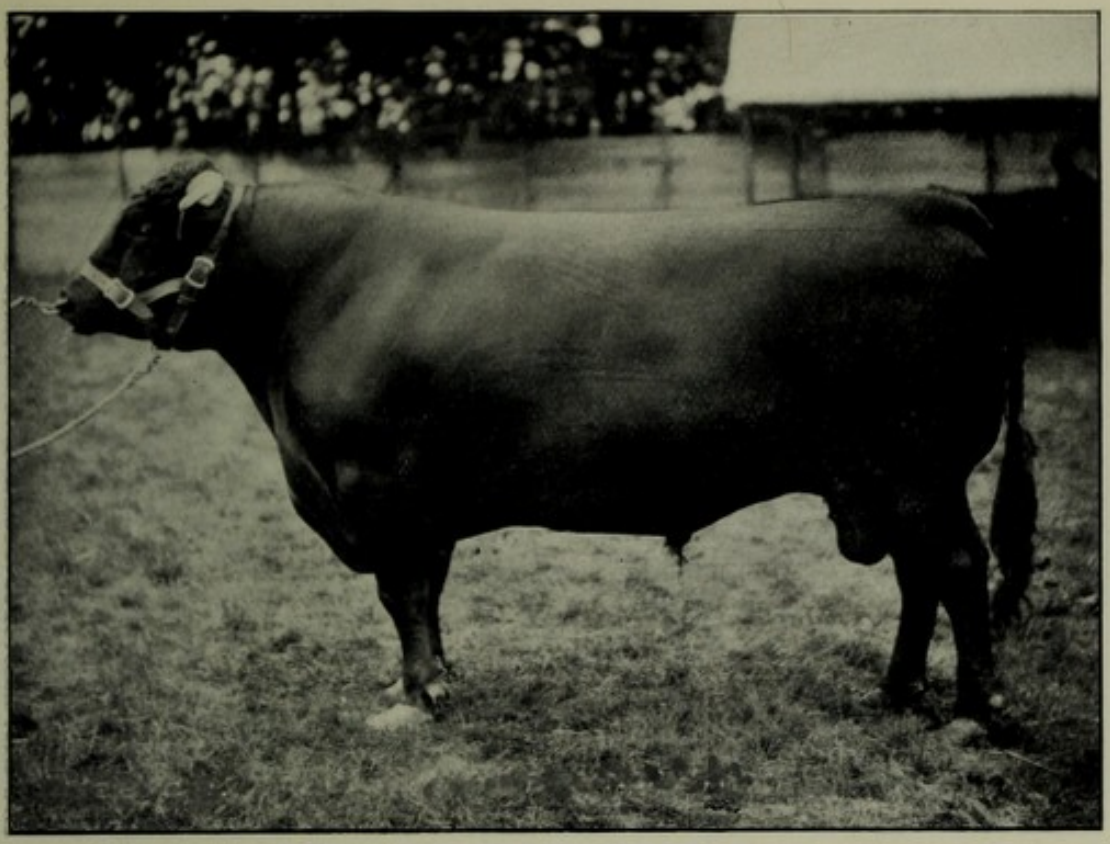
The North Wales Black cattle resemble in many respects the South Wales variety. From the latter they differ in having shorter legs, heavier heads, thicker necks, thicker, shorter, and whiter horns, heavier and more silky coats of wavy hair (neither curly nor bristly), thinner skins, and a better touch. The colour most highly appreciated is black, though there is a frequent tendency to white patches. Red is not an uncommon colour, although not officially recognised. They are not naturally so wild as South Wales cattle, and more resemble the Shorthorn in disposition. It is asserted on good authority that, in certain strains, Shorthorn blood has been introduced to improve the form and develop a tendency to early maturity, but this kind of improvement is gained at the expense of loss of the natural ability to subsist on a scant food supply, and to withstand stress of weather. The most satisfactory way of improving all the hardy breeds which are periodically exposed to trying climatic conditions is to select, for breeding purposes, the best specimens within the breed. Sussex blood has also been successfully introduced in the development of the modern breed, but to what extent has not been made known to the public.

The cows are good milkers, but probably not quite equal to the Pembrokes. As beef-producers they are the better of the two, having broader backs and better flanks and thighs. There is a tendency to be high at the rump and tail-head, flat in the ribs, and slack at the loins, but these defects are being gradually eliminated. **The bullocks** have been long and highly appreciated as grazing cattle in the English Midlands, under the name of "Welsh Runts." They yield at four years old 50 to 60 stones of dressed beef, which ranks in the London market as prime Scotch. Heifers have also been sent in considerable numbers to graze in Kent, Leicester, and Northampton.

Black Welsh cattle are improving rapidly with the greater care devoted to their selection, breeding, and feeding. They have begun to be appreciated in America, and, on account of their great wealth of constitution, will no doubt grow in favour. American ranchers have been taught a severe lesson by the death of immense numbers of their cattle, and have been shown the absurdity of breeding on the exposed prairies of the Far West stock that is too fine and too soft. Had they been fortunate enough to select Herefords (which they have in the end largely adopted), Welsh, Galloway, or Highland cattle, and been contented to manufacture beef at a slower but surer rate, they might have saved themselves the serious consequences of early disaster.

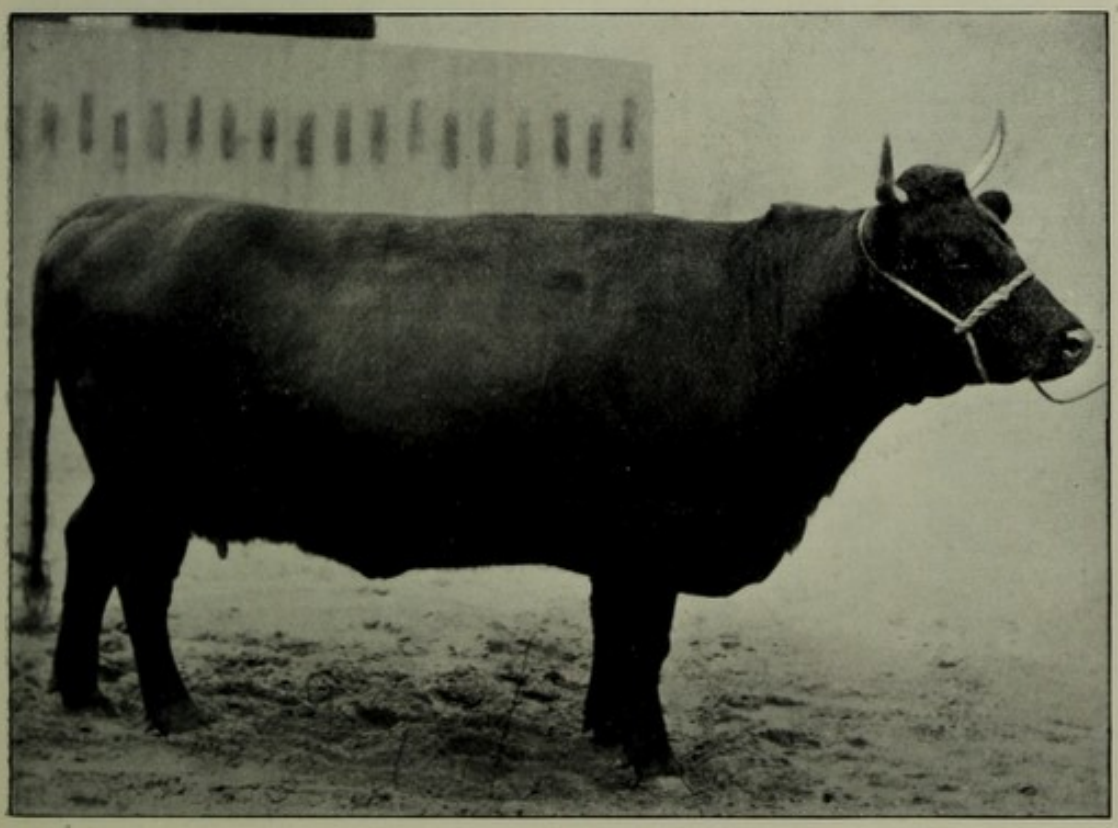
White Belted or sheeted **Welsh cattle** on the common black or the equally characteristic red of the cattle of the Principality appear in certain districts of North Wales. Little is known of their origin, but it is believed that about the beginning of the nineteenth century Sir Robert Vaughan of Vannan, Merionethshire, imported some cattle, probably Holsteins, with a view to the improvement of the native stock. There is also a tradition that about the seventies of last century two belted cows were brought over to Anglesey from France. During the last decade of the century, Wm. Lester Smith, acting for Lord Penrhyn, collected a number of the best black and white specimens of the variety, formed the Herd now (1906) numbering upwards of 100 head at the Home Farm, Penrhyn Castle, Bangor. At first "a few of the calves came wholly black, a few without a complete belt, and a few with the white extending over almost the whole body," but only those properly marked were kept for breeding. The herd is purely Welsh, showing the typical characteristics of the Northern family or original Anglesey variety, but of the larger, rougher, and more lanky sorts. They are poor milkers, and at an early age poor feeders, but in time they grow to enormous weights. The white markings exclude them from the *Herd Book*. The bulls are usually of a savage disposition.

A white belted herd, believed to be Dutch, existed for many years at Broadlands, Hants, but when the importation



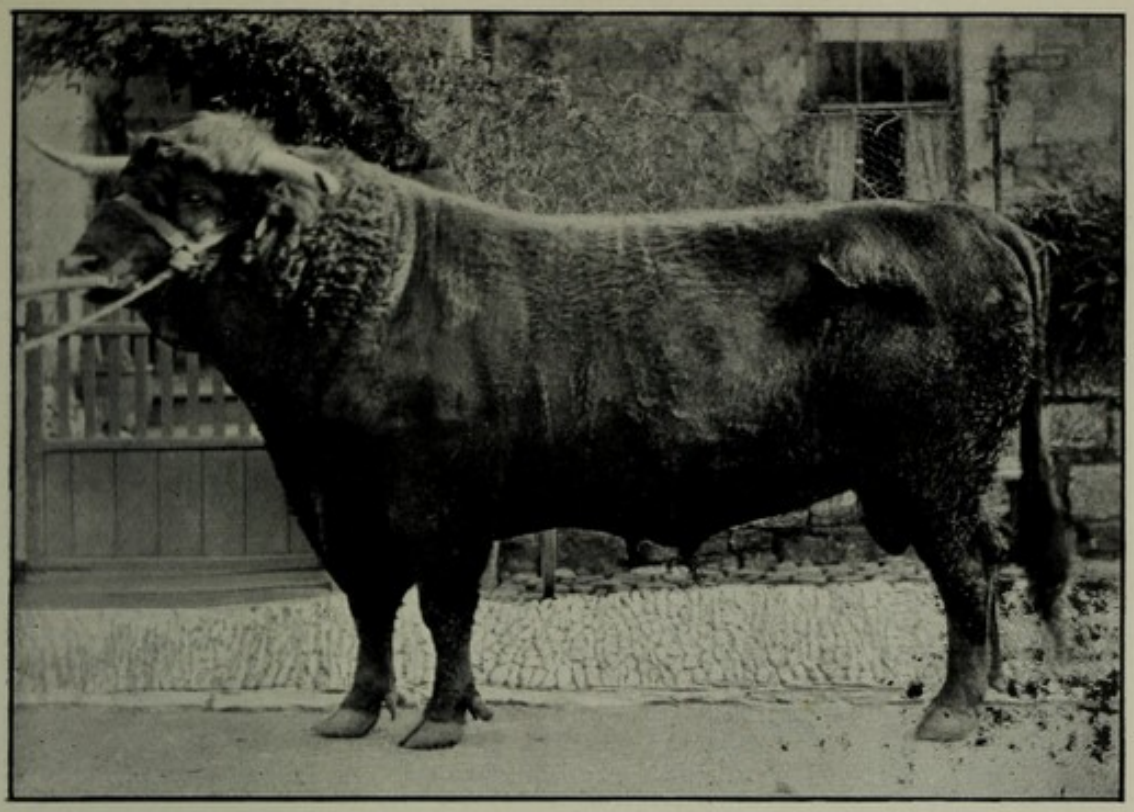
A. Welsh Black Bull (North).

[*C. Reid, Wishaw.*



B. Welsh Black Cow.
A Royal prize-winner. Bred by Colonel Platt, C.B., Llanfairfechan, North Wales.

[*p.* 144



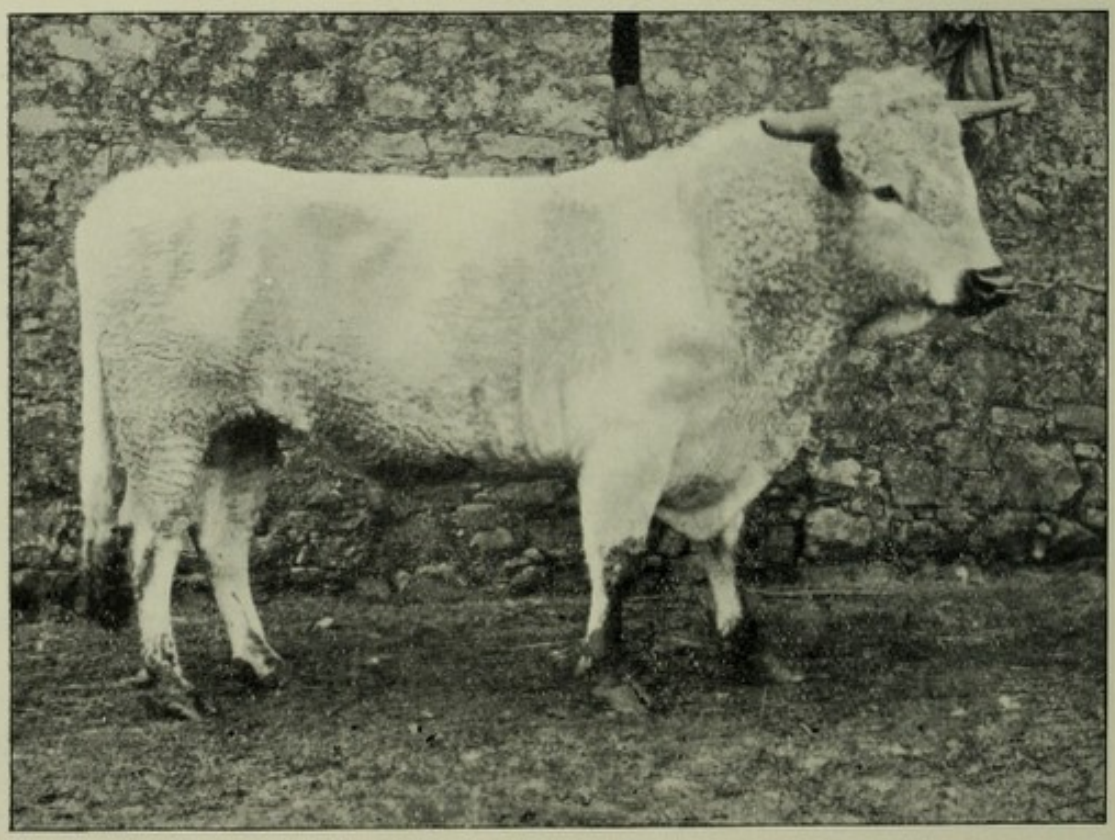
A. Welsh Black Bull, "Reality" (189).
First Special and Champion Cup at Pembroke in 1898, etc. etc.
Bred by J. M. Griffiths, Penally Court, Penally.
[*Vol. V., South Wales Black Cattle Herd Book.*



B. Welsh Black Cow (North), "Marian Lady."
[*G. H. Parsons, Alsager, Cheshire.*



A. Welsh White Pembroke Cow and Calf.



B. Welsh White Pembroke Bull.
Both owned and bred by Chas. Mathias of Lamphey Court, South Wales.

[*p*. 145



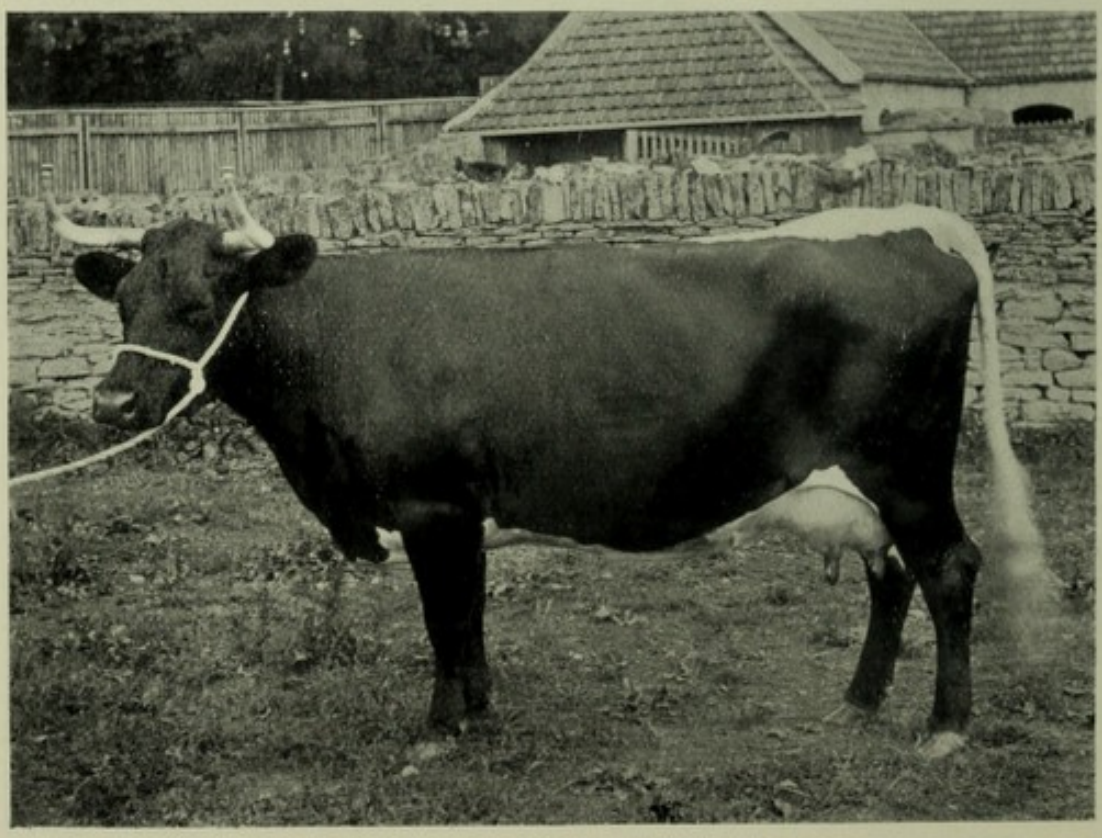
A. Glamorgan Bull (Breed now Extinct).



B. Polled Hereford Bull.
Owned by H. B. Arbuckle, U.S.A.



A. Old Gloucester Bull.
In His Grace the Duke of Beaufort's Herd, Badminton S.O., Gloucestershire.



B. Old Gloucester Cow in Badminton Herd.

Both by T. A. Trotman, Chippenham.

of Dutch cattle was stopped it was crossed by Devon bulls and transformed into a red herd with white belts. This cross, while increasing the tendency to beef-production, reduced the milking qualities of the cows. By the use of a black and white sheeted bull from Lord Penrhyn, the original white belt with black is now being restored; but the herd, more Welsh than Dutch, will be a general-purpose rather than a milking breed.

The ancient white breed of the Principality has been rehabilitated by selecting and mating together those specimens of the South Wales breed which have "thrown back" in the matter of colour to their forest ancestors. In every other respect they are distinctly Pembroke cattle. Their colour is chiefly white, but there are frequently black spots over the body. The muzzles, ears, and eyelashes are black, and the feet and fetlocks should also be black. Charles Mathias, of Lamphey Court, to whom the Welsh originals of Plates X. and XLIII. belong, has raised this off-shoot of the South Wales breed to a position of importance.

The difficulty of procuring at all times stud bulls good enough to keep up the standard of a small number of cattle is got over by the use of a choice black bull when a white is not available. A large proportion of his progeny take after the mothers in being white with black points, and those that are born black are transferred to the black cattle herd.

R. H. Harvey (1874) says: "The late Lord Dynevor had some very fine specimens of the white breed near Llandeilo, and I have often admired the five-year-old oxen as I have passed the park." For **Professor David Low's** beautifully illustrated book on *The Domesticated Animals of the British Isles*, published in 1842, was selected a Pembrokeshire "cow eight years old," from Haverfordwest, to represent the type of the Wild Forest breed. The painting of the animal is among the collection of original oil paintings which were used by him to illustrate the book, and which now adorn the walls of the Agriculture Department of Edinburgh University.

The Glamorgan breed is interesting historically as the connecting link between the Black Welsh cattle and the

Red Devons and Herefords, although as a breed—one of the oldest and one of the best for the production of milch cows and draught oxen—it is now extinct. According to **Youatt**:—

"They were of a dark brown (the bull almost black) with white bellies, and a streak of white along the back from the shoulder to the tail. They had clean heads, tapering from the neck and shoulders; long, white horns, turning upwards; with a lively countenance. Their dewlaps were small, the hair short, and the coat silky. If there was any fault, it was that the rump, or setting on of the tail, was too high above the level of the back to accord with modern notions of true symmetry," a common original defect in Welsh and in some other British breeds.

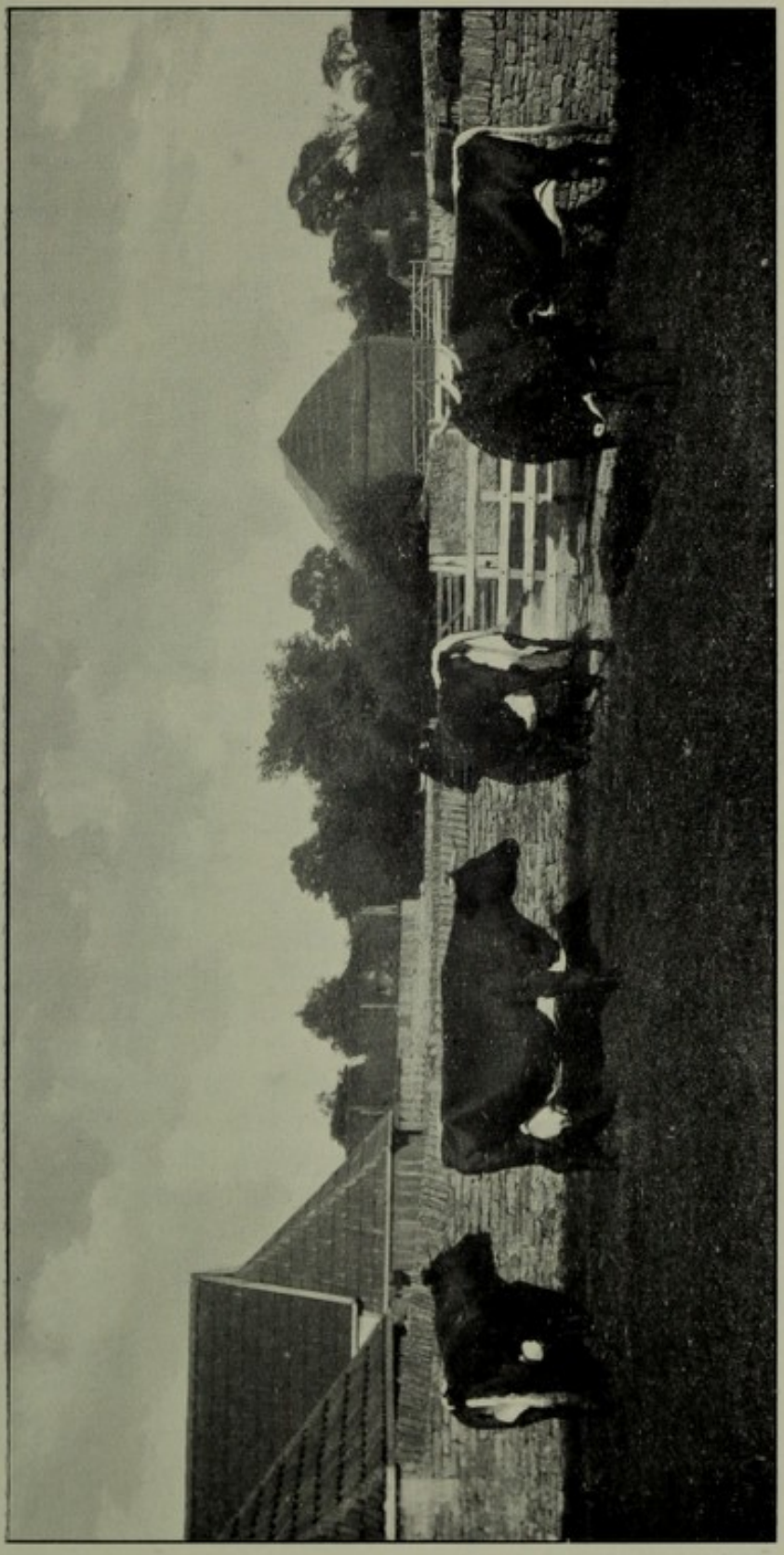
A Welsh writer, about one hundred years earlier, "describes the cows as being of a large size, some red and some pied." There were two strains, as in the Devon breed.

Lowe says:—"The Glamorgans of the lower country fall short of the ordinary size of the Durhams and Herefords; but yet they are of the larger class of cattle. Their horns are small, fine, and pointing somewhat upwards; and in the breed of the hills, the horns have yet more of the upright curvature. The skin is generally orange-yellow, and the individuals are more esteemed in which this colour prevails. The hair is dark brown, usually broken with white. . . . The cows are exceedingly good milchers, giving a rich yellow cream. (The average yield of milk is about 16 quarts a day.) The domestic dairy has always been an important object of attention in this and other parts of Wales. The Glamorgan cattle also produced a rare quality of meat, highly prized in the metropolitan and provincial markets."

Youatt accounts for the first decline in the quality of the breed, which ultimately led to its extinction, by pressure of the more favoured and more improved Shorthorn, Hereford, and Devon breeds. He says:—

"During the French revolutionary war the excessive price of corn attracted the attention of the Glamorganshire farmers to the increased cultivation of it, and a great proportion of the best pastures were turned over by the plough. Turnip-husbandry necessarily followed; and then the improvement of their sheep stock became an object of importance, and the cattle were almost entirely neglected."

The accompanying **illustration** of a Glamorgan bull is from a photograph of one of the last remnants of the breed,



OLD GLOUCESTER DAIRY COWS.
In the herd of His Grace the Duke of Beaufort, Badminton S.O., Gloucestershire.
T. A. Trotman, Chippenham

which was pretty true to type, although crossing with other breeds had been introduced.

The old Gloucester breed at Badminton has been preserved from extinction by the Duke of Beaufort. **Morgan Evans,** in *Coleman's Cattle of Great Britain*, expresses the belief that they were descended from the Welsh breed, which at one time extended into Monmouth and Gloucester. He goes on to say:—

"The true Gloucester cow shows a good deal of character, being a lengthy, good-looking animal, with light fore but deep hind quarters, and good milking points. The body is brown; head, nose, and legs black; horns well-shaped and white, with black tips; tail and top of rump white; udder white with black teats; and tongue on upper side and end also black. The great peculiarity is the white mark, which extends from the loin along the ridge of the tail, and down between the hind-legs to the fore-part of the udder."

In 1834 **Youatt** refers to them as, "nearly extinct, and evidently of Welsh origin, mingled with the Hereford, and sometimes with the cattle further inland. They were the Glamorgans chiefly, but upon a larger scale, and of a different colour. The Glamorgans are black, or inclined to brown; the Old Gloucesters were either red or brown. The bones were small and the carcase light, scarcely averaging more than twelve score per quarter. The bag was thin, yet large, and the milk abundant and long-continued. The characteristic mark was said to be a streak of white, generally along the back and always at the root of the tail."

Marshall at an earlier date (1789) writes of "the characteristic colour black-red, provincially brown; with the face and neck inclined to black; the head mostly small; neck long; shoulders fine and generally clean; the carcass mostly long; the hide thin and the hair short; the horns of some winding, with a double bend in the middle-horned manner. . . . For dairy cows I have not, in my own judgment, seen a better form; and it was this breed which raised the Gloucestershire dairy to its greatest height."[1]

Reference is made to the superior qualities of the Boddington breed. In 1783, he asserts, the vale dairy cows were mostly of the Gloucester breed, and had been so for time immemorial; but they were rapidly supplanted or crossed by the Stafford-

[1] With this view **Youatt disagrees**, declaring that "almost every variety of breed is found there, and the milk of all is mingled together."

shire Longhorns, or "North-country sort," which were reputed to be hardier in the open strawyards in winter, and to fatten more easily. In the **remnant of the breed** there is no trace of the defects which were liable to appear through neglect in breeding, *i.e.*, they are no more "narrow in the chest, light in the hind quarters, and long upon the legs." The milk is very rich in cream in small globules, and specially suited for cheese-making.

Old Gloucester cattle are **preserved in the country** by:—

His Grace the Duke of Beaufort at Badminton; G. E. Lloyd Baker, Hardwicke Court;[1] The Right Hon. Sir J. E. Dorington, Bart., Lypiatt Park, Stroud; Sir Lionel Darell, Bart., Fretherne Court, Stonehouse; Sir Gerald Codrington, Bart., Dodington, Chipping Sodbury.

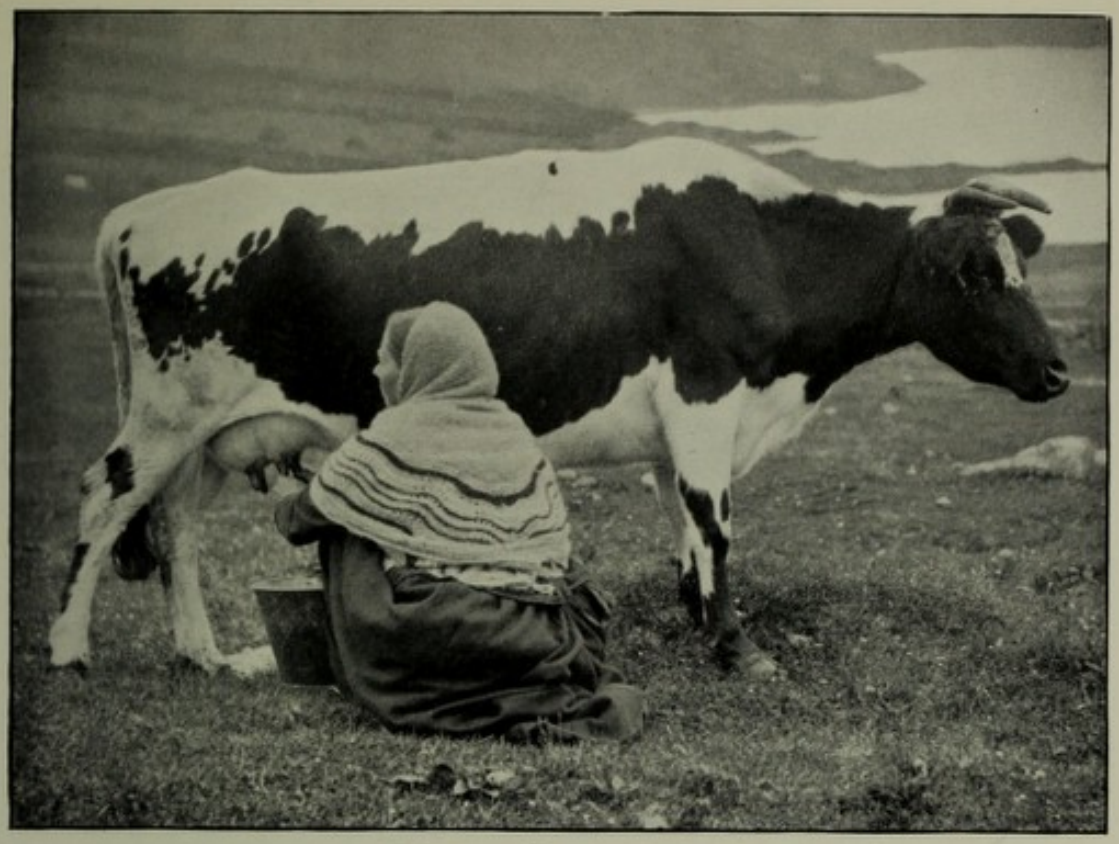
Shorthorn blood has been in recent years introduced into some of the smaller herds, owing to the difficulty of procuring bulls of pure strain and to a tendency to degeneration from close breeding.

The old Orkney breed, which was a variant of the Zetland, "but even smaller and more ill-shapen," is now extinct, having been gradually bred out by the use of Shorthorn and other bulls brought over from the Scotch mainland.

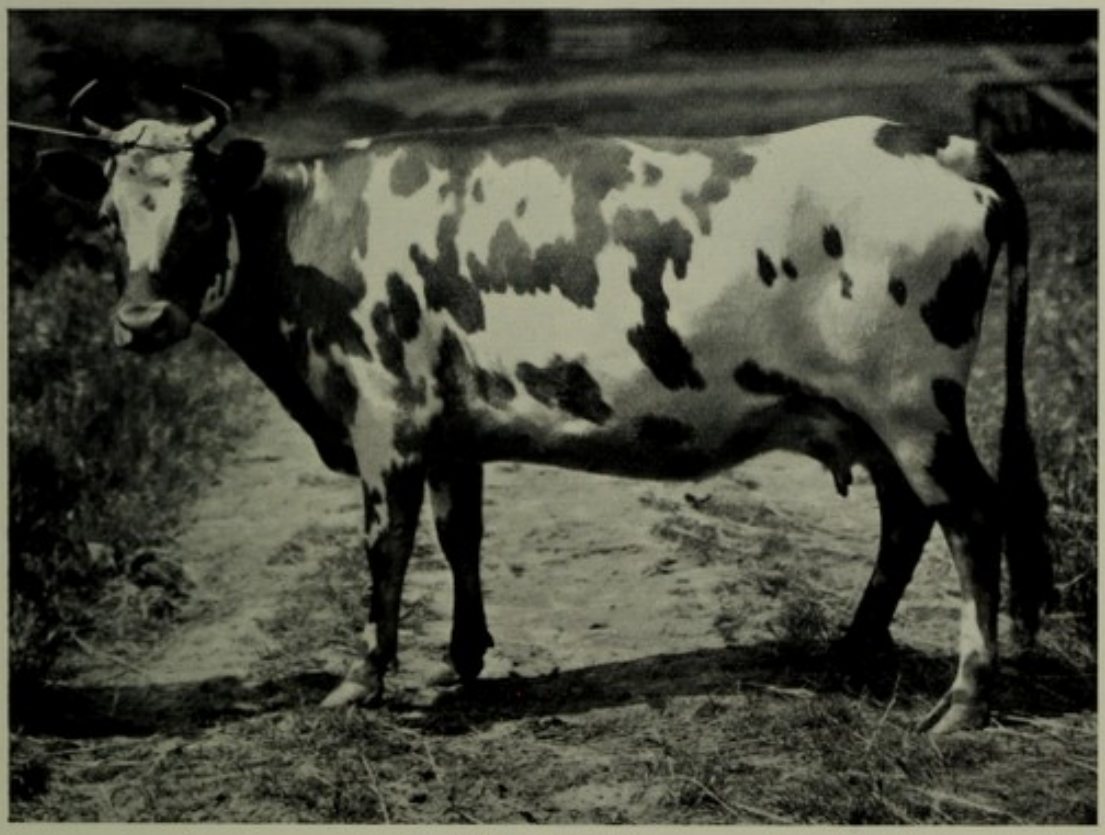
Shetland cattle are disappearing in the same way, and only in a few districts can the true type with some difficulty be found.

Youatt says:—"Shetland cattle exhibit evident traces of the same origin with the West Highlanders. They have been diminished in size by the coldness of the climate and the scarcity of food. . . . They are small, gaunt, ill-shaped, so far, indeed, as their shape can be ascertained through the long, thick hair with which they are covered, and which forms an impenetrable defence against the snow and the sleet. They are rarely more than four feet high at the withers, and sometimes scarcely more than thirty-five or forty pounds a quarter. . . . On the richer pastures of the North of Scotland they thrive with almost incredible rapidity, and their flesh and fat, being so newly and quickly laid on, is said to be peculiarly delicious and tender. They run to fifteen or sixteen, or even twenty stones in weight."

[1] This herd was started with a beautiful cow from the famous old herd at Gravelcourt Farm, Brookthorpe, Gloucester.



A. Shetland Cow giving Milk.



B. Shetland Cow.

[*Both by C. Reid, Wishaw.*

[*p.* 148

Low held a different opinion, which is perferable in view of the historical connection of the islands with Norway, and the fact that the people, and, till recently, their language, were Norse. He wrote :—

"The cattle are distinctly Norwegian in their character, and a similar race extends to Iceland. They are small, but of very good form when pure, and fatten with great quickness when carried to superior pastures. Their horns are short (irregular in form and insignificant), their skin is soft, and their flesh is equal to that of any cattle produced in the British Isles. They are of various colours, generally parti-coloured, and tending more to the lighter shades than the cattle of the Highlands. The females receive the male at an earlier age than is known in the case of any other breed in this country (at five or six months, or even at four months). The cows are tolerably good milkers, in which respect (although smaller) they agree with the cattle of Norway, and differ from those of the Highlands; and in this respect, too, they agree with the cattle of Jersey and the islands of the Channel, which are likewise believed to be of Norwegian origin."

Whatever be the origin, the case of Mrs Blackburn's cow, p. 19, indicates a connecting link with the ancient white cattle with black points. Low shows how the introduction of **foreign blood** was carried out :—

"The cattle of Zetland have necessarily been much mixed with those of Orkney, and the latter again with those of Caithness and the Northern Highlands. These mixed races are rarely equal to those of pure descent." He had in consideration the fact that "the cattle of the Zetland Islands are left almost in a state of nature, without sufficient sustenance in winter, and with scarce any other shelter than the desolate rocks of the country supply."

He advocated greater care in management, and "the introduction of suitable males for breeding" from the parent stock in Norway. He also said, prophetically, the "first crosses with superior breeds, as the Shorthorn, are admirable," but "this system of crossing, though it may be more profitable to individual breeders, can do nothing for the general improvement of the stock of the country itself."

CHAPTER VIII

CATTLE—ENGLISH WHITE AND RED POLLS [1]

Somerford Park White Herd—Characteristics—The "Missing Link"—**Blickling Hall** and **Woodbastwick** Herds—Other extinct Herds—Origin and History—Points and Modern Features—**Red Polls**—Authorities quoted: Marshall, Young, Euren, on Points and History—Early Breeders—Dual-Purpose Cattle—Herd Book and Red Polled Society—Crosses.

THE **Somerford Park White Polled Herd** of Sir Walter Shakerley, near Congleton, in Cheshire, numbered about 35 in 1893—a number which, in 1904, when the writer saw it, had been reduced to 26, viz.—14 cows in milk, 1 three-year-old heifer that had slipped calf, 4 two-year-olds in calf, 1 yearling heifer, 1 yearling steer, 4 calves (one being a bull), and 1 bull five years old. It contains the most direct representatives now extant of the domesticated, hornless descendants of the ancient forest cattle of this country. Four generations of owners have not known the origin or history of the breed. Tradition, a generation ago, said that it had been in its present quarters for 200 years. Probably the original cattle were shut in by enclosing a part of Maxwell Forest, which at one time extended over the Congleton neighbourhood. In general appearance (including colour) this breed strongly resembles the Chartley, the great difference being the want of horns. In some minor details the resemblance is striking — for example, both breeds have a top-knot of long, white hair, white tail and udder, usually black teats, and black spots, most numerous about the neck and head. In addition to the black spots referred to bearing black hair, there are many black patches,

[1] Excellent accounts of the different breeds of Polled Cattle, by acknowledged authorities, appear in the 13th *Report of the Kansas State Board of Agriculture*, Part III., 1902, to which indebtedness is acknowledged.

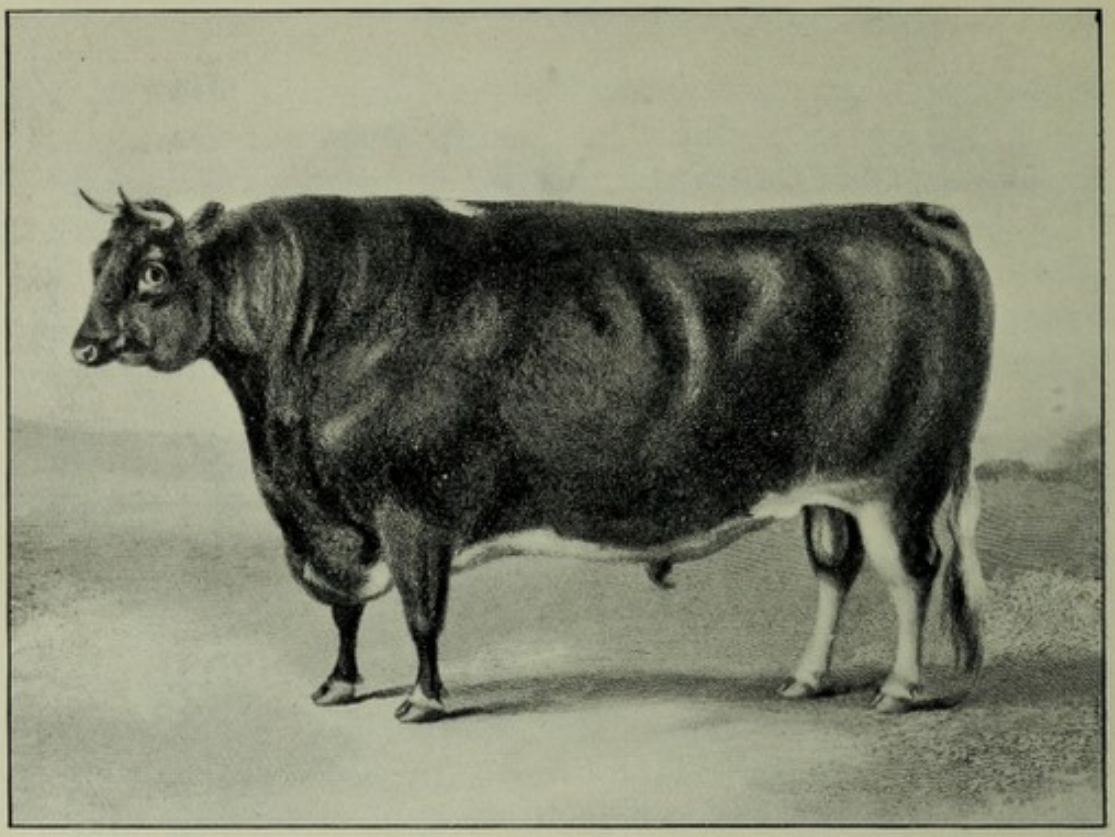
large and small, on the skin of the body, with white hair, which are completely obscured during winter, but show through the thin summer coat of hair. The skin of the head is black underneath both the characteristic black ring round the eye and the white or mottled hair covering other parts of it. Some cows have the patches of black skin expanding until they cover the back like a sheet of black cloth thrown over it, which produce white hair similar to that on some of the smaller spots on others. In 1904, one cow, that when in full coat showed only a few black spots on the body, was black-skinned all over, except a speckled udder. The eyes of the Somerford Park cattle are very black, large, and prominent. The forehead is remarkable for width, and the crown is high and massive. The ears should not be very rough with hair. Very few have red ears, although for some years subsequent to the rinderpest a bull with red ears and muzzle was used. In some good specimens the ears are set very low. The cows are normally fertile, but there is a tendency to produce more female than male calves. Two possible indications of the effects of consanguineous breeding were noticeable in a tendency in one cow to protrusion of the vagina, and, in a few cases, in a loose attachment of the shoulder-blade, or scapula, to the trunk.

The milking powers of certain members of the breed are exceptionally good. In 1893 their daily average, when in full flow at pasture, was 3 gallons each. But individual cows appear now and then which give, when "in bloom," as much as 14 quarts at a milking, or 7 gallons in the day. The best specimen in 1904 gave little more than half this amount. When dry the cows are not deficient as beef-producers. A moderately fat six-year-old cow killed by a local butcher in the winter of 1904-5, weighed, fore quarters 7 score[1] 11 lbs., and hind quarters 6 score 10 lbs., equal to 28 score for the whole body. The quality and flavour of the beef was excellent, but the fat was very yellow in colour, resembling that of Guernsey beef. The herd was one year crossed with a Shorthorn bull from Derbyshire after being reduced by the rinderpest. Shorthorn qualities were thus introduced. For

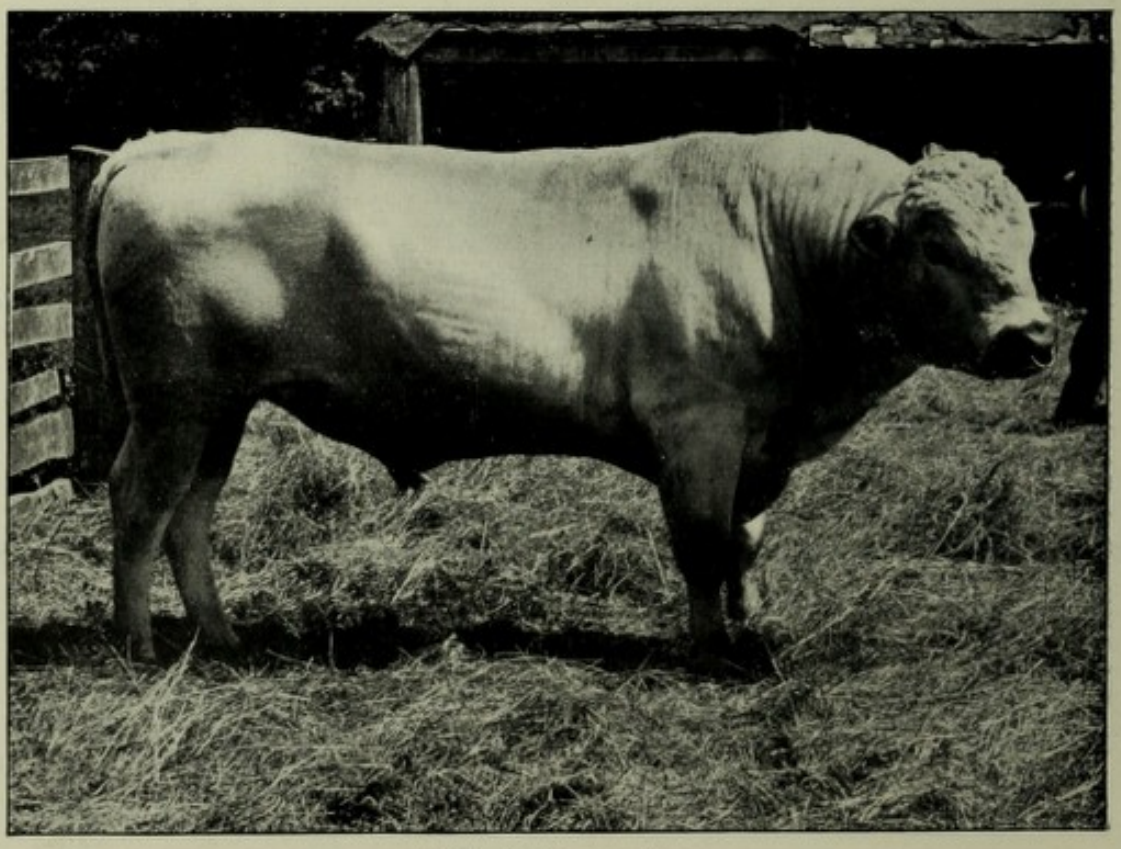
[1] A score, =20 lbs., is a local weight by which fat cattle and pigs are sold.

some years afterwards a good many cows were kept which were black and white or mottled, but in 1904 nearly all had returned to the breed-marking, viz., white with black stockings, ears, and muzzle, with a little black ring round each eye. The sire of the herd bull came from Woodbastwick in Norfolk, and he developed loose horns at two years old. A good many of the cows by the Shorthorn bull grew loose horns, and again they have appeared since the arrival of the Woodbastwick bull. The old bull in his fifth year (1904) developed a small horn. The breed is now well fleshed and massive. The whole appearance of the animals is striking and attractive, the head and neck being specially handsome. The rudimentary mane present in the bull when in full coat is not only an ornament, but also an additional indication of the connection of the breed with the ancient "wild beasts" of the forest. This is one of the most interesting breeds of British cattle, as it forms (with the related polled whites in Norfolk) the "missing link" between the wild cattle and the breeds under domestication, and supplies a connection between the horned and polled varieties. It also tends to prove the existence of a superior power of milk production in the aboriginal race of our island, or at all events in the domesticated branch of it.

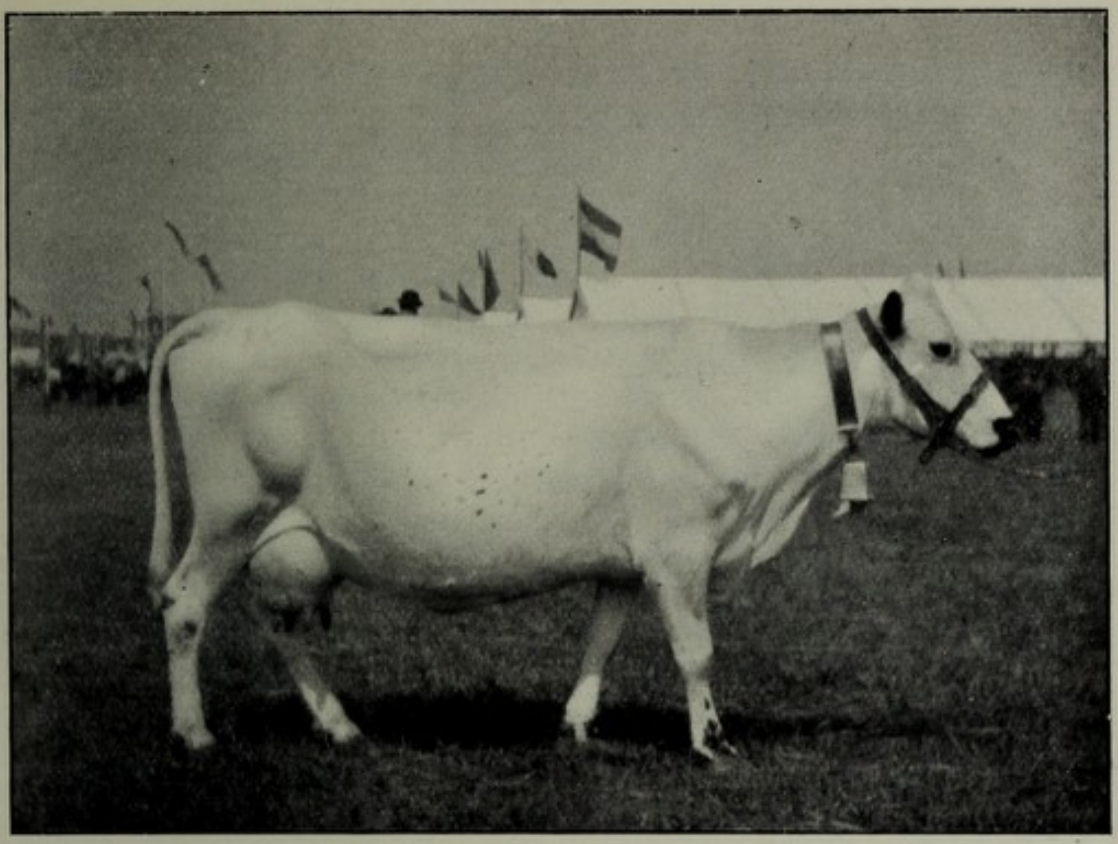
The cattle of **Blickling Hall** and **Woodbastwick**, in Norfolk, form the only remaining White Polled herds of any importance in the country. They had a common origin in the White Polled cattle of Whalley Abbey, Lancashire, probably saved from destruction by the abbots of Whalley in the "Lords' Park." Tradition says that this herd, which ceased to exist at Whalley in 1697, was transferred to Middleton Park, also in Lancashire, and to Gisburne Park in Yorkshire. To Gisburne they are supposed to have been "drawn by the power of music." There some specimens were "perfectly white, except the insides of the ears," which were brown. The Middleton cattle were also white, but "some had black, others brown ears." They were transferred to Gunton Park, 16 miles north of Norwich, the Norfolk seat of the first Lord Suffield (created 1786), after the death of his father-in-law in 1765. The herd died out there not later than 1853; but some animals had, about half a century before, between 1793-1810, been removed to Blickling Hall, to establish the



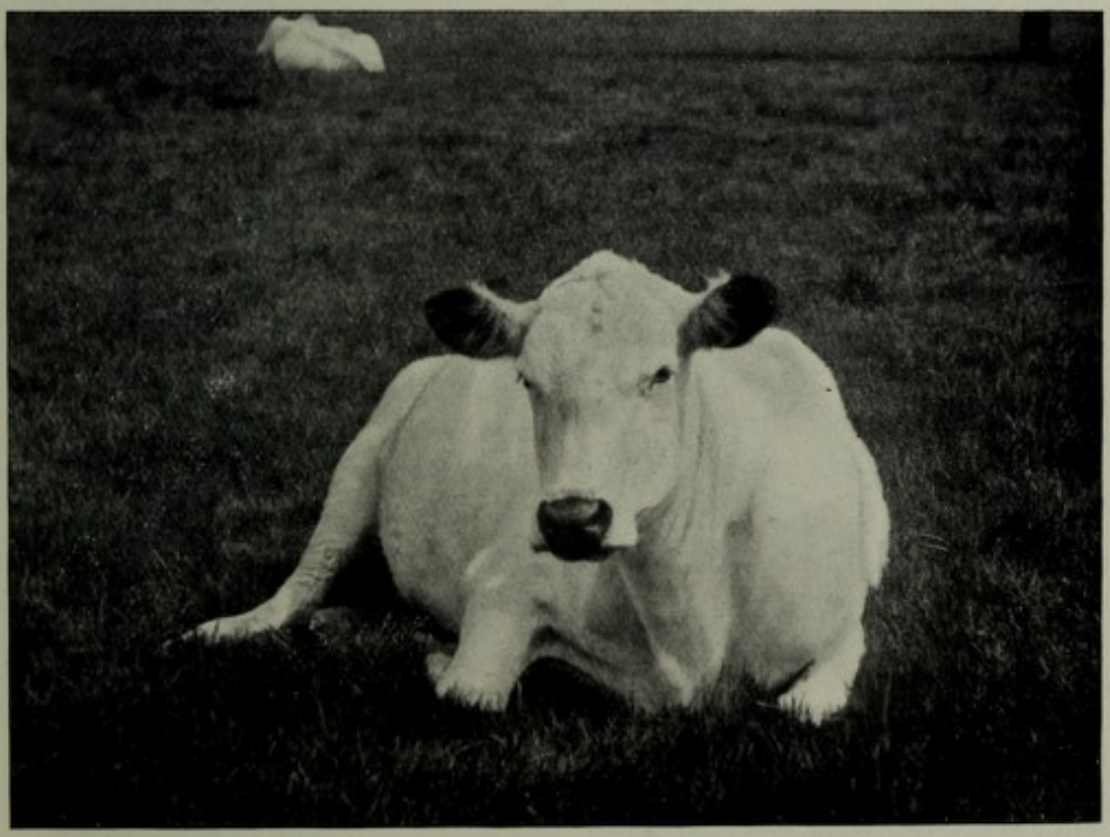
A. Aberdeen Horned Bull (Extinct).
A prize-winner at the Highland Society Show at Aberdeen in 1840.
[*Copied from an Engraving lent by G. H. Parsons, Alsager.*



B. White Polled Bull.
In the Woodbastwick Herd, Norfolk, formed by Albemarle Cator in 1840.



A. Fjreldras Cow.
An Ancient Swedish Breed of White Polled Cattle with black points.



B. Somerford Park White Polled Cows at Rest.

[*G. H. Parsons, Alsager, Cheshire.*

[*pp.* 152 *and* 153

breed which still exists, probably by the second Lord Suffield, who married the heiress of Blickling, and others had been sold to Albemarle Cator of Woodbastwick Hall, near Norwich.

Storer, quoting reliable authority on the **Gunton Herd**, says:—"The colour of this breed was white, with black ears, but some had dark brown ears; nose black, no horns, very good skin; hoofs also black. They were very large, big-framed beasts, with wide haunches, back, and loins, and of considerable height at the spine-line. They were not large consumers for their size, and were generally very healthy. The cows were capital milkers, and had very large, well-formed udders. The calves always came pure-white (swan-white) except the noses and ears, but in a few instances inclined to cream-colour. I never recollect seeing any of the true breed spotted with black or red. The herd consisted of about forty animals, two or three of which were bulls. They were never crossed with any other cattle."

The Blickling Herd was reduced to some three or four calves by rinderpest. Constance, Marchioness of Lothian, contending against decreased fertility, made a strenuous, though not quite successful, effort to breed it up to its former standard. At the Norfolk Agricultural Association Show at Blickling in 1887, "Blickling Tom," a fine specimen of the breed, gained the premier place. Since the death of the Marchioness the herd has been reduced to ten in number.

The Woodbastwick Herd was of recent formation, dating from about 1840, when one or two White Polled cattle were bought from the fourth Lord Suffield by Albemarle Cator. One cow "had black spots round her muzzle; the ears and the circles round the eyes were dark brown. She was in calf when she came, and produced a bull, which was retained; the dam remained barren for more than a year, and her second calf at Woodbastwick, a heifer, was by her first."

Although at Blickling black ears prevailed, and at Woodbastwick red ears were preferred, the two colours were common to both breeds, which mutually gained in constitution as well as in colour by exchange of calves of both sexes. For about twenty years the Woodbastwick cattle were bred pure; but about 1862 a well-bred Shorthorn bull was used for at least two seasons, and about ten years later another white pedigree Shorthorn bull was introduced. Early in the eighties of last century a black-and-white bull of the Somerford Park breed was secured, and with this change of

blood came the rough poll, a greater breadth of forehead, low set ears, black spots on the skin of the neck and shoulders and legs, sometimes black teats, and in a few instances considerable sheets of black skin over the back, growing white hair. Fresh, though nearly related, blood has been imported by exchange from time to time from the Blickling Herd, as in 1888; and a bull was got on loan for a few months from R. E. Lofft in 1889; but, owing to the increasing difficulty of securing a satisfactory change of blood, a white Shorthorn was again used towards the end of last century, with satisfactory results as regards size and constitution, but to the detriment of the colour-markings, which have lost uniformity of type. At the time of the writer's visit in the spring of 1905, the herd consisted of 14 cows, 6 heifers, and 3 bulls—massive, well-built animals of the general-purpose type. Only two cows remain which have not more or less of the recent importation of Shorthorn blood. Four cows have red points, and all of that colour have correlated white teats. A number have little colour-marking, which has decreased in area under the Shorthorn influence. The cows breed regularly and are fair milkers, considering the nature of their pasture, which is light and of second quality. One cow in 1906 gave up to 45 lbs. of milk daily before going to grass. Farmers bring cows to the white bull, and a good many white polled half-bred cattle, greatly appreciated by butchers, are to be seen in the neighbourhood. A 3½ year old bullock, weighing 910 lbs., fetched £25 in March 1907.

In May 1895 the **Stanton Herd** of twenty-five White Polled cattle, owned by Robert Emlyn Lofft[1] of Troston Hall, was dispersed at auction by John Thornton & Company, and realised 341½ guineas. In an interesting historical notice in the sale catalogue, under the title of "The Monks' Cattle,"[2]

[1] His old "Thompson" cow bred always true to type—"White Polled with red ears," even when crossed with a Shorthorn bull; but this rule did not hold good with other families in the herd.

[2] This note was kindly supplied by J. M. Webb, 7 Princes Street, Hanover Square, W.:—"The field known as Haberdon, in Bury St Edmunds, was held in monastic times by the singular tenure that the tenant should find a white bull as often as it should happen that any gentlewoman should visit the shrine of St Edmund "to make the oblation of the said bull" with a view to secure a favourable answer to her prayers for offspring. On such an occasion the bull was led from the pastures

Lofft shows that early in the nineteenth century "two herds of these cattle existed in Suffolk that had quite escaped the observation of the historian of the breed"—the Rev. John Storer.[1] In support of his statement he drew attention to a picture by the elder Ward—who painted in the eighteenth century—of "a large landscape in the National Gallery, Trafalgar Square, where stands in the foreground a grand White Polled bull with red ears; and in the same gallery another picture, much smaller, of a white bull with red ears"; adding, "I have myself two pictures of this master, in one of which is a White Polled cow, in the other a White Horned cow, both with red ears"; from which he inferred that "stock of this sort was spread over the country to a much greater extent than writers of that period would lead us to suppose."

Two cows and a heifer were secured at Troston Hall sale, by V. P. Lort, for the Home Farm at Vaynol Park. They were not hardy, and were disposed of. They were crossed by the wild white bull; but the experiment was unsatisfactory, the offspring proving unsound. A small herd existed, from 1895 to 1902, on the estate of the **Hon. W. F. D. Smith,** M.P., of Great Thurlow, Suffolk. At the Troston Hall sale four cows and a young bull were secured to form it; but the cows did not prove to be good butter-makers, and at the end of seven years they were crossed with a Shorthorn, and no further attempt was made to retain them as a herd.

Storer clearly indicates the probability of the existence of an **ancient white breed** of domestic cattle in Norfolk and Suffolk at this early date, and refers to the "gigantic stature" of its presumed descendants, which stood 6 feet high, and to the extraordinary power of certain cows of the breed to perpetuate their characteristics for generations, even when mated with Shorthorn and other bulls. The equally ancient **Swedish Fieldra** breed of white polled cattle are in shape and colour-markings indistinguishable from many of our white polled cattle of to-day, and it is open to conjecture that the two breeds had a common origin. (See Appendix I.)

here in procession through the principal streets of the town to the Church of St Edmunds. This relic of Druidism prevailed here even to the Reformation."—From Tymms' *Handbook of Bury St Edmunds.*

[1] Probably Lofft overlooked Storer's reference, made at page 317, to the Brook House Stock, owned by Sir Roger Kerrison.

Red Polled Cattle have been formed into a general-purpose breed of unsurpassed merit in this country by uniting picked specimens of the old Norfolk horned breed of superior grazing cattle with the equally meritorious milking breed of polled "Suffolk Duns."

Marshall, who spent from 1780 to 1782 in Norfolk, describes the former breed belonging to the Norse and Danish settlers:—

"The native cattle of Norfolk are a small, hardy, thriving race; fattening as freely and finishing as highly at three years old as cattle in general do at four or five; they are small-boned, short-legged, round-barrelled, well-loined, thin-thighed, clean-chapped; the head in general fine, and the horns clean, middle-sized, and bent upward; the favourite colour a blood-red, with a white or mottled face. The breed of Norfolk is the Herefordshire breed in miniature, except that the chine and the quarter of the Norfolk breed are more frequently deficient. If the London butchers are judges of beef, there are no better-fleshed beasts sent to London Market."

At that time some Herefords were altogether red, and the area of white markings in others was not so great or so well defined as now.

Arthur Young describes the "universally polled" Suffolk dun cow of the Woodland Area "Dairy District," in north-eastern Suffolk, which in 1792 "was spread over the whole country," and had for more than half a century been famous for its butter, "justly estimated the pleasantest and best in England." The best milkers were "red, brindled, or yellowish cream-coloured." This breed, according to Bede, is believed to have been brought from Holland (Jutland) in the fifth century by the Angles or English, who took with them "their slaves, their cattle, and their live stock, leaving no living thing behind them in their old homeland."

Henry F. Euren,[1] the historian of the Red Polled breed, believes that the original Suffolk Polled cattle were descended from a Scythian stock. "Polled cattle are yet to be found in Central Russia and in that part of Hungary adjacent to Russia. That they were found in Norway and also in

[1] To whose article on "Red Polled Cattle," in the *Journal of the Bath and West of England Society*, vol. x. (1899-1900), reprinted in *Report No.* 83 *of the Kansas State Board of Agriculture*, September 1902, indebtedness is acknowledged.

Iceland, which was settled from Norway in the ninth century, shows that the variety went with the nomads of old days."

The fact that the two very distinct breeds of cattle for long maintained their individuality, although reared at no great distance from each other, is fully accounted for by their owners being of a different race and of different habits, and having little intercourse with each other.

Galloway cattle were at one time taken in large numbers by drovers into Norfolk to fatten, and probably bulls may also have been introduced; but **Youatt's statement** that they were the origin of the Polled Suffolks will not stand the test of competition with the foregoing hypothesis—the Red Polls and the Galloways being different in practically all essential particulars. To our thinking the Red Polls more resemble the Polled Angus, and between these two breeds of Scotch Polls there are sufficient distinctions to indicate different origins.

John Reeves, a tenant on Holkham Estate, and a yeoman relative, **Richard England**, of Binham, began about the beginning of last century to blend the two breeds to form the "new kind" of general-purpose beast. It was to be without the horns of "the true Norfolk Red," and the bullocks were "to fatten to about fifty or sixty stones, with as little coarse meat as could be expected." When Reeves retired in 1828 his cattle were dispersed—"eleven matchless blood-red cows in calf," 13 two- and three-year-old heifers in calf, and "a two-year-old blood-red bull, one of the most perfect animals in the Kingdom." England's herd comprised 30 cows of "a beautiful red." Another pioneer was **George**, of Eaton, near Norwich, who began during the first decade of the nineteenth century to collect a herd of so-called blood-red Polled Suffolk cows. One of the most famous was a Norfolk cow, "Foulsham," bought for 25 guineas from Wale of Foulsham, near Elmham. The Norfolk and Suffolk breeds were "mixed," and close in-and-in breeding by using home-bred bulls was systematically practised.

The name "Norfolk Polled" was in use in 1818, and the breed was then carefully distinguished from Galloways and "Polled Derbys." It is now thought that the latter term, found in an old advertisement, applied to polled cattle of the Shorthorn type then common round Newmarket, and that they are probably closely related to the section of Polled Durhams which sprung from Muley ancestors (p. 99).

The blood-red colour was introduced into the Suffolk dairy district, near Eye, by Sir E. Kerrison, through bulls bred at Eaton, and by Mosley, who carried a herd of the improved Norfolks bodily into the south of the Suffolk dairy district; but showyard competition between the animals from the counties of Norfolk and Suffolk led to their admixture on the common basis of the blood-red colour. At the Royal Agricultural Society's Show in London in 1862, the blend was first publicly recognised as "Norfolk and Suffolk Red Polled." Twenty years later the name was shortened for convenience to "Red Polled."

In place of the common wedge shape for a milch cow, the ideal which has prevailed with Red Polled breeders is the old Norfolk form, in combination with high milking qualities and the polled condition of the earlier Suffolk Dun cattle. In this way an ideal **type of dual-purpose cattle** has been established, with the origination of which the names of B. Pond of Dunham, and Nicholas Powell of Snoring, are justly associated. Another inheritance from the Suffolk "is the remarkably large milk veins, rising in knotted puffs." Arthur Young "scarcely ever saw a famous Suffolk Polled milker that did not possess them." Similar knotted veins are to be seen on the sides of the udders of a good many of the cattle in the Island of Jersey.

The *Herd Book* was begun privately, but with the support of the breeders, by Henry F. Euren, working in consultation with the Rev. George Gilbert, in his day (1827-1893), one of the best informed and most brilliant writers on live stock. It was started on progressive lines, which have "enabled breeders to note rapidly and accurately which of the families breed stock that will give the best results." To this end there were introduced "group letters and numbers, which tell at a glance from what foundation cow of a certain herd or district every animal in the *Herd Book* has descended on the dam's side." A self-acting process of selection was thus created in 1874 with the appearance of the first vol. of the *Herd Book*. After the second issue in 1877, animals required to have "proof of twenty years' Red Polled inheritance, or four generations of Red Polled blood." A section for "Probationers" prevented the complete elimination of the progeny of meritorious animals that could not comply with these conditions, but it was closed in 1905.

The Red Polled Society of Great Britain and Ireland was formed in 1888.

"The Council made a regulation that any record sent in for publication at the Society's cost in the *Herd Book* should show the milk yield of all the cows in the herd." In 1899 it formulated regulations for judging, which provided for the taking of morning and evening records under normal conditions and subject to independent inspection. "They also provided for pail and butter-fat tests in the showyard, and for the judging there of the cow by quality and appearance as a dual-purpose cow. One-third of a specified number of points being allotted to milk, a third to butter-fat, and a third to quality. . . . A dual-purpose cow must be able to give a fairly good account of herself in the dairy, and be able to produce calves which, when steered, will grow well and fatten into good butchers' beasts."

In the oldest herd, that of **R. Harvey Mason**, Necton Hall, a recent year's record of 43 cows, including 14 heifers, was 203·12 lbs. of butter-fat. Of the mature cows the best gave 369·82 lbs. of butter-fat—4·41 lbs. to each 100 lbs. of milk; another, 388·37 lbs. = fat 4·08 lbs. per cent. A heifer which milked 365 days gave 10,396 lbs. of milk, yielding 353·79 lbs. of butter-fat.

The breed is noted for abnormally prolonged periods of lactation. The cow "Crocus," whose dam was of the old Suffolk dun milking blood, yielded, after dropping her third and last calf, in May 1890, during a period of nine years and four months of continuous profit, 50,427 lbs. of milk—with during the last five years a percentage of 4·3 of butter-fat.

Some cows have a **nervous habit** of holding up their milk for one or two milkings if moved to strange surroundings, as when taken to milking competitions at shows, the percentage of butter-fat as well as the yield of milk being altered. The Red Polled breed suffers acutely in this way. At the dairy show in 1898 the cow which gained the breed silver medal for butter-yield, showed the abnormal difference in percentage of butter-fat between 2·26 in the morning and 4·26 in the evening meals. Another winner "gave 17·5 lbs. at the first morning trial, 25·5 lbs. at the second; 27·4 lbs. at the first evening trial, 24·7 lbs. at the second; and while the morning's fat was only 2.54 per cent., the evening's was 4·45."

TRING PARK RED POLLED COWS, IN THE HERD THE WHOLE OF THE YEAR ENDING 26TH SEPTEMBER 1903 (*Live Stock Journal*, 20th Nov. 1903).

No.	Date of Birth.	Date of last Calf.	Calves.	Total yield in lbs.	Days in Milk.	Average per day in lbs.	Days dry.
1	Dec. 1898	April 1903	2	5,670	265	21.39	99
2	July 1899	Sept. 1903	3	6,108	341	17.91	23
3	Jan. 1891	July 1903	10	7,955	268	29.68	96
4	Nov. 1896	March 1903	5	7,429	304	24.43	60
5	Feb. 1894	Oct. 1902	*	8,914	361	24.69	3
6	April 1898	Nov. 1902	3	9,237	308	29.99	56
7	April 1897	June 1902	4	4,634	247	18.76	117
8	Oct. 1893	Feb. 1903	8	5,957	210	28.36	154
9	Feb. 1896	April 1903	5	7,982	324	24.63	40
10	Feb. 1895	Nov. 1902	5	9,847	322	30.58	42
11	March 1896	Jan. 1903	4	7,912	241	32.82	123
12	Jan. 1897	Nov. 1902	4	7,166	301	23.80	63
13	June 1898	Oct. 1902	3	5,738	291	19.71	73
14	June 1897	Jan. 1903	4	6,894	322	21.40	42
15	July 1896	Sept. 1903	5	5,960	305	19.54	59
16	Dec. 1892	March 1903	7	6,852	284	24.12	80
17	May 1897	June 1903	4	6,025	317	19.00	47
18	Jan. 1896	Aug. 1903	6	8,460	364	23.24	...
19	May 1896	March 1903	6	7,704	364	21.16	...
20	Oct. 1897	March 1903	4	7,649	308	24.83	56
21	June 1897	April 1903	4	7,355	304	24.19	60
22	Oct. 1896	Feb. 1903	4	9,145	268	34.12	96
23	Oct. 1895	Nov. 1902	6	10,387	336	30.91	28
24	June 1898	Sept. 1903	4	5,205	284	18.32	80
25	Dec. 1899	May 1903	2	6,704	293	22.88	71
26	Aug. 1897	Feb. 1903	4	6,684	324	20.62	40
27	Sept. 1899	April 1903	2	5,643	324	17.41	40
28	Feb. 1895	Feb. 1903	5	8,676	272	31.89	92
29	Dec. 1898	July 1903	9	5,764	264	21.83	100
30	July 1899	May 1903	2	5,666	256	22.13	108
31	Oct. 1893	May 1903	8	5,841	290	20.14	74
32	Jan. 1899	July 1902	1	5,216	299	17.44	65
33	Aug. 1894	Jan. 1902	6	6,257	364	17.18	...
34	Sept. 1896	Oct. 1902	4	7,980	341	23.40	23
35	May 1896	Feb. 1903	5	6,369	228	27.93	136
36	Feb. 1894	Dec. 1902	7	7,428	282	26.34	82
37	Nov. 1900	June 1903	2	4,851	364	13.32	...

Thirty-seven cows gave a total of 259,264 lbs., or an average of $7007\frac{5}{37}$ lbs.

* Uncertain.

10. "Handsome 35th" has been in the herd six years, and given a total of 48,551 lbs., or an average of $8091\frac{2}{3}$ lbs. per annum.

18. "Ladylike 2nd" has been in the herd five years, and given a total of 41,622 lbs., or an average of $8324\frac{4}{5}$ lbs. per annum.

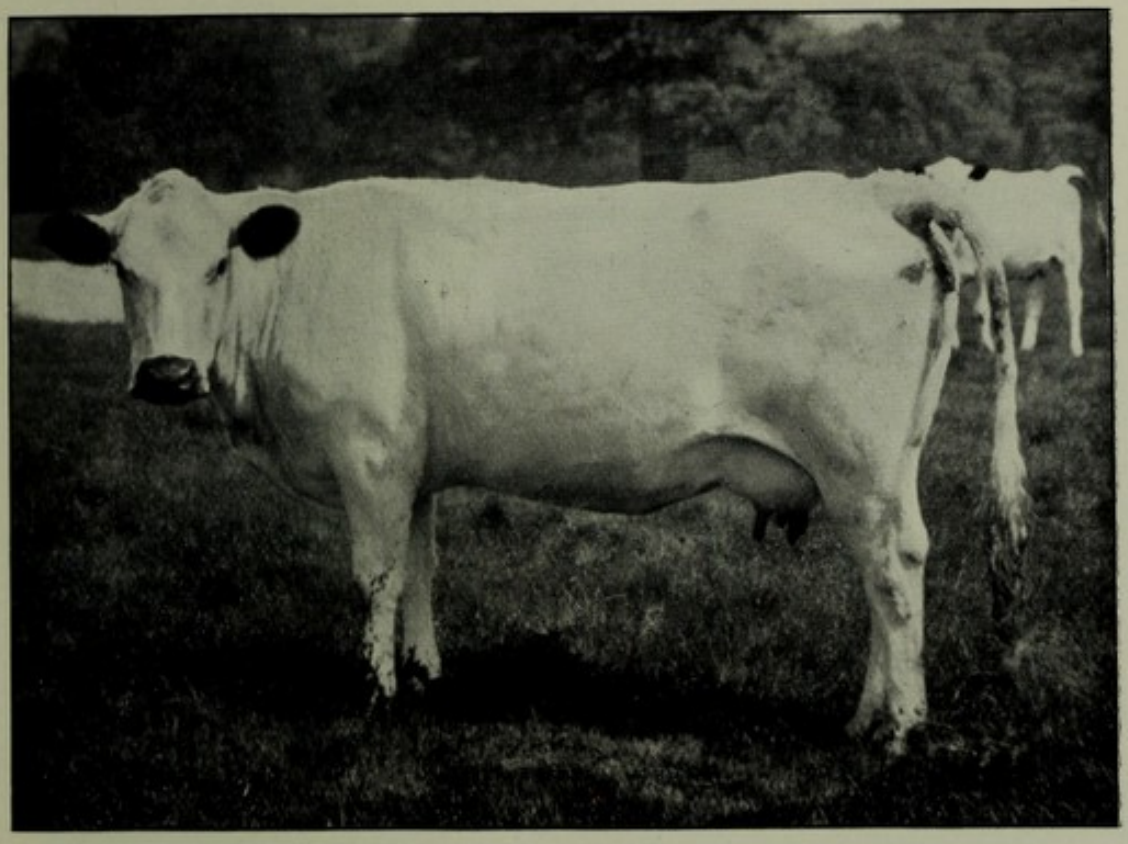
22. "Palm Branch" has been in the herd four years, and given a total of 32,094 lbs., or an average of $8023\frac{1}{2}$ lbs. per annum.

23. "Peaceful" has been in the herd six years, and given a total of 51,646 lbs., or an average of $8607\frac{1}{3}$ lbs. per annum.

29. "Rosette" has been in the herd ten years, and given a total of 95,089 lbs., or an average of $9508\frac{9}{10}$ lbs. per annum.

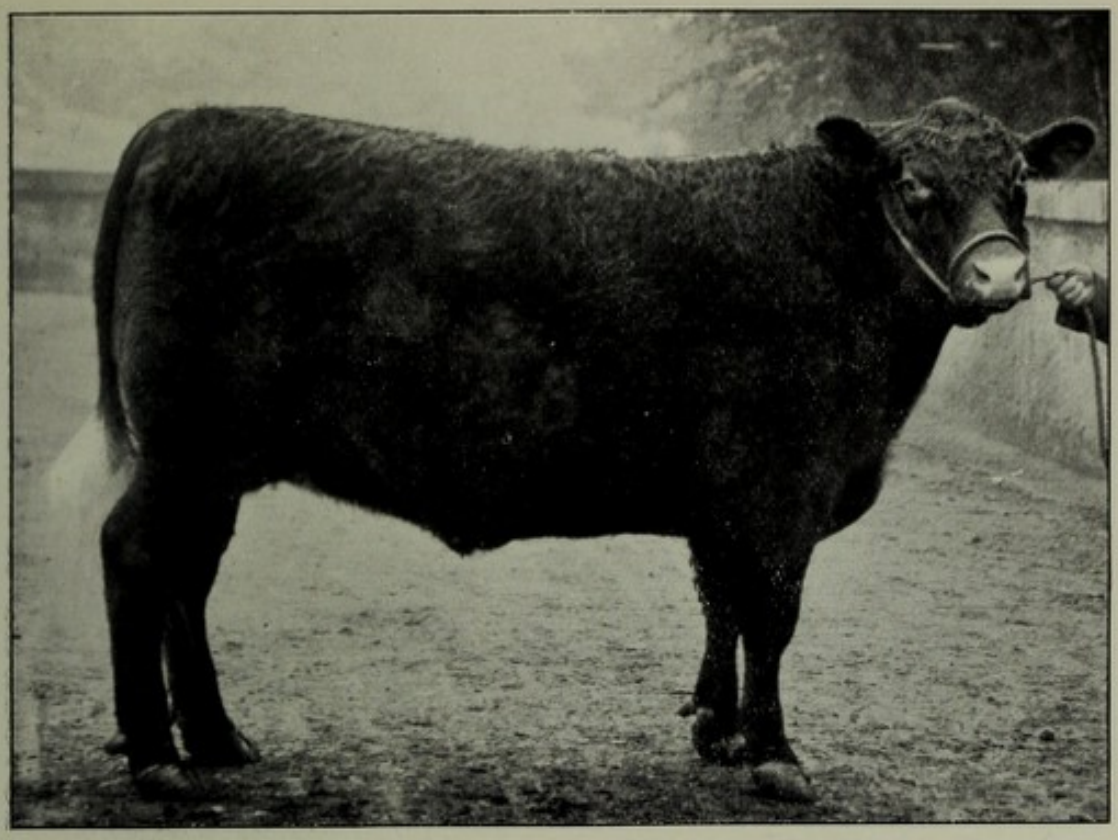


A. White Polled Cow, "Blickling Jenny."



B. Somerford Park White Polled Cows.

[*G. H. Parsons, Alsager, Cheshire.*



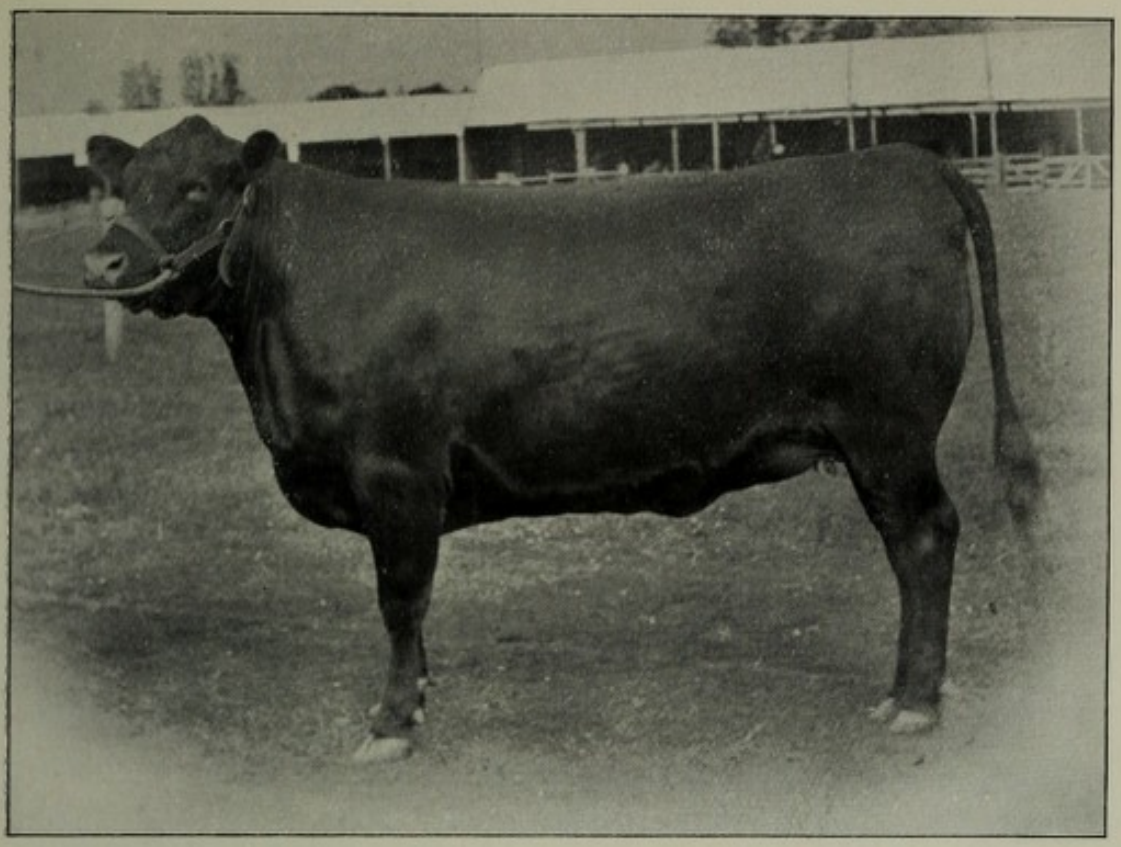
A. Red Polled Steer, "Acton Comet," sire "Logan."
First and Breed Cup at Smithfield, 1904, etc. etc.
Bred by Sir W. O. Corbet, Bart., Acton Reynold, Shrewsbury.



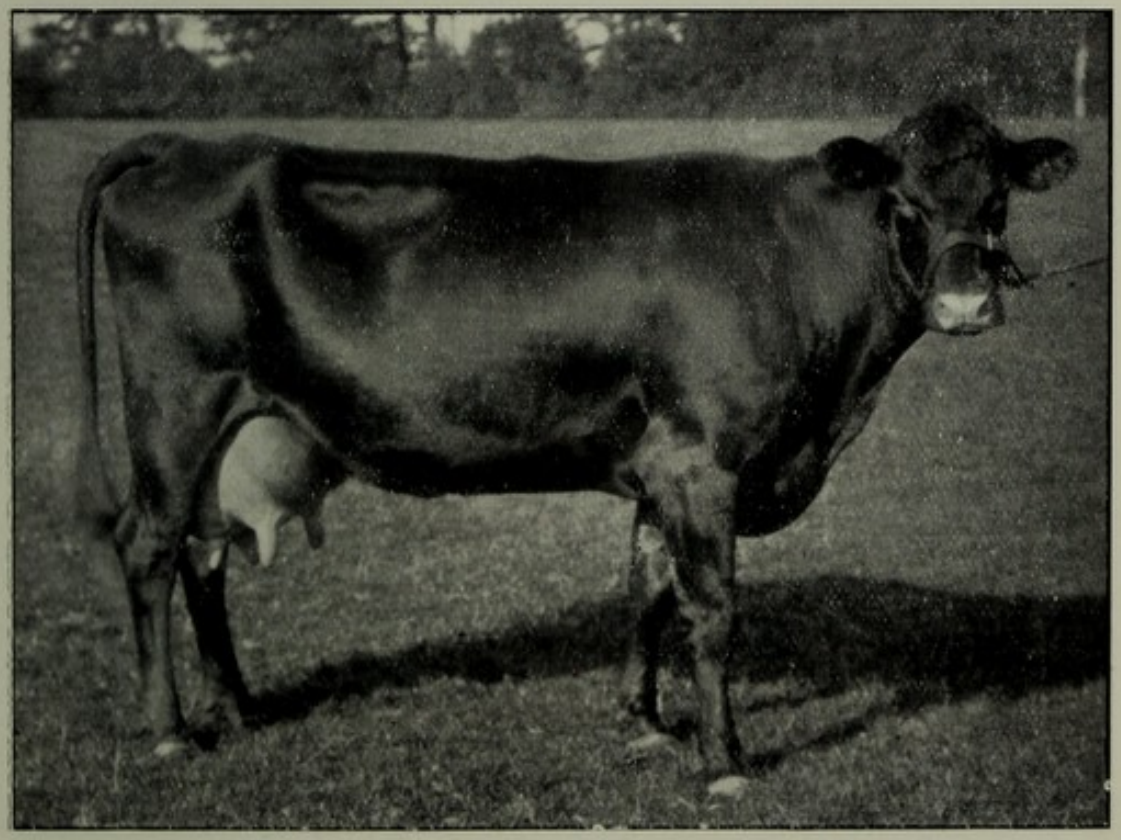
B. Red Polled Bull, "Albert."
Many 1st prizes, including the English Royal in 1904.
Bred by Hon. A. E. Fellows, and owned by Sir W. O. Corbet, Bart.

[*Both by G. H. Parsons, Alsager, Cheshire.*

[*p.* 160



A. Red Polled Heifer, (Davy, 204).
1902 to 1905, won eight Firsts and four Champions, besides other prizes.
Bred and exhibited by John Hammond, Bale, East Dereham, Norfolk.
[*W. L. Shrubsole, Norwich.*



B. Red Polled Cow, "Ladylike 2nd" (11425).
In the herd of Hon. Lionel W. Rothschild (Richardson Carr, agent), Tring Park, Herts.

[*p.* 160

A striking example of prepotency in Red Polled cattle is given by H. F. Euren. In the U.S. of America, "an imported Red Polled cow, served by Jersey and other horned bulls, from 1848 produced year after year polled bull calves, and these in their turn having served all sorts of horned cows, became sires of other polled cattle, usually red in colour, generation after generation for thirty years." Andrew Ralston, writing of the Glamis herd of Polled-Angus cattle, says: "We never cross with anything but a black bull; and all crosses, whether first, second, or third, come black, and they never have horns."

Red Polled Crosses with other breeds show some interesting and unique features. A bull, "Excellency" (6211), from Mason's herd was used, beginning at one year old, by William Fleming of Tudhoe, Durham, at Burn Hall, on 33 heifers (25 West Highland of various colours, 7 Shorthorn, and 1 Polled Angus), which produced calves during the years 1900, 1901, 1902. All were red, and, when the Polled-Angus calf was excluded, the polled and horned calves were each 16 in number. Of 15 heifers in 1900, 10 had calves, and 5 of these developed horns; only 1 out of 6 calves in 1901 grew horns; but in 1902, of 12 heifers 10 had calves which grew horns. This is a decidedly larger proportion of horns than usually appears in the progeny of either of the Scotch Polls when mated with horned cows; but they were mostly "scurs," and many of them without horn-core attachments. One calf of a Highland cow had two white feet. The same bull on a black Kerry heifer produced a black bull calf with scurs, but by a red Dexter the calf was red and polled.

J. W. Lee, of Meigs, County Ohio, reports:—"I had sixteen Shorthorns and a few grade cows, which I bred to the Red Polled bull 'Glenmore.' The calves were the finest that had ever been dropped on my farm up to that time. They were all red in colour, uniform in style and shape, and all muleys, from horned cows of all colours. In this 18 head of calves, 13 were heifers, which averaged at twelve months old 1000 lbs. The bull calves, when sold, averaged 100 lbs. for each month of their age."

It has been demonstrated that **steers** of about eighteen months, put up after grazing to feed off, will grow till about two years old, and finish rapidly in prime condition, making

during the last six months an average increase of nearly 2 lbs. per head per day, and also that prime carcases command the highest prices in the London market.

The high general-purpose standard of the breed, and the polled condition, together with the fashionable red colour, make Red Polled cattle peculiarly **suitable for the River Plate** countries, where a brisk opening up of an export trade has been in progress for a few years, and an independent Argentine Red Polled Breed Book and Association are assured.

Improvement.—The rate at which the Red Polled breed has come to the front and has taken its place among the most important breeds in this country is quite remarkable. **Low**, writing in 1845, after giving the breed under the name of Polled Suffolks a poor character in respect of almost every quality except that of milk-production, suggested the great probability of its immediate extinction. Recent years have seen not only improvement in quality, but a large extension of the numbers of good herds and of first-rate animals.

The **leading** present-day **breeders** of Red Polls are:—Right Hon. Lord Amherst of Hackney, Didlington Hall, Norfolk; Thomas Brown & Son, Marham Hall, Norfolk; Kenneth M. Clark, Sudbourn Hall, Suffolk; Sir Walter O. Corbet, Bart., Acton Reynold, Shrewsbury; Sir R. P. Cooper, Bart., Ashleyns Hall, Berkhamstead, Herts; Rt. Hon. Ailwyn E. Fellowes, Honingham Hall, Norfolk; John Hammond, Bale, Norfolk; R. Harvey Mason, Necton Hall, Norfolk; T. S. Matthews, Sporle, Norfolk; Rt. Hon. the Earl of Radnor, Longford Castle, Salisbury; Rt. Hon. Lord Rothschild, Tring Park, Hertfordshire; Alfred J. Smith, Rendlesham, Suffolk.

CHAPTER IX

CATTLE—SCOTCH POLLED ABERDEEN-ANGUS AND GALLOWAY

Aberdeen-Angus — Habitat — Colour — Ancestors — Early Breeders—Modern Prize-Winners — Standard of Excellence (Bull)—Points (Cow)—Comparison with the Galloway—Their Crosses—Herd Book and Polled Cattle Society—**Aberdeen-Angus Red Polls**—Origin—**Galloways**—Distinctive Characteristics—Colour—Resemblance to West Highlanders—Prepotency—Early Breeders—Milking Qualities—*Herd Book*—Blue-grey and other Crosses—Quotations from Gilbert Murray and Dr Gillespie—Biggar's Method of Feeding—**Belted Galloways**—Low and Gilbert on other Belted Cattle—Characteristics—Breeders in Tyneside and in Galloway.

THE **Aberdeen-Angus Breed**,[1] from Aberdeenshire, Forfarshire, and the district largely embraced within the adjoining counties, is most probably the result of the amalgamation of a number of very different, local, polled and also horned breeds, associated with careful selection and in-and-in breeding, together with, it is asserted, the infusion, within comparatively recent times, of a greater or less degree of alien blood. In common with the only other domesticated breeds of the Scottish mainland—the Galloway, the West Highland, and the Ayrshire—there is a strong probability, if there is not absolute proof, that it originally descended from the native wild cattle of the country. The difference of climate and surroundings, together with the influence of artificial selection by man, and probably the importation of fresh blood from abroad, is sufficient to account for the diverse appearances in all those allied varieties.

The absence of horns and the prevailing almost uniformly **black colour**, although ranking among the most persistent characteristics of the Northern Scotch polls, were

[1] See also *The History of Polled Aberdeen-Angus Cattle*, by Macdonald and Sinclair: Blackwood & Son, Edinburgh, 1882.

by no means uniform features in olden times. Black cattle without horns were recorded nearly four hundred years ago,[1] but long after the beginning of last century very many of the cattle from which the existing breed sprang had horns. Their colours were extremely variable: some were yellow, red, or brown; others brindled (red and black, sometimes with white mixed or broken in an irregular flaked fashion), black and white, "belted" and "rigged"—the latter black with a white or brown stripe along the back. Certain herds had a brown ring round the muzzle associated with the brown ridge. The late Lord Southesk, himself at one time a considerable breeder of polled cattle, writing on July 19, 1889, reflected upon the change of colour in Highland cattle from black to reds and yellows, and the possibility of the blacks becoming nearly extinct, and added: "Just as the red, brindled, and dun Polled Angus, common in my youth, are now hardly ever seen."

According to the early records, the largest and best varieties of the polled cattle were to be found in the low country. The smaller horned cattle which resembled the old Highland breeds occupied the uplands.[2] **Buchan cattle,** about half of which were polled at the end of the eighteenth century, justly claimed superiority. They are said to have done so at the time of the Romans. They have been represented from time immemorial by two polled breeds possessing good milking powers, but of very different size. These were locally termed "humlies," while the early Polled-Angus cattle were named "doddies." In the *General View of the Agriculture of Angus*, published in 1813, it is stated with regard to the general stock that "little attention was then paid to the selection of the males or females by whom the breed was propagated." The good qualities of the modern cattle, we

[1] A legal document, in Vol. III., p. 344, of the *Spalding Club Antiquities of the Shires of Aberdeen and Banff*, refers to a case of "sasine," or the assumption of the actual possession of property, symbolised by giving a handful of earth and a stone—"yird and stane." In relation to an alternative symbol, it mentions the acceptance by John Cumyne in 1523 of *unum bovem nigrum hommyee*—a black hummel (hornless) ox—valued at 40s. 8d. Scots.—*Banffshire Journal.*

[2] A valuable paper on "Aberdeenshire Horned Cattle," by James R. Barclay, *Banffshire Journal* Office, appears in the *Transactions of the Highland Society*, Vol. XVIII., 1906.

may therefore conclude, have been either developed in recent years, or have been obtained by selection and moulding from the superior herds of those proprietors who, before the time referred to, took an interest in the improvement of live stock.

The Aberdeen-Angus of the present day occupies among Scotch cattle very much the same position that the North Devon does among English breeds for quality of flesh, refinement of style, perfection of the rounded type of symmetry, and, it might be added, for the excellence of its marbled beef; yet it must not be forgotten that these qualities, like those of all British breeds, however distinct and however permanent they may be, are the results of the commingling of blood of various kinds. No single breed is pure if we go back for but a few generations. Each breed has its ups and downs in the record of its development, and it is pretty generally recognised among experts that the early years of the present century marked one of the periods of depression in the history of this northern polled breed, during which regression was probably more active than progression.

It is recorded that less than one hundred years ago **crossing** was carried on with Ayrshire, Guernsey, Fife,[1] Shorthorn, and Galloway cattle. How much of this blood has been maintained in the best animals of the present day is a matter for conjecture. It is true that the well-known attempt by Lord Panmure to introduce a Galloway cross was not attended with success; but, on the other hand, there is good reason to believe that the very extensive and successful use of Shorthorn bulls in breeding grazing cattle for the Southern markets, led to the incorporation of Shorthorn qualities into the breed during the early years of its improvement. At times very distinct Shorthorn characters appear by atavism in polled cattle of good blood and long pedigrees, and disappear in the next generation.[2] The use of a Short-

[1] The Fife Horned breed is now extinct. They were large black cattle, rather slow in coming to maturity, but unsurpassed as grazers after they were three years old. See Plate LXV.

[2] The author remembers having seen a black-and-white cow of this kind some years ago, which had well-developed horns, and quarters unmistakably like those of a Shorthorn. Her immediate ancestors as well as her descendants were animals of the pure type and of superior quality.

horn bull on virgin polled heifers has also been accredited with the power of stamping Shorthorn qualities upon their future calves by bulls of their own breed. But Cossar Ewart's telegony experiments (page 11) have shown this to be merely a popular fallacy.

In-and-in breeding has been adopted to fix the good qualities which have from time to time been spontaneously produced by nature under the influences of the tendency to change brought about by crossing. In the matter of consanguineous relationships, the Aberdeen-Angus is not an exception to the rule which applies to the Shorthorn and other well-known breeds. **Hugh Watson** of Keillor, in Forfarshire (born 1789, died 1865), was the Colling of the Northern polled breeds, carrying out the principles laid down by Bakewell and his followers. But it was reserved for **William M'Combie,** of Tillyfour (born 1805, died 1880), to make the breed known to the outside world. After a long and successful showyard career, he eclipsed all the previous performances of the breed by carrying off two champion prizes of £100 each at the Paris International Exhibition in 1878—(1) For the best group of foreign cattle; and (2) for the best group of beef-producing animals—both bred by the exhibitor.

During recent years no breed has been so successful as the Polled Aberdeen-Angus in competing for the highest honours at the London and Birmingham **Christmas fat shows,** and at similar "expositions" in America. In this country the names of Clement Stephenson, Newcastle; George Wilken, Waterside of Forbes; Sir W. G. Gordon Cumming, Bart., of Altyre; and the Earl of Strathmore, Glamis Castle, are closely associated with these honours.[1]

"At the Smithfield Club Show during the last twenty-five years (1879 to 1904 inclusive):—The champion plate for the best beast in the Show has been won eight times by

[1] Full details of the wonderful showyard performances of this breed on both sides of the Atlantic up to 1886 may be seen in Auld's work, *The Breed that Beats the Record*, published by Aldine Co., Detroit; and more recently in a brochure compiled by Albert Pulling, the Secretary of the English Aberdeen-Angus Association, and issued in January 1905, on *Aberdeen-Angus Cattle and their Crosses as Beef-Producers* (from which the subjoined quotation is extracted), and in Supplements to the above, issued in 1906 and 1907.

Aberdeen-Angus heifers, and three times by Aberdeen-Angus cross-bred cattle. The gold medal for the best steer has been won three times by Aberdeen-Angus steers, and five times by Aberdeen-Angus cross-bred steers. The gold medal for the best heifer has been won ten times by Aberdeen-Angus heifers, and six times by Aberdeen-Angus cross-bred heifers."

The Smithfield championship was again won in 1905 by an Aberdeen-Angus heifer after the foregoing statement had been written.

One of the most successful herds of between fifty and sixty cows and heifers in the country, has been that of Clement Stephenson, Balliol College Farm, Long Benton, Northumberland. There being now no preparation of cattle for showing, the herd is kept in the most natural conditions. "The highest champion honours have been secured by animals of the herd at all the great fat stock shows—at York, in 1881; at Leeds, in 1883; at Norwich, in 1881, 1883, and 1893; and at Birmingham, in 1883, 1884, 1885, 1887, 1893, and 1894. In addition, supreme honours have been won at Smithfield on three separate occasions—by 'Luxury' in 1885, by 'Young Bellona' in 1887, and by 'Benton Bride' in 1894."

As a breeding herd of old standing, that of Sir George Macpherson Grant at **Ballindalloch** occupies the premier position in Scotland.

Standard of Excellence for Aberdeen-Angus Bull.

From the *Herd Book*

"*Registered Pedigree. Colour*—Black. White is objectionable, except on the under-line behind the navel, and there only to moderate extent; a white cod is most undesirable. *Head*—Forehead broad; face slightly prominent, and tapering towards the nose; muzzle fine; nostrils wide and open; distance from eye to nostril of moderate length; eye mild, full, and expressive; ear of good medium size, well set, and well covered with hair; poll well defined, and without any appearance of horns or scurs; jaws clean. *Throat*—Clean, without any development of loose flesh underneath. *Neck*—Of medium length, muscular, with moderate crest (which increases with age); spreading out to meet the shoulders; with full neck vein. *Shoulders*—Well laid in, covered on the blades and on the top, which should be on a line with the back, and moderately broad. *Chest*—Wide and deep.

Bosom (or Brisket)—Standing well out between the legs, and moderately covered with flesh and fat. *Ribs*—Well sprung from the backbone, arched and deep, neatly joined to the crops and loins. *Back*—Broad and straight from crops to hooks; loins strong; hook-bones moderate in width, not prominent, and well covered; rumps long, full, level, and rounded neatly into hind quarters. *Hind Quarters*—Deep and full; thighs thick and muscular, and in proportion with hind quarters; twist full. *Tail*—Fine, coming neatly out of the body on a line with and hanging at right angles to it. *Under-line*—As nearly as possible straight; flank full and soft. *Legs*—Short, straight, and squarely placed; hind legs slightly inclined forward below the hocks; forearm muscular; bones fine and clean. *Flesh*—Even, without bumps or patchiness. *Skin*—Of moderate thickness and mellow touch, abundantly covered with thick and soft hair. *General Appearance*—Gay, well-bred, and masculine." With the exception of those relating to sex, the **points of the female** are identical with the above."

Only a few characteristic features call for special mention. The normal colour is black, but the rusty brown referred to in varieties of the old breeds, and also white patches of moderate dimensions about the udder and belly, are tolerated. Though to appearance an animal of this breed looks small, yet, owing to its short legs and compact rounded form, its weight classes it among the larger breeds. The hook bones are not so wide or prominent, and the quarters not so square as in the Shorthorn. The absence of patchiness and the equality and levelness of flesh are proverbial. The milking qualities are low as regards quantity, the result of breeding for beef and the prevailing custom of suckling the calves, but the quality of the milk is good.

In comparison with the Galloway, the breed weighs heavier at an early age owing to its greater rapidity in coming to maturity, though a difference in the size of breeding-stock is not marked. The bones are finer, the skin thinner, the hair shorter, and the poll more pointed.

Lord Southesk's letter, already quoted, says on this subject:—

"The 'Gothic' arch form of poll is thought preferable to the 'Roman' arch as bespeaking a remoter distance from a horned ancestry. Polled bulls with flat-top heads often have

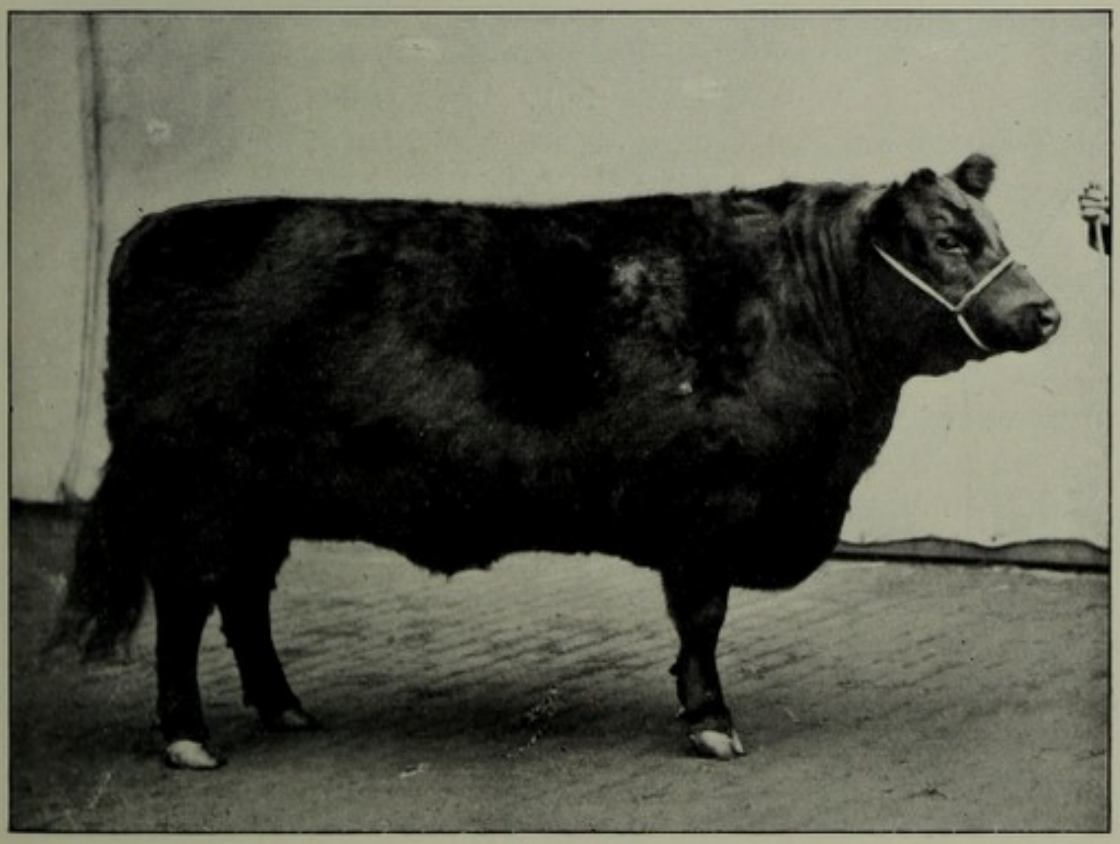


ABERDEEN-ANGUS BLACK POLLED HEIFER "LEGEND."
Bred by Col. Geo. Smith Grant, Auchorachan, Glenlivet.

[*Robt. Stewart, Elgin, N.B.*



A. Aberdeen-Angus Black Polled Bull, "Wizard of Maismore."
Winner of First and Champion at many shows.
Owned by J. J. Cridlan, Maismore Park, Gloucester.
[*G. H. Parsons, Alsager, Cheshire.*



B. Aberdeen-Angus Black Polled Heifer, "Minx of Glamis."
Champion at Birmingham and Smithfield in 1896.
[*Henry R. Gibbs, London.*

[*pp.* 168 *and* 169

actual 'scurs,' or, if not having actual scurs, they bear hairy twists on each side of the skull. It is always held as an indication of imperfect purity of blood (originated, perhaps, at a time long before the *Herd Book*) to have a flattened poll. Perhaps the Galloways were at some period a horned breed. They resemble the Highlanders in several particulars."

The Crosses resulting from mating Aberdeen-Angus and Shorthorn cattle are similar in size and appearance, whichever breed supplies the male, provided the Shorthorn cow put to a polled bull be a big-framed animal. The small Angus cow will throw a full-sized cross to the Shorthorn bull, but the progeny of a small Shorthorn cow and Angus bull is small in the bone and undersized. Nearly all first crosses from pure parents are black, but a few are "grey-hairs," or "blue-grey," like the first-cross Galloway; and the majority are without horns. Compared with black crosses the blue-greys seem to take more after the Shorthorn, and as cows they are more liable to throw horns in their progeny. The polled bull on an Ayrshire cow produces a small thinly-made-up animal, and Angus crosses from other milking breeds or cross-bred dairy cows are on the highest authority, that of John Ross, of Meikle Tarrel, Easter Ross, difficult beasts to make anything of for the butcher until they are three years old. This central fact accounts to a large extent for the early non-success of the Polled Angus bull when used to cross the common cattle of Argentina. As country cows become graded up by the use of Shorthorn bulls the Angus bull will ultimately establish himself as a prime beef-producing sire. A demand is beginning to spring up in this direction, although at moderate prices in comparison with those paid for Shorthorns. It is stated on good authority, that during the year 1906, one hundred and forty-six head were purchased at public sales or by private treaty from English and Scotch breeders for export to Argentina. The Aberdeen-Angus crosses with the Dexter breed seen at Smithfield are models of small cattle. The black is very persistent, as second crosses are usually black, but third and later crosses diverge into mixed or broken colours, and some become white. The white heifer with black muzzle and grey fringes shown on Plate LIX. is an exception to this rule, being a second-cross Shorthorn. Her dam was a blue-grey got by the roan bull "Regulator" out

of a pure Polled-Angus cow, but "Regulator" had a dash of white in the roan.

It has been pointed out that a black first-cross between a **Galloway bull** and a red Shorthorn cow strongly resembles in appearance and also in feeding qualities the Angus breed of cattle, and, had the origin of the latter not been known, the likeness might have been accepted as strong presumptive evidence of its being due to this cross. The Galloway bull is on the whole more impressive than the Aberdeen-Angus, the breed being more ancient in its origin and the cross-bred stock with the pure Shorthorn more uniform in size and of better colours—commanding a readier market in districts where both are known. There is much less uncertainty about a blue-grey entirely free from horns than a black first-cross Aberdeen-Angus that is not so attractive in colour, and may develop horns or scurs, and may easily be mistaken for an inferior type of cross. From the Aberdeen-Angus Shorthorn cross one has the chance of getting probably a greater number of exceptionally good show animals, still there are, all over, more of the narrow-hipped sort among them than among Galloway crosses, and they do not possess such well-developed coats of hair to withstand exposure in a humid country like the south-west of Scotland. But that they are unsurpassed as butchers' beasts to be quickly fed in favourable surroundings into beef of the finest quality their annual record at Smithfield clearly shows.

The first volume of the *Polled Herd Book* was published in 1862, and the second in 1872. After the publication of the fourth volume the Galloway portion was withdrawn, to be published separately. **The Polled Cattle Society,** Banff, N.B., which was established in 1879, has since its formation superintended the registration of the Aberdeen-Angus breed. The **English Aberdeen-Angus Cattle Association**, which publishes no Herd Book, was formed in May 1900, mainly with the object of holding an annual show and sale at a convenient centre for English breeders and buyers; but also to promote generally the interests of the breed, to hold discussions and give breed prizes at the shows of the Royal Agricultural; Bath and West; Yorkshire; and Royal Counties Societies; and champion medals at the shows of various local

societies. An annual spring show and sale of young bulls and other cattle is held under the auspices of the association at Birmingham, and in 1906 an autumn show and sale of cows and heifers was instituted at the same centre.

The following is an alphabetical list of a number of the **leading breeders** in Scotland, followed by those who have superior herds in England and Ireland :—

Earl of Airlie, Cortachy Castle, Kirriemuir, Forfarshire; James Beddie, Banks, Strichen, Aberdeenshire; Garden A. Duff, of Hatton, Hatton Castle, Turriff, Aberdeenshire; Sir George Macpherson Grant, Baronet, of Ballindalloch, The Castle, Ballindalloch, Banffshire; William Shaw Adamson, of Careston, Careston Castle, Brechin, Forfarshire; George Bruce, Tochineal, Cullen, Banffshire; Patrick Chalmers, of Aldbar, Aldbar Castle, Brechin, Forfarshire; George Cran, Morlich, Towie, Glenkindie, Aberdeenshire; William S. Ferguson, Kinochtry, Coupar-Angus; William S. Ferguson, Kinochtry, Perthshire; John R. Findlay, Aberlour House, Aberlour, Banffshire; Colonel George Smith Grant, Minmore and Auchorachan, Glenlivet, Ballindalloch, Banffshire; James Kennedy, Doonholm, Ayr, N.B.; John Macpherson, Mulben, Keith, Banffshire; Colonel Charles M'Inroy, C.B., of The Burn, Edzell; Caroline, Countess-Dowager of Seafield, Cullen House, Cullen, Banffshire; The Earl of Strathmore and Kinghorne, Glamis Castle, Forfarshire; George J. Walker, Portlethen, Aberdeen; William Hatton Whyte, of Eassie, Glamis, and Spott, Kirriemuir, Forfarshire; William Wilson, Coynachie and Drumfergue, Gartly, Aberdeenshire.

Thomas H. Bainbridge, Eshott Hall, Felton, Northumberland; H. L. Bland, Kilquade, Greystones, Co. Wicklow, Ireland; Rev. C. Bolden, Preston Bissett, Buckingham; John H. Bridges, Langshott, Horley, Surrey; Charles Calder, Woodhill, Newcastle-on-Tyne; Captain F. Cookson, Stondon, Andover; Sir George A. Cooper, Bart., Hursley Park, Hursley, Hants; William J. Cotton, Humphreystown House, Blessington, *viâ* Dublin; J. J. Cridlan, The Home Farm, Maisemore Park, Gloucester; George Drummond, Swaylands, Penshurst, Kent; H. G. Fenwick, Birtley Hall, Chester-le-Street, Co. Durham; W. B. Greenfield, Haynes Park, Bedford; W. S. James, Broughton

Lodge, Kettering, Northants; T. Fielding Johnson, Goscote Hall, Leicester; Mrs Macpherson, Wyrley Grove, Pelsall, Staffs; J. M'Intyre, Theakston Lodge, Bedale, Yorks; Arthur J. Owen, Shanvaghey, Ballacolla, Abbeyleix, Queen's County; The Duke of Richmond and Gordon, Goodwood, Chichester; Clement Stephenson, Sandyford Villa, Newcastle-on-Tyne; Col. W. Neville Tufnell, Langleys, Great Waltham, Chelmsford, Essex; Thomas Wotton, Tile Lodge, Sturry, Canterbury.

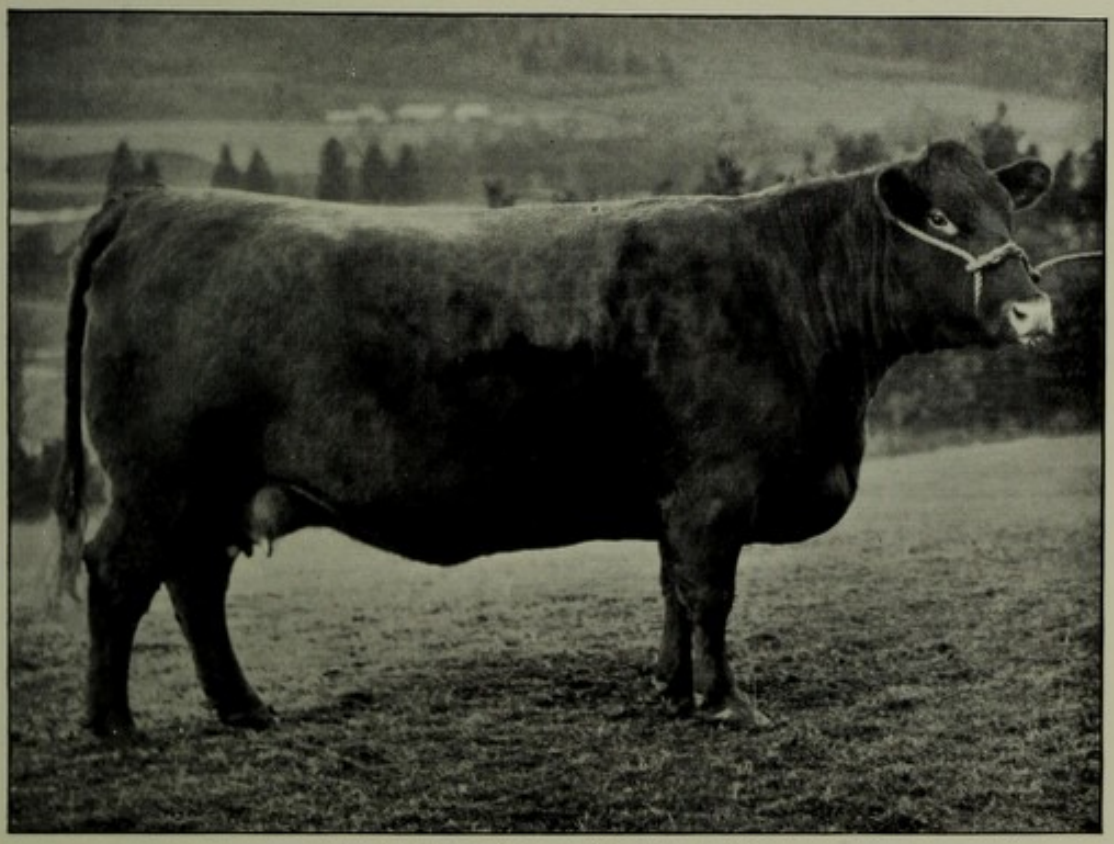
Average Prices at Auction Sales of Aberdeen-Angus Cattle in Scotland, twenty-four Years, 1882-1905, from the *Banffshire Journal.*

Year.	No. Sold.	Average Price per Head.	Year.	No. Sold.	Average Price per Head.
1882	434	£55 13 10	1894	1168	£21 5 3
1883	265	46 11 1	1895	1052	19 17 7
1884	782	36 3 4	1896	1185	22 14 0
1885	939	24 16 1	1897	876	25 6 11
1886	814	24 15 5	1898	1061	23 10 10
1887	849	17 1 10	1899	1083	27 4 9
1888	987	20 8 10	1900	1168	23 15 11
1889	1173	21 5 4	1901	1282	24 12 8
1890	1155	22 9 3	1902	1578	25 10 0
1891	862	26 15 10	1903	1435	25 4 4
1892	1013	22 13 8	1904	1435	21 17 1
1893	1423	20 15 1	1905	1419	22 12 11

The Aberdeen-Angus Red Poll is a pure strain of the Northern Scotch Polls derived from red specimens that have appeared from time to time among the best Black Polled herds. This sub-section of the breed has been collected by W. K. MacDonald, Windmill House, Arbroath, N.B., whose herd numbers about forty animals. He began by purchasing from George Wilkin "Waterside Elena 2nd"—whose dam was champion heifer at Birmingham Fat Stock Show, first prize cow at the Highland Society's Show at Dundee, and first at the Royal Northern Show at Aberdeen. With the founder of the herd and her progeny some half a dozen other red cattle of the best strains of blood in Scotland have been mated. The females keep easily up to the level in quality of well-bred herds; but the difficulty in dealing with such a limited number of cattle is to find a stock bull good enough to mate with them. Resort has been had to a black bull, who



A. Aberdeen-Angus Red Polled Bull.



B. Aberdeen-Angus Red Polled Cow.
Both bred and owned by W. K. Macdonald, Windmill House, Arbroath, Scotland, at Ballintinne, near Blairgowrie.

[*Both by C. Reid, Wishaw.*

[*p.* 172

usually gets red calves. The red colour being more in favour than the black in the River Plate countries, an offshoot of the Windmill House Herd has been established in Argentina by Knight and Porteous, at Las Tres Lagunas. The cattle are found to be hardy, and the bullocks feed to 1500 lbs. live-weight. The difficulty about the quality of the bull occurs there also.

The Galloway is one of the oldest, hardiest, and most characteristic of all British breeds of cattle—so old, that, with the exception of the wild white cattle, no trace is left of the breed or breeds which contributed to its formation. It derived its name from a district in the south-west of Scotland, comprising Wigtownshire and the Stewartry of Kirkcudbright. At one time Galloway extended to nearly the whole area of the six south-western counties, being bounded on the north-east by an imaginary line drawn between Glasgow and Carlisle; and the Galloway was the most prevalent breed in Scotland west of the Tweed and south of the Forth and Clyde till the first decade of the nineteenth century. Wilson's *Record of Kirkbean* says of the **cattle of Dumfries** in 1811, that "the cows for breeding are principally of the Galloway kind. The young two-year-old bullocks kept for grazing are one-half Galloways, and the other half West Highland, bought at Falkirk Tryst in October; and after being fed one year, they are sold to drovers to be forwarded to the English markets."

Distinctive Characteristics.—Though Galloways are now polled and of a black colour, with a brownish tinge on the tips of the hair, particularly at that stage when it is long and inclined to be somewhat woolly, yet, Youatt says, as late as the middle of the eighteenth century, many animals of pure blood had horns of considerable length, and not a few were red-brown in colour. These characters every rarely appear in pure-bred specimens, but the horns are loose scurs. White patches on the udder and belly or thigh, also belted markings, or a white hind foot, are not uncommon, and are seriously objected to for export purposes only when they are large or prominent. This tendency to revert to white, which is most pronounced when two animals of very distinct types are mated together, indicates the descent from the ancient wild cattle, a condition similar to that already

pointed out in the case of other breeds. Some tribes show white hairs in their tails, and a good many have white hairs through their coats, like West Highlanders. Dun is a comparatively rare but recognised colour of the breed, still persistent in a few families—especially in tribes hailing from farms in Mochrum and Kirkcowan districts. John M'Kie of Ernespie (1905) owns a very fine dun cow with twin dun heifer calves at foot, and all her calves, with one exception, have been dun, although their sires were black. Wm. M'Connell, Glasnick, Kirkcowan, keeps a pure family of duns that most frequently bear dun calves to a black bull. Duns of superior quality still exist in other herds of the best cattle. A beautiful dun yearling heifer from Chapleton took first prize against all breeds at Dumfries Show in 1905. The latter herd once contained a black cow with a grey stripe from the chin down each side of the dewlap till they united on the breast, a marking akin to that of the Polled Angus grey-breast family. This marking is of a different class from a natural swirl of reversed hair, which springs on patches like the hair on a cow-lick, and is believed to indicate in-breeding.

"There is no race of cattle in which the importance of a good head is more generally or more strongly recognised than in the Galloway." The head should be free from scurs, wide and short—a long head being one of the prominent characters by which a Galloway cross can be distinguished from a pure-bred animal; the distance from the eye to the wide nostril short; the forehead broad and square between the eyes, carrying the width well up to the crown, which should be low and rounded, not peaked like the crown of the Polled Angus. The ear, resting on a short shank, is set on rather farther back than in most breeds, and should point upward and forward. The lobe or flap should be wide, rounded at the top, and abundantly fringed with long hair. The skin is comparatively thick and heavy on the scales, but mellow to the touch, and covered with a profusion of long, silky, and wavy hair with a mossy undercoat. Wiry or curly hair is very objectionable. The flesh at Smithfield ranks as "prime Scots"—marbled beef well distributed over the frame and down to the knees and hocks. Rounded buttocks are most objectionable.

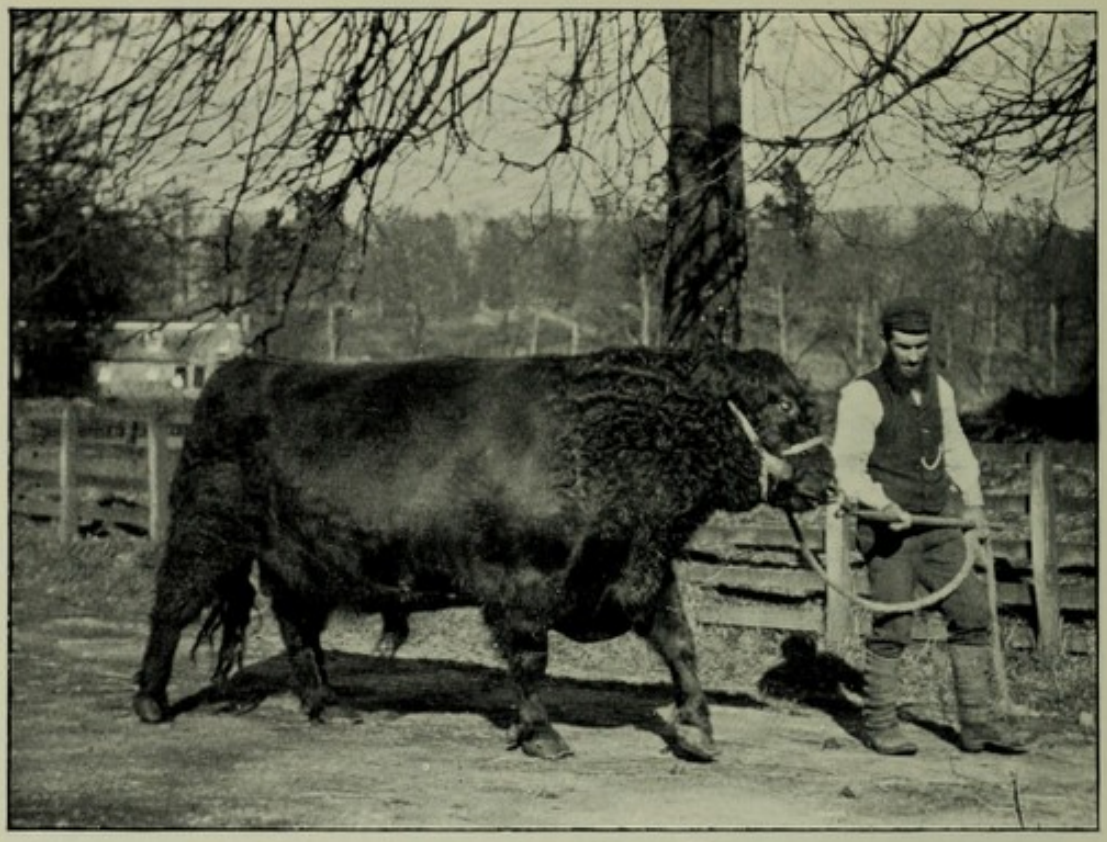
The origin of the polled condition is veiled in doubt.

It may be said that the early written history does not even speculate upon its cause. It is known that this characteristic was preferred by the English buyers who, since a time soon after the union of the crowns of England and Scotland in 1603, have carried four- or five-year-old bullocks of the Galloway breed to finish in the rich pastures of Leicester and Northampton, the salt marshes of Cambridge, and the adjoining counties, especially Norfolk and Suffolk. The injury which half-wild cattle with horns were capable of inflicting upon one another, and possibly upon the men in charge of them, during a walk of some hundreds of miles, seems to be a sufficient excuse for the preference of the southern drovers for the condition of hornlessness, which was taken into their calculations in the purchase of their droves, a higher price being given to secure it.

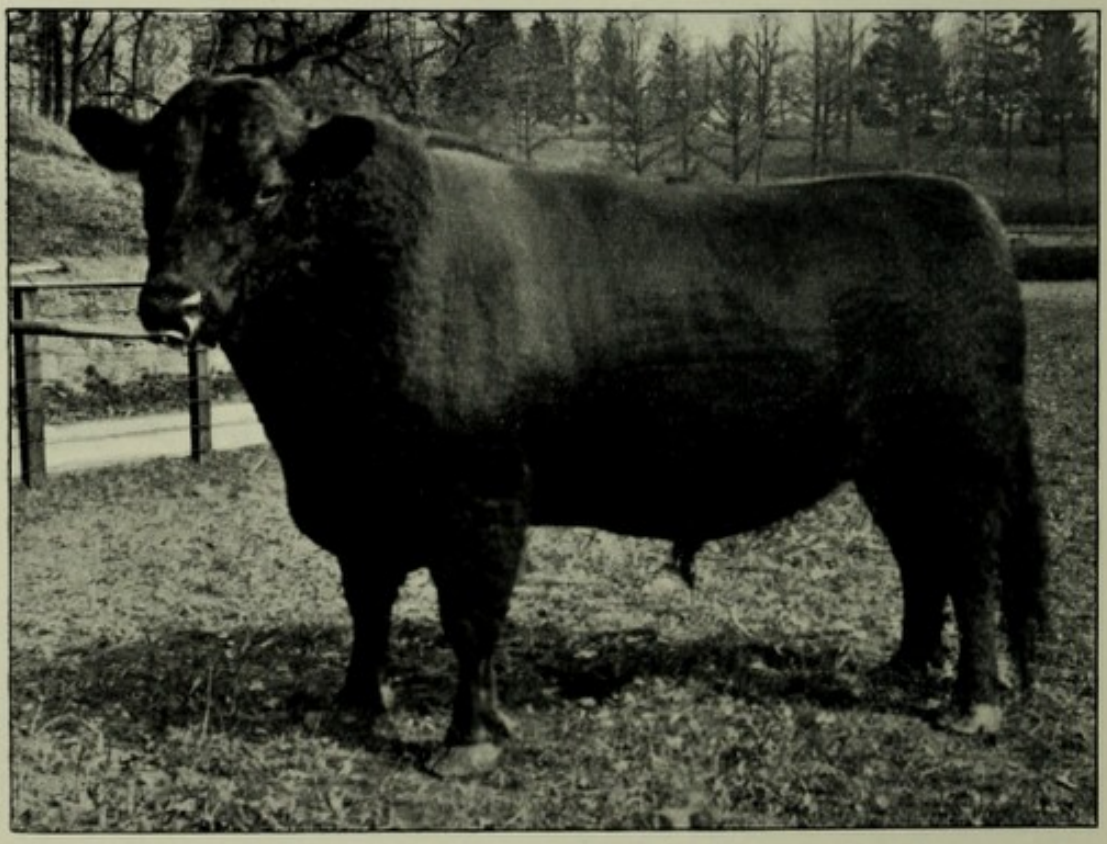
The Galloway and the West Highland breeds are universally considered to be descended from the same original stock; but although in type of body they are much alike, there are no sufficient historical grounds for the belief. The former are said to be "Highlanders without the horns." This, if true, would associate them directly with the wild forest cattle. West Highland crosses by a Galloway bull have been put with pure-bred Galloways, and the best judges of Galloway cattle have been unable to distinguish the crosses from the pure specimens. As already noted, the corresponding Highland cross is easily distinguished by the colour and coarse quality of its hair, showing that there is a greater difference between the pure breeds referred to than is usually supposed.

Galloway bulls possess great power of stamping certain characters upon their crossed descendants. With a cow of almost any other breed, with the exception of the Shorthorn, the offspring is almost invariably black, and "with cows of different horned breeds, almost without exception, the offspring is polled." James Little, Tower of Sark, put a Galloway bull to a good herd of Cumberland (non-pedigree) Shorthorn cows. The produce were all hornless and blue-grey, but some of them with white patches. The following year an Angus bull was used, but the results were not nearly so uniform. Some were roan and several had horns. The difference may be mainly attributed to the

different characteristics of the Black Polled breeds, although the greater prepotency of one bull, and also the fact that second crosses even by the same parents are at times more variable in colour than first crosses, may claim a share of the influence at work. The breed did not acquire this special prepotency, as improved cattle have usually done, by close-breeding on both the male and the female sides. Close-breeding has been practised only within recent years, as may be gathered from their wonderful hardiness of constitution and also from their being, under natural home conditions, rather slower than most breeds in coming to maturity. Still, under forced feeding from early youth, the great wealth of constitution enables them to stand the unnatural pressure, and to rank well with early maturity breeds. No great so-called "improver" ever rose to do work like that of the Collings upon the Galloway breed. But the work was well done under the fostering care of the noblemen and gentlemen of Galloway, towards the end of the eighteenth and early in the nineteenth century. Besides the family of the Earl of Selkirk, also those of Lord Daer and the Earl of Galloway, were the Murrays, Herons, Gordons, Maxwells, Maitlands, M'Dowalls, Cathcarts, Hawthorns, and Stewarts. The old breeders knew well that to attempt to improve them on the lines adopted by Shorthorn men, to increase their size and lessen the period spent in coming to maturity by close-breeding, meant ruin to the constitution of the breed in the matter of withstanding the cold and inclement weather to which they are exposed under natural conditions in their native district. It is impossible to obtain excellence in regard to rapid maturity by the usual course of in-and-in breeding, and retain the hardihood necessary in mountain cattle. This country already possesses an abundance of breeds that fatten quickly, and it would be a misfortune if a breed of animals that, with open-air quarters both summer and winter, after the first year is past, now produces the finest quality of beef, often on inferior food and within adverse climatic surroundings, were thoughtlessly and ignorantly sacrificed in the rush for early maturity. We have not yet seen the final results of the system of in-and-in breeding which has been going on more or less closely for a hundred years; but the time may come when it will be necessary to

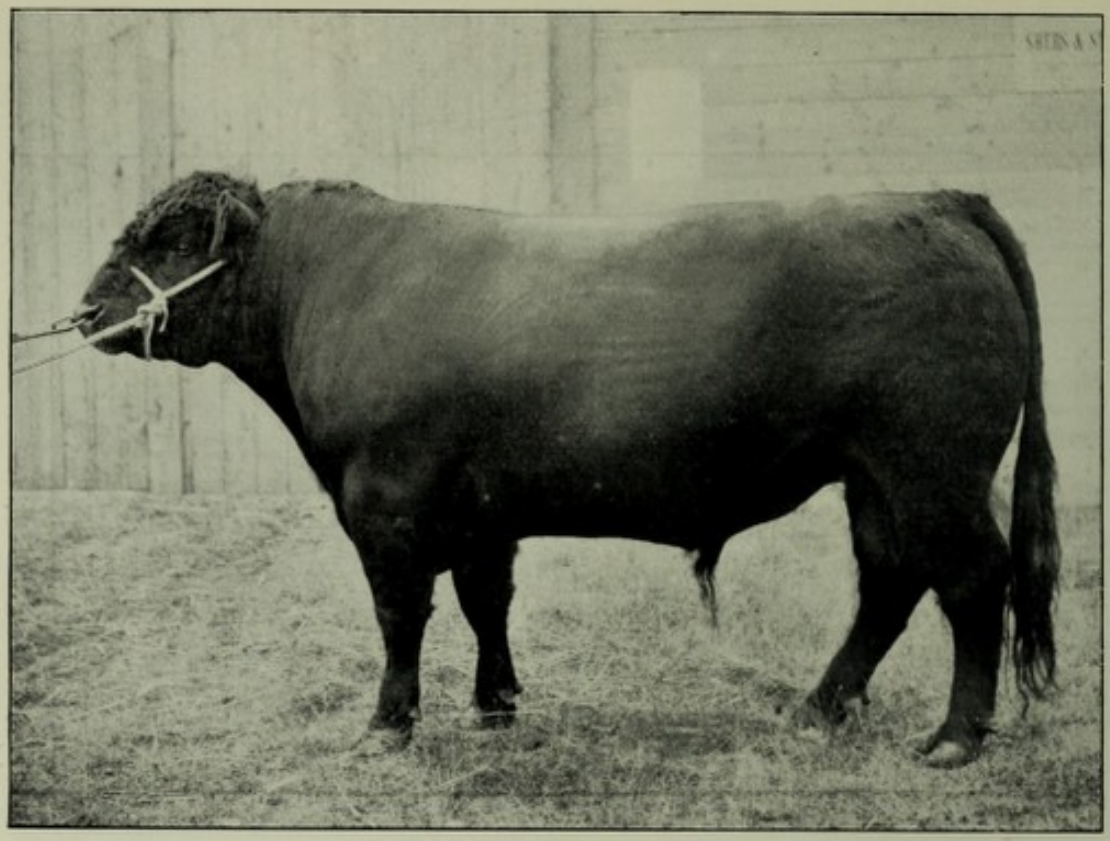


A. Galloway Black Polled Bull.
Bred by His Grace the Duke of Buccleuch at Drumlanrig.
[*Photo by J. Fingland, Thornhill.*

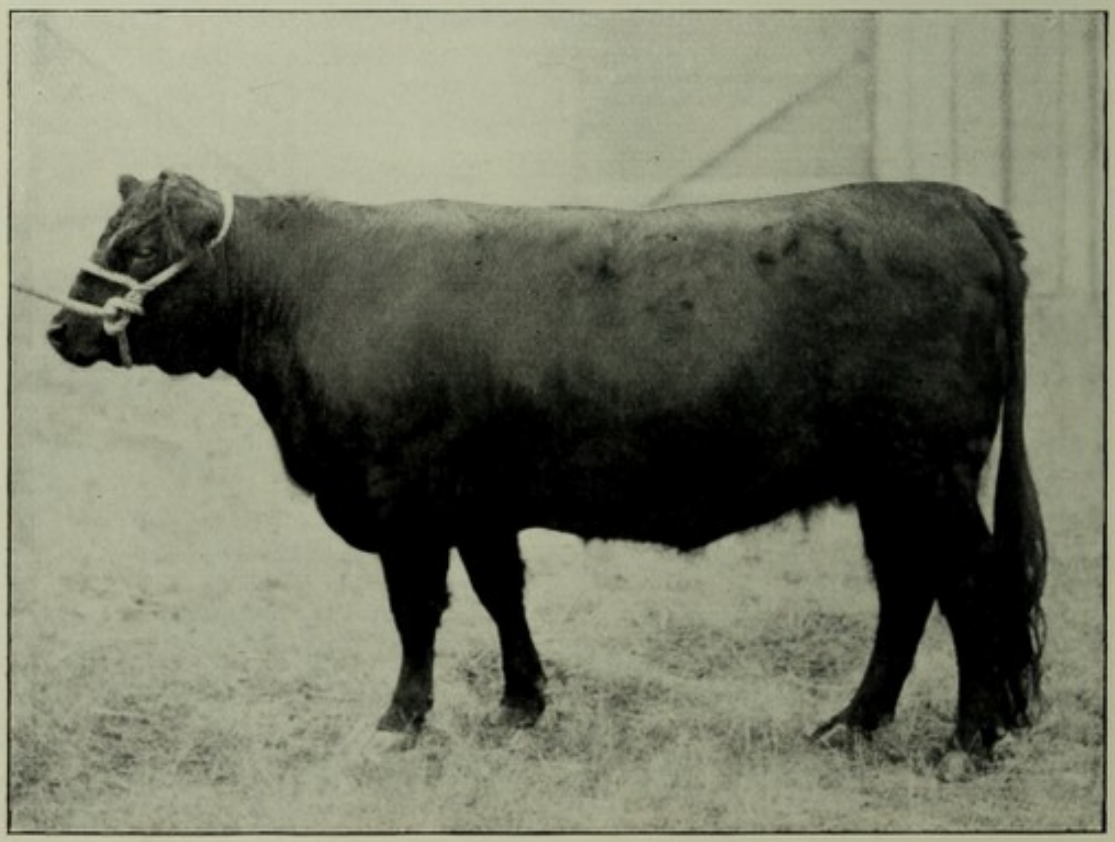


B. Galloway Bull, "Black Prince of Drumlanrig."
Perhaps the most famous of the great sires of the breed.
[*T. Douglas, Thornhill.*

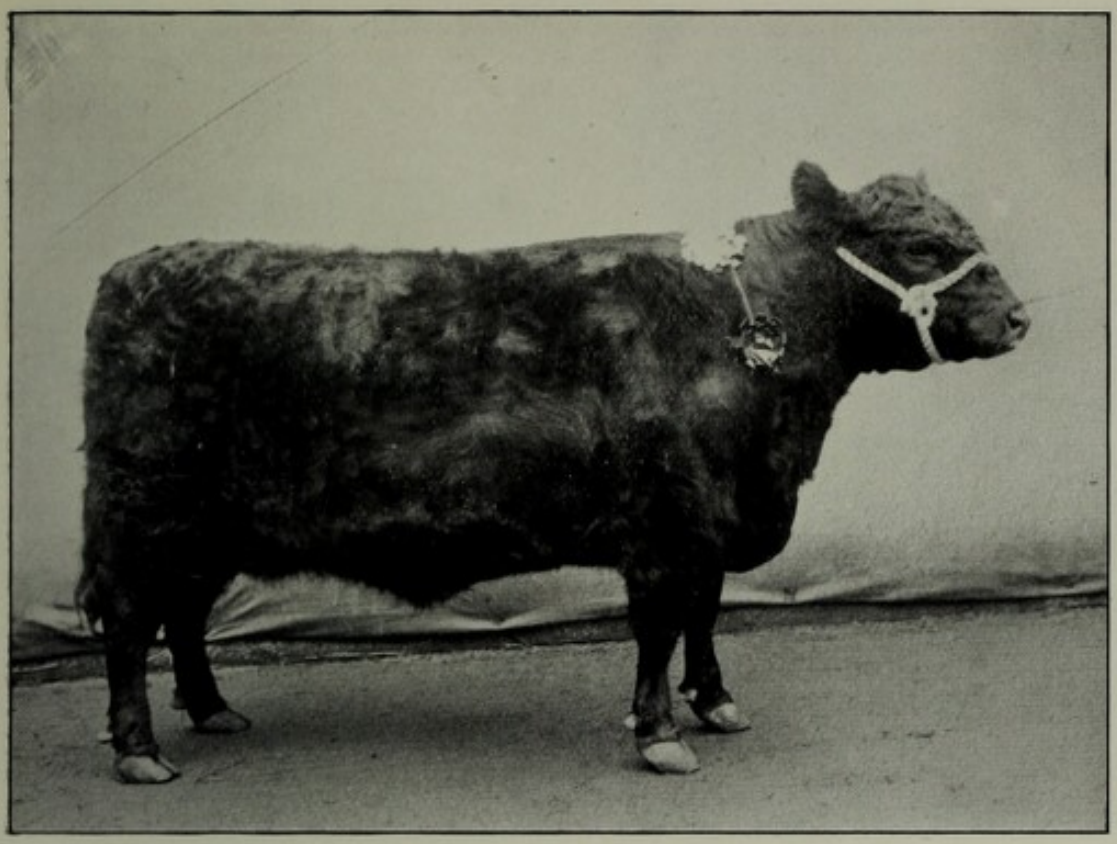
[*p.* 177.



A. Galloway Bull, "Camp Follower" (5042).
First, Highland Society Show, Inverness, 1892.
Bred by James Cunningham, Tarbreoch, Dalbeattie.



B. Galloway Heifer, "Tidy V. of Drumlanrig" (11933).
First, Highland Society Show, Inverness, 1892.
The property of Leonard Pilkington, Cavens, Dumfries.



A. Galloway Heifer, "Lady Grace."
First and Breed Champion, Smithfield, 1904.
Bred by Thos. Biggar & Sons, Chapelton, Dalbeattie.

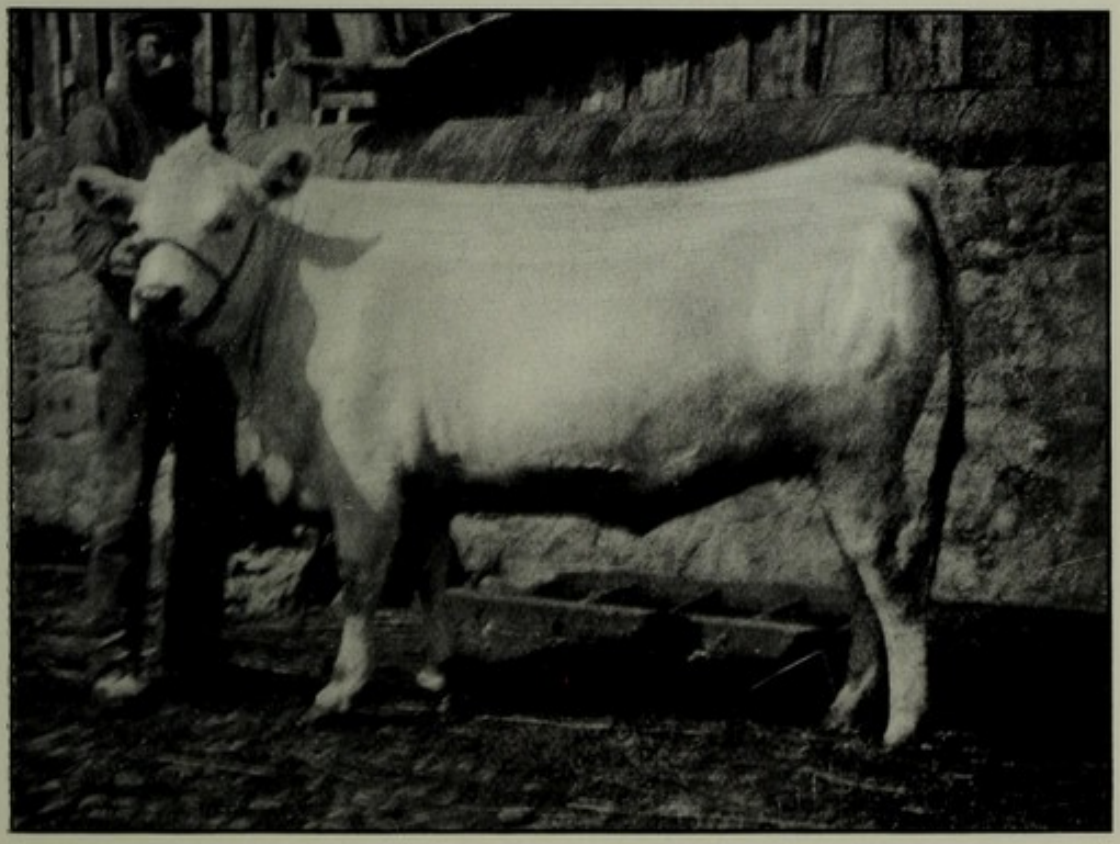


B. Galloway Steer, "Shamrock," 2 Years 9 Months. Weight, 1652 lbs.
Champion, Galloway Breed Cup, and reserve for Steer Championship at Smithfield and Edinburgh, 1904. Bred by Lord Antrim.
Both fed and exhibited by Thomas Biggar & Sons, Chapelton, Dalbeattie, Scotland.

[*p.* 177



A. Aberdeen-Angus well-bred Calf,
Whose mother had her two previous calves to a White Shorthorn.
Born on Cambridge University Demonstration Farm.



B. White Second Cross Shorthorn Heifer with Black Points.
A blue-grey Aberdeen-Angus heifer by "Regulator," and a pure cow.
[*Photo by the Author.*

[*p.* 177



A. Blue-Grey Roan Steer, "General," in 1896.



B. Blue-Grey Roan, "General."
Champion Steer at Norwich, Birmingham, and Sheffield in 1897.

[p. 177



1. 2. 3. 4.

A. Blue-Grey Shorthorn Crosses by a Galloway Bull, Nos. 1, 2, and 4.
No. 3 (Heifer), second cross by Galloway bull on Aberdeen-Angus cross.
No. 4 (Heifer), was Champion at Hetherington's Mart, Carlisle Christmas Show, in 1900.
All 1st prize cattle.



1. 2.

B. Galloway Shorthorn Heifers.
Won at Dumfries in 1902. No. 1 also at the Carlisle, Royal, and three principal English shows.
All exhibited by Wm. Kennedy, Luce Mains, Ecclefechan.

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go back to such breeds as the Galloway to recruit the ebbing strength of some of the greatest sufferers from the consequences of the practice. Tuberculosis, which is both prevalent and on the increase in some breeds, is one of the signs that should warn breeders of the peril of a heedless course of in-and-in breeding. The disease is almost unknown among Galloway cattle.

As dairy cattle Galloway cows are not noted. The calves are generally allowed to follow their mothers. The quality of the milk is excellent, but the quantity, as a rule, is deficient. Individual instances of cows giving large quantities of milk occur, but as a breed they have never been managed like dairy cattle. Proof of this is seen in the rare occurrence of but three teats in place of four on the udder—the third teat being located midway between where two teats should have been.

The increase in the feeding of crosses and half-bred sheep and the remarkable extension of dairying during the latter half of the nineteenth century have brought about a great diminution in the numbers of this breed, and a concurrent increase in the deeper milking Ayrshire. It is asserted, too, that in spite of increased attention during that period, the best animals of the present day have only begun to show improvement on those of former times.

The establishment of a Galloway Herd Book in 1877[1] has given an impetus in the direction of improvement, and the qualities of the breed for ranching purposes in the Canadian North-west and in the United States, with Iowa and Illinois as the centre, are fully realised.

A Cross bred from a Galloway cow by a bull of one of the favourite flesh-producing breeds, such as Shorthorn or Hereford, is usually an excellent butchers' animal.[2] The

[1] The editor is the Very Rev. Dr John Gillespie, Mouswald Manse, Dumfriesshire, who is also the writer of a valuable article on "The Galloway Breed of Cattle" in the *Transactions of the Highland and Agricultural Society* for 1878, and another on "Famous Galloways" in Vol. xviii., 1906, as well as various notices in different years in the *Live Stock Journal Almanac.*

[2] The champion ox, exhibited by Sir John Swinburne, at the Smithfield Club Show, 1892, was a light blue-grey cross, between a Galloway cow and Shorthorn bull, which at the age of 1250 days weighed 2276 lbs., an average daily gain from birth of 1·82 lbs.

calves produced by a Shorthorn bull, if he be white or light roan, are prevalently **blue-grey** or uniform mealy roan, polled, and much more like the Galloway than the Shorthorn. At times the colour is black, and on rare occasions white with black points. Alex. Gordon, of Cullinaw, Castle Douglas, has bred a considerable number of white crosses with black points by a white Shorthorn bull from grey cows possessing very little cross blood, and on one occasion from a pure Galloway cow.

A strawberry roan or red bull gets more red crosses than blue-greys. So important is the matter of colour and so superior the blue-grey as a market quality, that white Shorthorn bulls are being systematically bred to supply the Galloway breeders in the North of England from two white parents, to emphasize the white tendency.

White cattle with black noses, a few black hairs about the ear, and the dark Galloway eye are common in the Galloway cattle district of Northumberland. They are mostly the result of a second cross, a Shorthorn bull on a blue-grey heifer, although this marking sometimes occurs in the first cross. "General" (Plate LX.), the blue-grey bullock which in 1897 was champion at Norwich, Birmingham, and Smithfield, was by a Galloway bull out of a white Shorthorn cow.

During five years from September 1900, **J. Shields, at Dolphinstone,** Tranent, has made an excellent record with an annual purchase of about fifty mixed market heifers rising two years old, selected for breeding cross calves to a white Shorthorn bull. The price paid has varied with the general run of cattle prices from about eight to ten guineas, though in 1905 the rates were a little less. The sires of the breeding heifers were Galloway bulls, but their dams included Ayrshires, cross-bred dairy cows, non-pedigree Galloways, and a few animals entered in the *Galloway Herd Book*. After being wintered out-of-doors, and put to the bull about the end of March, the heifers continue at pasture and incur no expense for artificial food till the calves begin to drop about the following Christmas. They then get the shelter of an airy cattle court, and are fed on sliced turnips, mixed meal and straw, and each calf follows its mother. When a year old, four-fifths of the calves weigh about 7 cwts. each. Those that are good enough for show purposes are kept going forward with a liberal supply of linseed and other cakes,

amounting about that time to 3 or 4 lbs. per day. Symmetrical, kindly feeding animals under eighteen months, fit to put in training for showing, sell for £25 to £34, and when not good enough to exhibit they go to the butcher before they are two years old, fetching from £24 to £30. The remainder go off at from twenty to twenty-four months, making top market prices, 40s. to 41s. per live cwt. When fed with their dams during summer grazing, the show animals develop very rapidly. The dams when fat, generally about Christmas, make, according to the season, £13, 10s. to £20. One steer shown at the Scottish National Show, Edinburgh, in 1905, by an Angus bull out of a blue-grey heifer, weighed 12 cwts. 2 qrs. at one year and seven months; and another of the same age of the Galloway-Shorthorn Cross weighed 13 cwts. At the same show in 1903 one of the steers under two years, fed by Lord Rosebery, was fourth in his class, and third at Smithfield a few days later. At the same time two bullocks fed at Dolphinstone were first as a pair for butchers' cattle under 13 cwts. at the Scottish National. One of the heifers under 11 cwts., fed by Peter Dunn, gained third at Birmingham, second at York, and first at Leeds, in 1905.

Hereford Crosses by Galloway Bulls are also polled, with white heads and red or dark-grey bodies. Both crosses produce beef of the finest quality; the Herefords, the smaller animals, being perhaps the finer of the two. The progeny of a Galloway bull on cows of slow maturity breeds are usually tardy or inferior, being often thinly built like their dams. Galloway crosses from Ayrshire cows are mostly black, but slow and unsatisfactory feeding animals while young, though when more than three years old and under good treatment they develop into excellent light-weight butchers' beasts at the finish, and the cows are fair milkers.

Carlisle, situated conveniently for the Galloway cattle-breeding area in the north of England, has naturally assumed the position of the **chief market** for Galloway crosses, mostly blue-grey by Shorthorn bulls. Dumfries was for many years the great cattle market of the south of Scotland, and it remained so till into the eighties of the nineteenth century, when, simultaneously with the development of auction marts for store cattle, much of the trade gradually moved to Castle Douglas. From Dumfries alone, droves aggregating 25,000

to 30,000 head started annually on the journey of about three weeks, avoiding turnpikes and following the green lanes or drove-roads which traversed the country from north to south.

We have it on the authority of the late Gilbert Murray, in *Coleman's Cattle of Great Britain*, that, down till about the fourth decade of the nineteenth century, large numbers of horned cattle, having in hair, colour, and general appearance a strong resemblance to Galloways, were bred in Ireland, and shipped when one to two years old to Portpatrick in Wigtownshire—as many as 10,000 in a season. Irish breeders and cattle-dealers removed the horns and scurs with a fine saw to make them look more like Galloways, and then they were bought by graziers who came from long distances to attend the markets at Stranraer, "the great mart for Irish cattle in Scotland." It has been asserted that Galloway cattle became deteriorated by crossing with this inferior Irish breed, but the facts of the case clearly indicate otherwise. Galloway breeders disliked them because of their inferiority and the competition with their own cattle, and it was the practice, also commonly applied to Galloway heifers, to spay the heifers to be fed, either in Ireland or shortly after landing—"the distinguishing mark of a spayed heifer being a triangular piece cut from the top of the right ear"—so that they settled better, and fed faster, and could be grazed along with any other class of cattle. Moreover, there is no indication, in the breeding of Galloway cattle of the present day, of the recent introduction of alien blood.

From a *Brief Account* of the breed by the Very Rev. Dr Gillespie, issued about the opening of this century, we learn that in the early carcase competitions at the London Fat Stock Show the Galloway "carried off the lion's share of the prizes against all other breeds"; and that fat Galloways dress to 60 per cent. of their live-weight. A heifer thirty-three months old, weighing 1690 lbs., yielded 1120 lbs., or 66 per cent. of beef. A fair estimate of the **live and dead weights** of well-fed cattle is:—

Age.	Live-Weight.	Dead-Weight.
15 months	900 lbs.	540 lbs.
27 „	1400 „	840 „
39 „	1750 „	1070 „

The **method of feeding** show animals adopted by Thos. Biggar & Sons, of Chapelton, Dalbeattie, N.B., is applied most successfully to the Galloway breed. During the past seven years they have won the breed championship six times with four steers (that of 1902 being dun) and two heifers. And at the show of 1904 their Galloway steer, "Shamrock," was reserve champion steer; and some good judges thought he should have held the first place. In 1901 their heifer stood third against all ages and all breeds.

The amount of turnips given varies from 50 to 75 lbs. per day according to circumstances, and the rye-grass, hay, and chaffed straw averages 12 to 14 lbs. The grain, consisting of a mixture of linseed cake, maize, crushed oats, and some bean meal, varies from 8 to 12 lbs. The grain and chaff are mixed, and boiling water poured over the mass, which stands from twelve to fifteen hours before being given in three feeds. With two supplies of roots the animals have five feeds a day; and this goes on all the first winter. Meanwhile the beasts go out daily for exercise and to maintain health. In spring they are let out to grass for a couple of weeks to clear out and alter the system. They are then put into well-littered loose boxes for the remainder of the time, so that the amount of food may be under control, and the animals have regular exercise (a walk of about ¾ mile daily), and be trained to lead and to stand, so as to show to advantage. The exercise keeps the legs and feet in good order, and stimulates the appetite. The winter grain-rations in moderate quantities are continued during summer, but, in place of hay, straw and roots, grass, clover, or vetches are substituted, as bulky food, till August, when the final feeding period of high pressure with roots and dry fodder commences. Flesh is then made rapidly. As the show season draws near, the roots and hay are decreased and the grain and cake increased. "Shamrock" received the following rations during the last two months:— Maize meal, 4 lbs.; bean meal, 4 lbs.; crushed oats, 4 lbs.; linseed cake, 2 lbs.; cut hay and long hay, 12 lbs.; turnips, 40 lbs.; a lb. or two of treacle being added daily to make the fodder more attractive. About ½ oz. of crude carbolic acid was given in the food each week to keep the blood in good order. Towards the end of summer, and during the last few months, the linseed cake was

gradually diminished and the bean meal increased, to firm up the flesh.[1]

At the **carcase competition at Smithfield** in 1895, a Galloway bullock from Chapelton weighed 12 cwts. 3 qrs. 3 lbs. alive, and dressed to 8 cwts. 3 qrs. 1 lb., or 68·3 per cent. at two years and ten months, the record percentage for the year; but he was considered rather fat.

Subjoined is a **list of the breeders** of the most prominent herds:—Earl of Antrim, Glenarm Castle, Larne, Antrim; Thomas Biggar & Sons, Chapelton, Dalbeattie; A. H. Fox Brockbank, Croft, Kirksanton, Carnforth; David Brown, Stepford, Auldgirth; Duke of Buccleuch, K.G., K.T., Drumlanrig Castle, Thornhill; Robert I. Calwell, Ballyboley, Ballymore, Co. Antrim, Ireland; R. D. B. Cuninghame, of Hensol, New-Galloway; John Cunningham, Durhamhill, Dalbeattie; Robert Graham, Auchengassel, Twynholm; Sir R. Jardine, Bart., of Castlemilk, Lockerbie; J. Murray Kennedy, of Knocknalling, Dalry, Galloway; A. B. Matthews, Knockstocks, Newton-Stewart; Major W. Maxwell, of Glenlair, Dalbeattie; William M'Conchie, Mains of Penninghame, Newton-Stewart; Wm. M'Connell, Glasnick, Kirkcowan; John M'Cormick, Lochenkit, Corsock, Dalbeattie; R. and J. Shennan, Balig, Kirkcudbright; H. C. Stephens, Cholderton Lodge, Cholderton, Salisbury; James Wilson, Tundergarth Mains, Lockerbie.

Sheeted, Belted, or White-middled Galloways form one of the oldest and concurrently one of the most valuable strains of this ancient Scottish breed.[2]

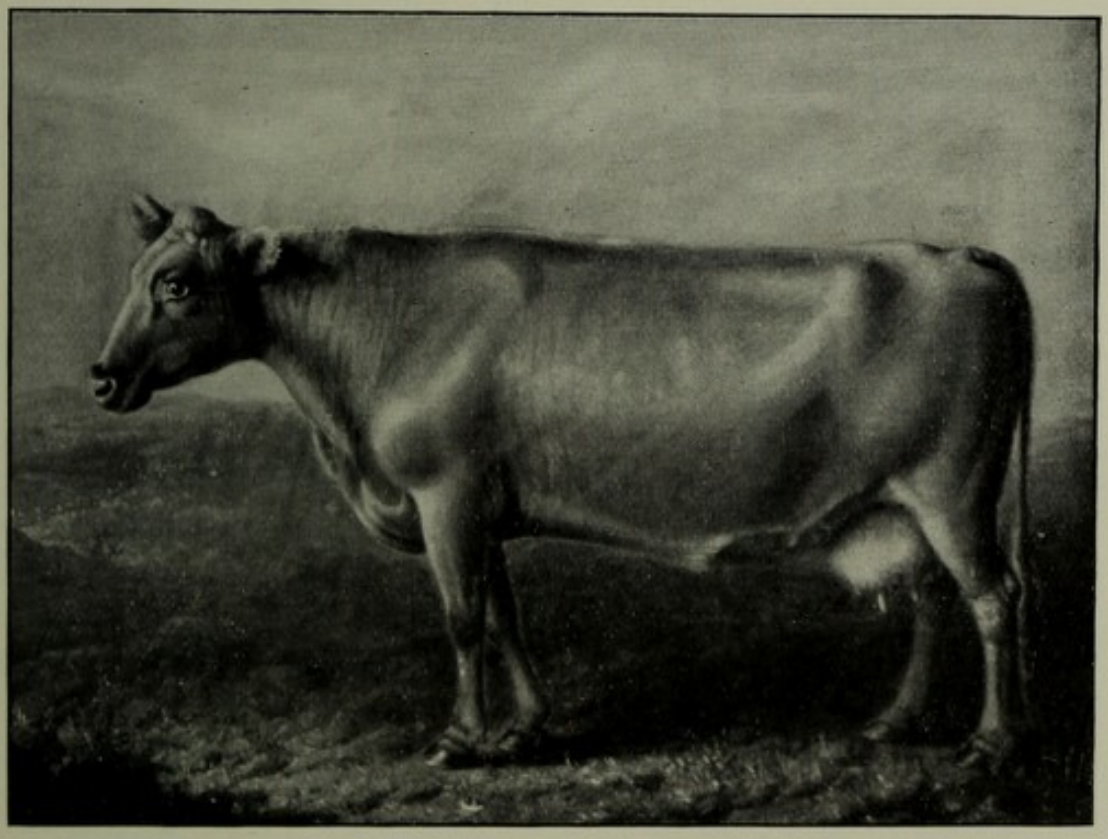
Low mentions:—"The sheeted breed of Somerset, now extinct, which had existed in the same part of England from time immemorial. The red colour of the hair has a light yellow tinge, and the white colour passes like a sheet over the body. 'The head, the neck, the shoulders, and the hind parts appear as if they were uncovered, while there is a sheet fairly and perfectly thrown over the

[1] Indebtedness is due to Prof. Kennedy's article in *Wallace's Farmer*, 31st March 1905.

[2] A painting by Gourlay Steel, R.S.A., of a good type of a three-year-old belted ox, the property of Patrick Dudgeon, of Cargen, Dumfries, shown at the Highland Society's Show at Dumfries in 1870, hangs in the Society's Chambers at 3 George IV. Bridge, Edinburgh.



A. White-Sheeted (Brown) Somerset Cow (Extinct).
A polled and a horned variety. Good milkers.



B. Polled Irish (Aged) Cows (Extinct).
In 1848, "yet largely diffused." As large as a Shorthorn, and a good dairy breed.
[*Both from the Low Collection of Paintings in Edinburgh University.*

barrel' (Youatt). The cows, sometimes horned, but more frequently hornless, are hardy, docile, and better suited to the dairy than others that have been adopted. The peculiar marking which distinguishes these cattle is not confined to any one breed. It appears among the cattle of Wales when they are crossed by the White Forest Breed, and is frequent among those of Ireland, and used to be amongst the older Galloways of Scotland. It is very common in Holland, where the colours are black and white. It may be ascribed to the intermixture of two races having each a tendency to produce the pristine colour of the stock from which it is derived."

On the authority of the **Rev. Geo. Gilbert**, quoted by **A. D. Euren**:—"At one time there were quite a number of sheeted cattle, since dead, out on the Marshlands bordering on Norfolk and Suffolk, which had been there for quite a century. They were brought over from Holland at the time when great numbers of cattle were landed from the Continent at Yarmouth and other places."

The **chief home** of the Belted Galloway during recent years has been the Haltwhistle district of Tyneside, not their native Galloway, where they have declined in numbers (*a*) as a result of the favour conferred on black by the *Herd Book* regulations, directing foreign buyers to pure black skins; (*b*) in consequence of the increased numbers of sheep kept displacing some of the old pure-bred though not pedigree herds in which white-belted cattle were kept; and (*c*) owing to the uncertainty as to purity since Ayrshire cattle came into the district. They were first introduced into the North of England from the South of Scotland about the beginning of last century, by Lady Melville—(Lady Jane Hope of Hopetoun), the wife of Lord Wallace of Featherstone Castle, Haltwhistle—according to one tradition, from Lady Selkirk's herd, Balmae, Kirkcudbright. She had been previously married to the first Viscount Melville[1] (1742-1811), whose statue in St Andrew Square, Edinburgh, was erected in 1821. They were known at one time as Melville Galloways; but they were probably not the first Galloways introduced into Northumberland, since, as Dr Gillespie says, "the same race of cattle (Galloways) have been kept from time immemorial in Cumberland, the (adjoining) most north-westerly county of

[1] Henry Dundas, Lord Advocate 1775, raised to the Peerage in 1802, persecuted politically 1803.

England." From Featherstone the belted blood was distributed among the tenantry and became popular, and prizes were offered for them at the Haltwhistle cattle show. They are present in greatest numbers in the outlying mossy region, to the north of Haltwhistle, up the South Tyne, and up the Irthing to the north of Gilsland. Not many farmers have bred from belted cattle on both sides, but exceptions were—the Grahams of Wileysyke and Rotheryhaugh, Gilsland; Thomas Teasdale, Bogg, Slaggyford, whose herd has existed for forty years; the late George Armstrong of Whiteside, Haltwhistle (who had about 16 cows); Walter Armstrong, late of Scotscoulthard, Haltwhistle, now of Crook Burn, Penton, Newcastleton (20 cows and their progeny of the direct line from the Melville Galloways of about eighty years ago); and George Waugh, late of Moss Petral (who has retired). The Hon. Francis Bowes Lyon has for many years taken much interest in "specialising" in the original strain, producing the most perfectly marked beasts by carefully selecting belted sires to mate with his pure-bred herd of milch cows at Ridley Hall, Bardon Mill (Plate LXIII.).

There is no absolutely uniform **white marking**, as,—in addition to different shapes and sizes of the belt (which is most perfect when it goes right round the body and extends from behind the shoulder to the hooks, and thus includes the front of the udder and two teats)—white feet and tail ends are often seen. At times the white sheet is only on one side, on others it does not reach so far up as the back-bone, and it may be represented by only a small patch. Where the black and the white hair meet about half an inch of black skin grows white hair. In the case of a good many representatives of the breed, black patches of skin growing pure white hair occur within the white areas, and are only to be seen in summer after the winter coat is shed. It is claimed for the breed that they are bigger framed, and, though not so wild, are quite as robust and hardy as the black Galloways, and also better milkers; but the hair of those in the North of England is not so silky. They seldom go wrong or give trouble in parturition. White heads or "brocket" (mottled) faces, especially seen in Bladnoch, do not normally belong to this strain. The experience of breeders in securing white markings is very

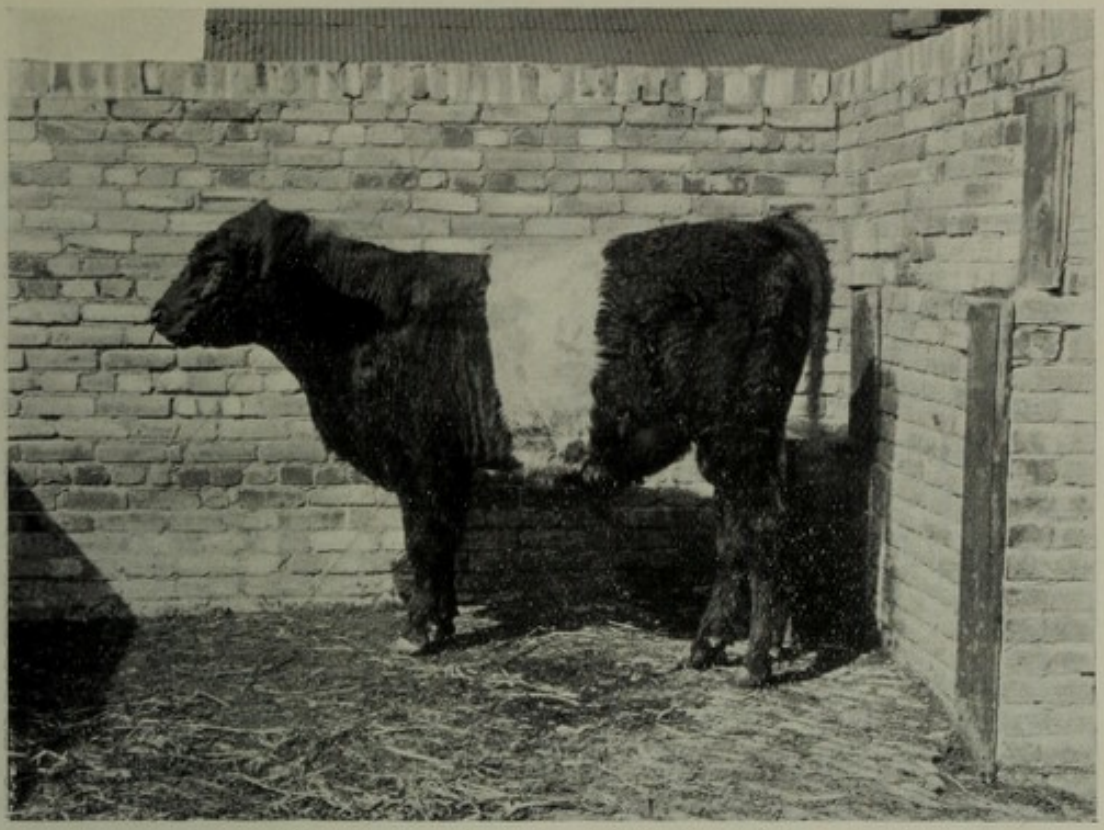


A. White-Belted Galloway Milch Cows.
The property of Hon. F. Bowes Lyon, Ridley Hall, Bardon Mill, R.S.O., Northumberland.



B. White-Belted Galloway Cow with Twins.
The property of Percy O. Laidlaw, of Stonecroft, Fourstones, S.O., Northumberland.

[*Both photos by the Author.*



A. White-Belted Galloway Bull at 15 Months.



B. White-Belted Galloway Heifer at 15 Months.
Both bred and owned by Percy O. Laidlaw, of Stonecroft, Fourstones, S.O , Northumberland.
[*Both photos by the Author.*

[*pp.* 184 *and* 185

various. James Biggar of Chapelton, Dalbeattie, tells of the existence of a family of females that showed the white belt through successive generations for fifty years, in spite of the fact that the sires were nearly all black. Percy O. Laidlaw of Stonecroft, Fourstones-on-Tyne, R.S.O., Northumberland, has bred black calves from white-middled parents, and many sheeted calves from a sheeted bull on black cows—many properly belted, but one calf perfectly marked on one side only. A white-belted cross heifer from an Irish high-grade Shorthorn, produced by a belted bull a calf which was all white, except black on the head and neck, on one foreleg, on the other foreleg down to the knee, round the tail, head, and down both quarters to the hock. Crosses between a white-middled cow and white Shorthorn bull are usually beautiful white-middled blue-greys. Irish or grade Shorthorn cows breeding to a belted bull, usually throw calves black in place of red, sometimes belted. It is not uncommon for a white-middled calf to appear in a herd which has been breeding black for several generations.

Among the **remaining herds in Galloway,** at one time prevalent in the Cree Valley, that belonging to George G. B. Sproat, Boreland of Anwoth, Gatehouse of Fleet, presents many features of interest. The foundation of it was got by his father in Glenkens, early in last century. A belted bull was used a few years ago which came from Bardon Mill to restore the belt to its former dimensions, as the belts had shrunk and become irregular through the repeated use of black bulls. A combination of the belted and "brocket" conditions has been secured in the same animal on two occasions, one being a belted brocket-faced bull calf born in 1904, and now being reared. In 1905 a dun Galloway bull was used to secure dun belties. A two-year-old bull of conspicuous merit from Sproat's herd scaled 15 cwts. in store order. The Galloway variety of the breed are "exceptionally thick, blocky, nice-haired animals, and so hardy that they can winter and calve outside and ail nothing."

Other Scotch breeders not already mentioned who own a few pure-bred animals are:—James Brown, Knockbrex, Borgue, N.B.; Alexander Gardiner, Killeron, Gatehouse; John Gibson, Barncailzie, Castle Douglas; R. Graham, Auchengassel, Twynholm, R.S.O.; Wm. Hyslop, Knockycoid,

Barrhill, S. Ayrshire; R. A. Lamb, Hayton House, How Mill, Carlisle; Chas. A. Phillips, Dildawn, Castle Douglas; Rev. Reginald Vignoles, Craigeach, Kirkcowan.

A beautiful dun belted bullock belonging to the Auchengassel herd was first in his class (two-year-olds) at the Smithfield Show in 1905, and he was sold to feed for another year.

CHAPTER X

MILCH CATTLE. THE AYRSHIRE. THE KERRY AND DEXTER, AND THE DUTCH OR "HOLSTEIN."

Introduction — **The Ayrshire** — Habitat — Historical Records — Cattle Introduced to Improve the Breed—The Type early in the Eighteenth Century—Milking Records—Influence of Soil and Climate—Points and their Showyard Values—Milk and Butter Yields—Bullocks—Ayrshires Abroad—List of Prominent Breeders—**Irish Breeds—The Kerry**—The Irish Cottar's Cow—Milk Records—History of the Breed—Breed Societies and Herd Books—Weights—Fat and Milk Records—Points—**The Dexter**—Points and Peculiarities—Speculations as to its Origin—Pioneers of Kerry Introduction into England—Kerry Crosses with other Breeds—**Dutch Cattle**—Position in Europe and America—Points—Herds in this Country.

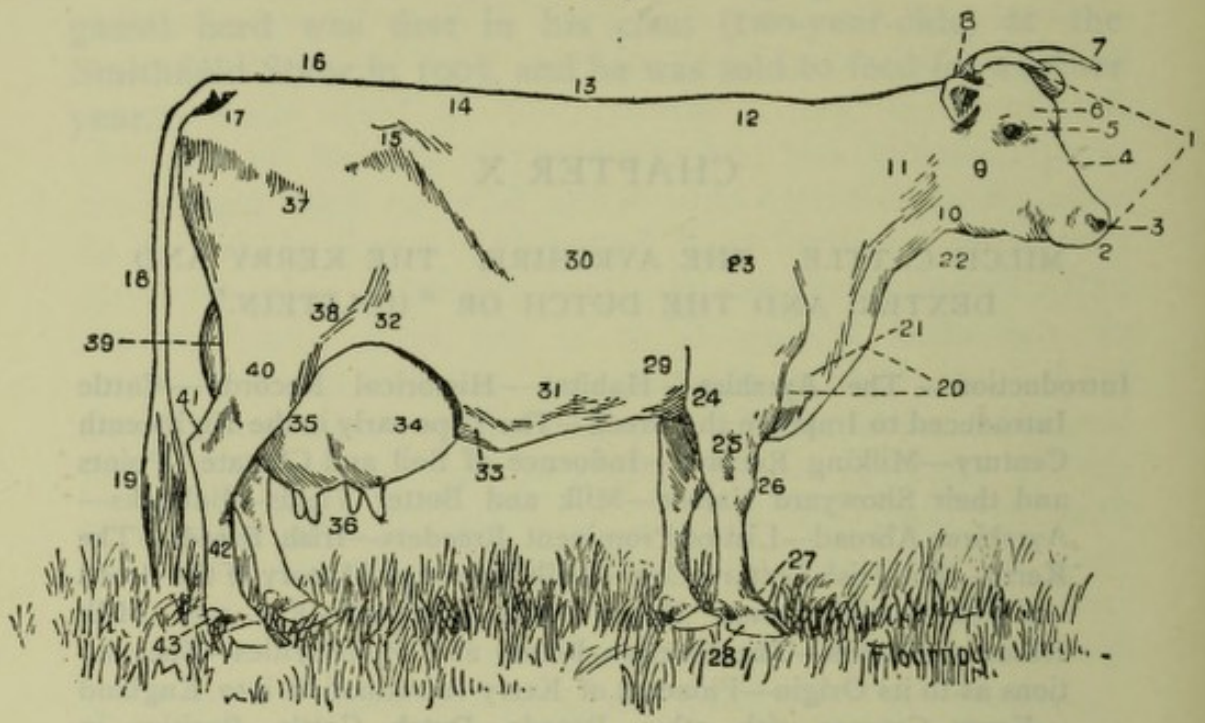
INTRODUCTION.—Though certain strains of cattle already described—notably the Welsh and the Red Polled breeds—are good general-purpose breeds, yet they could not be properly classed among those specifically kept for milk production. We shall find, on the other hand, that some which are distinctly and unmistakably milking breeds are nevertheless capable of producing excellent beef. The Shorthorn occupies a unique position in this connection, as non-pedigree dairy cows of this breed are more numerous, taking the United Kingdom as a whole, than all the cows of the special dairy breeds to be described put together.

The Ayrshire Breed has come more into prominence in comparatively recent times, although its milking reputation is not new.

Its natural habitat was Cunningham, or the upper of the three divisions of Ayrshire—Carrick, Kyle, and Cunningham—occupying that part of the county which lies north of the river Irvine.

The records[1] **of the early history** of the breed fix the date of the beginning of improvement from 1750 to 1780. Before that time the native progenitors of the Ayrshire were

FIG. 3.



POINTS OBSERVED IN JUDGING DAIRY CATTLE*

1. Head.	12. Withers.	23. Shoulder.	34. Fore udder.
2. Muzzle.	13. Back.	24. Elbow.	35. Hind udder.
3. Nostril.	14. Loins.	25. Forearm.	36. Teats.
4. Face.	15. Hip-bone.	26. Knee.	37. Upper thigh.
5. Eye.	16. Pelvic arch.	27. Ankle.	38. Stifle.
6. Forehead.	17. Rump.	28. Hoof.	39. Twist.
7. Horn.	18. Tail.	29. Heart girth.	40. Leg, or gaskin.
8. Ear.	19. Switch.	30. Side, or barrel.	41. Hock.
9. Cheek.	20. Chest.	31. Belly.	42. Shank.
10. Throat.	21. Brisket.	32. Flank.	43. Dew-claw.
11. Neck.	22. Dewlap.	33. Milk vein.	

* From the U.S.A. *Circular*, No. 48, June 1904.

small, inferior, irregularly-shaped animals, with short crumpled horns, and of a black, black-and-white, or brown colour, but hardy, and suited to the humidity and inferiority of the

[1] Colonel Fullarton's *Survey of Ayrshire;* Aiton's *General View of the Agriculture of the County of Ayr*, 1811; Aiton's *Dairy Husbandry of Ayrshire*, 1825; Low's *Domesticated Animals*, 1845; Farrall's "Essay on the Ayrshire Breed of Cattle" in the *Transactions of the Highland Society* for 1876, and in Vol. I. of the *Ayrshire Herd Book*, 1877; Gilbert Murray's notice of the "Ayrshire Breed of Cattle" in J. Coleman's *Cattle of Great Britain*, 1875; and Wm. Rodden's "Presidential Address to the Ayrshire Importers and Breeders Association of Canada," in Vol. I. of *The Canadian Ayrshire Herd Record*, 1886. Ortelius, writing in 1573, speaks of a superior class of oxen in Carrick; but his remarks no doubt refer to the ancestors of the Galloway breed, not to Ayrshire cattle as the term is now understood.

STUDENT'S SCORE CARD, SOUTH-EASTERN AGRICULTURAL COLLEGE, WYE, KENT.

MILCH COWS. (K.J.J.M. and T.R.R.)

Name or Description of Cow *Weight and Age*	Max. Points.	Student's Estimate.	Instructor's Estimate.
GENERAL APPEARANCE—25 per cent.			
Temperament, active, yet quiet to handle	5	.....	.....
Form, distinctly feminine, lighter in fore-end than in flank or quarter	3	.....	.....
Quality and Touch. * Skin soft, moderately thin, very flexible and elastic (handle over the paunch). The whole animal covered with soft, fine hair	9	.....	.....
* Skin of an unctuous, oily nature, denoting butter-fat.			
Action, head slightly raised and gracefully carried when walking, movement free from sweeping motion, and active	3	.....	.....
Legs, not too long, bone fine, and joints true	5	.....	.....
UDDER, MILK VEIN, AND ESCUTCHEON—23 per cent. (All four quarters sound, otherwise disqualifies.)			
An easy milker	2	.....	.....
The Bag, carried well forward, extending well up and wide behind	4	.....	.....
Teats, wide apart and equidistant from each other, equal in size, well shaped, and of moderate length	2	.....	.....
The whole Udder showing great capacity	4	.....	.....
Quality, soft and mellow to the touch, covered with loose, elastic, velvet-like skin, showing the veins	6	.....	.....
Milk Veins, large, prominent, and tortuous	2	.....	.....
Escutcheon, wide at thighs, and fine hair running up vertically. Above the hind teats showing two oval patches of down-growing hair	3	.....	.....
HEAD AND NECK—6 per cent.			
Horns, fine and waxy, and gracefully curved. A yellow base indicating quality of milk *Face*, moderately long, clean cut, and lean, wide across forehead *Eyes*, bright and prominent, yet showing gentleness and intelligence *Nose*, healthy, with large sensitive nostrils *Ears*, fine and mobile, well fringed with hair. Inside of ear yellow	4	.....	.....
Neck, long (compared with beef animals), fine at its junction with the head, and spreading out gracefully to meet the shoulders	2	.....	.....
FORE QUARTERS—12 per cent.			
Chest, deep, showing plenty of room for heart and lungs	5	.....	.....
Brisket, prominent, Dewlap fine, with loose skin	1	.....	.....
Shoulders, well laid back, fine, close at the points	3	.....	.....
Chine, narrow	3	.....	.....
BODY—18 per cent.			
Back, wedge-shaped when seen from above, of good moderate length	5	.....	.....
Ribs, well sprung and deep	4	.....	.....
Abdomen, very capacious, but not baggy and unsightly	6	.....	.....
Flank, deep and firm to touch	3	.....	.....
HIND QUARTERS—16 per cent.			
Hips, wide apart and neat (a hollow between spine and point of hips is desirable for milk)	3	.....	.....
Quarters, long	4	.....	.....
Pin Bones, far apart	2	.....	.....
Tail, put on level with the spine, long, fine, and tapering to a point, and showing a good tassel	2	.....	.....
Thighs, sinewy, long, thin, and well bent	5	.....	.....
Total	.....	.....	.....

district in which they were placed. The deep rings at the bases of the horns indicated the hardships they annually endured. The descriptions of this early condition of the breed appear to indicate its relationship to the *Bos longifrons*.

The Ayrshire of the present day, however, is very different, the change having been brought about by crossing with other breeds, by subsequent careful selection, and better feeding and management, in addition to the natural tendency which soil and climate admittedly have in developing and maintaining certain qualities or characteristics.

The breeds definitely mentioned in history as having been **imported** and used in crossing with the native cattle, are the Teeswater, or early Shorthorn, and the Alderney.[1]

"In 1750 the Earl of Marchmont purchased from the Bishop of Durham several cows and a bull of the Teeswater or some other English breed, of a light brown colour, spotted with white; these his lordship kept for some time at his seat in Berwickshire. Bruce Campbell, who was the factor on his lordship's estates in Ayrshire, carried some of the breed into Kyle; from thence their progeny spread throughout the country. A bull from the stock was sold to John Hamilton of Sundrum, who raised a numerous herd from that strain."

"Stranger cattle" of unknown or unrecorded breeds were imported by John Dunlop of Dunlop House, "John Orr of Barrowsfield, and other dairy farmers." And in probably more recent times West Highland crosses have been taken into the breed. The resemblance of the Cadzow and the Chillingham Park Wild Cattle to certain strains of the Ayrshire breed—in horn, in colour, and in form—points to a Wild Forest breed connection. The improvement in the milking qualities was no doubt largely due to the cross with the cattle introduced. To it also may in some measure be safely attributed the distinct tendency among Ayrshires to become lighter in colour than those of a generation or more ago; indeed, the result is a most natural one to expect when the broad lines of the facts before us are considered. A little, inferior, dark-coloured, poor-milking breed of cattle is found in a given district; it is improved in size and milking qualities by crossing with an

[1] Probably more correctly termed the Jersey, as cattle were sent to Scotland, according to Colonel le Couteur, by two successive governors of Jersey—Field-Marshal Conway and Lieutenant-General Andrew Gordon.

imported breed, which gives greater variety of colour and a greater admixture of white. During subsequent selection, carried on with the main object of increased milk production, it is most natural to suppose that the animals possessing large proportions of new blood would be favoured and preserved on account of form, size, and good milking qualities; and that along with these would be associated the tendency to whiteness, a correlated original attribute of the imported blood. The fashion for the light colour, small teats, and heavy fore quarters in showyard animals, has developed much since Lawrence Drew of Merryton took the first prize for an Ayrshire cow in milk with "Collyhill," at the Highland Society's Show in Edinburgh in 1859. This cow also took the first prize for an Ayrshire in milk at the Royal Agricultural Society's International Show at Battersea in 1862, and a painting of her by Gourlay Steel, the property of the Highland Society at 3 George IV. Bridge, Edinburgh, formed the original of the frontispiece in Vol. I. of *The Ayrshire Herd Book* (Plate LXVI.). "Burnhouse" (No. 8), though a brown bull, was the progenitor of many white prize-winners.

The Improved Ayrshire of the early part of last century is thus described in probably the oldest record:—

"Their colours vary from a dark brown to different shades of red, and some are approaching a cream colour. The head and horns are fine, some strong near the head and wide apart, the eye bright but mild. They have a fine neck with little dewlap, are round and straight in the barrel, and free from disposition to rise in the backbone, light in the upper part of the shoulder, flat and wide in the loin and space between the hips, with a capacious udder extending well both forward and behind, and broad, held well up to the body, with teats standing much apart and not of great length, having good-sized milk veins; the tail long and light, the skin soft, having fine woolly hair, and legs short, with fine bone and firm joints. They yield a large return in proportion to the food they require; they easily fatten their calves. Their produce of milk varies from one thousand gallons in one year, when in their best condition, down to seven or eight hundred gallons when not at their best, each twenty-eight to thirty gallons making twenty-four pounds of cheese. Their usual yield of butter is a pound and a half to three and a half to four gallons of milk, according to the feed they get. They will do well on pastures that could not

support heavier cattle. A breed of dairy cows that will weigh from nine to eleven or twelve hundred pounds are thought the most preferable."

Wilkinson's definition of a milch cow exactly described the Ayrshire of this period:

"She's long in the face, she's fine in her horn,
She'll quickly get fat without cake or corn,
She's clear in her jaws, and full in her chine,
She's heavy in flank, and wide in her loin.[1]

"She's broad in her ribs, and long in her rump,
A straight and flat back, with never a hump,
She's wide in her hips, and calm in her eyes,
She's fine in her shoulders, and thin in her thighs.

"She's light in her neck, and small in her tail,
She's wide in her breast, and good at the pail,
She's fine in her bone, and silky of skin,
She's a grazier's without, and a butcher's within."

The improved Ayrshire was **taken to Carrick,** the division of the county south of the river Doon, by Fulton in 1790; and Ralston established the first herd in **Wigtownshire** in 1802. They were introduced into **Dumfriesshire** towards the end of the eighteenth century—the estate of Hope Johnston of Annandale being one of the first centres favoured. The poet Burns—then at Ellisland, near Dumfries, where he kept a dairy and made cheese—refers in a letter, dated 1788, to a heifer presented to him by Dunlop of Dunlop, which he designated the "finest quey in Ayrshire."

There are indications that although the Ayrshire is now accepted as a pure breed, all the characteristics contributed by the various breeds employed in its formation have not yet been thoroughly distributed and blended. Proof of this may be seen in the fact that the strains of Ayrshires which are most successful as prize-winners in the "eild"[2] classes (for bulls and heifers), seldom produce animals which are very successful when shown "in milk." These cows may give as much milk as those belonging to the strains celebrated for producing successful winners in the classes for animals in milk, but their udders are rarely symmetrical enough to

[1] The Ayrshire pronunciation of loin, *i.e.* "line," rhymes with chine.

[2] "Eild" or "yeld," the Scotch expression to indicate cattle, whether male or female, that do not yield milk.



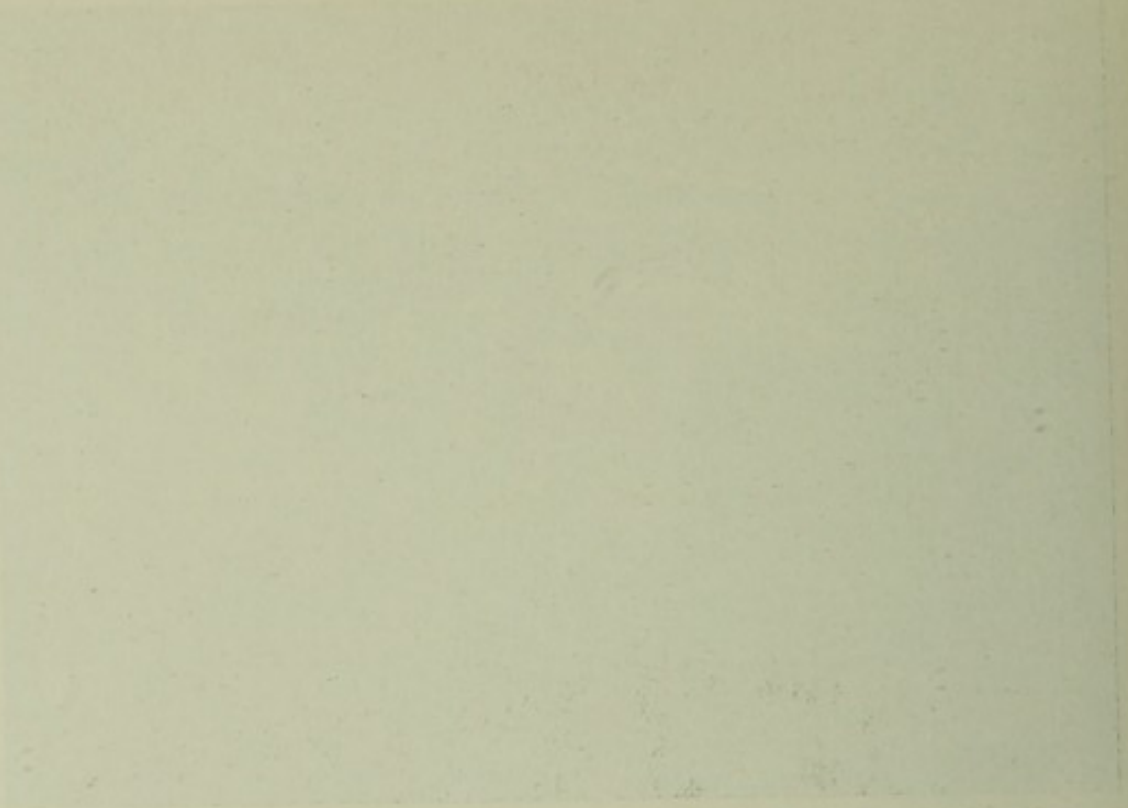
A. Spanish and Portuguese Breeds.
A Cow, 4 years old, and an Ox, 6 years, from Gallicia; and a Heifer, 3½ years old, from near Oporto.



B. Fifeshire or Falkland Cow (Extinct), of a breed which "presented an analogy to the black dairying breed of Holland," and was used in the improvement of Aberdeenshire Cattle from which the Polled-Angus was in part developed.

[*Both from the Low Collection of Paintings in Edinburgh University.*

[*p.* 192





A. Ayrshire Heifer, "Blood II." (12707).
First, R.A.S.E. Show, Park Royal, 1904. Bred and owned by Alexander Cross, Knockdon, Ayrshire.
[*C. Reid, Wishaw.*



B. Ayrshire Cow, "Collyhill."
Highland and Agric. Society Show Champion.
Painting by Gourlay Steell in the Society's Rooms.
[*Photo from the Ayrshire Herd Book.*

enable them to carry off the prizes, although they possess an advantage over the others in style and in a more perfect form of body.

Some modern members of the breed, when reared under circumstances of soil and climate suitable for beef production, **fall away** from the true Ayrshire characteristics, assume strong bones, heavy and fleshy fore quarters and chest, and also decline in milking powers; but changes such as these are usually dependent upon local surroundings, and have been already fully explained. The best preventive of the worst results of the tendency to coarseness through high feeding, is to arrange that the heifers shall calve at two years old in place of three years, the ordinary calving time of the breed. Should the calf arrive when the quey is two years old, her milking powers become better developed, and the tendency to produce flesh is checked.

The following is the scale of points for the Ayrshire cow:—

SCALE OF POINTS

Showing excellence in Ayrshire Cattle approved by the General Meeting of Members of the Ayrshire Cattle Herd Book Society of Great Britain and Ireland held in July 1906.

HEAD—*Forehead*—Broad and clearly defined	1	
Horns—Wide set on and inclining upward	1	
Face—Of medium length, slightly dished, clean cut, showing veins	1	
Muzzle—Broad and strong without coarseness, nostrils large	1	
Jaws—Wide at the base and strong	1	
Eyes—Full and bright, with placid expression	2	
Ears—Of medium size and fine, carried alert	1	
	—	8
NECK—Fine throughout, throat clean, neatly jointed to head and shoulders, of good length, moderately thin, nearly free from loose skin, elegant in bearing		3
FORE QUARTERS—*Shoulders*—Light, good distance through from point to point but sharp at withers, smoothly blending into body	2	
Chest—Low, deep and full between and back of forelegs	6	
Carry forward	8	11

FORE QUARTERS—*continued.* Brought forward	8	11
Brisket—Light	1	
Legs and Feet—Legs straight and short, well apart, shanks fine and smooth, joints firm; feet medium size, round, solid, and deep	2	
	—	11
BODY—*Back*—Strong and straight, chine lean, sharp, and open-jointed	4	
Loin—Broad, strong, and level	2	
Ribs—Long, broad, wide apart, and well sprung	3	
Abdomen—Capacious, deep, firmly held up with strong muscular development	3	
Flank—Thin and arching	1	
	—	13
HIND QUARTERS—*Rump*—Wide, level, and long from hooks to pin bones, a reasonable pelvic arch allowed	3	
Hooks—Wide apart and not projecting above back nor unduly overlaid with fat	2	
Pin Bones—High and wide apart	1	
Thighs—Thin, long, and wide apart	2	
Tail—Long, fine, set on a level with the back	1	
Legs and Feet—Legs strong, short, straight when viewed from behind, and set well apart; shanks fine and smooth, joints firm; feet medium size, round, solid, and deep	2	
	—	11
UDDER—Long, wide, deep, but not pendulous nor fleshy; firmly attached to the body, extending well up behind and far forward; quarters even; sole nearly level and not excessively indented between teats, udder veins well developed and plainly visible		20
TEATS—Evenly placed, distance apart from side to side equal to half the breadth of udder, from back to front equal to one-third the length; length 2½ to 3½ inches, and not less than 2 inches, thickness in keeping with length, hanging perpendicular and slightly tapering, and free flow of milk when pressed		12
MAMMARY VEINS—Large, long, tortuous, branching and entering large orifice		5
ESCUTCHEON—Distinctly defined, spreading over thighs and extending well upward		1
Carry forward		84

	Brought forward .	84
COLOUR—Red of any shade, brown or those with white, mahogany and white, black and white, or white; each colour distinctly defined. (Brindle markings allowed, but not desirable)		2
COVERING—*Skin*—Of medium thickness, mellow and elastic	3	
Hair—Soft and fine	2	
Secretions—Oily, of rich brown or yellow colour .	1	
	—	6
STYLE—Alert, vigorous, showing strong character; temperament, mild		4
WEIGHT at maturity from 800 to 1000 pounds .		4
Total .		100

The points of the bull differ from those of the cow only in the masculine characters, which, according to the general rule, ought to be distinctly defined, although at one time a feminine tendency in the appearance of the bull was thought to indicate that he belonged to a good milking strain. The scrotum should be white, and still more important the rudimentary teats large and well apart. He should come of a strain noted for milk yield; but milking record is not as yet generally recognised in the showyard when awarding prizes to either males or females. His weight at maturity should be 1200 to 1500 lbs.

The Ayrshire is unquestionably the most important and the **most typical** example of a milking cow in the British Isles. She shares with the Kerry the credit of being able to yield a greater return of dairy produce on poor land and inferior food than any other cow. She is essentially a cheese-dairy cow, on account of the comparatively small-sized butter globules of the milk. The Channel Islands breeds supply, on the other hand, the true butter-dairy cows, owing to the large-sized globules which the specially rich and highly-coloured cream contains. In the same way the milking Shorthorn is the typical cow for town dairying, for the supply of large quantities of milk of moderate quality for immediate domestic use, and for the accumulation of beef of second quality as a by-product during the latter portion of the milking period.

Ayton put the **milk yield** of some cows at 5 or 6 gallons, and after, as "extraordinary returns," 6 to 7 gallons per day for six or eight weeks. Farrall says: "Several, when in their best plight and well fed will yield 4 gallons per day for three months, and produce a total of 800 to 900 gallons per cow. As an average 600 gallons per cow for the year has been mentioned, but on the poorest farms the average return falls far short of this, and cannot be more than 480 to 500 gallons."

Gilbert Murray gives results of a milking competition held at Ayr in April 1861, as follows:—

Name of Owner.	Greatest Meal.		Average of 4 Meals.		Weight of Butter.	
	lbs.	oz.	lbs.	oz.	lbs.	oz.
A. Wilson	28	12	24	3½	2	2
J. Henderson	26	0	24	5	2	14½
W. Reid	25	7	20	8¾	2	9
W. Reid	30	15	27	5½	3	6½
R. Wallace	28	14	28	8½	1	9½
R. Wallace	25	5	23	8	1	15

Rodden quotes **U.S.A. Official Reports** of cows of 10,220 lbs. to 10,907 lbs. live-weight in 1885. Six cows showed an average of 7054 lbs. each for twelve months. One cow of only 875 lbs. gave 1174½ lbs. of milk in thirty days, yielding 14 lbs. 5 oz. of butter weekly. Another cow in seven days gave 464 lbs. of milk, yielding 19 lbs. 6 oz. of butter. Another test gave 1 lb. of butter for 17 lbs. of milk. The greatest milk yield per day was 74 lbs.

The continental method of **co-operative milk and butter testing** every fourteen days has been growing in volume and importance. Within eleven years from its initiation, Denmark developed 400 milk record societies. Sweden had also 200 similar institutions in 1905. By means of elimination of the poor-milking strains on the basis of the records made, the Vallakra Society in Southern Sweden, in six years, increased the average yield per cow 31 per cent., or over 5 per cent. anually. The increase in the year's milk was from 670 gallons to 876 gallons, and the percentage of butter-fat from 3.09 to 3.21 per cent. Kuperus, at Marsum, Holland, with a herd of thirty-five cows, made a still greater improvement in eight years:—

Year.	Fat p.c.	Year.	Fat p.c.	Year.	Fat p.c.	Year.	Fat p.c.
1897	3.15	1899	3.39	1901	3.47	1903	3.50
1898	3.28	1900	3.46	1902	3.44	1904	3.52

Similar societies are being formed in the Ayrshire dairy counties in the south of Scotland. The following records got by the Fenwick Society in 1905, testing every twenty-first day, are recorded by John Speir, Newton, Glasgow, in the *Transactions of the Highland Society* for 1906. The average yield of milk in eighteen dairies, containing 443 cows (including heifers two and three years old), was 875 gallons of milk of 3 per cent. of fat in the lactation period, ranging, as to individual cows, from about thirty-eight to nearly forty-six weeks.

The following figures give details of **seven of the heaviest milking cows** in the Fenwick Milk Record Association.

No. of Cows.	Total Milk in Gallons.	Average per cent. of Fat.	Total Milk of 3°/. of Fat in Gallons.	Value of Produce at 5d. per Gallon.	Age of Cow.	Dates of Calving.	Weeks in Milk.
30	1312	3.80	1679	£34 19 7	6	Nov. 25 „ 14	48
25	1186	3.90	1554	32 7 6	10	Feb. 6	45
26	1305	3.50	1533	31 18 9	4	Mar. 19	45
27	886	5.10	1523	31 14 7	3	Nov. 20 „ 7	48
22	1135	4.00	1518	31 12 6	11	Feb. 10	45
23	1151	3.90	1488	31 0 0	10	„ 8	42
8	1073	4.12	1473	30 13 9	7	Aug. 30 „ 14	48
Best . .	915	3.89	1170	£24 7 6	...	...	42$\frac{5}{7}$
Lowest .	563	3.61	677	14 2 1	...	...	36$\frac{6}{7}$
Difference	...	...	...	£10 5 5	...	...	5$\frac{6}{7}$

The average yield of 10 per cent. of the heaviest and of the lightest milking cows of each dairy, excluding heifers, are given at the bottom of the above table. The results indicate the possibility of a marked improvement in the average milking power of the Ayrshire breed by a systematic process of eliminating the worst and breeding from the best.

The following are the milk records of the dairy of thirty cows of A. M. Baird, Garclaugh, New Cumnock, a rough old-pasture farm 800 feet above the sea, one of the places included in the foregoing records by Speir, but extended to the whole milking period of 1905, finishing on December

23rd. The cows got no concentrated food except 1 lb. of meal daily during June, July, and August.

Name of Cow.	Age.	Record began.	Lbs. of Milk.	Per Cent. of Fat.
"Mansfield III.," 15502	8	April 13	9,056	4.1
"Dainty II."	8	,,	9,287	3.6
"Loneys III."	...	May 11	8,427	3.7
"Beauty"	4	April 13	6,895	4.1
"Garclaugh Queen," 16449	4	,,	8,269	4.6
"Brocky"	4	May 11	6,820	3.85
"Gay Lass of Garclaugh," 16445	4	April 13	7,432	3.95
"Garclaugh Fleckie"	9	May 11	9,268	3.75
"Garclaugh Snowdrop," 15504	8	April 13	8,995	3.85
"Brigland"	6	,,	7,914	3.75
"Garclaugh Brockie"	5	,,	7,572	3.85
"Garclaugh Rosy II."	5	May 11	9,432	3.85
"Garclaugh Snowflake"	8	,,	10,163	3.4
"Garclaugh Violet III.," 15514	6	April 13	10,074	3.65
"Garclaugh Flirt"	5	,,	Aborted	...
"Garclaugh Snowdrop III.," 15506	5	,,	12,028	4.00
"Garclaugh Snowflake IV."	3	,,	9,463	4.15
"Brownie"	4	,,	11,577	3.9
"Garclaugh Musefield IV."	5	,,	9,327	4.3
"Garclaugh Violet II.," 15513	10	,,	9,764	3.7
"Gay Lass I."	10	,,	11,425	3.5
"Primrose"	5	April 27	8,200	3.5
"Garclaugh Spotty"	9	April 13	8,663	3.5
"Garclaugh Mansfield"	10	,,	11,034	3.7
"Garstang Mansfield"	10	,,	11,034	3.7
"Spotty II."	2	April 27	6,429	3.9
"Garclaugh Rosy II."	5	,,	6,141	4.2
"Brown Sonsy"	10	April 13	9,689	4.1
"Garclaugh Rosy"	5	,,	7,721	3.9 yeld
"Garclaugh Mansfield"	3	May 11	Bad milker	...
"Blackie"	4	April 13	11,466	4.0 yeld

A **noteworthy record** is that of the cow "Polly" (Plate LXVIII.), bred and owned by Robert Thompson, blacksmith, Thornhill, Dumfriesshire; born April 1899; the last calf of "Polly of Auchenhessnane" (5212), when fourteen years old; sire "Wee Earl's Heir" (3998); first when 2½ years old in milk at Nithsdale Agricultural Society's Show, Thornhill, in 1901; has borne five living calves without going dry. One month before calving she yields 30 lbs. of milk, or about half her normal maximum during the three months before receiving the bull. On the "common" pasture in 1905, with no additional feeding, three weeks after calving, she gave 30 lbs. of milk at 6 A.M. and 28 lbs. at 6 P.M.; butter-fat, by Gerben's test, 5·4 per cent. Her weight after milking was 9 cwts. 2 qrs.

Ayrshire bullocks feed well after they are three years old,

and so do crosses with the Shorthorn bull even at an earlier age, and produce excellent beef; but Ayrshire steers are not often met with, as the bull calves are usually sold for a few shillings as "slinks" (newly born calves), and killed when a day or two old. Many are never allowed to drink milk, but are killed immediately after birth, and sent for consumption into the large centres of population. Two-year-olds, steers, and queys are hardy, and will winter well at little cost in a sheltered place in the open air if provided with 2 or 3 lbs. each of undecorticated cotton-cake per day, and a handful of hay when snow covers the ground or during a prolonged period of hard frost. An equivalent in food values of dried brewer's grains is a satisfactory substitute when hay is not available.

The cross-bred **Ayrshire-Galloway** is very hardy, but a slower maturity animal than the Ayrshire-Shorthorn cross. It is in greater favour both as a milking and as a grazing animal, now that young cattle are better attended to and not left so much to their own resources as in olden time. A check to crossing is the fact that giving birth to the larger calf by a Shorthorn bull is liable to break down an Ayrshire dairy cow prematurely, and prevent her yielding her normal flow of milk. The Ayrshire-Polled-Angus cross, although not subject to the same objection, is not a general success. It requires more milk than the pure Ayrshire calf, more than a dairy farm can spare; and most strains of Angus cattle do not nick well with thin-fleshed kine like the Ayrshire.

American and Canadian settlers from this country took Ayrshire cattle with them, and others imported them, to ultimately form the foundation stock of dairy cattle in many centres of the **other side of the Atlantic**. In Canada the Ayrshire Importers and Breeders Association was formed in 1885; and a similar older Association in the United States attends to the maintenance of the standard of excellence and purity of the breed by pedigree registration and other means. But in Argentina Ayrshires find little or no favour in competition with Shorthorns. They are too thinly built, like the native cattle of the River Plate. The chief dairy cattle of our Australasian possessions are the Shorthorns, the Ayrshires, and their crosses formed by the alternate use of pure bulls of the two breeds on the common milking cows.

The conditions of South Africa invite a greater number of Ayrshire cattle than are there now, of dark colour of hair and underlying skin. The skins of most white or light Ayrshires are liable to burn and blister with the sun during bright weather, even in this country, and the animals give unsatisfactory results in consequence. As in some Channel Islands cows the white hair and light skin do not correspond, but the dark skin extends under the white hair for an inch or less, so that it forms a ring of dark skin covered with white hair round a dark spot. The areas are easily recognised during the heat of summer by the dark colour shining through the thin coat of white hair and by the hair lying smoothly, while that on the fair and sunburnt surface stands up like a coat "staring" from cold.

The following is a list of names of **important breeders of Ayrshire cattle:—**

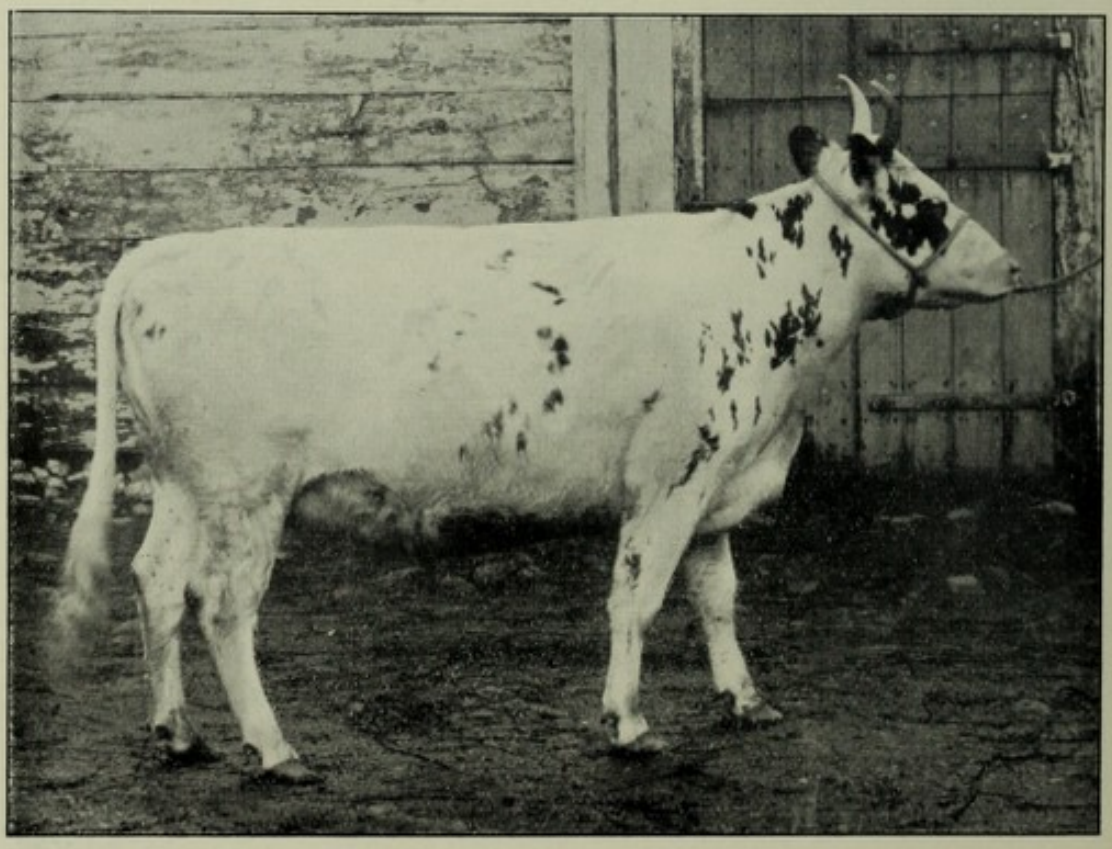
John Cochrane, Nethercraig, Kilmarnock; Alex. Cross of Knockdon, Maybole; John Drennan, Hillhouse, Galston; James Howie, Hillhouse, Kilmarnock; William Howie, Burnhouses, Galston; James Lawrie, West Newton, Strathaven; Thomas Lindsay, Carsegowan, Wigtown; Thomas C. Lindsay, Aitkenbrae, Monkton; A. W. Montgomerie, Lessnessock, Ochiltree; Andrew Mitchell, Barcheskie, Kirkcudbright; John Murray, Carston, Ochiltree; William Murray, Borrowmoss, Wigtown; John M'Alister, Ardyne, Toward; R. M'Kinlay, Hillhouse, Lanark; R. Osborne, Morton Mains, Thornhill; Sir Hugh Shaw Stewart of Ardgowan, Greenock; Sir Mark J. M'Taggart Stewart of Southwick, Dumfries; P. Wardrop, Garlaff, Cumnock; R. Wilson, Manswrae, Bridge of Weir; J. R. W. Wallace, Auchenbrack and Auchenbainzie, Thornhill, Dumfriesshire.

The predominating cattle of Ireland are Shorthorns, the blood of which has been more or less mingled with that of the most numerously represented of the ancient Irish breed, the Longhorn. The last three or four decades have seen an enormous improvement in the feeding qualities of the general run of Irish graziers and milch kine, brought over in large numbers, and sold at fairs and markets in both Scotland and England.

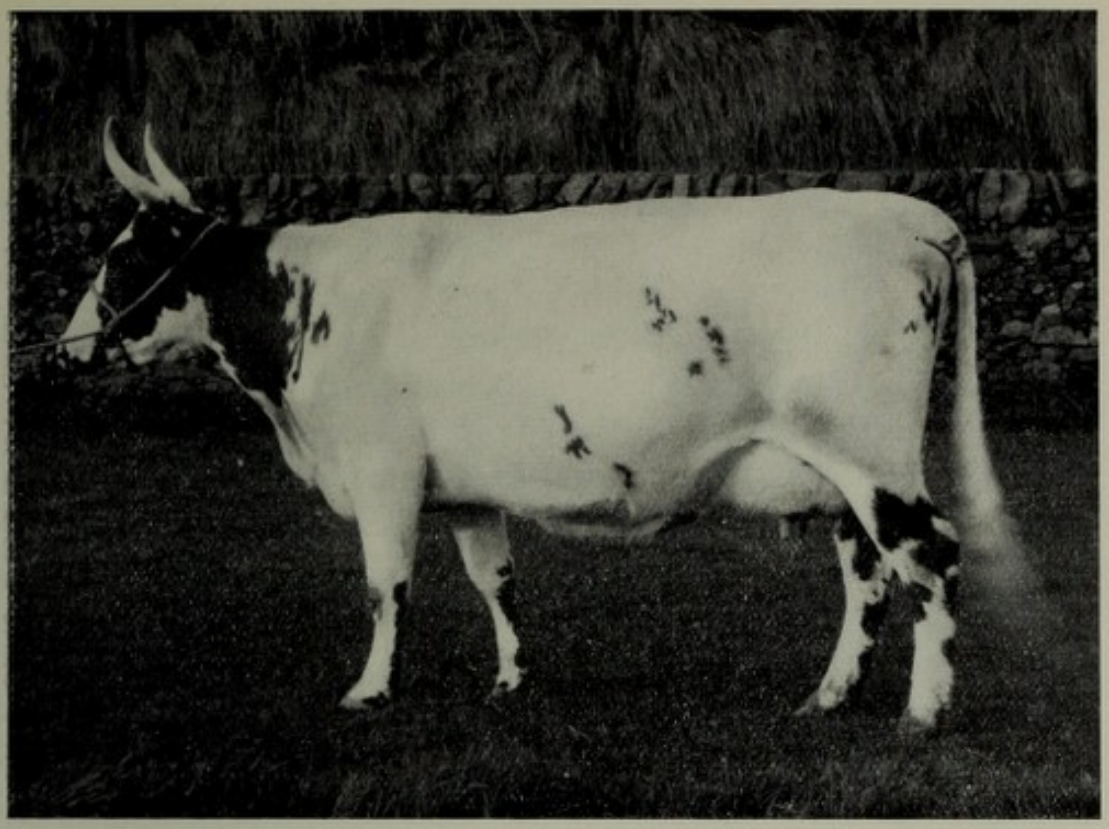
In some secluded districts, such as a poor tract of moory



A. Ayrshire Bull, "Gigantic Stunner" (3872), of Wynholm.
Owned by J. Osborne, Morton Mains, Thornhill, Dumfriesshire.
[*C. Reid, Wishaw.*



B. Ayrshire Two-Year-Old Heifer, "Nellie of Barcheskie."
First at Dumfries Union Show, 1888.
Bred by And. Mitchell, Barcheskie, Kirkcudbright.



A. Ayrshire Cow, "Auchenbrack Jenny Lind" (15126).
In the third week after calving, October 1906, gave 55 lbs. of milk daily, yielding 4·3 per cent. fat producing 16 lbs. of butter. Bred and owned by J. R. W. Wallace, Auchenbrack, Thornhill, N.B.
[*J. Fingland, Thornhill.*



B. Ayrshire Cow, "Polly."
A heavy milker (see page 198). Bred and owned by R. Thompson, blacksmith, Thornhill, N.B.
[*Photo by the Author.*

[*pp.* 200 *and* 201

and unreclaimed land lying to the west of Cork, may yet be seen remnants of the modern representative of the "old Irish milch cow" of the Cork and Limerick districts, a breed anterior in time to the Longhorn in the island. It has been described as small, deep-bodied on short legs, with heavy bags of milk, and it was to be found as late as the middle of last century in a form which did not appear to be much changed by the introduction of foreign blood. The remaining cross-bred descendants are thin-fleshed and slow to feed, but yield on inferior fare a considerable quantity of poor milk. Their horns are of medium length, thin and "spaley." The hair, usually brown, has single white hairs more or less mixed with it, and a ridge of white along the line of the back-bone: a characteristic which is common among Irish cattle other than Shorthorns or their high-grade descendants. The Longhorn breed possesses it, and, when Low wrote, it was an acknowledged point of the Kerry, though it has disappeared from the best Kerry blood of recent years.

The Kerry is "the poor man's" or the Irish cottier's cow, especially in cold and inferior districts, and is noted for docility and as a family pet.

The Kerry bears evidence of great antiquity, although the history is not traceable much further back than the middle of the eighteenth century. It is practically the only surviving pure breed of cattle of some four or five breeds which Ireland possessed not very long ago. One has already been referred to at p. 180. Sir William R. Wilde,[1] as a result of osteological researches in connection with the remains of oxen found in Irish bogs, showed that "four breeds or races of cattle existed in Ireland in early times—the straight-horned, the curved- or middle-horned, the short-horned, and the hornless 'Maol' or 'Moyle.'" The latter has been lost among the cross-bred cattle which form the chief Irish herds of the present time. The polled condition which at times appears is as likely to have originated from Scotch polled bulls (of which a good number have been used, especially in the North), as from the Irish prototype. Wilde says, that "so far back as the eighth or tenth century we had in Ireland a breed

[1] "On the Ancient and Modern Races of Oxen in Ireland," read at a meeting of the Royal Irish Academy, and quoted by Pringle.

of cattle which, for beauty of head and shortness of horn, might vie with some of the best modern improved races so much admired by stock-masters, and which are now being reintroduced from England." The latter are extinct. The Longhorn, still represented by a few herds, seems to have been a more recent introduction; but the curved or middle-horned variety is represented in the Kerry and Dexter of the present day. The accounts of Kerry cattle by Low and Youatt are rather contradictory, and a little confusing; but two articles in the *Royal Agricultural Society's Journal*, dated 1872 and 1898, and Pringle's chapter in Coleman's *Cattle of Great Britain*, deal interestingly with the subject.

"**The true Kerry** 'the thoroughbred of Irish cattle,' is (1872) a light, neat, active animal, with fine and rather long limbs, narrow rump, fine small head, lively projecting eye, full of fire and animation, with a fine [waxy yellow or] white cocked horn tipped with black, and in colour either black or red." The latter colour is not eligible for entering in the English *Herd Book*.

Kerries first appeared at the Spring Show of the Royal Dublin Society in 1844, but a separate class for Dexters was not established till 1876. The *Dublin Farmers' Gazette* published the first "**Register of Pure Kerry Cattle and Dexters**" in 1887, under the auspices of the Society. Kerries have in recent years attracted great attention in England as **ornamental cattle,** and have on more than one occasion been publicly taken notice of by Royalty.[1] After the breed had fully established its reputation not only as showyard celebrities but as ornamental as well as general-purpose animals of high merit, the **English Kerry and Dexter Cattle Society** (of which H.M. the King is the patron and a life member), founded in 1892, and incorporated in 1899, published the first volume of its **Herd Book** in 1900. By its regulations "a cross between the Kerry and Dexter is considered a half-breed, and cannot be entered."

The following is a list of a few of the **most prominent breeders** in the English Society, which numbers over seventy members:—

His Majesty the King; B. de Bertodano, Cowbridge House, Malmesbury, Wilts; F. P. Bulley, Marston Hill,

[1] The King owns a good herd of Dexters.

Fairford, Glos.; Godfrey John Boyle Chetwynd, Wyndthorpe, Doncaster, Yorks; Clifford J. Cory, Llantarnam, Monmouthshire; Countess De la Warr, Old Lodge, Nutley, Sussex; Duchess of Devonshire, Compton Place, Eastbourne; H. Martin Gibbs, Barrow Court, Bristol, Somerset; Lady Greenall, Walton Hall, Warrington; Countess of Lathom, Lathom House, Ormskirk, Lancs; H. Meuric Lloyd, Delfryn, Llanwrda, S. Wales; Duchess of Newcastle, Clumber, Worksop, Notts; G. L. Palmer, Lackham, Lacock, Wilts; James Robertson and R. Tait, La Mancha, Malahide, Dublin; Countess of Sefton, Croxteth Hall, West Derby, Lancs; William Stallard, St John House, St John, Worcester; Martin J. Sutton, Holme Park, Sonning, Berks; Colonel Victor W. B. Van de Weyer, New Lodge, Windsor Forest; William Vickary, The Knoll, Newton Abbot, S. Devon.

The Kerry cow in breeding condition should not **weigh** more than 900 lbs., and a breeding bull 1000 lbs. live-weight. The Dexter cow and bull should each weigh 100 lbs. less respectively.

The breed, more especially the Dexter section of it, possesses the power of beef production in an eminent degree, "fattening rapidly on even middling pasture, and their beef is exceedingly fine and well flavoured."

A **record of a** typical **fat Kerry cow** is given in 1872 by Pringle as: "38 in. in height at the shoulder, 70 in. in girth, and 42 in. in length from the top of the shoulder to the tail-head, and a weight of about 30 imperial stones"; and he adds, "the average daily yield of milk of a Kerry cow, properly fed and attended to, is 3 gallons—a quantity capable of producing 6 lbs. to 7 lbs. of butter weekly." James Lang says:—

"The **records** of the **milking trials** of the British Dairy Farmers at **Islington** show that one year eight Kerries averaged 36 lbs. of milk daily, containing $3\frac{1}{3}$ per cent. of butter-fat. Another year twelve Kerries gave $25\frac{1}{2}$ lbs. of milk, with $4\frac{1}{3}$ per cent. of fat, and other solids amounting to 9.2 per cent. A third year's average was $33\frac{1}{2}$ lbs. milk, 3.69 per cent. of fat. Throughout, the Kerries averaged over 3 gallons of milk per day, while in three different years thirty-two cows gave milk with $4\frac{1}{4}$ per cent. of fat. Adeanes' cow, 'Babraham Bell,' produced 1100 gallons of milk in one year, and from the La

Mancha herd many cows have been sold which have yielded 20 to 22 quarts per day."

Points.—The Kerry colours are orange skin with black hair, though specimens with red-brown hair do occur in the purest blood, but more frequently in the Dexter variety than in the other. White patches also appear from time to time; but stringent regulations against white markings passed by the Royal Dublin Society exclude from entry in the *Kerry Herd Book* all bulls which are not pure black, with the exception of a little white about the scrotum or sheath in animals of exceptional merit, and all cows and heifers which have white on any part of the body, with the exception of the udder, or extending slightly along the inside of the flank or under side of the belly, or a little on the end of the tail. In general outline, the Kerry has much in common with the Jersey, and also with the Ayrshire, though in size it is, under its home conditions, smaller than either. Its spare form indicates its superiority in milking rather than in beef production.

The Dexter, which is either "whole black or whole red (the two colours being of equal merit)," though now distinctly, in the breeders' acceptation of the term, a pure Kerry, whatever may have been its origin. is a much more compact, more substantial, and lower-set animal than the Kerry proper. Its toes turn in after a peculiar fashion, and it tends to walk over the outer digits, especially in the case of the hind feet. The leg-bones are shorter and more substantial, the neck thicker and shorter, the horns heavier, not so elevated and airy, and the head heavier and not so deer-like as in the case of the original Kerry. **Pringle** says :—

"The Dexter has a round, plump body, square behind; legs short and thick, with the hoofs inclined to turn in; the head is heavy, and wanting in that fineness and life which the head of the true Kerry possesses; and the horns are inclined to be long and straight. A great favourite with many persons: the majority of the prizes at shows where there is no separate classification are awarded to Dexters." Low says, "the short legs and a small space from the knee and hock to the hoofs, have probably given rise to the saying, 'Tipperary beef down to the heels.'"

Low, in 1845, states the prevailing belief as to **its origin**

to be, that it was introduced (whether through crossing or selection was not known) by one Dexter, an agent of Maude, Lord Hawarden; but a considerable amount of doubt exists as to the accuracy of the statement. The author, while travelling in Kerry some years ago, found that the word "Dexter" was used in a generic sense with reference to all diminutive animals, even men, if low-set and bandy-legged; and also that the term was in the first instance applied to short-legged sheep kept by a resident coastguard officer. Another possible origin is given by **Wm. Hooper,** in an article in the *Royal Agricultural Society of England Journal*,[1] 1898, Vol. IX., p. 667, which says:—"There were other cattle in Kerry besides the little black cattle of the mountainous districts, and the cattle of Cork and Limerick were within easy reach. Among them were small deep-bodied cows, on short legs, with heavy bags of milk; such—though even then becoming rare—were to be found in those parts within the last forty years, and were known as 'old Irish cows.' These crossed with a small Kerry bull would produce an animal with all the essential characters of a modern Dexter."

Probably the Dexter type originated, like Darwin's Niata cattle (with hollow face and nose turned up, like a small white Yorkshire pig),[2] as a freak of nature, and that the first bull which showed the peculiarity of structure was an intensely in-bred dwarf. In support of this possible view we have the existence of the smaller specimens of the breed, which have from time to time attracted public notice at the leading shows, and the fact that the females often give birth to monstrosities that do not live.

The pioneers of **Kerry introduction into England** were Sir Robert Peel, the Rev. J. C. Macdona, and James Robertson of Malahide, near Dublin, father of the present owner, who was largely instrumental in bringing the breed into prominence by exhibiting good specimens of his own breeding at the Royal Agricultural and the London Dairy shows. He also carefully selected the young and undeveloped members of the purest and best sorts to be found at the Killarney and

[1] See also R. A. Pringil's article on "Irish Agriculture," *ibid.*, 1872.

[2] A small, very much in-bred herd of Niata cattle still survive (1905) in Chili, although they are believed to have died out a few years ago in Argentina.

other Western fairs, and shipped them when they came into sale condition to supply the English demand.[1]

Although Kyloe and other **alien blood** has from time to time been introduced among the common cattle in the hands of small crofters, who exercise no special care in breeding, yet the tendency to breed back to the original type is so strong in the Kerry breed that a few excellent specimens can yet be picked out of very common droves at the fairs. This is held to be an evidence of the ancient origin of the breed, which is acknowledged to be connected with the West Highland, the Welsh, and the Devon breeds, and the Wild White Cattle of Britain. The three men who did most in the Kerry country during the latter half of last century to **maintain the old standard** of quality, and to bring the use of good bulls within reach of their poorer neighbours, were the Knight of Kerry, Glanleam; Richard Mahony, Dromore Castle; and the late James Butler, near Waterville.

Kerries, of both kinds, especially females, **cross remarkably well** with other breeds; with the British flesh-producing breeds for fattening cattle, and with the milking breeds—Channel Islands and Ayrshire—for dairy cattle. Cross animals, at a little distance, often strongly resemble West Highlanders in the variety of their shades of colouring. This is additional evidence of the common origin of the breeds. The first cross with the Shorthorn is a remarkable butchers' animal—the Dexter cross exhibiting greater breadth of shoulder and greater depth through the heart, in proportion to size, than any other British breed. The Straffan Dexter-Shorthorns were bred from first crosses by a Shorthorn bull (page 93). The Red-Polled cross is an excellent general-purpose beast, and the Polled Aberdeen-Angus-Dexter has made a creditable appearance at Smithfield.

Dutch or so-called "Holstein" Cattle in Great Britain.—In the *U.S. Consular Reports on Cattle and Dairy Farming*, Part II., p. 504, the following list of **breeds of Dutch or Netherlands cattle** is given, with the relative percentages attached to indicate the popularity or usefulness of the different strains, which, although all good dairy cattle, vary con-

[1] The trade is now carried on by Robertson & Sons, La Mancha, Malahide, Co. Dublin.

siderably in size and general characteristics:—Groninger, 7; Friesland, 18.2; Holland or Hollandish, 7.1; Flemish or Zeeland, 3.8; Geldrian, 7.1; Drenthish, 1.4; Friesland-Drenthish-Geldrian, 13.6; Flemish-Geldrian-Holland, 15·5; Groninger-Friesland-Geldrian, 23.8; crossed with foreign breed, hardly to be recognised, 2.5 per cent. Although Dutch cattle are often referred to as "Holsteins," there is in reality no breed of that name. There is the Dutch Belted Cattle Association, and the "Holstein-Frisian Association," which look after the interests of Dutch cattle in America. The Hollandish, from the province of North Holland, and the Flemish breeds are believed to share the credit of having contributed to the ancestry of the English Shorthorn. The Holland and the Frisian breed, belonging to the provinces of Friesland and Drenthe, are for export purposes regarded with greatest favour as milk-producers, but for milk and beef the Groninger breed—the Hereford of Holland—holds first place.

"Friesland cattle," says **Storer, quoting Moll and Gayot,** "are a mere sub-variety of the Holland or Dutch breed. They tell us that, both in Friesland and in the neighbouring country of Oldenburg, the ancient Friesland race has succumbed under the blows of repeated crossings following the great epidemics of the end of the eighteenth or the beginning of the nineteenth century, and though it still preserves exclusively the names, it is in reality much more Dutch than Friesland."

The pure Drenthish breed of the best type found in the province of Overyssel are reported to be "hardly distinguishable from Ayrshires." The practical advantages derived from the union of the original breeds into modern composite breeds, is proved by the fact that nearly 53 per cent. of all the cattle of Holland belong to the three already named breeds, which have been each formed by mingling the blood of three of the older breeds.

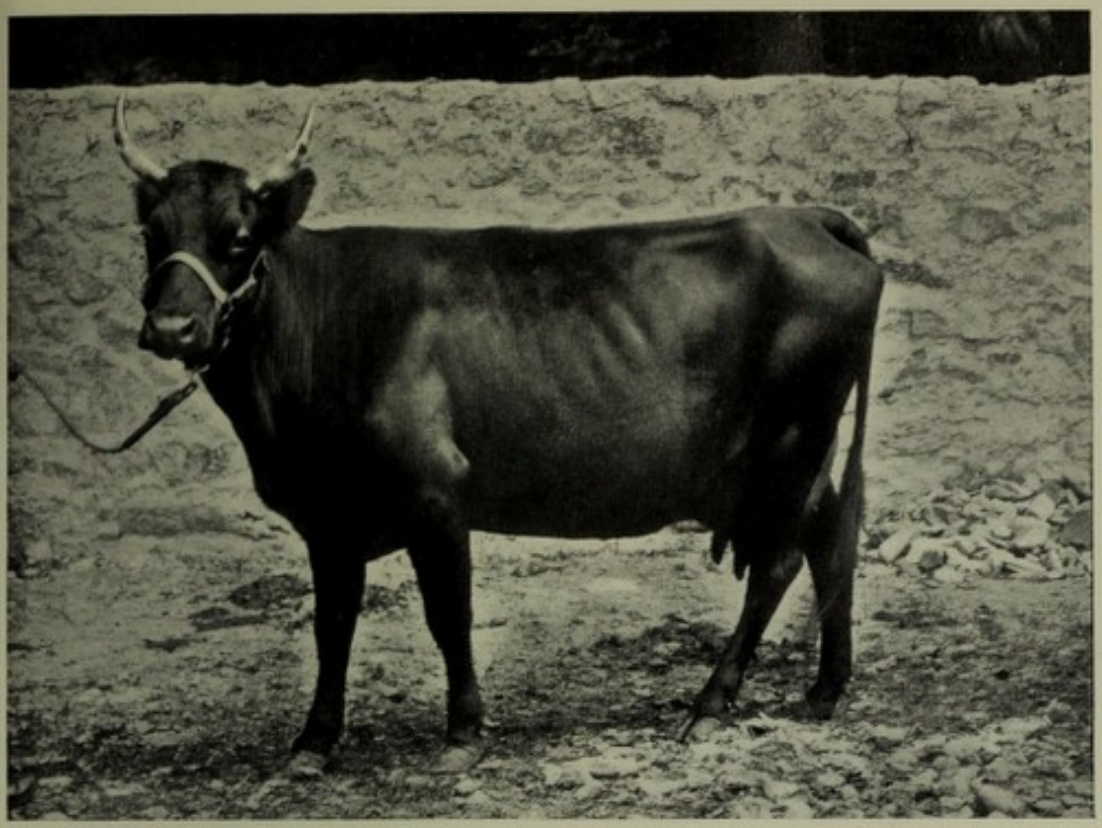
"The Dutch race of cattle is the leading representative of the lowland races found on land of a moist and marshy character, where there is much green vegetation. It is mainly sought after in the neighbourhood of large cities, where the sale of fresh milk is profitable." It is well established in both North and South America, and in Cape Colony,

where it is accredited with giving better results than the Shorthorn, except when food is abundant and shelter available. In Europe, it extends from Holland to all parts of Northern Germany.

Points.—"The head of the Holland cow is long and narrow and light, with broad mouth, and horns always pointing forward, their black tips usually being turned upward. The long neck, with but indifferently developed dewlap, frequently shows a slight depression on the ridge; chest and back are broad, and the line of the back, with rare exceptions, straight to the tail. The body is long, limbs flat and high, hind legs of cows often inclining to be knock-kneed. The most profitable Friesland variety is very heavy, with fine bones, delicate skin, and in colour mostly white with black, grey-blue, grey, or even dark-brown spots. Their live-weight averages 1300 pounds. The efforts to increase the size and beauty of the cattle, which have been quite successful, have resulted in diminishing their milk-giving properties, so that a decrease of 150 litres per year (one litre = one quart) as compared with former estimates, has been established. The average amount of milk now (1888) is about 2700 litres per year, the cows yielding about 27 litres per hundredweight of hay-value (*sic*), these 27 litres making about 2 lbs. of butter. The cows require plenty of food, but remain lean while giving milk; but when no longer milking, they fatten quickly."

Dutch cattle are not admitted into this country unless for immediate slaughter, but herds of excellent milking cattle of pure Dutch origin remain in the possession of the following **British breeders,** who claim for them superior merits as heavy, rent-paying milkers in competition with our home breeds, while the animals not kept for milking or breeding purposes feed readily into beef of good quality:—N. Boxendale, Allington Farm, Eastleigh; John Brown, Marden Farm, Hertford; Hugh Brown, Colton Mains, Dunfermline; John Clark, Wamphray, North Berwick; T. Case, North Elmham, East Derham, Norfolk; Earl Egerton (John F. Smith, agent), Tatton Park, Knutsford; Albert Merry, Southcote Farm, Leighton Buzzard; Rumbal & Sons, dairy farmers, Upper Clapton, London, E.

The crosses of Dutch cattle with all the common British breed are useful milking or grazing cattle, depending upon



A. A Kerry Cow, "Annie" (30).
Owned by Robert Tedcastle, Marlay, Rathfarnham, Co. Dublin.
[*From the Kerry and Dexter Herd Book, Dublin.*

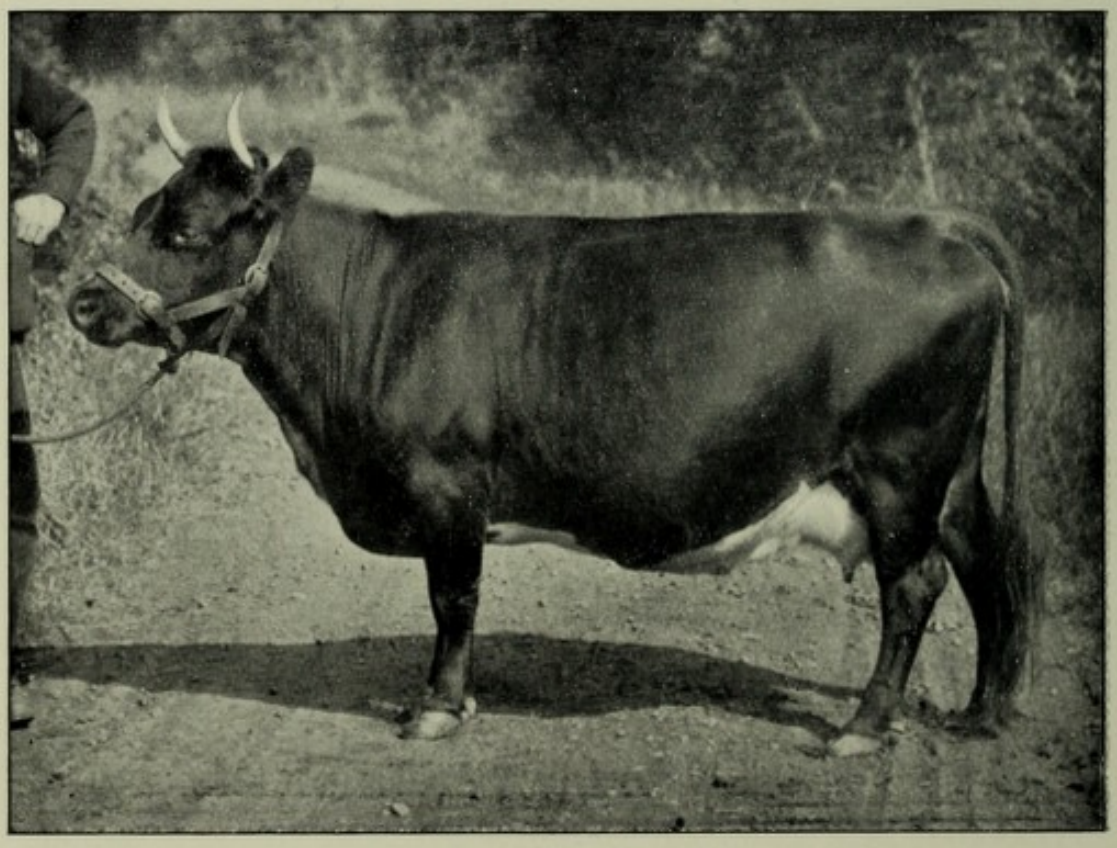


B. Kerry Bull, "Paddy Blake,"
which was the property of the late Lord Clonmell.

[*p.* 208

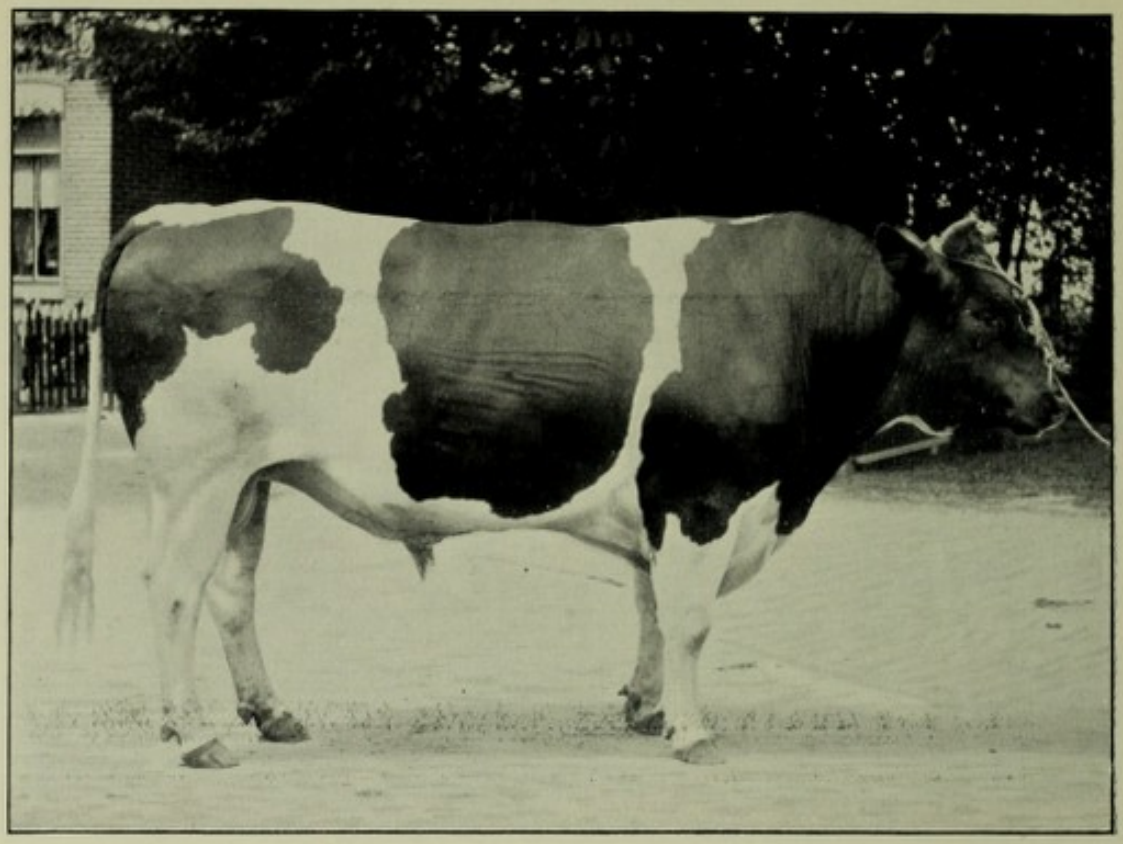


A. Dexter Bull, "La Mancha Union Jack."
Thrice champion at the English Royal, and never beaten.
[*C. Reid, Wishaw.*

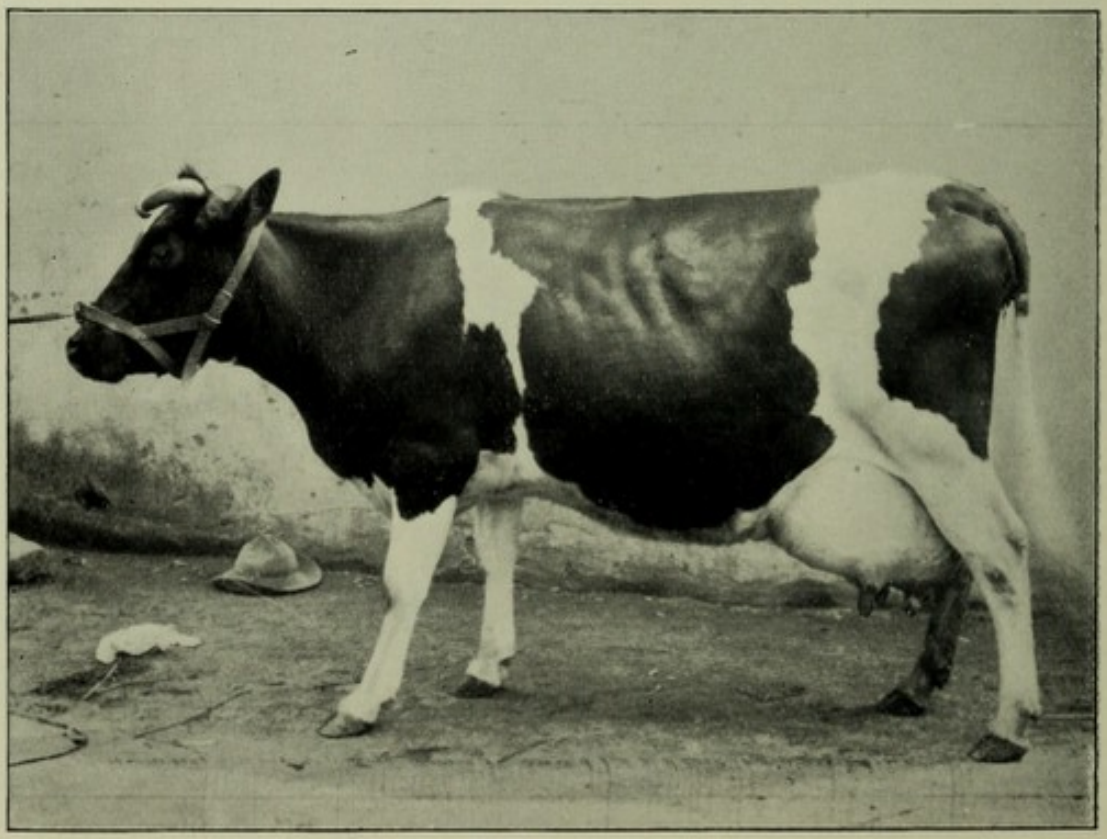


B. Dexter Cow, "Irisine."
Many prizes in Ireland and England, including first at London Dairy Show in 1886.
Owned by Martin J. Sutton, Reading.
[*Victor White, Reading.*

[*p.* 208



A. Holstein Bull, "Brinio II." (Dutch Bred).



B. Friesland Cow, Bred in South Africa.
Maximum yield, 9 gallons of milk per day.
Died calving, the day after being photographed.

[*p.* 208

whether the mate belonged to a milking or a beef-producing variety.

At St Louis World's Fair test in 1904, among the first 15 cows placed according to butter production, the Dutch occupied the first, seventh, twelfth, and fifteenth places, and the Jersey was the one other breed represented (p. 227). It was stated that the best Dutch cow "secreted about $2\frac{3}{4}$ lbs. of milk per hour day and night, or a little more than a quart, estimated at $2\frac{1}{2}$ lbs. The butter-fat, 282.601 lbs., and other solids not fat, 620.534 lbs., made a grand total of 903 lbs. of digestible solids in 120 days." This is at the rate of $7\frac{1}{2}$ lbs. per day of twenty-four hours. "The same cow cost £7, 6s. to feed, or about 36s. per month. Against this we place 200 gallons of milk, which at 1s. a gallon would be £10; or at 16d., the retailer's price, £13, 6s. 8d. The cost of the milk for food is only nine-tenths of a halfpenny per quart. The quantity of food consumed was 10,347 lbs., of which 2652 lbs. was of a concentrated and costly character; but upon it she also gained 54 lbs. in weight" (*J. Long*). John Speir records the yield of a Dutch cow at Marsum at 1865 gallons of milk in 329 days, or 5.66 gallons daily, and another at 615 lbs. of butter in 317 days.

There is a **Dutch Belted Cattle Association** in the United States, and the scale of points which has been adopted for the breed is recorded with those of ten other milking breeds in *Circular* No. 48 of the Bureau of Animal Industry at Washington.

CHAPTER XI

MILCH CATTLE. THE CHANNEL ISLANDS BREEDS. JERSEYS AND GUERNSEYS

Channel Islands Cattle Exported as "Alderneys"—**The Jersey**—Origin of its Excellence—Colours of the Breed—Association with Druidical Remains—How Bred Pure—Revival of the Breed—Colonels le Couteur and le Cornu—The Jersey (Islands) Herd Book—The English Jersey Cattle Society—Its Herd Book and Influence—American Demand—Prices—Prominent Breeders—Influence of Soil and Climate—Noted Strains—Jersey Steers—Points of Cows and Bulls—Quality of Milk—Docility and Bad Temper—Milk Records—**The Guernsey**—Compared with the Jersey—Influence of Climate—Guernsey Butter and Beef—Prices and Numbers of Cattle—Antiquity of the Breed—Prominent Present-day Breeders—**The Alderney**—Origin and Present Position—Smith Neill's Cow "Doctor."

CHANNEL Islands cattle were for many years imported into England under the generic name of "Alderney," although the animals from that island have been throughout the least important. The misnomer is supposed to have originated in one of three ways:—from Alderney cattle having been the first sent to England; through English officers being stationed in Alderney, and thus identifying all the kindred breeds by the name most familiar to themselves; or most probably because the Channel Islands "packets" touched last at Alderney, so that all the cattle, whatever their origin, came by way of Alderney.

The Fowlers, who were long the great exporters of stock from the Islands, before herd books existed, adhered to the name "Alderney" which they found in common use. This was rather an unfortunate practice in the interests of the legitimate Islands trade, as it enabled dealers in inferior Brittany cattle to get them cleared through Alderney for England as genuine Islands cattle.

The Jersey[1] is the most numerously represented—the normal stock of the island varying from 11,000 to 13,000 head—and the most important of the three breeds, which at some distant date sprang from a common origin, in which the Brittany breed of the adjacent French coast and the Normandy breed participated. Some specimens of these animals, especially in the mountainous parts of Brittany, so strongly resemble Jersey cattle, although very inferior in milking qualities and the development of good dairying appearances, that they have been sold in large numbers in this country as Islands cattle, to the detriment of the good name of, and injury to the trade in, the genuine animals.

As far back as 1734 (fully one hundred and seventy years ago) superiority was claimed for Jersey cattle. Col. le Couteur attributes the excellence of the cow "to the circumstance of a few farmers having constantly attended to raising stock from cows of the best milking qualities, which attention, prosecuted for a long number of years in a small country like ours, where such superior qualities would soon be known, led to the excellence of milking and butter-yielding properties of the race at large This never could have been attained so generally in Normandy, from whence our breed probably originated, or in any other extended country."

The "whole" or "self" **colouring**, and the light shades which prevail (prominently fawn or greys) in the modern Jersey are of comparatively recent date, and have been encouraged by many English and American buyers, who were partial to them.

Cattle are now to some extent bred as a result of merit in performance, and colour is of secondary consideration. The loss in the milking qualities of the breed resulting from breeding for fashionable colours was very striking. Silver-grey, a colour obtained by a Swiss cross, was in great repute in England in the early seventies of last century, and animals with defective udders were kept for breeding on account of

[1] Articles on Jersey cattle appear in the 1880 *Report of the Agricultural Department, Washington;* in the *U.S.A. Consular Reports on Cattle and Dairy Farming*, 1888; and the *Journal of the Royal Agricultural Society of England*, 2nd series, vols. xiv., xvii., and xxi. For much information the Author is also indebted to the exhaustive treatise on the history of the Jersey breed of cattle by John Thornton, being the introduction to the first volume of the *English Herd Book of Jersey Cattle*, 1880.

their colour. The silver-greys soon lost caste, but not before some mischief was done. Popular opinion accredited them with producing very pale milk. The mulberry, a dull, dark brown coat, with hair of a reddish tinge in it, is indicative of rich milk. It is a colour of hair high in favour in America.[1] The colour of the bull is generally darker than that of the cow, although fawns with black points are quite common. A mulberry fawn or bronze is a good characteristic colour, and the dark mulberry bull shows a dappled brown sheet over the back and a light grey ring round the muzzle. This, and a nearly allied dark brown with a "mealy mouth" or a silvery ring and a light brown over the back and sides to the midrib, are favourite and hardy colours. The second-prize bull of the island in 1905 was black, with white legs and patches, and a brown ridge up the line of the back-bone. Some cows are black, shading into brown with white patches, like an Ayrshire, and with udder and teats also black.

The original unimproved Jerseys described by the early writers[2] were variously coloured, "commonly red or red and white, occasionally cream-coloured or cream mixed with white, black with a dingy brown-red about the nostrils and on the back ridge," and also "black, and black and white." Most of these colours still appear among well-bred cattle. Blue spots on the white and a blue ring round the edges of white patches are held to be good indications of milking quality.

Thornton calls attention to the similarity of colouring, and to the correspondence in the appearance of the older forms of the Brittany, Kerry, Welsh, Cornish, Shetland, and Ayrshire breeds. He further points out that these are usually located in the vicinity of ancient Druidical remains,

[1] At the **Jersey Spring Show**, held on 18th May 1905, the following were the respective numbers of the **different colours** of 214 cattle entered in the Catalogue with colours stated:—Fawn, 72; fawn and white, 15; grey-fawn, 10; light fawn, 5; dark fawn, 3; brown, 53; grey-brown, 10; dark and light brown, 6 and 8; dark grey-brown, 2; brown and white, 5; mulberry, 4 (probably some of the mulberries were entered as browns or blacks of sorts); grey, 8; dark grey, 5; light grey, 3; and the remainder, one specimen of each, black, black and white, light and dark grey-brown, and grey and white.

[2] Thomas Quayle, author of *The General View of the Agriculture, etc., of the Islands on the Coast of Normandy*, 1812; Garrard on *Varieties of Oxen common to the British Islands.*

and that there is a strong presumption that they are the most direct descendants of the small-sized, short-horned, dark-coloured representatives of the *Bos longifrons*, which, being the earliest domesticated cattle of Great Britain, were the milch cows of the Druids. They are found clinging to existence on the fringes of civilisation in out-of-the-way corners, where they and the associated Druidical remains would naturally meet with least interference during the many disturbances which overwhelmed, and destroyed or altered the features of the more accessible interior of the country. In the colour of some West Highland cattle there is a very striking resemblance to the fawn of certain specimens of the Islands breeds, more especially to the yellowish-fawn of the Guernsey.

Jersey cattle have been **bred practically pure** for a longer period than any of our British varieties, on account of the importation of foreign cattle to the island being forbidden by law. **"Acts of the States of Jersey,"** dated 1763, 1789, 1826, 1864, and 1878, detail severe prohibitive penalties against the fraudulent importation of cattle from France, with the object of excluding disease, preserving the purity of the breed, and fostering the export of Jersey cattle to England.

Jersey cattle **degenerated** during the first three decades of the nineteenth century. The great **revival** of the breed was brought about by the formation, in the autumn of 1833, of the **Royal Jersey Agricultural and Horticultural Society,** to the efforts of which, through its stringent regulations with regard to the qualities which an animal must possess before registration or receiving the stamp or decoration of merit, is due, in the first instance, the marked improvement which took place soon after that time.

Many have taken part in the work as breeders, but the **two grand old men** of Jersey cattle fame are **Colonel le Couteur** and, following him, **Colonel le Cornu**, whose far-seeing wisdom and untiring devotion to the best interests of the breed have done so much to secure its present enviable position in competition with other dairy cattle. Among its claims to superiority is the freedom of Jersey Island cattle from tuberculosis. A few Guernseys are admitted to have been affected, but it is believed that the disease has been stamped out. In some highly bred strains of Jersey cattle the very

prominent eye develops into a diseased and inflamed condition known as "gimlet" eye, from the way the animals turn their eyes.

Colonel le Couteur has left the following **early description of the breed** :—"The Jersey farmer, conscious of possessing a breed excellent for the production of rich milk and cream . . . sought no further, but was content to possess an ugly, ill-formed animal, with flat sides, wide between the ribs and hips, cat-hammed, narrow and high hips, with a hollow back." Nevertheless, "she possessed the head of a fawn, a soft eye, an elegant crumpled horn, small ears, yellow within, a clean neck and throat, fine bones, a fine tail—above all, a well-formed, capacious udder, with large swelling milk veins."

The Jersey Herd Book, begun in 1866, materially contributed to the improvement of the breed from the point of view of good looks, and the unshapely form of the old-fashioned Jersey was speedily changed to that of the elegant and graceful creature of the present time. But beauty of form and superior milking qualities do not necessarily go together.

One important superiority possessed over other herd books, made possible by the moderate area of the island, is that each animal must be inspected and attain a certain standard of merit before it can be registered. Those passed are classified by the *Herd Book* judges as "commended" or "highly commended." The merits of the dam are taken into account in the case of a bull, and no heifer can be entered in the *Herd Book* until she has borne a calf. Those who favour inspection think that it is by such means that the Jersey cow has reached the first position of merit in producing the richest quality of milk of all dairy breeds, and during a more prolonged period of lactation.

Dr Watney adds :—"While no cow or bull can be admitted to the *Herd Book* except as above, it should be carefully kept in memory that all cattle without exception bred on the Island are considered to be pure bred, even if their dams, sires, and their ancestors are not entered in the *Herd Book*, *i.e.*, if they are non-pedigree, yet they are equally eligible—with the descendants of the cattle of the *Herd Book* —to be entered should they show merit. The only difference is that for one generation the one are classed as F. (Foundation Stock), the other as P.S. (Pedigree Stock).

Thus the gold medal cow of this year (1906), who made 3 lbs. 6½ oz. of butter, the highest result that has been obtained in the Island, is Foundation Stock.

A record of 3 lbs. 4¾ oz. of butter, produced in twenty-four hours, was formerly claimed for an Island cow.[1] The funds of the *Herd Book* are kept separately, but the management is under a Sub-committee of the Society.

About 1853 a demand sprang up in America for Jersey cattle, and one leading endeavour of the Board of the Agricultural and Horticultural Society has since been, owing to the increase of this demand, to encourage breeders to keep, at least for a time, their best stock in the Island, so as to secure the retention of a share of the best blood. Prize bulls must now remain for a year, else the prizes awarded at the Society's shows are forfeited. In 1882 **another American boom** in prices of Jersey cattle did a lot of harm, and the Island is only now overcoming the evil effects of it. From £500 up to £1000 was then paid for a cow, and from £100 to £300 were fairly common prices realised for cows and heifers. Few bulls went to America at that time, and it is believed that the highest price, though only £200, was paid for the celebrated bull "Wolseley," the property of M. Francis Le Brocq, of St Peters.

Denmark is now a good outlet for surplus general-utility Jersey stock. Danish farmers combine to buy some hundreds of cattle at a time. In 1905 Jersey exported 1952 cattle of the value of £28,261.

An effort is being made to eliminate some of the modern fancy types bred for English inspection shows and get back to the **old type of dairy cow,** which was larger than now, although fine in the bone, with great depth of heart, short legs, and enormous bags, which required a specially low-set form of milk-pail.

A few of the most **prominent breeders** of Jersey Island-bred cattle in 1905 were: P. J. Ahier, "La Ferme," St Martins; J. le C. Arthur, "Monplaisir," St Johns; T. le Brocq, Leoville, St Owens; Ph. Duval, Somerleigh, St Peters; T. P. Hacquoil, L'Etacq, St Owens; C. Mauger, Herupe, St

[1] "Two English-bred Jersey cows have made over 3 lbs. 9 oz. of butter at a public test. They were both descended in large measure from the Dauncey old English Jersey blood."—WATNEY.

Johns; W. J. Labey, "Le Parcq," Grouville; E. G. Marett, "Boulivot," Grouville; Frs. le Masurier, "Les Nièmes," St Peters; Charles Mourant, Maufant, St Saviours; J. A. Perree, Oaklands, St Saviours; Sir W. H. V. Vernon, St Peters.

When bred out of the island, Jerseys often grow stronger bones, become more massive, and lose the deer-like features of the genuine home-bred animals. That the combination of the soil (said to cultivate more kindly than the soil of any other part of the world) and the climate of the Island has much to do with the size and character of the cattle, is shown by the fact that on the cliffs of St Johns a small and hardy variety of the breed was once prevalent. Foreign breeders consequently find it necessary to come back to the Island for sires to maintain the characteristic features of their herds. We have a parallel to this in the selection of North Devon bulls to take into surrounding districts which produce varieties of the type.

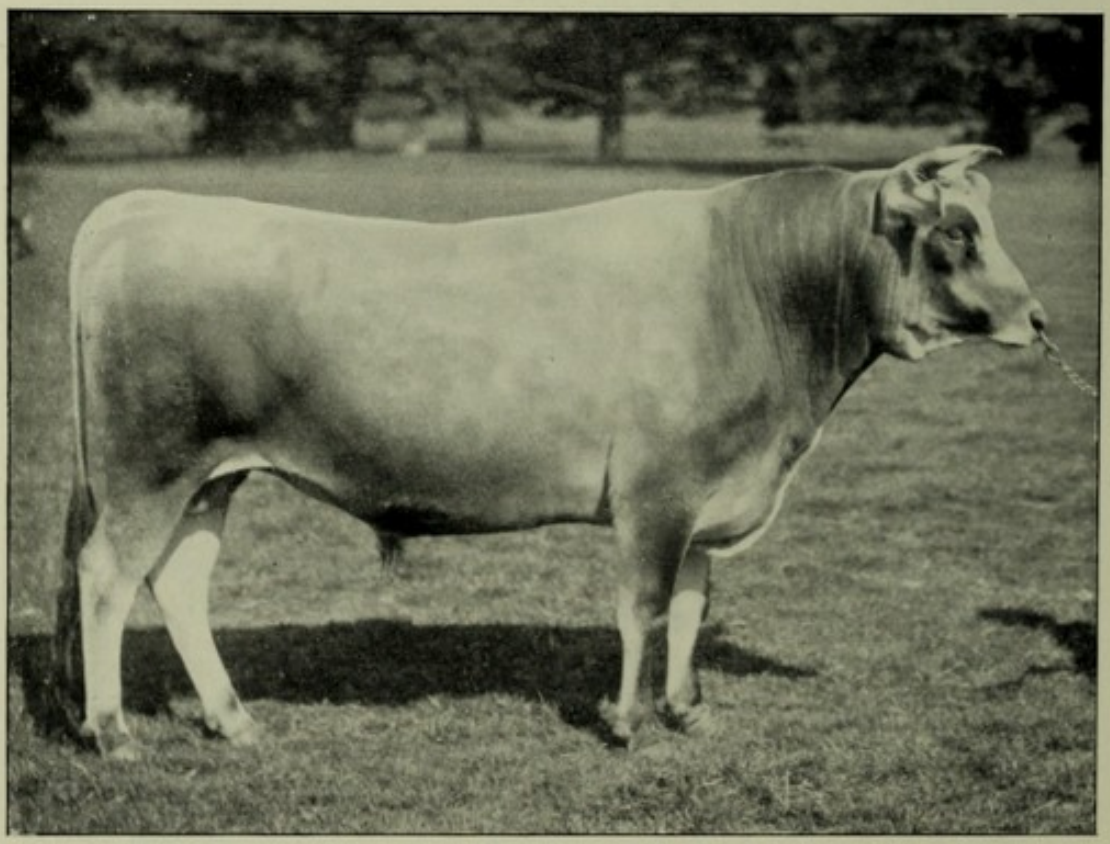
The **Bagatelle** strain of blood is said to be probably the best in the Island for milking, as well as for refinement and symmetry. The **Oxfords,** bred by the late J. P. Marett, belong to one of the most noted strains. "Oxford Dahlia," owned by Lord Rothschild, took the championship of the Royal Agricultural Society of England three years in succession, in the inspection classes.

The **English Jersey Cattle Society** (1878) published the first volume of its *Herd Book* in 1879.[1] It initiated butter-test classes at shows in 1886—an institution (originated by John F. Hall) which has since found conspicuous favour in other parts of the British Empire, in America, and on the continent of Europe. One useful outcome of this movement is the annual competition at the Tring Show, where all classes of dairy cattle are attracted by prizes offered by Lord Rothschild to compete with one another to determine their relative merits in the production of milk and of butter from the churn. Similar competitions also take place at the Society Shows of the Royal Agricultural of England, the Bath and West of England, the Royal Counties, and the British Dairy Farmers. Since 1905, bulls exhibited at the British Dairy Farmers' Annual Show in London must be the progeny of cows which

[1] Also *Jersey Cattle, their Feeding and Management* (2nd edition), 1903; Vinton & Co., Limited.



A. Jersey Heifer Calves, "Doreen" and "Maisonette Blanche."
Two Firsts, Staffs County Show, 1904.
Owned by Captain L. G. Gisborne, Allestree Hall, Derby.
[*G. H. Parsons, Alsager.*



B. Jersey Bull, "Distinction's Pride" (1486), I.H.B., H.C.
First, R.A.S.E. Show, Warwick, 1892.
Owned by Sir James Blyth, Wood House, Stansted.



1. 2. 3. 4.

COWS OF THE BUCKHOLD HERD, OWNED BY DR H. WATNEY.

1. "VIOLETTE." Two Gold Medals. Island Bred. 3 lbs. of butter in 24 hrs. at a public show. 2. "BLUE BELL." Three Gold Medals. Bred in England. 3. "SHARAB." Four Gold Medals. Bred at Buckhold. 56 lbs. of milk in 24 hrs. On another occasion 3 lbs. 9¾ oz. butter in 24 hrs. at a public show. 4. "RED MAPLE." Four Gold Medals. Bred at Buckhold. 112 lbs. of milk in 48 hrs. at a public show.

[*Photographed by S. Victor White, Reading, England.*

[*pp.* 216 *and* 217.

have passed the milk or butter test. The influence of the English Society has done much to bring the merits of the breed in its commercial capacity to the notice of the general public.

The following is a list of a few of the most **prominent British breeders** of Jersey cattle, selected from the list of members (numbering about 470), published by the English Jersey Cattle Society :—

Charles William Armitage, Woodlands, Northaw, Herts; Sir James Blyth, Bart., Blythwood, Stansted, Essex; Sir Geo. F. Brooke, Bart., Summerton, Castleknock, Co. Dublin, Ireland; The Fifth Earl Cadogan, Culford Hall, Bury St Edmunds; Joseph Carson, Crystalbrook, Theydon Bois, Essex; James Richard Corbett, More Place, Betchworth, Surrey; T. R. Barnewall Elliot, Clifton Park, Kelso, Scotland; Viscount Enfield, Dancers Hill, South Myms, Middlesex; Capt. Lionel G. Gisborne, Allestree Hall, Derby; The Right Rev. the Bishop Fisher, Burgh House, Yarmouth; James Joicey, Poulton Priory, Fairford, Gloucestershire; The First Marquis of Linlithgow, Hopetoun House, Queensferry, Linlithgowshire; Mrs Charlotte M. M'Intosh, Havering Park, Romford, Essex; Ernest Mathews, Little Shardeloes, Amersham, Bucks, *hon. member;* Alexander Miller-Hallett, Goddington, Chelsfield, Kent; D. Mutton, Triangle, Plumpton, Sussex; Herbert Padwick, Manor House, West Thorney, Emsworth; Augustus Frederick Perkins, Oak Dene, Holmwood, Surrey; Lady de Rothschild, Aston Clinton, Tring, Hertfordshire; The First Lord Rothschild, Tring Park, Hertfordshire; John Henry Shore, Whatley House, Frome, Somersetshire; George Murray Smith, Gumley Hall, Market Harborough; Hugh C. Smith, Mount Clare, Roehampton, Surrey; Lady Smyth, Ashton Court, Bristol; Richard James Streatfeild, The Rocks, Uckfield, Sussex, and Rossington Hall, Bawtry, Yorks; R. Bruce Ward, Westwood Park, Droitwich, Worcestershire; Herbert Watney, M.D., Buckhold, Pangbourne, Reading.

There have been **four English breeders** who have specially turned their attention to the development of butter-producing qualities in Jersey cattle — the late Dauncey of Horwood, Buckinghamshire; Baxendale, of Bonningtons, Ware, Herts; Lord Braybrooke, Audley End, Saffron Walden; and Dr Herbert Watney, Buckhold, Pangbourne.

Dauncey was the great pioneer, whose achievements have not only recently been equalled, but surpassed, at Buckhold. He bred Jerseys for about forty years before the days of cream-separators, which introduced a ready means for testing the quality of milk, and the account of his displenishing sale is recorded in Vol. I. of the English Jersey Society's *Herd Book*. Dr Watney, who has so successfully extended the lines laid down by Dauncey, speaks of him as "the greatest breeder of Jerseys ever known"; and claims credit for English Jersey breeders from the conspicuous fact that many of the winners at the great Chicago and St Louis butter-tests were descended from Dauncey blood, which Thornton exported to America. American farmers were not slow to recognise the merit of the Dauncey strain, in spite of their reputed coarseness—the large useful type being better able than the deer-like, refined varieties (more notable for beauty than for performance), to compete at milking trials against cows of other breeds. The practical result has been that, at the two great international contests named, the Jersey breed carried off the prizes for economical production of butter and "milk for all purposes relating to dairying."

At the six great shows in England, viz., the R.A.S.E., Bath and West, Royal Counties, Tring, Tunbridge, and the London Dairy Show, Jerseys are judged in two entirely different ways:—

A. In the inspection classes, solely by their appearance;

B. In the butter-test and milking classes, entirely by their milk and butter production.

It is more or less rare to find an animal in the front rank in both classes.

The relative showyard positions of the English and the Island bred cattle in trials of performance may be seen from the subjoined results of the butter-tests during the last ten years in England (1896-1905), at the six shows referred to, where medals are given by the English Jersey Cattle Society.

	Gold Medal.	Average Points.	Silver Medal.	Average Points.	Bronze Medal.	Average Points.
English bred, won .	44	48.4	31	46.2	39	42.8
Island bred, won .	11	47.7	23	43.5	15	43.5

Dr Watney's success as a breeder of Jerseys is worthy of the closest attention, as beginning so recently as 1890, without special knowledge of any breed of cattle and adhering rigidly to the one aim, that of butter-production, he has achieved a phenomenal record. He has but once shown for appearances; but in the butter-tests during the last eleven years the Buckhold herd has won more gold medals than all the other herds in England combined, and 80 out of the total of 181 medals awarded. This has been accomplished by disregarding colour, size, shape, and every other fancy characteristic, and breeding exclusively for butter yields. The herd was formed by purchasing the best performers that could be found in the market with hereditary butter-producing tendencies, and subsequently continued with home-bred animals which have developed powers of butter-production beyond anything that money could buy.

The following analysis of the figures in the foregoing table relating to Jerseys shows the unprecedented success achieved by the representatives of Dr Watney's herd.

	Island Bred, won	English Bred, not Bred by Exhibitor, won	English Bred, Bred by Exhibitor, won
	G. S. B.	G. S. B.	G. S. B.
All other English Herds	9 17 13=39	8 9 14=31	11 6 14=31
Buckhold Herd . .	3 7 3=13	8 3 1=12	22 18 15=55
	Total . 52	Total . 43	Total . 86

G. = Gold medals. S. = Silver medals. B. = Bronze medals.

Dr Watney has demonstrated—(1) that the hereditary tendency to butter-production is a matter of the first importance in the breeding dairy stock; (2) without keeping a butter record it is impossible to breed with any certainty for butter; (3) in-breeding to any great extent is a dangerous policy to pursue, owing to the consequent loss of constitution; (4) the cattle winning prizes for butter yields at public shows are not necessarily the cows that take the highest places in the annual butter records, in which the property of giving much rich milk for a period of eight to ten months is a most important factor; (5) careful milking at regular intervals is absolutely essential; and (6) on the whole, "the English

Jersey cows which are entered for the butter-test classes have considerably smaller udders than the cows which are presented in the inspection classes." (7) Great strength of constitution is required in a cow that gives a weight of milk equal to her own weight in sixteen to eighteen days, and is able to give a weight of butter-fat equal to half her own weight in one year. (8) There are families who are uncertain breeders, and are not suitable for Foundation Stock in a herd. (9) Some families bear a very small proportion of heifers among their calves. (10) It is necessary, in holding the record position, to keep all the very good cows and all the best calves, to increase the chances of producing something phenomenal and to decrease the possibilities of reversion to inferior types of milkers. (11) It is fatal to follow the practice of many breeders and overfeed the calves, or "not to dilute the milk sufficiently in feeding the quite young stock." (12) In many cases milking cows are kept too poor. Then cows of good pedigree either "have to give less than their full record, or to waste themselves until they are hardly on the border-line of good health"; but, on the other hand, cowmen are apt to overfeed cows going in for butter-tests, so that they do not give such good results as are got from them at home. (13) The greatest milkers and noted prize-winners have the greatest vital force, as shown by a cow producing 3500 lbs. of butter in seven consecutive years; by gold-medal winners producing twelve to fourteen calves; and by cows appearing in the winning lists at first-class competitions for six successive years. Even a more striking illustration of this fact may be given in Captain Smith Neill's brindled cow, of mixed Channel Islands blood (Plate LXXVI), which at twenty-four years of age won the 1st prize for butter at the London Dairy Show in 1906 for the third time in succession, in the class for cross breeds (see p. 230).

The following description of **four of Dr Watney's noted cows** (Plate LXXIII.), given us by the owner, is an interesting record of the milking powers of the Jersey breed of cattle, which, at the same time, gives concrete proof of many of the thirteen deductions from breeding experiences which have been culled from Dr Watney's statements. The photograph was taken from life in the year 1903:—

"'**Red Maple**' was calved in 1896. Living and won

prizes in 1906. The cow, her sire, dam, one grandam, and both grandsires were bred at Buckhold. She gave an average of 484 lbs. of butter per year for six consecutive years. She has won four gold medals in the butter-yield tests. At the R.A.S.E. in 1904 she gave 112 lbs. of milk and 5 lbs. 13½ oz. of butter in the two days' test, fifty-three days after calving. She is descended from 'Maple,' who won one silver medal, and from 'Cleopatra,' who won one gold medal.

"'**Sharab**' was calved in 1896, and killed in 1905. This cow, her dam, her sire, and grandam were bred at Buckhold. She yielded an average of 540 lbs. of butter per year in five consecutive years. Her highest yearly record for any one year was 615 lbs. of butter. She won four gold medals in the butter-yield tests. At Tring, in 1902, she gave 3 lbs. 9¾ oz. of butter in one day, 128 days after calving, and thereby established a record for Jersey cows in England and Jersey at a one-day's test. At the Royal Counties Show, 1902, she gave 56 lbs. of milk in one day, 73 days after calving. She is descended from 'Sherbet,' one gold medal; 'Sherry,' one gold medal; 'Lady of the Isles the 3rd,' one gold medal.

"'**Blue Bell**' was calved in 1894, killed in 1905; bred by Mr S. Baxendale, Bonnington, Herts. She gave an average of 398 lbs. of butter per year for seven consecutive years. She won three gold medals in the butter-yield tests. She is descended from 'Chestnut the 2nd,' who won four gold medals, and from 'Broom,' winner of the first gold medal given by the E.J.C.S. in 1887 for butter yields.

"'**Violette**' was calved in 1897. Living and won prizes in 1906. An Island-bred cow, entered in Vol. XV. *E.J.H.B.* as a Foundation cow, *i.e.*, pure bred but without pedigree. She gave an average of 512 lbs. of butter in the three consecutive years she has been at Buckhold. She has won two gold medals in the butter-yield tests. In the Island of Jersey she gave 3 lbs. and ¾ of an ounce of butter in one day, 67 days after calving.

"These are **four great cows** in a great butter herd. For the year ending September 30, 1904, twenty-six cows that were in the herd the full year produced 12,156 lbs. of butter. The highest individual yield was 619.31 lbs. of butter, and the lowest (with one exception), 245·17 lbs. 'Sharab' stands fourth in the list, 'Red Maple' tenth, 'Violette' eleventh, and 'Blue Bell' twenty-second. So it is evident that the Buckhold herd contains a lot of other superior year-round workers in addition to these gold-medal winners."

It is the usual practice to regard **the Jersey steer** as

worthless for feeding, and discarded male calves are almost invariably slaughtered for slink veal. That the Jersey steer is, under certain circumstances, a useful feeding animal has been fully demonstrated by the Dukes of Bedford and others. J. B. Ellis of West Barsham, Walsingham, Norfolk, rears with satisfactory results from ten to fifteen male calves, which, if not reared, would sell for only a few shillings. They are liberally fed from the first, and the calf fat is carefully conserved. Living without cover summer and winter, and consuming the same quality of food given to other breeds, they average about 40 stones imperial at two years old. The proportion of internal fat is large, and, now that the local butchers and their customers know about it, top prices are obtained for the beef, which is of excellent flavour and texture, but not good in colour. The flesh of not more than from 5 to 10 per cent. of the animals is yellow in colour, and even then it has not the deep yellow of Guernsey beef.

SCALE OF POINTS FOR JERSEY COWS, arranged by Royal Jersey Agricultural and Horticultural Society

PERFECTION—100.

Articles.	*Points.*
1. *Head* fine; *face* dished; *cheek* fine; *throat* clean .	4
2. *Nostrils* high and open; *muzzle* encircled by a light colour[1]	2
3. *Horns* small and incurving;[2] *eye* full and placid .	2
4. *Neck* straight, thin and long, and lightly placed on the shoulders	5
5. *Lung capacity*, as indicated by width and depth through body immediately behind the shoulders	3
6. *Barrel* deep, broad and long, denoting large capacity; *ribs* rounding in shape . .	10

[1] Now and then Jerseys appear with a few light spots on their black noses, in consequence, it has been asserted, of the relaxation in the early eighties of the laws relating to importing cattle and the introduction of a few Guernseys; but without any material consequence to this breed. About 1845, Ayrshires and Shorthorns were tried, "with a view to improve the cattle," but with such unsatisfactory results that the progeny were all sent to the butcher.

[2] It is a common practice to set the horns of young animals that are not assuming a proper form during development. They are first drawn inwards and afterwards pulled down.

Articles.		*Points.*
7.	*Back* straight from withers to setting of tail; *croup* and *setting on* not coarse	6
8.	*Withers* fine, and not coarse at *point of shoulders* .	4
9.	*Hips* wide apart, rather prominent and fine in *bone*	2
10.	*Hind legs* squarely placed when viewed from behind, and not to cross or sweep in walking .	2
11.	*Tail* thin, reaching the hocks, good *switch* .	2
12.	*Udder* large, not fleshy, and well balanced .	10
13.	*Fore-udder* full and running well forward . .	10
14.	*Rear-udder* well up, protruding behind and not rounding abruptly at the top	8
15.	*Teats* of good uniform length and size, wide apart and squarely placed	7
16.	*Milk-veins* large and prominent . . .	3
17.	*Richness*, as indicated by a *yellow colour* on *horns*, *escutcheon*, and inside of *ears* (the latter mostly an animal excretion which can be rubbed off) .	3
18.	*Skin* thin, loose and mellow	4
19.	*Growth*	3
20.	*General appearance*, denoting a high-class and economical dairy cow	10

Additional special points extracted from the **scale of points for bulls**:—*Head* broad; *eye* full and lively; *muzzle* broad; *neck* arched, powerful, and clean at the throat; *withers* fine; *shoulders* flat and sloping; *loins* broad and strong; *legs* rather short; *rudimentary teats*, squarely placed and wide apart. A bye-law makes it impossible for a bull to get a prize before he is a year old.

The whole form of a typical Jersey cow is handsome and deer-like, and the shades of colour being bright and uncommon, Jerseys are, irrespective of their milking powers, favourite park cattle. Like all good dairy cows, Jerseys have a tendency, when milking heavily, to become too thin to appear to the best advantage, the production of rich milk being incompatible with putting on fat.

The milk, though not invariably abundant, is noted for a large proportion of cream of peculiarly rich quality and colour, which makes the cows favourites in many private household dairies throughout the country. A few are also kept in

ordinary farm dairies, where specially rich milk is wanted; also as a guarantee against the milk of a herd falling below the legal minimum of 3 per cent. of fat and 8.5 per cent. of other solids; or, where butter is the manufactured product, to make the churning of the cream more easy, and to give the Jersey tint and flavour to the butter.[1] The whole milk is too rich for rearing calves, and separated milk and cream substitutes are more economical, and are used with more success.

The cows are extremely docile, owing to their being constantly tethered at pasture in the Island, while the bulls are more dangerous to strangers than bulls of other breeds—an objectionable feature which develops in the cows when reared in a state of nature under Argentine camp conditions. No doubt this unruly tendency is one explanation of the old custom on the Island, which involved the destruction of bulls before they were three years old, as a precautionary measure of safety to human life. Another reason advanced to account for this practice is that the bulls, while young, had so many cows put to them that they became used-up and worthless.

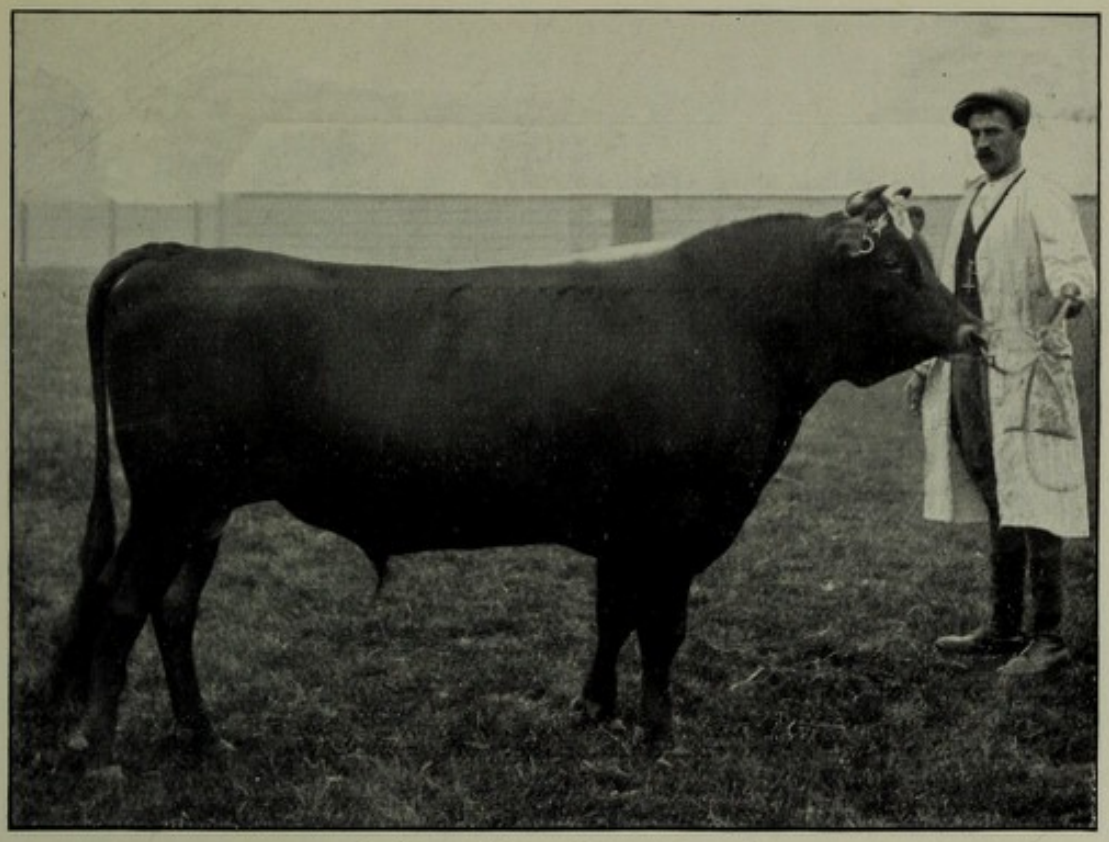
The general average of produce during the best part of the milking season may be stated at 8 to 12 quarts of milk per day, yielding from 7 to 9 lbs. of butter per week, although occasionally there will be found individual cows which give rather more than double the average, *i.e.*, from 15 to 18 lbs., and even 20 lbs. of butter a week.

Thos. Quayle, in 1812, gave 22 imperial quarts "as the greatest quantity of milk given in twenty-four hours, the medium quantity being 10 quarts—*i.e.*, 5½ gallons, with an average of 2½ gallons."

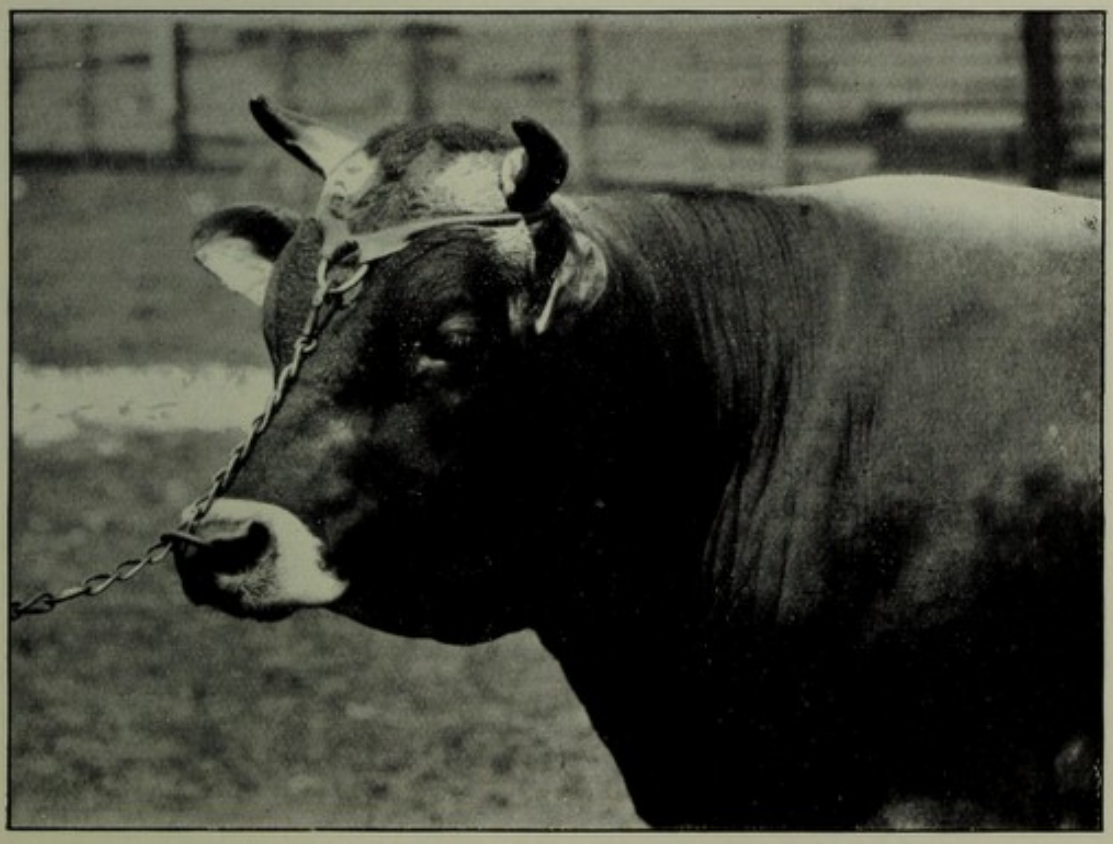
Records at St Helier's Show, Jersey, in May 1904.

Name of Owner.	Days in Milk.	Milk. lbs. oz.	Butter. lbs. oz.	Butter. Ratio lbs.	Points.	Award.
C. Syvret, "Sandgirl"	135	36 0	3 2¾	11.34	60.25	Gold Medal.
C. Mourant, "Cora 4th"	65	42 12	3 3¾	13.21	54.25	Silver Medal.
Do., "Oxford Ixia 3rd"	94	45 12	2 15¼	15.49	52.65	Bronze Medal.

[1] Ernest Mathews has advanced strong reasons why the Jersey should be regarded an ordinary rent-paying dairy cow, in a paper on "The Jersey Cow," read at a Congress of the British Dairy Farmers in Jersey, May 1905, to which indebtedness is acknowledged, see *B. D. F. Journal.*



A. Jersey Bull, "Black Pearl."
First, B. and W. and Oxford Shows, 1905, etc. etc.
Owned by J. C. Drew, Wadhurst, Sussex.



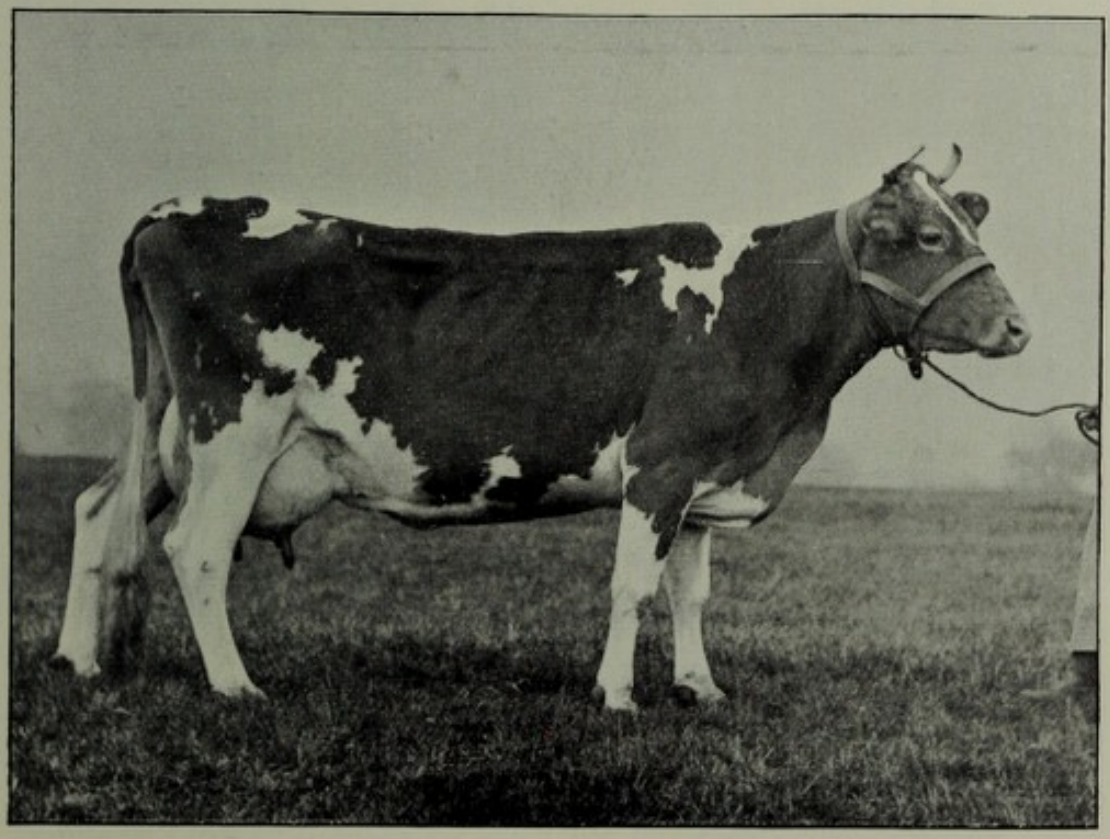
B. Head of a Typical Jersey Bull, "Glorious Lad."
Owned by Captain Gisborne, Allestree Hall, Derby.

[*Both by G. H. Parsons, Alsager, Cheshire.*

[*p.* 224



A. Guernsey Bull, "Climax" (14), E.G.H.B.
Winner of one championship and seven 1st prizes.



B. Guernsey Cow, "Ladybird II." (388), E.G.H.B.
Winner of two first milking prizes at the Dairy Show of the B.D.F.A.
"With more points than any other Channel Island cow."
Both owned by the Express Dairy Company, Limited, College Farm, Finchley.

[*p.* 224

The averages of the cattle were as follows:—

Number.	Days in Milk.	Milk. lbs. oz.	Butter. lbs. oz.	Butter. Ratio lbs.	Points.
56 Prize-winners .	141	33 0¼	2 0½	16.18	40.91
93 Cows . . .	136	31 6¼	1 11¼	18.36	34.62

At the butter-test in October, fifty-four cows competed.

JERSEY COWS AT TRING PARK, IN THE HERD THE WHOLE OF THE YEAR ENDING 26TH SEPTEMBER 1903, *Live Stock Journal*, 20th November.

No.	Date of Birth.	Date of last Calf.	Calves.	Total yield in lbs.	Days in Milk.	Average per day in lbs.	Days dry.
1	Aug. 1891	Sept. 1902	10	6,584	351	18.75	13
2	Nov. 1890	March 1902	10	3,713	352	10.54	12
3	May 1894	Dec. 1902	8	5,889	333	17.68	31
4	Jan. 1899	July 1902	1	6,257	364	17.18	...
5	Feb. 1897	Sept. 1902	4	7,717	351	21.98	13
6	April 1899	June 1903	3	4,271	332	12.86	32
7	... 1896	Aug. 1903	5	9,630	330	29.18	34
8	Feb. 1895	Feb. 1903	6	8,592	333	25.80	31
9	Oct. 1897	Nov. 1902	4	6,291	289	21.76	75
10	Dec. 1889	July 1903	12	4,616	315	14.65	49
11	Sept. 1900	June 1903	2	5,039	336	14.99	28
12	,, 1897	Nov. 1902	4	12,833	338	37.96	26
13	March 1900	Jan. 1903	2	4,902	364	13.46	...
14	June 1893	March 1903	8	6,121	331	18.49	33
15	Jan. 1898	Nov. 1902	3	5,751	336	17.11	28
16	... 1895	Oct. 1902	*	9,577	342	28.00	22
17	... 1893	,, 1902	7	7,811	336	23.24	28
18	Feb. 1900	Dec. 1902	2	7,538	364	20.70	...
19	,, 1896	April 1903	6	5,576	364	15.31	...
20	Jan. 1897	Nov. 1902	5	5,330	311	17.13	53
21	Feb. 1897	April 1903	5	6,845	342	20.01	22
22	... 1895	Oct. 1902	7	7,129	320	22.27	44
23	Sept. 1897	March 1903	4	4,290	329	13.03	35
24	April 1896	Jan. 1903	6	7,724	325	23.76	39
25	... 1893	April 1903	*	6,935	241	19.47	123
26	... 1900	May 1903	2	6,192	318	28.77	46

Twenty-six cows yielded 173,153 lbs., or an average of 6659$\frac{13}{26}$ lbs.

* Uncertain.

8 "Fleurie" has been in the herd five years, and given a total of 43,647 lbs., or an average of 8729$\frac{3}{5}$ lbs. per annum.

12 "Joyful" has been in the herd four years, and given a total of 38,178 lbs., or an average of 9544$\frac{1}{2}$ lbs. per annum.

In the World's Fair 120 days' **test at St Louis in** 1904, supervised by Professor Farington, 25 Jersey cows, during 90 days, made the following average daily record per head: 42.85 lbs. of milk, yielding 1.95 lbs. of fat, or 4.57 per cent. of fat and 8.80 per cent. of solids-not-fat. During the full

period of 120 days, they yielded a grand total of 124,524 lbs. of milk, which produced 5810 lbs. of butter-fat. By adding one-sixth to the fat to find the commercial butter produced, this amount works out to about 270 lbs. of butter per cow, or a little over 2¼ lbs. per day. Of the 74 cows in competition (5 Swiss, 25 Jerseys, 15 Dutch, and 29 Shorthorns), 33 "produced sufficient fat in their milk to make an average of 2 lbs. or more of butter daily" during 120 days. Of these, 21 were Jerseys, 10 Dutch, 1 Shorthorn, and 1 Swiss. As the accompanying table shows, the Dutch in milk production were an easy first, the Jerseys second, and the Shorthorns last. The Jerseys, as butter-fat producers, were first, the Dutch second, and Swiss third. The greatest amount of solids-not-fat was produced by the Dutch cows. This table gives an example of figures published at the end of each ten days during the dairy test at the World's Fair at St Louis:—

Number of Cows.	Average Milk per Cow per day.	Average Fat Test.	Average Butter-fat per day per Cow.	Average Solids-not-fat per day per Cow.
	lbs.		lbs.	lbs.
Jerseys, 25 . .	37·5	5.11	1.91	3.40
Dutch, 15 . .	50.2	3·45	1.73	4.12
Shorthorns, 29 .	29.8	3·78	1.12	2.63
Swiss, 5 . .	39	3.85	1.50	3·54

The cost of food stuffs consumed to produce one pound of butter-fat was estimated at 13.51 cents for a Dutch cow, 10.56 cents for a Jersey cow, and 14.67 cents for a Swiss cow. The cost of food producing one pound of milk was estimated at .536 cents for a Dutch cow, and .58 cents for a Jersey.

At the **World's Fair in Chicago** in 1893, 25 Jersey cows were tested for 90 days. A comparison of the results got during that time with the results obtained in a similar period at St Louis, shows a marked improvement in the Jersey breed in America within eleven years.

Average yield of milk per head per day at St Louis	.	42.85 lbs.
„ „ „ Chicago	.	32.66 „
Average yield of butter-fat per head at St Louis	.	176.39 „
„ „ „ Chicago	.	140.64 „
Average yield of fat per head per day at St Louis	.	1.95 „
„ „ „ Chicago	.	1.56 „
Average percentage of fat in milk at St Louis	.	4·57 „
„ „ „ Chicago	.	4·78 „
Average percentage of solids-not-fat at St Louis	.	8.80 „
„ „ „ Chicago	.	9.22 „

The results obtained by Jerseys in England at the milking trials of the British Dairy Farmers' Association are shown in the quantity and quality table at page 297, and may be compared with the results also stated of other breeds.

(See also Appendix J on the Dairy Test at the World's Fair at St Louis.)

POSITION OF THE FIRST FIFTEEN COWS, ACCORDING TO BUTTER-PRODUCTION, AT ST LOUIS IN 1904.

	No.	Total Fat.	Average p.c. Fat.	Butter.
		lbs.		lbs.
1. "Shadybrook Gerben," Dutch	20	282.601	3.5	330.361
2. "Loretta D," Jersey	37	280.161	4.8	330.037
3. "Brown Lassie," Jersey	39	264.879	5.1	312.557
4. "Eurybia," Jersey	45	263.557	4.8	310.470
5. "Dorinda Darling," Jersey	25	255.321	4.6	300.513
6. Prize May II.'s "Duchess," Jersey	26	254.500	4.4	299.292
7. "Lady Truth Gerben Mechtilde," Dutch	13	254.605	3.7	298.142
8. "Oonan 11th," of H. Farm, Jersey	21	250.522	4.9	295.365
9. "Baronette" of Ingleside, Jersey	40	248.788	5.1	293.570
10. "Ella Golden," Jersey	30	246.523	4.8	290.404
11. "Oonan 23rd," of H. Farm, Jersey	38	246.438	4.8	290.304
12. "Maplecroft De Kol Perfection," Dutch	12	245.303	3.8	287.495
13. Diploma's "Brown Bessie," Jersey	43	243.375	4.8	286.696
14. "Annie of Seekonk," Jersey	35	240.273	4.8	283.042
15. "Hadria 2nd," Dutch	15	239.617	3.5	280.112

The Guernsey is an offshoot of the Normandy breed. It is a larger, stronger-boned, and coarser animal in appearance than the Jersey. It has not been bred with such care, and its outlines are not so regular or symmetrical. Prize-winning animals even go down in the back when standing; but as a supplement to good milking qualities—the sole possession of the Jersey beyond its good looks—the Guernsey possesses no mean capacity for beef-production when not giving milk. The meat is not of first-rate quality, on account of being yellow in the fat, like that of a few Jerseys. The largest cows belonging to the original old-fashioned type are to be found in the west of the Island. Cows are docile, but bulls are treacherous and dangerous even to their attendants. They are usually so massive in the neck that it is unsafe to tie them in the usual way. A rope or chain round the horns and through the nose-ring is found much more reliable (Plate LXXIV).

The colours of Guernsey cattle are more "broken" than those of the Jersey, patches of white appearing on the predominating light yellow, brown, or reddish-fawn. The grey

hair about the head of the Jersey is absent. The muzzle is flesh-coloured, although black is not always, at least in America, objected to when it does appear. The nostrils are more rounded and not so dilated as those of the Jersey. Black and brindled specimens, though few, having been bred out, are said to be the hardiest and the best milkers.

The climate of Guernsey, with its northern aspect, is not so genial as that of Jersey, with its sunny southern exposure, and consequently the cattle are hardier, and more inured to cold on their arrival in England than those from Jersey. The latter, it is true, become acclimatised in a few years, and their descendants retain their hardiness, but they also lose the refined delicacy of skin and form, and become stronger in frame and altogether coarser. Some strains of Island-bred cows in high condition are too broad at the withers, but on their losing condition as a result of heavy milking, the shoulder-top becomes sharp, as it ought to be. Apart from these, poor-milking cows sometimes occur of a beefy type, and should be discarded as breeders of keeping stock. Young animals are not too highly fed, which would tend to make them heavy and coarse, but the calves are made to follow the cows at pasture to clean up what the cows reject.

Guernsey butter is considerably deeper in colour than Jersey butter, and 10 lbs. to 12 lbs. a week is a good return from a cow kept in an ordinary natural way. The richer colour, together with the possibility of selling the calves at a better price than Jersey calves, owing to the thin condition of the latter, has raised the Guernsey in favour with dairy farmers in this country. A further inducement is the greater weight of the animal as compared with the Jersey, as it gives better results when dry and fed for beef. A four-year-old Guernsey steer produces beef of excellent quality in everything but colour, but it would not pay a farmer on highly rented land to feed so slowly. Yellow carcases found among American chilled beef are sent to be consumed in Guernsey, where the colour is not objected to. In estimating the various qualities of the breeds, one is liable to overlook the fact that five Jerseys can be kept on about the same amount of food as four Guernseys or three Shorthorns.

Calving heifers of good quality can be bought in the Island, after much parleying with the breeder owners, who are

very wary and deliberate in making a transaction, for £18 to £25, and bulls a year old from £15 to £20. Outstanding pedigree animals fetch larger prices for exportation. By the statistical returns of June 1905 there were 6528 cattle in the Island, of which 3538 were cows and heifers in milk and in calf. The cattle entered in the *Herd Book* number (1905) over 1200.

The breed, like many of the old Guernsey families, such as the De Garis, Allez, Mansell, and Blendel, has a record many centuries before William, Duke of Normandy, conquered at Hastings. The identical breed is now found in several parts of Normandy; around Lisieux, William the Conqueror's birthplace, and especially near Isigny, where the cattle were scrupulously bred, the model Guernsey is to be seen alike in every particular to its Island cousins. The **richness in cream,** and its colour—*there*, as in Guernsey, a *sine qua non*—were points uppermost in the selection of breeding stock.

The following is a **list of prominent present-day breeders** in the Island of Guernsey:—J. G. Browning, Rose Farm, St Martins; Gen. de Vic Carey, Le Vallon, St Martins; J. De Garis, Sea View Farm, Castel; C. Domaille, La Villette, St Martins; T. R. Gallienne, Ponchez, Castel; F. Jehan, Le Chêne Farm, Forest; J. le Page, Birquet, St Saviours; A. le Patourel, La Ramée, St Peter-Port; T. le Prévost, L'Etiennerie, Castel; T. Lucas, Mont Marche, Forest; J. W. Martel, Préel, Castel; P. Martel, jun., Hunguet, St Andrews; P. D. Ozanne, Les Pelleys, Castel; H. M. Ozanne, Lilyvale, Castel; T. M. Simon, Les Câches, St Saviours.

For cheese-making purposes, the milk of the Islands cows, owing to the large size of the cream globules, is inferior to the milk of the Ayrshire or Shorthorn.

A successful **Guernsey herd**, the property of J. Maconochie Wellwood, is maintained as far north **in Scotland** as Meadowbank Home Farm, Kirknewton, Midlothian, for the supply of milk of superior quality for a West-end trade in Edinburgh, being driven by cart a distance of ten miles morning and evening, except during the summer months when people are on holiday. It was started in 1891 with 22 cows and calves, and it now numbers 116 of all ages. P. D. Ozanne's bulls are imported from Guernsey. The last pair of Ozanne's breed cost about £30 each. Male calves are sold to the butcher for 7s. 6d. upwards; the heifers are

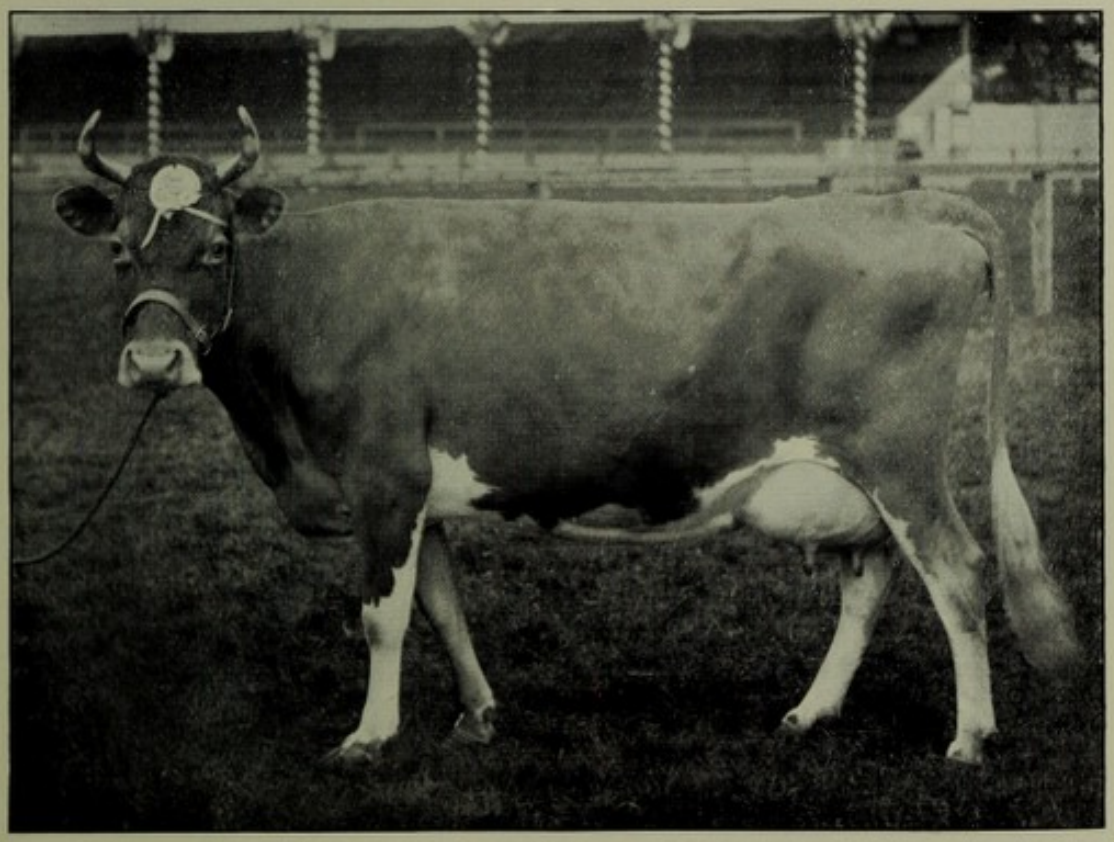
reared, and after the first winter they are hardy enough to be in the open in a sheltered field until they come into profit about two years old. They give on an average annually from 700 to 750 gallons of milk, containing 8 ounces of butter-fat per gallon. It is sold as sweet milk at 2½d. per pint, or 1s. 6d. per gallon. The daily food of a cow in full milk consists of about 100 lbs. of turnips, 8 lbs. of dried grains (with 3 or 4 lbs. of pease meal) steamed, 6 or 7 lbs. of hay at night, and straw *ad libitum*.

The Alderney section of the Channel Islands cattle is now absorbed by the Guernsey breed. The Alderney was originally formed by mingling Jersey and Guernsey blood. The cows are smaller than Guernseys, and at one time they were much darker in colour. No Alderney bulls are admitted into Guernsey, but cows and heifers are; and many of the Alderney cows of the day have been brought as calves from Guernsey, and Guernsey bulls are also taken by the Alderney State by permission of the Court of Guernsey.

History and Produce Record of Captain Smith-Neill's Brindled Cross-bred Channel Islands' Cow, "Doctor" (*already referred to on page* 220).—This cow was purchased as a heifer by Doctor Woollerton of Wendover, from Adams, a cattle-dealer of Little Kimble, in 1882 or 1883, and calved a bull calf shortly after. Dr Woollerton sold her twice to local men because she gave too much milk for his requirements. On the third occasion, in September 1902, Captain Smith-Neill secured her for £15. She has since won the following Premier Prizes:—Milking trials (cross-bred class), London Dairy Show, first prize in 1902, 1905. Butter tests (cross-bred class), London Dairy Show, first prize in 1902, 1903, 1904, 1905, and 1906. Milking trials at Tring, first prize for a cow under 900 lbs., in 1904, 1905, and 1906. The Lord Mayor's Cup, in 1905, for a cow other than a Short-horn giving the most milk in the milking trials of the London Dairy Show. Her total earnings in money were £115; and her milk record, 1903, 12,707 lbs.; 1904, 11,696 lbs.; 1905, 10,469 lbs. From April 28th to November 1st, 1906, 8837 lbs., when she was still giving 20 lbs. per day. Her last record would no doubt have been better, but for injuries received through being knocked over by another cow at the Dairy Show.



A. Channel Islands (Cross-Bred) Cow, "Doctor," at 24 Years Old.
Many prizes, including the Lord Mayor's Cup in 1905 at the London Dairy Show.
Owned by Captain J. Smith Neill, Wendover Lodge, Wendover, S.O. (see page 230).



B. Guernsey Cow, "Queen of the Roses."
A great prize-winner, including first at London Dairy Show, 1904, and first at B. and W. Show, 1905.
Owned by E. A. Hambro, Haynes Place, Kent.

[*Both photos by G. H. Parsons, Alsager, Cheshire.*

CHAPTER XII

BREEDING AND MANAGEMENT OF CALVES

Management of Cattle—Calves—Methods of Rearing—Estimated Cost of Rearing and Feeding—Diarrhœa—White Scour and its Contagious Form—Castration—Treatment of the Growing Calf—Ringworm—Lice—Warts and Angleberries—Method of Throwing—Speying.

IN a system of good management it is essential to employ stock of good quality, though for ordinary purposes not necessarily belonging to the strains of blood most run upon, and, consequently, commanding the highest prices. Dealing in fancy animals and fancy prices, is more or less a special business involving some degree of speculation, and requiring special skill and an abundance of spare capital, such as the ordinary farmer does not possess. Much well-bred stock does not come within this category, but is of a kind suitable for a farmer working on ordinary commercial lines.

A calf should have its mother's milk, and that only, for the first five to eight days. "Beastings" or colostrum—the milk secreted during the few days after calving—is the best food for the calf, and it is unfit for other purposes. It frequently contains streaks of blood, especially in the case of heifers of the first calf. Butter can be made from "green milk" rather sooner than cheese, but it is a mistake to use milk from newly calved cows for any other purpose than that of feeding their calves, until it becomes normal in composition and will boil without coagulation.

Analysis of first-day **Colostrum** and average **cows' milk**:—

	Colostrum (1st Day).	Cows' Milk (Average).	Solids (Normal Milk) per Gallon.
Water . .	78·7	87·30	...
Butter-fat .	4·0	3·75	6·0 oz.
Milk Sugar .	1·5	4·75	7·6 oz.
Albumen .	7·5	0·50	·8 oz.
Casein . .	7·3	3·00	4·8 oz.
Mineral ash .	1·0	·70	1·1 oz.
	100·0	100·00	20·3 oz.

Colostrum, having nearly five times the amount of albumenoids, is an extremely nourishing food with laxative tendencies, and is thus peculiarly well suited to the wants of a new-born calf. Normal milk is such a poor and unsuitable substitute for it that it is no wonder calves deprived of their natural food and put too soon on ordinary milk thrive badly and suffer from scour.

In rearing, calves may be—(1) tied by the neck; (2) kept singly in small cribs; or (3) let run together, loose, in a large, dry, well-ventilated place. When loose they are liable to suck each other about the navel, and produce enlargement and often rawness of the part. To prevent this, calves are sometimes muzzled by putting on a bridle with sharp spines projecting upwards from the nose, to prick other calves and prevent them standing to be sucked. It is a good practice to give artificial food, such as finely ground cake, immediately after the meal of milk, to take up the attention of the calf until the strong instinctive desire to suck passes off. Hay-racks and small boxes for cake should be fitted up on the side of the wall of the crib or calf-house at convenient heights.

Concrete, being easily cleaned, makes the best floor for all cattle-houses. There should be sufficient fall into open channels in preference to covered drains, to prevent urine stagnating in pools. The channels should be regularly swilled with water to prevent the occurrence of sour or putrid odours, which are specially objectionable in a calf-house.

There are three common methods of Rearing Calves:—

1*st.*—Allowing the calf to suck its mother. This is the most natural way, and produces the best calves for the showyard or for fattening, but it is expensive, and the calves grow up wild unless frequently handled. There is a greater mortality when foot-and-mouth disease breaks out among sucking calves than among hand-fed ones, as a change to healthy milk cannot be made if the mother becomes affected, and the virus of the disease in such milk is liable to act as a blood-poison to the calf. Bulls and pedigree show-stock, especially in beef-producing breeds, are often allowed to suck cross-bred foster-mothers, owing to the deficient milking powers of the pure-bred females. Less milk sucked from a cow suffices, as compared with hand-feeding, and "farrow" cows giving little milk may rear good calves. Two store

calves are often fed at the same time by one cow when she yields a sufficient supply of milk. After the first two are weaned, at eleven or twelve weeks old, another pair may be put to the cow, and finally a single one as the flow of milk lessens at the end of the season. An additional calf can be easily given to a cow by chaining it to her own calf so that she cannot prevent it sucking, although the practice is attended with danger to the calves if a cow should rise while the calves stand one on each side. They have been found hanged and suspended by the chain passing over her back. The drawbacks to this system are—the difficulty of getting a supply of good calves; the great mortality among very young calves that are moved about and deprived of their natural food and green milk; and the fact that calves reared in this way are far from being a level lot. They should be trained to eat linseed cake before weaning, so that they may be tided over that critical period without loss of flesh. The attendance necessary can be got among the cottagers on an ordinary farm for about 7s. 6d. each calf.

Sometimes the last of the milk is drawn by hand, and is much richer in cream than the first part. A cow which suckles a calf is none the worse for milking purposes in the following year, although some dairymen are prejudiced against cows which have been so treated. Should a cow be sucked for a number of years, the milking qualities are liable to be impaired, and breeds which rear their young by suckling are never heavy milking dairy cows.

2nd.—Giving full milk alone, newly drawn from the cow, when the milk is about 90°F. A calf is taught to drink from a pail by giving it a finger and keeping its lips down in the milk, so that while sucking the finger it draws in the milk. In a few days it will drink without the finger. An ordinary Shorthorn calf should receive for a day or two a daily allowance of ¾ gallon of milk divided into three meals. The calves of smaller breeds require smaller quantities. Milk should be given in moderate amounts at first, to encourage the development of the calf's instinctive desire to satisfy the cravings of hunger, and train it to drink freely. Increase should consequently be gradual. Some calf-rearers only feed twice a day, although it is better to do so three times. The amount should be increased to 2 gallons by the

end of the fourth week, and to 2½ at three months; then the calf may be weaned by gradually reducing the amount. Some continue to feed with milk for six or even nine months, in the case of pedigree stock, including young bulls, which require to develop quickly to suit show and market purposes. Dry cake and long food are also given in gradually increasing quantities when the calf is old enough to eat, and able to digest them. This method is expensive, and therefore not much practised. Fattening calves should have as much milk as they will drink, and they should also be kept quiet and in the dark.

3rd.—Giving the full milk of the mother for a few days, and finishing with fortified skim milk or milk substitutes. The calf at birth should be rubbed with straw, or simply covered up with straw, to keep it warm until it dries, and the cow should not be allowed to lick or even to see it, as this unsettles her when the calf is at last removed. Many allow the calf to suck for three or four days, among other reasons as an excellent precaution against milk fever, and then take it away; but the ordinary dairy cow in moderate condition is apt to fall off in milk, the flow of which does not always return to the full extent. When the calf is a week or ten days old, the new milk may be gradually reduced, and skim milk made up to a proper proportion by artificial substitutes, such as boiled gruel, given at a temperature not exceeding blood heat. It is a good practice to begin with a table-spoonful of boiled linseed until the stomach is accustomed to digest solids; a larger quantity would cause indigestion. An excellent mixture to follow the linseed, as the calf grows older, is half and half linseed meal and pea meal, given after cooking. Ground linseed cake may be used in place of linseed meal, and may then form two-thirds of the mixture. Oatmeal is a good ingredient, but it is more liable to produce acidity if the feeding be not well and regularly attended to. Cotton-cake should not be used; it kills young calves, as they cannot digest it. One gallon of skim milk per day with mixed meal, gradually increased to one pound and then to two pounds, is enough for an ordinary calf before weaning. In the last stage, sweet whey is sometimes substituted for milk, or one quarter of the meal may be the Lactina preparation. Calves are fond of the latter, but it

seems to be rather dear, and the cooking of it requires great care being taken that the water used in mixing is quite boiling, else calves fed on it scour and get thin in condition. Much less milk than that stated above is often made to suffice. The milk from one Ayrshire cow, aided by artificials, has been known to rear sixteen calves in one season; and in the summer of 1884, a good Shorthorn cow, in the neighbourhood of Horsham, supplied all the milk given to twenty-four Shorthorn cross calves. This is carrying the use of milk substitutes rather far, when separated milk is to be had at extremely moderate prices, and when such milk dried by the Just-Hatmaker process (see p. 699) and fortified with a digestible oil can be secured wholesale to supply calf feed, which, on being prepared by the addition of water at blood heat, will cost only 2d. per gallon. However useful substitutes may be when an animal is a few weeks old, there is no doubt that to follow Nature's plan of feeding mostly on milk in the early stages of the life of a calf is the most economical.

Estimated Cost of Rearing a Cross-bred Calf for Feeding Purposes till it is Two Years Old.[1]

Calf at birth, say			£2 0 0
Summer, 6 months.			
Grass and milk for 4 months:			
1st. If suckled, mother, 2 acres at 20s.			
2nd. If hand-reared, milk, etc.			
To 2s. 6d. per week for 16 weeks			2 0 0
Young grass or foggage (and cake for 2 months):			
Say ½ acre at £1 per acre	£0 10 0		
Cake	0 7 6		
			0 17 6
A calf at 6 months would cost			£4 17 6
(If worth £5, 10s., profit 12s. 6d.)			
Wintering, 180 days.			
Turnips, ¼ cwt., 1½d. per day	£1 2 6		
Cake and meal, 2 lbs. „	0 15 0		
Straw, hay, attendance	0 15 0		
			2 12 6
			£7 10 0
(A yearling, probably worth £8, 10s., gives £1 of profit)			
Second Year.			
Grazing, say 1½ acres at 20s. per acre			1 10 0
			£9 0 0

[1] By Dr Shirra Gibb, Boon, Lauder, N.B.

(An 18 months' stirk should then weigh probably 7 cwts., and be worth, at 30s. per cwt., £10, 10s.)

If the price to the feeder be £10, 10s., the profit for 18 months to the breeder and grazier would be £1, 10s., less interest, say 10s. = £1.

Feeder's price, 7 cwt. at 30s.		£10 10 0
Turnips, ¾ cwt. per day at 4d.		
Feeding stuffs, say	4½d.	
Straw, hay, attendance,	½d.	
	9d.	
180 days at 9d.		6 15 0
Interest		0 5 0
		£17 10 0

If fat, a 2-year-old after 6 months' feeding should weigh 10¼ cwt., and bring 36s. per cwt. (an increase of about 2 lbs. live-weight per day).

Which = say £18, 10s. 0d., leaves £1 for 6 months' feeding.

By this calculation the breeder and grazier has the animal for 18 months at a cost of £9, and has £1 for profit and risk. The feeder has the animal for 6 months, spends on it £7, and has also £1 for profit and risk.

White scour (associated with *Tympanitis* or "hoven" from indigestion) often breaks out even in sucking calves, when they begin to eat hay. A young calf's stomach is too small, and it is also in other respects unsuited for digesting such dry food. Green forage or silage, in place of hay, is better; but when a calf is a few weeks old, hay of fine quality may be used in moderate quantities. In the case of hand-fed calves the milk, on the outbreak of scour, should be given oftener than twice a day. The undigested curd produces a light colour of fæces, the acid in the stomach having expelled the whey, and made the curd hard and cheesy. *Remedies.*—In young calves, diet by feeding often and reducing the quantity of food supplied at each meal, giving boiled starch and less cream if the milk be rich. Administer a stimulant and purgative, such as a mixture of powdered rhubarb and magnesia, 4 drachms, along with 15 to 30 grains of ammonium carbonate, two or three times daily in flour gruel. Two to 4 oz. of castor oil may at times be substituted for the rhubarb and magnesia; and, when calves are older, 4 to 6 oz. of Epsom salts, and ¼ oz. of gentian and ginger powder, may be given.

A deadly diarrhœa may also be induced if the cows are

too highly fed, or if the food is impure or inferior to such a degree that the system becomes fevered, so that an abnormally large proportion of albumen is present in the milk. Excess of albumen, inducing convulsions, often occurs in calves fed on undiluted Jersey cows' milk. The albumen precipitates in the calf's stomach, and is made hard and indigestible by the acidity which develops. The irritation throughout the alimentary canal, no doubt intensified by some alkaloid poisoning, induces death within a few hours. *Treatment* must be directed towards the restoration of the normal condition of the cow, and while this is progressing, to treating the milk so that the excess of albuminoids and other deleterious matters is rendered innocuous. This may be to some extent accomplished by a local but successful method of "burning the milk" by stirring each pailful with a red-hot bar of iron.

The contagious form of white scour is an extremely fatal disorder among calves. It appears, generally, when large numbers are crowded together under insanitary conditions associated with faulty feeding. Once established, it is difficult to eradicate. The immediate isolation of affected cases and stringent disinfection is imperative. Professor Nocard was employed by the Board of Agriculture for Ireland to investigate the disease.[1] He discovered that it was due to the presence of a microbe which got into the calves' blood circulation by the navel, but which might be present in large numbers in milk-fed calves without doing injury. When the bacteria were artificially cultivated outside the body of the animal and healthy calves inoculated, white scour was invariably produced and death occurred. The navels of calves which died of the disease in the natural way were found to be diseased. He believed that the microbes "are present in the genital passage of the cow, on dirty straw or hay, and on the floors of cow-houses and calf-houses, and in fact on everything about a farm where 'white scour' is prevalent." Calves that survive an attack of white scour are very liable to die of a lung disease which is a frequent sequel to it. *The preventive methods* recommended are as follows: — Thoroughly disinfect the cow by a warm 2 p.c. solution of lysol;[2] tie the

[1] See the Board's leaflets on White Scour in Calves, Nos. 11 and 11(A).

[2] Carbolic acid, 5 per cent., may be substituted for lysol, and iodoform for iodine.

navel of the calf immediately after birth with twine which had been kept in a solution of lysol; immediately brush over the hanging end of the navel and the surrounding parts with a solution containing methylated spirits, 2 pints, and iodine, 35 grains, and, after drying, with a thick layer of collodion containing 1 per cent. of iodine, or with Stockholm tar; remove the calf to a bed of clean carbolised straw.

The concrete floors of cow-houses and calf-houses require thorough disinfection before calving, and once each week after, with a solution of 2 lbs. bluestone (sulphate of copper) to every 3 gallons of water; and a calf should be fed on its mother's whole milk for four weeks, and, when separated milk is gradually substituted, it should be fortified by 2 oz. per day of the best cod-liver oil, or a flaxseed mucilage prepared by hot water.

All calves should be taught to eat linseed cake before weaning, in order to make the change as slight as possible at that time; and each may be allowed 1 lb. per day all summer, especially when the land is subject to anthrax or black-leg. The cake keeps the animals thriving all the time, and they are in consequence less liable to contract disease. A seton put into the dewlap is also widely believed to be a preventive, although the reason of its success is not satisfactorily explained. A vaccine of attenuated virus soaked into a thread, and introduced by a needle into the subcutaneous tissue of the tail, is now largely used in this country, and reported to be a successful means of prevention.

Castration should be done when the calf is a month old; if much older, the animal ceases to thrive for a time. When the operation is not performed till strong masculine characteristics develop, the resulting steer (then called a "seg") is reduced in market value, owing to its bull-like appearance and supposed coarseness of flesh. Many cross-bred Irish bulls which, owing to the neglect of their breeders, who are usually small crofters, have missed castration, are best fed off when they get to two years old without being castrated. If they be finished at any period exclusive of the active breeding season, the flesh has no objectionable flavour, and sells at good though not top prices. To castrate a bull at this age may imply the loss of two months' feeding, unless the Indian process of *kutne* be introduced. By it the skin is not

cut, but the seminal ducts are ruptured by a few taps of a rounded smooth stone on the strings of the testicles, the neck of the scrotum having been stretched over some solid smooth substance placed underneath (see *Indian Agriculture*, p. 70).

Bulls should be taught to lead before they are a year old, either by "bulldogs" or "humbugs," or by a ring put through the gristle dividing the nostrils. At a year they may serve heifers or small cows, but if not quite large enough should not be allowed to take an advantage, say on a hill side or slope, as under such circumstances a bull is liable to fall and injure his back. Bulls are now more docile than of old, in a great measure due to their being more gently treated. While at service they should be maintained in good store condition, and each may have daily, according to size, up to 6 or 8 lbs. of mixed meal or bruised grain. With this they are usually more sure, and get better calves than when fed on cake.

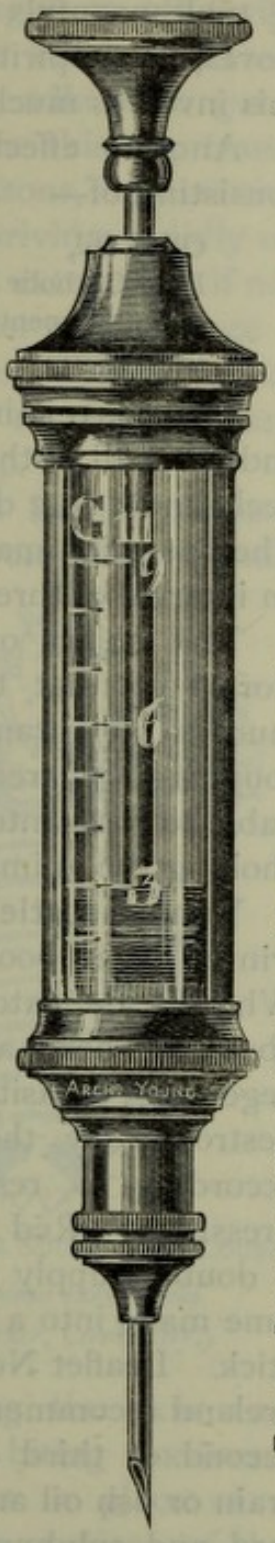


FIG. 4.—PROFESSOR W. O. WILLIAMS' INTRATRACHEAL INJECTION SYRINGE (REDUCED ONE-FIFTH).

Calves should be housed for the winter early in October, when cold nights come, to save flesh and to prevent "husk" or "hoose" (denoted by the unthriving appearance of the animal, a husky cough, and a discharge from the nostrils) which is liable to occur about this time, or in late spring, especially if calves are allowed to get down in condition. The disease is similar to gapes in poultry, and is due to the presence, often in large numbers, of the nematode worm, *Strongylus micrurus*, in the trachea, causing irritation and inflammation. *Treatment* consists of keeping the animal warm, feeding well, and giving turpentine ($\frac{1}{2}$ oz. to 1 oz.), soaked into dry meal, and then mixed with cold gruel; and repeating once, or perhaps twice, after an interval of a few days. When given

in this way the risk of choking from turpentine is reduced to a minimum. Leaflet No. 40 (*q.v.*) of the Department of Agriculture for Ireland recommends for each calf twice daily 1½ tablespoonfuls of a mixture made up of 1 drachm oil of cloves, 3 oz. spirits of turpentine, and 24 oz. linseed oil; but this involves much labour.

Another effectual remedy is an **intratracheal injection** consisting of—

Olive Oil, . .	100 parts.
Pure Carbolic Acid,	4 parts of each.
Oil of Turpentine, .	
Chloroform, . .	

The sharp point of the syringe is thrust through the skin and the wall of the trachea (windpipe) in the middle of the neck, and 1 to 2 drachms of the mixture are injected into it. The operation may require to be performed three times, with an interval of three days between two operations.

The object of the treatment is to kill or paralyse the worms so that they lose their power of adhering to the mucous membrane of the trachea and can be expelled by coughing. If treatment be neglected too long, the worms are liable to form into a ball too large to eject, and the risk of choking the animal becomes imminent.

Young cattle are particularly liable to ringworm in winter if in poor condition, as imported Irish often are. White scaly patches without hair appear, most abundantly about the head and neck, as the result of the growth of a vegetable parasite, *Trichophyton tonsurans*, which may be destroyed by the application, once, twice, or three times, according to results, of one or other of the following dressings:—Red mercurial blistering ointment made up with a double supply of lard; paraffin oil; carbolic oil; or hot lime made into a thin paste and spread on with a flat-pointed stick. Leaflet No. 45 of the Department of Agriculture for Ireland recommends the application with a stiff brush every second or third day till cured, of a mixture of one pint of train or fish oil and half a pound of sulphur, or a mixture of lard and sulphur. Even treacle smeared carefully over the surfaces of the affected parts has proved successful. The last destroys the organism by excluding the air which is necessary for its existence; the other substances directly poison it.

The inside walls of the cattle-shed and the wood-work with which the animals come in contact must be whitewashed with fresh lime-wash "to which has been added 1 pint of paraffin per gallon," after an outbreak of ringworm, otherwise the cattle wintered in it the following year will be affected. The organisms producing ringworm also adhere to gates and rubbing-stones in the fields, and are in this way transferred to fresh lots of cattle in succeeding seasons, if preventive means be not taken. When cattle are thriving rapidly on good pasture, the spots disappear to a great extent, but if not treated, spores persist till the following winter and produce a fresh outbreak. Cattle bought in an open market where ringworm is seen, should be washed as a precautionary measure with a solution of carbolic sheep dip.

Lice of two common species appear on British cattle—(1) the large, or broad-bodied, or sucking ox-louse, *Hæmatopinus eurysternus*, which lives by piercing the skin and sucking blood; and (2) the small or biting ox-louse, *Trichodectes scalaris*, which has biting jaws in place of a sucking mouth, "and feeds on the decaying portions of the cuticle and hairs," and not on blood. Both are insects with six legs, and both do injury by causing irritation, the sucking one to the greater degree. If cattle of any age be

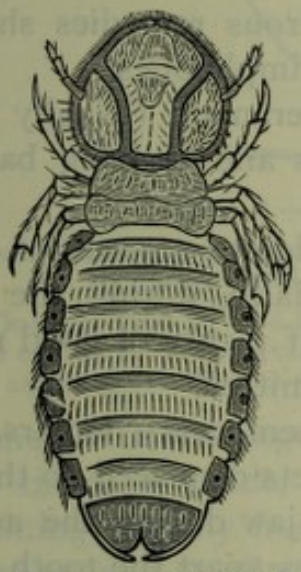


FIG. 5.—SMALL BITING OX-LOUSE
Trichodectes scalaris

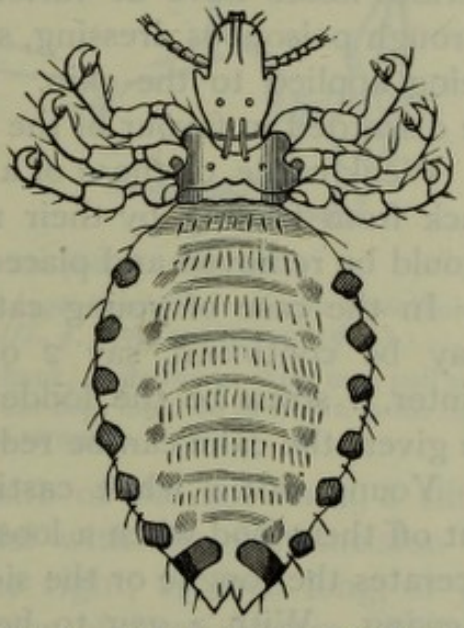


FIG. 6.—LARGE SUCKING OX-LOUSE
Hæmatopinus eurysternus

(*After Drawings made by the late Professor Allan Harker, Cirencester.*)

allowed to become too lean, be kept too hot in a close house, or fed for a time on insufficient food, as barley-straw or flying-bent (*Molinia*), or any other inferior hay, they are liable to become infested with lice (usually both varieties together), most abundantly about the rump, head, neck, and shoulder tops. Lice may be destroyed by one or two dressings, well rubbed in, of train oil, sour butter-milk, black soap, or any of the various carbolic dressings. Paraffin oil is effectual, but requires care in application. Anything which would injure the cuticle or poison the animal (see p. 262) in the event of its licking the skin, which it should do regularly, must be avoided. Tobacco and the seeds of stavesacre are used in decoctions as dressings for lice. They cause poisoning if taken in by the animal licking. "*The symptoms* are those of nausea, attempts to vomit, diarrhœa, and convulsions, and the treatment is to give stimulants." Serious losses have at various times occurred among stock through poisonous dressing, such as blue mercurial ointment, being applied to the skin. All dangerous remedies should be discarded in favour of the safe and simple ones.

Weak cattle, or those of a soft temperament (usually kept back from feeding by their neighbours and thriving badly), should be removed and placed apart.

In the case of young cattle, a moderate amount of cake may be continued, say 2 or 3 lbs. daily, during the first winter, if straw be the fodder used. If plenty of good roots be given, the cake can be reduced or omitted.

Young cattle, while casting their temporary molars, are put off their food when a loose molar gets displaced so that it lacerates the tongue or the side of the jaw during the act of chewing. With a gag to hold the jaws apart the tooth may often be removed by the fingers, or, if too firm, by forceps.

Warts, or angleberries, on the udders, teats, and bellies of cattle are, if pedunculated, easily strangled by a ligature of catgut or thin twine tied round the neck; but when they grow on a broad base, the animal has to be cast, the warts removed by the knife, and the parts seared with a hot iron.

Speying of heifers that are not to be kept for breeding is best done between the ages of one and nine months. Old cows may be operated on with safety, even to within three weeks of calving. Cold, wet weather should be avoided, as

well as a period when pastures are dry and the solid excrement hard. There are **two methods** of speying :—(1) **Ovariotomy,** in which the ovaries are extracted—a painful operation attended with hæmorrhage and often considerable mortality. (2) **Webbing** or severing the Fallopian tube and withdrawing the weblike structure, which has given origin to the name in common use in Australia—a safe, simple, and painless process. **The operation** in adults involves a clean perpendicular slit in the skin, 4 inches long, nearer the hook-bone than the last rib on the left side. After the wound in the hide has been

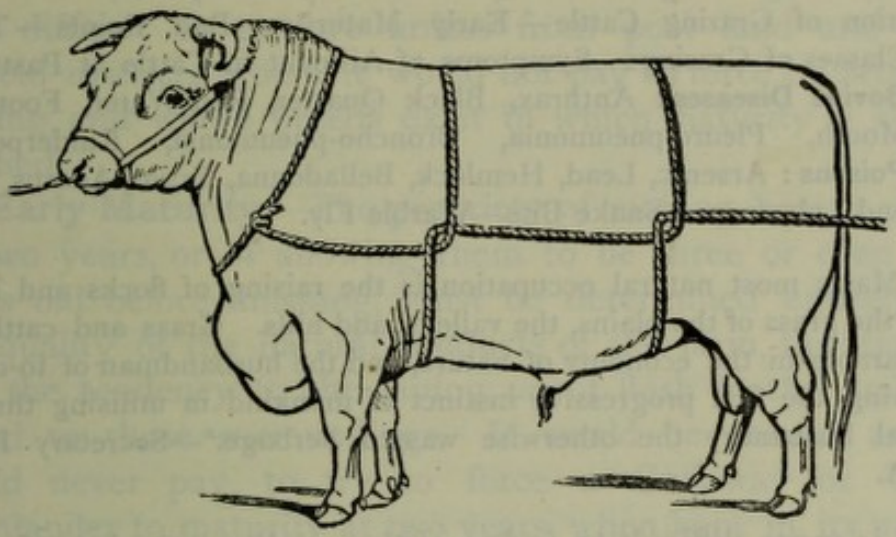


FIG. 7.—ANIMAL ROPED FOR THROWING.

(*From Clem Stevenson's article on Aberdeen-Angus Cattle in the Kansas State Board of Agriculture, 13th Report, Part III., p.* 357, 1901-2, *pub.* 1903.)

One man pulls forward by the halter shank, while two or three men pull at the loose end of the ordinary cart rope which has been fitted on as shown in the figure. The animal generally goes down without a struggle.

opened with the finger and thumb of the left hand, a slit in the tissue is made, not parallel with the first incision but inclining slightly from it to the right, 1¾ inch long, or just large enough to allow the insertion of three fingers, which on being twisted round procure the admission of the left hand and arm. When the Fallopian tube is reached two fingers are passed round the web, the hand is then turned and sharply withdrawn with the web adhering to the fingers.[1] It is clear, however, from the experiments of physiologists, that whereas webbing could not fail to bring about a condition of sterility, it is incapable of exercising an influence over the general metabolism like that induced by ovariotomy.

[1] Indebtedness is due to Robert Christison, of Lammermoor, Queensland, and 5 Lawn Road, London, N., for the foregoing facts on speying.

CHAPTER XIII

GRAZING CATTLE, THEIR DISEASES AND POISONS

Selection of Grazing Cattle — Early Maturity — Bad Points — Three Classes of Grazings—Symptoms of Ailment in Cattle at Pasture—**Bovine Diseases:** Anthrax, Black Quarter, Red-Water, Foot-and-Mouth, Pleuro-pneumonia, Broncho-pneumonia, Rinderpest — **Poisons:** Arsenic, Lead, Hemlock, Belladonna, Ergot, Acorns, Yew, and Laburnum—Snake Bite—Warble Fly.

"Man's most natural occupation is the raising of flocks and herds upon the grass of the plains, the valleys, and hills. Grass and cattle are inseparable in the economy of nature, and the husbandman of to-day is following the first progressive instinct of mankind in utilising through animal husbandry the otherwise wasted herbage."—Secretary HAYS, U.S.A.

IT is more difficult to judge of the quality or value of store cattle than of fat ones. The most important rules for guidance in this matter cannot be learned by reading. A man must get to understand animals instinctively through long experience and intimate connection with them, to be able to judge of the possible outcome from the appearance at any time. In buying, one ought to learn how the beasts have been kept for some months previous to the time in question, and never take those from a better climate or which have been accustomed to better food than is to be had in their new quarters. Cattle moderately fed, and not kept too warm in winter, are generally acknowledged to have done better when the end of the grazing time comes than those which have been well fed but kept in close byres: in the latter, the hair tends to fall or rub off too early in the season, leaving them too little of their natural hirsute protection when turned out to grass in spring. Those that lie out all winter often in the end do best, if not too lean at the beginning of the season; the extra constitution gained by being out and living under more

natural conditions enables them to make up more than the winter's loss of flesh. To those not fed on cake during winter, a few pounds per day, given for five or six weeks before they go out, affords a good start, and "comes out" afterwards in "extra condition." Cattle at three or four years old arrive more quickly to maturity than two-year-olds, and "kill better" than they look, having more internal fat, and being "better made up," though they lay on a smaller amount of beef in a given time during the period of their existence (see p. 281). Three-year-old grazing cattle are now difficult to procure unless from poor land and high or cold districts, where it would not pay to force by artificial feeding, and where breeds exist in which maturity is slowly reached.

Early Maturity.—The propriety of making beasts prime at two years, or of allowing them to be three or even four years old before finishing, must be determined entirely by the quality of the natural products of the farm, the climate, and the tendency to the laying on of flesh in the animals suited to those surroundings. It would be absurd, and it would never pay, to try to force a Galloway or West Highlander to maturity at two years, when kept in its native conditions. Time must be allowed for the purpose of overcoming local natural disadvantages. It would be an equally bad practice, with a good climate and the best of food at hand, where animals of a breed accustomed to mature rapidly would do best, to keep them a year longer than necessary. A large proportion of food (and in this instance expensive food) is burnt up to supply the waste of the system; so that keeping animals till three years old, when by proper management they could have been fat at two, increases the loss by at least one-third of food substance. (See Appendix L for fig. of cattle dentition.)

The points of a good feeding animal are very much those already described at p. 52, in treating of the characteristics of all flesh producers. M'Combie says, the following denote slow feeders: "Deep neck; thick ['trousery'] legs and tail; thick skin, with hard hair and hollow eyes."

Grazings in this country may be divided into three qualities:—(1) **First-rate pasture,** which is rented at three guineas, four guineas, or in some instances (which are admitted

not to be numerous) even five guineas per acre. The extent of this land is not great, and much of it is annually let by auction. It is found in Leicester, Nottingham, Somerset (the marshes), in the Lincoln and Cambridgeshire Fen land, over parts of the Old Red Sandstone of Herefordshire, and in many small areas along the banks of rivers. These pastures are capable of feeding large bullocks without cake, and often an area less than an acre per bullock is sufficient. Sometimes an extra sheep per acre is put on. Sheep eat numerous weedy plants in pasture which cattle reject—for example, ragwort, *Senecio jacobæa;* knapweed, *Centaurea nigra;* and oxeye daisy, *Chrysanthemum leucanthemum.* Cattle do not thrive nearly so well on pasture of superior quality if sheep are kept on it during winter, as they eat out some of the finer grasses. The grass season in England is from about 1st May till the beginning of November. At first, if the growth of grass be backward, a little hay may be given with advantage. Thistles, nettles, and all large weeds should be cut regularly before seeding, and tufts of coarse grass also mown. Dung can be either spread on very good pasture or, better, carried off to prevent the growth of dark green "tathy" patches. It is considered a sign of good land to have a perfectly even surface, and a very close cover, which should not be allowed to become too long. Very fine pasture has often a velvety feeling under foot. Two lots of cattle can be made prime fat on the same land in one season—the first going off by the first and second weeks of July, having gained, without receiving cake, 8 or 9 stones of beef. The land is allowed to clean by resting for ten days.

The second lot of cattle, not being so far forward or so good in spring as the first, would, while the best cattle occupied the best pasture, be kept on pasture slightly inferior to it. These require a few pounds of cake, as the grass begins to fall off in quality at the end of September and in October. Some graziers think it pays to give cake to cattle even on the best pasture throughout the whole season, but this must entirely depend upon the rent of the pasture and the relative prices of cake and beef.

A few rough beasts (perhaps one for every four or five acres) kept to clear off rough grass, run out all winter, and do remarkably well, if sheltered from cold winds, and if 2 or 3

lbs. per day of undecorticated cotton-cake be given, and a little fodder in time of snow.

The shelter necessary is either natural—as trees and depressions in the ground; or artificial—as stone walls, hedges, and shelter-sheds. In Leicestershire, straw is sometimes thrown under the hedges to make a comfortable bed for cattle in summer.

(2) **Second quality pasture,** suited for feeding the lighter breeds or smaller animals, is rented at from about £2 to £2, 10s. per acre. If these are being finished they should have cake or cake and meal all the time (beginning with 3 or 4 lbs., and ending with 6 or 7 lbs.), given in troughs moved regularly from time to time to different parts of the field, to distribute the manure equally. By giving cake, beef is produced faster, and of better quality; the land is also gradually improved by the increased amount and value of the droppings, and will consequently "carry" more stock.

(3) **Third quality pasture,** rented at from about £1, 10s. down to a few shillings per acre, is useful only for keeping store cattle or sheep, or, in some localities, dairy cows. The land is often good, but the climate unsuited for fattening beasts. Besides hill and mountain lands, the various downs belong to this class.

Symptoms unnatural to healthy Cattle at Grass, which may be seen without handling them:—(1) An animal away by itself, if accustomed to go with others, and perhaps cowering behind a wall with its back up; (2) not stretching itself on being quietly raised; (3) with hair standing on end, "staring"; (4) showing the absence of lick-marks on the hair; (5) with saliva flowing from the mouth; (6) not feeding or chewing the cud for any length of time; (7) thin in condition of body; (8) blown out at the sides by gas formed through stoppage of digestion; (9) with a peculiarity in the movement of the head or limbs; (10) with quick breathing, or a cough; (11) with hollow sides consequent upon want of food.

The hollow condition of a heifer "a-bulling," from want of settling to feed, must not be mistaken for disease. She then stands quietly while another of the herd jumps upon her from behind, and she in turn tries to jump upon others, which however do not stand.

In addition to visible signs, the extremities, including the horns, may be cold, and the skin tight and cold to the touch; the temperature may also rise from the normal state (100° or 102° F.) to 104° or 106° in the more ordinary forms of disease, such as pneumonia and garget, and even 110° may be registered in a case of rinderpest.

The commoner or more important bovine diseases which reduce grazing profits are the following:—

Anthrax is a widely distributed infectious febrile disease due to the presence of the *Bacillus anthracis* in the blood. Cases in one lot of cattle usually occur singly, the disease not being directly communicable by one animal to another, or yet by an anthrax carcase. Animals shut in a small enclosure beside such carcases and kept there till the carcases broke up and the animals gnawed their affected bones, have not contracted the disease. The spores, which develop when affected blood is exposed to the air, become extremely resistent to change of temperature, and even to germicides, and may lie dormant for years until a natural habitat is found in the blood circulation of an animal, and the spore develops into the bacillus which produces the disease. Blood should on no account be permitted to escape, or the ground inoculated will be a source of sporadic infection for years. The carcase should be disposed of according to the Board of Agriculture regulations without the skin being broken—either burnt, or buried 6 feet deep in flour of lime in a dry sandy or gravelly sub-soil—and the surface of the probably infected part of the field heavily dressed with hot lime.

The course of the disease is extremely rapid—taking only a few hours from the first appearance of illness. Still undoubted cases of recovery have been recorded. The animal becomes greatly depressed and separates from the others—the temperature rises to 107° F., diarrhœa develops, rigors and weakness of the hind quarters occur, there is great difficulty in breathing, and blood passes through the anus and at times in the urine. Decomposition after death is rapid. Poisoning from consuming meadow saffron, *Colchicum autumnale*, and bracken poisoning, are the only disorders similar in symptoms to anthrax. The most effective preventive remedy against anthrax is inoculating according to the method introduced by Pasteur.

Black Quarter, Quarter Ill, or **Joint Murrain,** is an infectious disease due to a bacillus that morphologically resembles that of a malignant œdema. Young cattle and sheep are liable to the malady. Infection usually takes place by inoculation through a wound on the skin, or perhaps of the mucous membranes. Intense inflammatory swelling, bloody œdema, and emphysema of the tissues result, and a general condition of poisoning from the poisons (toxins) produced at the local lesion. (See pages 383 and 671.)

The symptoms are loss of appetite, lameness, a hot swelling (usually in a hind quarter), which is at first painful, but rapidly increasing becomes painless, cold, and crepitating on being touched, owing to the presence of gas in the tissues.

Treatment is usually of little avail, but, if discovered in the early stage, the swelling should be cut into and washed with a strong antiseptic, as 5 per cent. solution of carbolic acid in water. Old-fashioned graziers still introduce, with what is widely reported to be satisfactory results, a seton, which is kept open by a piece of twine drawn through it, in the dewlap of their calves at six months old. The belief is that the open wound secretes an antidote, which is absorbed into the system of the young susceptible animal and acts as a preventive of the disease. But inoculation with a Pasteur Co.'s vaccine prepared for this specific disease is more scientific and is now fairly reliable, a small percentage only dying of the effects of the inoculation.

Of the **Red-water, Black-water, Blood-Murrain,** or **Muir Ill,** which has not been generally associated with the red-water of tick-infested countries, Professor Wm. Williams said:—

"I am induced to conclude that the disease originates in an impoverished condition of the blood arising from want of proper food, that the albumen of the blood is thus degraded in quality, and as such is unfit to be appropriated for the nourishment of the tissues, and is consequently excreted by the kidneys and expelled from the body."

It is more common in females than in males, and more common in heifers than in cows; and it very frequently attacks cattle turned into coppice woods or on to moorland, coarse and marshy pastures, where the food is of inferior quality.

Symptoms.—The temperature rises; the urine, which is increased in quantity, is red in colour; constipation sets in, and is sometimes followed by diarrhœa. The animals have a poor and unthrifty appearance; they totter as they walk, and appear weak in the loins; the membranes are unnaturally pale, and anæmia is marked.

Besides the acute form, which runs its course in a few days and is seldom fatal, there is also a chronic and usually fatal form, with similar symptoms; but there is no fever, and the red coloration of urine is often intermittent.

Treatment.—Adminster a purgative, preferably Glauber's salts, *sodium sulphate* (at one time much more used than Epsom salts in cattle practice), and give good, nourishing, easily digested food, such as eggs, followed by linseed cake or cotton cake, when the animals are convalescent, and, as a tonic, two teaspoonfuls each of sulphate of iron and powdered gentian.

Preventive means are, keeping cattle out of woodlands that are liable to produce red-water, draining poor wet land, and improving the quality of the pasture by the use of 10 cwts. per acre of slag phosphate on damp places, or 6 to 8 cwts. of steamed bone flour on dry land.

Leaflet No. 63 of the Department of Agriculture and Technical Instruction for Ireland connects one form of the disease with the bite of the common tick, which introduces a parasitic organism into the blood that destroys the red corpuscles. It is the discharge of the remains of the corpuscles thrown off by the kidneys which gives the characteristic colour to the urine of affected animals. The colour is usually dark, "varying from light red to chocolate, or even approaching black." Healthy ticks are thought to be able to carry the disease from an affected animal to a sound one. The great means of prevention is to remove the natural shelter for the tick, such as clumps of bushes and rough herbage. Taking a crop of hay and closely grazing the aftermath, or the cropping of arable land, is found to be a useful means of prevention. Top dressing with 3 tons of lime and 10 cwts. of crushed rock salt per acre has also been found useful. In treatment the great object is to stop the rapid wasting, and to build up strength by careful nursing, and by giving "well boiled oatmeal gruel, boiled flax-seed, and even milk, eggs, ale, and stout."

Foot-and-Mouth Disease is a most acute and contagious specific fever, affecting not only cattle and sheep, but pigs and it is said horses, and even man.

Symptoms.—Smacking of the lips is followed by a flow of saliva. After three or four days the mucous membrane of the lips becomes red, and small vesicles form, which coalesce to produce larger blisters. The nostrils and the tip of the tongue become similarly affected. The animal walks tenderly or limps, and may kick, making a rattling noise with the hoofs. The skin round the coronet and in the cleft between the digits becomes hot, red, and painful. The temperature rises high—up to 105° F. Mortality is not usually great, unless when animals die from want of food or are killed by rough treatment, as was frequently the case in the Argentine Republic during the outbreak of 1900. Sometimes an attack is so mild that, under favourable circumstances for the animal's comfort, its presence is hardly noticeable. The most serious losses occur in flocks during the lambing season, and among cows nursing calves, when the virus taken in with the milk acts as a poison to the young; and in the case of milch cows which go off their milk. Affected animals should be left severely alone, supplied with abundance of soft food and water, and not allowed to trample in mud, manure, or sand, to poison or irritate the lesions about their feet. If they are tame and accustomed to being handled without becoming excited, the sores may be treated with an electuary of treacle, 1 oz., and borax and potassium chlorate, 1 drachm each.

Pleuro-pneumonia is a highly infectious disease of the lungs of cattle, and, on post-mortem examination, is characterised by more or less pleurisy, accompanied by pneumonia, which causes consolidation of the lung substance, which in section presents a marbled appearance. On the examination of a microscopic section, the lymph-vessels and air-tubes are seen to be completely filled with an inflammatory coagulated exudation. The country was freed from the disease by the energetic action of the Board of Agriculture in 1898, and its re-admission is one of the dangers to the cattle industry that the Board has constantly before it.

Broncho-pneumonia[1] is a disease which was brought

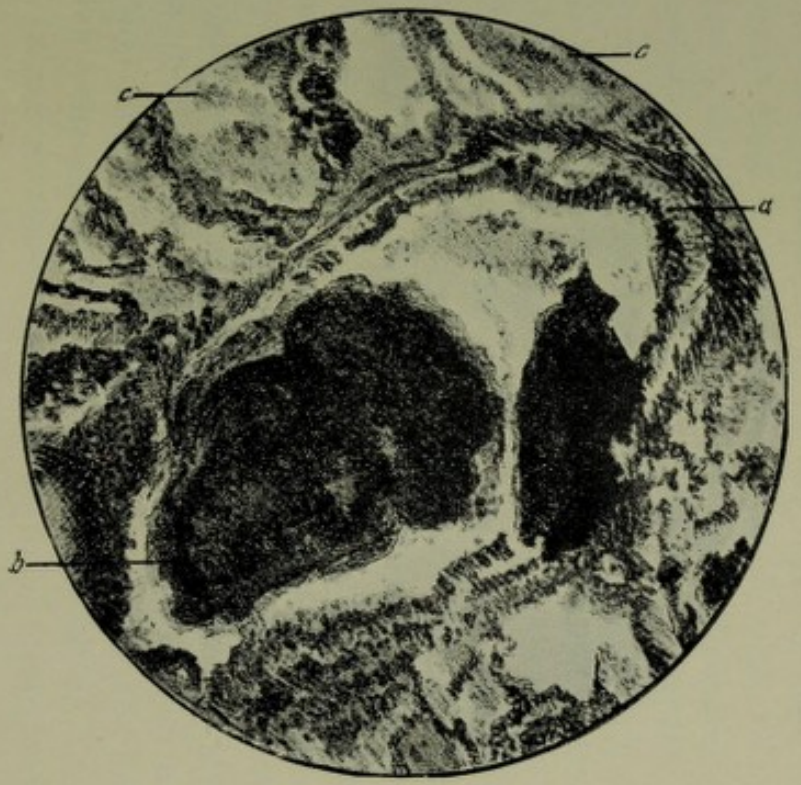
[1] For complete details of appearances, etc, see Williams' *Principles and Practice of Veterinary Medicine*, Menzies & Co., Edinburgh.

into prominence in this country owing to its frequent recurrence among live cattle imported from Canada and the United States of America, and on account of its having been repeatedly mistaken for pleuro-pneumonia. The difference in the post-mortem appearances and in the actual seats of the two diseases makes it extremely unlikely for any one versed in morbid anatomy to mistake the one for the other. In pleuro-pneumonia contagiosa the true seat of the disease is not in the bronchial tubes, although the smaller of these become gorged, as already stated.

Broncho-pneumonia is not a "specific" disease like pleuro-pneumonia contagiosa, but one which originates spontaneously when animals are exposed to cold and wet,[1] especially after being heated, as cattle are during transit by rail and sea. It may fitly be compared with influenza in the human species, not of the epidemic type, but of the old and familiar form of a severe cold. It is termed "cornstalk disease" in America, because it appears in autumn, when the cornstalks are past their best and beginning to decay. The true seat of the disease in broncho-pneumonia is the air-passages, large and small. Although the lung-parenchyma, through which the multitudinous ramifications of the air-tubes pass, naturally becomes congested, it is not subject to such changes as are found in a case of pleuro-pneumonia contagiosa. It is very different with the bronchial tubes, more especially the smaller of them. The desquamation, or, in common language, peeling off, of the columnar cells forming the epithelial lining of the air-passages indicates the seat of the disease. As the alteration of structure does not extend to the blood-vessels, nature may in time repair the injury, if death be not induced at the acute stage of the disorder.

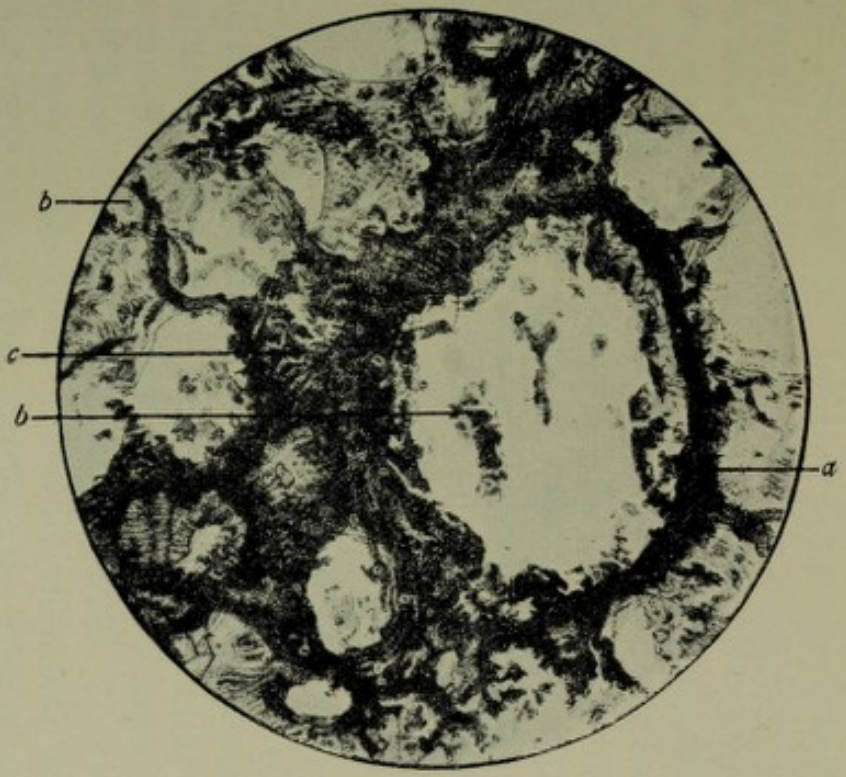
Not only is the fibrinous exudation of pleuro-pneumonia absent in the air-passages, but pus and degraded epithelial débris take its place, and are expelled from the lungs by the act of coughing in a manner corresponding to expectoration in a human being. The differences described are

[1] See a treatise by Dr Frank S. Billings on "Cornstalk Disease," in which the cause is attributed to a micro-organism which is found on the leaves of maize; but as the organism is probably one of the commonest kind, there is not sufficient proof that it is actually the cause of the injury.



A. Pure Pneumonia as seen in Pleuro-Pneumonia.

a. Healthy epithelium of bronchus.
b. Fibrinous plug.
c. Air vesicles containing croupous—fibrinous—exudate.



B. Broncho-Pneumonia as seen in "Corn-Stalk" Disease.

a. Bronchial walls, epithelium desquamating and shed.
b. Catarrhal products in tubes and vesicles.
c. Increased fibrous tissue—fibrosis.

Taken by permission from Williams, "Veterinary Medicine," 1893. Photo-Micrographs by W. Forgan.

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readily determined by the aid of the microscope, but there is a plainly visible characteristic difference in the post-mortem appearances in the two diseases, which in ordinary circumstances is sufficient to guide the observant practitioner.

A "Provisional Order in Council" was passed with the aid of Herbert Gardener (Lord Burghclere), in 1892, restricting the introduction of store cattle from Canada, which had been coming in increasing numbers since 1874. Walter Long, a succeeding President of the Board of Agriculture, carried through Parliament the "Diseases of Animals Act" of 1896, which prohibits the importation of live cattle from abroad, except for immediate slaughter. It is well known that the measure was passed mainly as a result of a mistaken diagnosis of cornstalk disease for pleuro-pneumonia, yet its importance to the great majority of people interested is so great that the House of Commons was fully justified in talking out a bill for its repeal introduced in 1906.

The loss to the country was so enormous from the outbreak of rinderpest in 1864, and from the more recent outbreaks of foot-and-mouth disease (notably that of 1883)—which with pleuro-pneumonia form the three important scheduled diseases—that to run any avoidable risk of reimporting disease is far too dangerous to be lightly incurred. Although Canadian cattle may be free from all of the three chief dangers, there is imminent risk of disease being carried from the United States over an open unprotected boundary line of about 3000 miles long. There are other important, although subordinate, reasons why the restriction on the trade in foreign store cattle should be maintained. The demands of the consumer of foreign meat are best supplied—on the scores of quality, humanity to the animals, and convenience—by the dead-meat trade, to which there is no limit. If the existing embargo were removed, this country would be flooded to overflowing with rough, big-boned cattle from the Western Prairies, which would cost the grazier a small price per live cwt., but could not be ready for the butcher till at least a year older than the butchers' cattle bred at home. The home rearing of good cattle for feeding purposes would be checked, and much land unfit for fattening but well adapted for the breeding and grazing of young stock, especially in Ireland, the North of Scotland, and Wales, would become

derelict. A small body of graziers would probably reap a temporary advantage, as they did prior to 1892, but to their ultimate undoing, and at the expense of the much larger bodies of breeders on the one hand, and of consumers on the other. The result of the introduction of Scotch-fed Canadian beef into the London market was to lower the general price of the best Scotch beef, and drive butchers, who could no longer rely on the uniform quality of beef from the North, to supply their West-end customers, but not at any reduction of price, from the best American chilled hind quarters that could be depended upon.

With the reduction of the commercial cattle-breeding industry of the country, and the development of the dependence of graziers and other feeders upon a foreign supply of cattle which natural circumstances would restrict to the United States and Canada, conditions entirely suitable for the operations of the all-powerful butchers' rings that effectually control the meat markets of the United States would be established, to the injury of the consumer as well as to the ruin of the home producer.

But the injury to the breeders of pedigree stock—one of the greatest and most treasured industries of the country—would be incalculable. At the present time this country possesses the most comprehensive variety of herds, studs, and flocks in the whole world, which it supplies with annual casts of breeding animals at high prices. The more demand there is from abroad, the greater is the encouragement to breeders to produce better stock in greater numbers. There is little wisdom, commercial knowledge, or breeding experience behind the arguments that our flocks, herds, and studs are being depleted by the sale of picked animals to foreign customers. Our animals of superior quality are too numerous for any probable foreign demand to have an appreciable influence upon those left behind. And as it will always be necessary for the foreigner to come back to the fountain-head of British breeds to replenish his stocks, which in new surroundings have an inherent tendency to diverge from the original types, the greater the success of the foreign breeder the better will it be for the home producers of high-class pedigree stock. To maintain and develop the trade, foreign purchasers must be guaranteed against risk from contagious

disease, and this can be accomplished only by keeping it out of the country.

The following official returns show the volume and the trend of the **British Live Stock Trade with Ireland**, now, with the Channel Islands, the only external source of live cattle supply for feeding or milking:—

Annual Imports of Live Stock from Ireland into Great Britain, 1895 to 1905.

Year.	Horses.	Cattle.	Sheep.	Pigs.
	No.	No.	No.	No.
1895	34,560	791,607	652,578	547,220
1896	39,856	681,560	737,306	610,589
1897	38,422	746,012	804,515	695,307
1898	38,804	803,362	833,458	588,785
1899	42,087	772,202	871,953	688,553
1900	35,606	745,519	862,263	715,202
1901	25,607	642,638	843,325	596,129
1902	25,260	959 241	1,055,802	637,972
1903	27,719	897,645	825,679	569,920
1904	27,500	772,363	739,266	505,080
10 years' averages	33,542	781,222	822,614	615,476
1905	30,808	749,934	703,842	363,823
5-year averages—				
1881-85	28,453	653,402	551,827	440,432
1886-90	30,444	685,380	634,206	504,778
1891-95	32,883	712,498	938,203	518,659
1896-1900	38,955	749 745	821,899	659,687

Month.	Horses.	Cattle.	Sheep.	Pigs.
1905.	No.	No.	No.	No.
January	1,782	48,941	19,211	54,666
February	1,689	41,550	11,729	38,172
March	2,100	57,995	10,530	33,884
April	2,679	60,854	13,738	23,482
May	3,990	47,486	54,379	15,696
June	2,934	45,754	107,326	8,329
July	2,951	36,660	154,036	5,524
August	3,247	46,090	120,746	8,369
September	2,839	89,454	96,818	26,466
October	2,756	120,877	51,690	39,027
November	2,126	104,180	38,144	51,220
December	1,706	50,093	25,533	58,988

The following figures, relating to cattle and sheep for immediate slaughter, and **other animal products,** are interesting in this connection:—

Values of Annual Imports into the United Kingdom of certain Articles of Live Stock Production.

	1903.	1904.	1905.
Cattle, for food . .	£9,209,122	£9,736,436	£9,665,806
Sheep, for food . .	546,063	591,984	278,753
Beef, fresh . . .	8,366,141	8,058,341	8,911,593
Mutton, fresh . .	7,826,062	6,861,531	7,336,480
Bacon	13,619,140	12,832,142	12,774,855
Hams	3,142,574	3,104,999	3,118,372
All Dead Meat . .	39,439,940	37,120,618	38,467,503
Poultry and Game .	1,202,288	1,217,277	999,480
Eggs	6,617,599	6,730,574	6,812,476
Cheese . . .	7,054,710	5,843,770	6,339,742
Butter	20,798,707	21,117,162	21,585,622
Margarine . . .	2,313,618	2,494,467	2,736,286
Lard	3,870,774	3,342,389	3,692,573

Rinderpest or **Cattle Plague** in its home on the steppes of Russia, in Tartary and Japan, is a chronic enzootic malady, and only a moderate proportion of the animals attacked die; but it is the most virulent and deadly of all bovine diseases among Western cattle. It spreads rapidly, and less than 10 per cent. of those affected recover, but they acquire immunity against future attacks. A very few animals are naturally immune. It is due to a specific organism in the blood, and is highly infectious and contagious.

The symptoms are those of acute fever, with discharges from the mucous membrane of the mouth, nostrils, eyes, etc., as a forerunner to ulceration. These are followed in turn by constipation, diarrhœa, emaciation, and exhaustion. It runs its course in about seven days. A military cordon along the Russo-German frontier to prevent Eastern cattle coming west and vigorous port inspection are the safeguards of continental Europe against the dire consequences of its introduction. But, mindful of the disaster and ruin to many stockowners in Great Britain and Ireland during the outbreaks of 1865 and 1877, the British Government wisely prohibit the importation of live cattle from all sources, except for immediate slaughter. Treatment is useless, and slaughter of all infected animals is a necessity. Rinderpest was prevalent all over South Africa in 1896-7, and a serious outbreak occurred after the close of the Boer

War. It found its way slowly through Central Africa from Abyssinia, and destroyed most of the buffaloes and many of the wild ruminants in its course to the south. When it reached the trek oxen used in transport work, it was carried by them and left by the way, and it spread rapidly; but a good many cattle (probably 75 per cent.) were saved towards the end of the outbreak by treatment under Professor Koch's method—injection of serum from the blood of an animal which had recovered from the malady and which had been fortified by receiving several subcutaneous injections of virulent blood.

Poisons are "substances which when absorbed into the blood are capable of seriously affecting health or destroying life" (TAYLOR). In the case of the lower animals, irritants which do not come within the scope of that definition should also be added. Stock may be poisoned by accident or mistake, on rare occasions by evil intent, by excessive doses of medicine, by grazing on poisoned herbage or having access to poisons in bulk, by careless dipping, by cutaneous absorption, or by licking after skin-dressing. Arsenic is a good example of a common mineral poison, belladonna of a vegetable poison, and cantharides of a poison of animal origin. The action, as in the case of mustard, may be merely that of an irritant on the alimentary canal, but it may, on the other hand, be physiological, and by its action on the nervous system produce, like belladonna, an effect akin to coma.

"*The treatment* must be prompt and energetic, the cause sought for, pastures examined for injurious plants, the possibility considered of contamination by mineral poisons of water and pastures, or of impurity of cakes and other feeding stuffs. The curative treatment comprises certain general principles. First eliminate the poison from the system as soon as possible, and, if it has been only recently administered, the stomach pump is effective; if this be not at hand, or if the poison has been in the system some time, demulcent drinks, as wheat-flour gruel, and white of egg should be given, as well as an oleaginous purgative followed by stimulants. If the poison be known, there may be an antidote which should be administered. But antidotes are not known for all poisons. They are used in cases of

poisons of a physiological origin, and they have a diametrically opposite action to that of the poison, or they may have in other cases a chemical action, turning a soluble salt into an insoluble salt. Poisoning by absorption from the body surface is treated by washing the agent off."

Mineral Poisons.—Arsenic, derived from sheep-dip, is one of the commonest.

"The best antidote is hydrated sesqui-oxide of iron, which can be prepared in an emergency by adding ammonia to perchloride of iron, washing the precipitate, and administering every ten to fifteen minutes in doses of a teaspoonful added to water. Other less effective antidotes are sulphur and sulphate of iron, also white of eggs and mucilaginous drinks, followed by tonics, as sulphate of iron in small doses, oleaginous purgatives being avoided. A chronic form of arsenical poisoning occurs in the neighbourhood of smelting furnaces in Cornwall and Wales. In this case there is blueness of the gums, swelling of joints, indigestion, and gradual emaciation. The animals should be removed to fresh pastures and tonics should be given."

Lead poisoning usually occurs among cattle grazing over rifle ranges and picking up the spattering from the bullets, or after licking out paint tins on refuse heaps, or from drinking water from newly laid lead-pipes.

"Cattle grind their teeth, have occasional fits of colic, and an unthrifty, staring coat; the abdomen is tucked up, and eventually wasting of the extensor muscles of the limbs comes on. *Treatment.*—Give small doses of Epsom salts, which forms insoluble sulphate of lead, and follow with an oleaginous purgative to remove it from the system."

Vegetable Poisons.—Hemlock, Cowbane, etc.

"Four plants of the natural order Umbelliferæ are responsible for a great many cases of cattle poisoning—hemlock, *Conium maculatum;* fool's parsley, *Æthusa cynapium;* water dropwort, *Œnanthe fistulosa;* and water hemlock, or cowbane, *Cicuta virosa;* the two latter plants growing in running water and swampy places. When cattle go out in early spring on bare pastures, they seek green herbage near the edges of streams and in marshy ground, and browse off these plants with fatal results. The cattle stagger, then become paralysed in the hind quarters; the eyes become dilated and glassy in appearance; finally they become comatose, and death is painless. *Treatment.*—Apply cold water

to the head, and give 1 quart linseed oil and chloral hydrate in 4-drachm doses. Before turning cattle out to graze, the pastures should be carefully searched and cleared of poisonous plants."

Belladonna poisoning.—In dry, hot summers when grass is scarce, cattle pick about hedges and waste places, near old buildings where the deadly nightshade, *Atropa belladonna*, grows. "*The symptoms* of poisoning from this drug are short and quick breathing, signs of excitement, eyes widely dilated, colicky pains, stiffness of hind limbs." *Treatment.*—Give laudanum in 2-oz. doses in oil every three hours till symptoms are relieved, and cold applications to the head, and bleeding in the excited stage.

Ergot of Rye.—Ergot is a fungus which attacks the flowering heads of grasses generally, and is never found on the leaves. Cases of ergotism occur only when grasses are in flower or seed. Rye grass and others of the large-seeded grasses are very susceptible of attack, and are most liable to produce injury. The fungus may also be found on certain of the small-seeded grasses, as on benty pastures, which on account of the wiry nature of the herbage have not been closely eaten in spring.

"Ergot causes abortion in cattle and horses, but rarely in sheep. The smaller ruminants are not far enough advanced in pregnancy in the late summer and early autumn when the ergot appears. Ergot produces symptoms of poisoning other than abortion, namely, intestinal pains, diarrhœa, and ulcerated eruptions on the lips, and the animal becomes dull and comatose, and finally paralysed, especially in the hind limbs."

In chronic cases the lower extremities become gangrenous and the hoofs slough. The animals die of starvation if not attended to. The stock should be removed to fresh pastures, and the symptoms usually pass off naturally, although relapses may occur for a considerable time. As a preventative all affected seed-stems should be mown, swampy places drained and improved, and ditches and hedge sides trimmed.

Acorn poisoning takes place when large quantities of green acorns are blown down early in the season from oak trees growing in pasture. Serious loss from death often occurs among young stock (milch cows and cattle over three

years old being generally immune) through the irritation produced in the stomach and bowels due to their consumption of immature acorns as food. After a storm of wind the cattle should be moved to pasture away from oak trees, and the fallen acorns collected (for the use of pigs during winter) before the animals can be safely returned. Pigs eat only the kernel and reject the husky covering. No effective remedy has yet been discovered, but it is usual to give oil and stimulants, with the tinctures of gentian and nux vomica in 1-oz. doses, to promote the peristaltic action of the bowels in cases of constipation, and to support the strength with gruel. Leaflet 13 of the Board of Agriculture and Fisheries says :—

"The true acorn disease (which appears generally after a long dry and hot summer), is distinguished by progressive wasting, entire loss of appetite, diarrhœa, discharge of an excessive quantity of pale urine, sore places inside the mouth, discharges from the nostrils, and also from the eyes, which are always sunken, giving to the animal a peculiar haggard expression. No fever is present from first to last, but, on the contrary, the temperature is commonly below the normal standard."

Meadow saffron, *Colchicum autumnale*, found growing wild in rank wet pastures and meadows, produces a reddish purple flower in autumn after the leaves have died down. The bulb is the most poisonous part, but the leaves and stems in hay have proved fatal to horses. "Animals that have eaten any part of the plant show intestinal pain, loss of appetite, flatulence, and blood-stained diarrhœa; sometimes they are delirious, sometimes comatose. *Treatment* is the same as that used for acorns, or demulcent drinks, as wheat-flour gruel, preceded by a purgative."

Yew tree leaves at certain periods of the year are deadly poison to cattle and horses. But in moderate quantity yew is not always poisonous.

"Horses are much more susceptible to the effects of yew than cattle. The first intimation that a horse has eaten yew is usually to find it dead; cattle, on the other hand, may at certain seasons eat quantities of yew without any marked injurious effects, or they may show the following *symptoms*—great tympanitis, rapid breathing, green and fœtid diarrhœa, and dullness followed by death. *Treatment.*—Use the trochar

and cannula to relieve the tympanitis, and give a strong purgative of Epsom salts followed by stimulants."

Yew trees and fences should be railed off, and at such a distance that stock cannot reach them. The young shoots are the most dangerous, and in the semi-dried condition; therefore care should also be taken that the clippings from yews are not thrown on rubbish heaps to which stock have access.

Laburnum seeds, picked up usually in the pods that fall on the ground, produce paralysis of the hind limbs, great constipation, coma, and death. *Treatment.*—"Rub the legs and spine with a stimulating liniment, and give purgatives and stimulants."

Mustard is at times present as an impurity in Indian rape cake, and acts as an acute irritant to the bowels. The low-priced Indian pulses and other seeds would be in much greater repute among cowkeepers but for the impurities, which make the food too hot or irritating for the animals.

Bites from vipers cause swelling of the tongue, and this swelling may be sufficient to produce a fatal result from asphyxia.

The Warble Fly or **Bot Fly**, *Hypoderma bovis*, de Geer, is the source of great discomfort to cattle, and of enormous annual loss, estimated at millions of pounds, to the farmers of this country. Miss E. A. Ormerod, who so ably brought its evil consequences and the means of prevention before the British public, says:—

"It is a two-winged fly, upwards of half-an-inch in length, so banded and marked with differently coloured hair as to be



2 1 3

FIG. 8.—1. OX WARBLE FLY; 2. MAGGOT; 3. CHRYSALIS.
(*After drawings by Miss Ormerod.*)

not unlike a humble bee. The face is yellowish; the body, between the wings, yellowish before and black behind; and the abdomen whitish at the base, black in the middle, and orange

at the tip. The head is large, the wings brown, and the legs black or pitchy, with lighter feet."

The female possesses a long ovipositor, with which during summer she most probably pierces the skin and plants an egg, which "is oval and white, with a small brownish lump at one end." Subcutaneous irritation begins in early winter. The young warbles are placed with the head down and the tail up in connection with breathing tubes, which open on the surface of the skin. They are easily destroyed, and the earlier the better, by the application of some liquid such as MacDougall's Dip or strong salt brine, which will run down the tubes and poison the inmates; or the mouths of the tubes may be closed up by some sort of greasy material. If this were largely practised, the injury resulting from the flies existing in such enormous numbers might be undone in a few years. Mercurial ointment, unless applied with great caution, and in the smallest possible quantity, is liable to produce poisoning, through the animals licking it off. The flies can be prevented from striking by applications, rubbed in once a week along each side of the backbone (the favourite seat of attack), of such things as train oil, or a mixture of linseed oil, sulphur, and carbolic acid. Paraffin oil or kerosene is useful only for a short time, as the smell goes off rapidly. As the weather becomes warm, the maggots force themselves out from beneath the skin and drop to the ground, where they assume the chrysalis form, of a dark colour. The fly appears in about three or four weeks if the season is warm and favourable. If a united and strenuous effort were made by owners of cattle in all parts of the country to get rid of this painful and irritating pest, it might, though with some difficulty, be as entirely stamped out as pleuro-pneumonia or foot-and-mouth disease.[1]

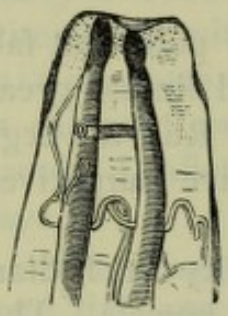

FIG. 9.—BREATHING-TUBES OF WARBLE MAGGOT MAGNIFIED.

[1] See Chapter XIV. of the *Autobiography and Correspondence of Eleanor Ormerod, LL.D.* (John Murray), for an account of the splendid work of warble destruction done by the boys of Aldersey School in Cheshire.

CHAPTER XIV

HOUSE-FEEDING OF CATTLE[1]

Classes of Foods—Calorific System of Valuation—Importance of Proteid—Wolff's Food Standards—Balancing Food Ratios—Vegetable Proteid by Mitchell's Process—Methods of Housing—Dishorning—Time to House—Regularity in Feeding—Roots—Concentrated Food—Necessity for Grooming—Amount of Food to give—M'Combie's Method of Feeding—Cost of Feeding per Week—Experiments of Lawes and Gilbert—Calculation showing Food given, and return in Beef—Conclusion dealing with the Relations of Live-Weight to Dead-Weight—Selling by Live-Weight—Table of Weights of Cattle at Smithfield—Gain in Eighteen Weeks of a Bullock, and Cost per Live-weight Cwt.—American and British Methods of cutting up Beef—Tables of Live and Dead-Weights of Fat Cattle—Function of Live Stock.

FOOD materials, exclusive of mineral matter (ash) and water, are for convenience classified in two distinct groups—carbonaceous and nitrogenous. The former, including starch, sugar, and fat, is employed in the animal economy to produce heat and energy for immediate requirements, and to create a reserve in the form of animal fat; while the retrogenous, or proteid constituent, is the muscle and tissue building and repairing material. The latter possesses also the power to produce heat and energy if required in the animal system, but as the carbohydrates are far more plentiful, and in consequence cheaper than proteid, an effort should be made to balance the food so that the two groups may be induced to exercise their relative functions in the most economical way. It is necessary that some reliable system of relative valuation should be clearly understood, as by the Calorific system of valuation, now so generally employed, the two groups of material have been assigned as heat producers the same value per unit of weight, while their proper functions are distinct and separate. *A Calorie* is the heat unit of the system, *i.e.*, the amount of heat used in raising one gram of water 1° C.: starch taken at

[1] See Appendix E for a statement of the breeds and ages of prize-winning cattle at Smithfield.

100 represents 4 calories. The equivalent of fat is usually estimated at 225 or 9 calories, and of albumin (proteid) 125 or 5 calories,[1] but some investigators assign to it the equivalent of starch. The value of fat in relation to starch is a little more than two and two-tenths greater, and to bring the two materials to the common level of starch, which is the unit basis adopted for carbonaceous food ingredients, it is necessary to multiply the percentage of fat by 2·268. The proteid derived from ordinary cattle foods contains about 16 per cent. of nitrogen, and the so-called "proteid-value" is ascertained by multiplying the percentage of nitrogen by 6·25. It has been demonstrated that some 20 to 30 per cent. of the nitrogen of food is not assimilable by animals, and therefore not in the form of proteid. The test for proteid is that it coagulates in boiling water. Nitrogen compounds that do not digest should consequently be deducted like other indigestible constituents of food in all calculations dealing with nutrition. It must be remembered that proteid is the one essential constituent of food without which animal life cannot be sustained. It must therefore form the *basis* of all calculations relative to food values. As year by year **compounded foods** are being more largely employed as feeding stuffs by farmers, the time has come when a standard of valuation for animal food should be determined and legally enforced. The "Fertilisers and Feeding Stuffs Act, 1893" gives the farmers the sort of protection in relation to manures which ought to be extended to feeding stuffs to save them from such misrepresentations as are encouraged by the calorific system of valuation. For example, cellulose, which is much employed to mix with compounded foods, possesses a calorific value equal to that of starch without any value whatever as a nutrient. The invoice of purchased foods should indicate the percentage of digestible proteid, carbohydrates, and fat contained in the material to enable the purchaser to judge of its value and suitability for his requirements.

The following is the **table of Food Standards** for horned cattle fixed by **Dr Emil Wolff,** Director of the Hohenheim Experimental Station in Germany :—

[1] For a fuller explanation of the terms used in food analyses, the student is referred to Primrose M'Connell's *Agricultural Note-Book*, Crosby, Lockwood, & Son.

	Live-Weight.	Food consumed per day.				
		Dry Organic Matter.	Digestible.			Albuminoid Ratio.
			Albuminoids.	Fats.	Carbohydrates.	
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Calves, growing, 2 to 3 months . .	150	3.3	0.6	0.30	2.1	1 : 4.7
Young Cattle, growing, 3 to 6 months .	300	7.0	1.0	0.30	4.1	1 : 5
Young Cattle, growing, 6 to 12 months .	500	12.0	1.2	0.30	6.8	1 : 6
Young Cattle, growing, 12 to 18 months	700	16.8	1.4	0.28	9.1	1 : 7
Young Cattle, growing, 18 to 24 months	850	20.4	1.4	0.26	10.3	1 : 8
Oxen in complete rest	1000	17.5	0.7	0.15	8.0	1 : 12
Oxen fattening, 1st period . . .	1000	27.0	2.5	0.50	15.0	1 : 6.5
Oxen fattening, 2nd period . . .	1000	26.0	3.0	0.70	14.8	1 : 5.5
Oxen fattening, 3rd period . . .	1000	25.0	2.7	0.60	14.8	1 : 6

A calf supported on average cow's milk (see analysis, p. 231) lives on a still narrower albuminoid or nutrient ratio than any stated above, viz., 1 : 3·93.[1] The ratio widens gradually as the animal under natural conditions grows older, but during the period of fattening a close or narrow ratio is essential to success. It may be seen from Wolff's researches, which have fixed the standard generally accepted in Europe, that there is a definite ratio of albuminoids to starch suitable for each class of animal, although there is a variation in the table of from 1 : 4·7 to 1 : 6·5. Any serious divergence from the foregoing ratios leads to loss of food substance, and in certain cases it involves injury to the animal consuming it.

Averaging the total figures given in the table, we find a *Medium Food* should contain approximately on its dry weight :—

	Per cent.
Proteid	9·40
Fat	2·15
Carbohydrate	55·00
Non-nutritive matter . . .	33·45
	100·00

[1] This, as well as the ratios in Wolff's table, was arrived at by multiplying the fats by 2·4—not by 2·268, the more recently accepted figure.

All foods contain cellulose and other non-nutritive material, therefore no ordinary food will approach the nutritive standard without the non-nutritive matter being deducted. This, however, should not affect the "nutritive ratio" which indicates if the food may be employed to its best economic advantage.

In the majority of vegetable foods there is a marked deficiency in proteid and fat with a corresponding excess of carbohydrates. To illustrate this by figures compare Wolff's average standard with the following constituents of common foods and their nutritive ratios (market value per ton, £5):—

Averaged Standard.		Bran.	Maize Meal.	Rice Meal.	Molascuit.[1]
9.40	Proteid . . .	16.4	9.7	7.2	2.87
2.15	Fat	3.5	5.4	2.0	0.36
55.00	Carbohydrate . .	43.6	68.9	76.8	51.64
1 : 6.74	Nutritive ratio . .	1 : 3.05	1 : 8.4	1 : 11.3	1 : 18.2

If we assume all the four commodities to have the same market value we may arrive at the comparative food value by multiplying the fat by 2·268, adding it to the carbohydrates, and dividing £5 by half the result, as this will give the carbohydrate unit value. If we further divide £5 by the figure representing half of the proteid we get the proteid unit value; the sum of the two will give the comparative food cost per unit. Thus we arrive at the following food unit cost of the four materials under consideration:—

	Cost per Food Unit.		Total.
	Proteid	Carbohydrate.	
	s. d.	s. d.	s. d.
Bran at £5 per ton . . .	3 0½	0 11½	4 0
Maize meal at £5 per ton . .	5 1½	0 7	5 8½
Rice meal at £5 per ton . .	6 11	0 7	7 6
Molascuit at £5 per ton[1] . .	17 5	0 11	18 4

It is possible to make up much of the shortage of proteid and fat by compounding cotton-seed meal (containing 42 per cent. of proteid), linseed meal (32 per cent.), and bran, maize germs,

[1] See pp. 274 and 308.

and leguminous seeds with materials containing starch and sugar in excess.

A new source of Proteid has recently been discovered in Castor seed as extracted in practically a state of purity (80 per cent.) by "Mitchell's Process," and as the raw material is plentiful and comparatively cheap, it is anticipated that this new vegetable proteid will enable the nutritive ratio in compounded foods to be easily and economically balanced to suit the varying requirements as shown on Wolff's table (p. 264). The following is an example of how the compounding of foods to their correct nutritive ratio is simplified by adding a pure proteid.

	Proteid.	Fat.	Carbo-hydrates.	Nutritive Ratio.
A { 50 per cent. Rice Meal . . 50 per cent. Maize Meal . }	8.45	3.7	82.8	1 : 9.7
B { 47.5 per cent. Rice Meal . 47.5 per cent. Maize Meal . 5.0 per cent. Vegetable Proteid }	12.2	3.0	68.0	1 : 6
Averaged Standard from Dr Emil Wolff's Table	9.4	2.15	55.0	1 : 6.74

This satisfactory result in compounding food to its correct "nutritive ratio" would be attained at a cost not exceeding 15s. per ton; and by taking A at £5 per ton, and B at £5, 15s., and calculating the food unit cost as explained, the relative *cost* would be A 13s. and B 9s. 6d. By paying 15 per cent. extra on cost the farmer gets an advantage on food value of 27 per cent., or 12 per cent. of actual gain.

There **are three common methods of arranging cattle** in a house to feed:—

1*st*, Tying by the neck in a byre, either in stalls or without divisions between them.

2*nd*, Putting them in loose boxes, one in each.

3*rd*, Leaving them untied, several together, in a shed, with an open door and an open or partially covered court.

In a byre they may be arranged, if in more than one row, either with the heads turned towards a passage up the centre of the house, or with the heads to the side walls, with or without a feeding passage in front. It is a mistake to have

double stalls more than 7 feet 3 inches wide, even when the cows are large; for ordinary animals, 7 feet is sufficient; and for Ayrshires, 6 feet. In stalls too wide, animals turn some way round, and drop their excrement on the bed of their stall-companions. Six feet is long enough for the largest stall, with 2 feet 6 inches of additional space in front for a manger to hold fodder. When the stall is too long the animal lies down in its droppings, and becomes matted with dung on the thighs and legs. The bottom of the manger (or feeding trough of glazed earthenware, say 18 inches wide) should be placed on the surface, or an inch or two below the level of the stall, so that it will not interfere with the animal in rising, or prevent the head from resting comfortably during sleep. The bottom ought to slope towards the beast, so that cake when given may be within easy reach, to prevent the animal from trying to place its fore-feet in the trough. The space beyond the trough provides room for bulky fodder, which is liable otherwise to work down under the fore-feet.

Ventilation is of paramount importance, and can be secured by an arrangement of holes in the walls near the floor level, together with openings in the roof. Where the heads are close to the wall, it is well to have a 1½-inch drain pipe through it, low down between the cows in each double stall, and inclining upward, so that the current of cold air passes over them.

Boxes (each 10 feet square, to hold one) are best for all kinds of stock except young "stores," and might be more generally adopted if it were not that the expense is great, owing to the amount of surface area taken up. Litter (cut, if convenient, to lengths of 6 or 8 inches) is given to each animal in a box, at the rate of 20 lbs. per day, while for those kept in open yards a sufficient amount is 40 lbs. each. In a byre it is not positively necessary to allow any, although cattle keep rather cleaner behind with it than without it, and if properly attended to it also protects the leg joints of heavy cattle from injury on the floor.

Open Sheds, with uncovered courts, sometimes designated "Reeds," may be—*1st*, Large, sufficient to accommodate ten, twelve, or more animals; *2nd*, Small (called "Hummels" in some parts), to contain from two to four animals in each.

Sheds with open courts are most comfortable for stores or for feeders in very hot weather. The great objections to them are—(1) The loss of manure by rain-washing, which, however, may be in a great measure prevented if the water from the eaves of the houses adjoining the court be removed, so that it is unnecessary to provide any outlet drainage, and if an ample layer of litter be spread on the floor. Contrary to the general belief, surplus moisture tends to rise to the surface through the animals puddling, and a comparatively dry layer is found at the bottom of an open courtyard. (2) The extra straw required for litter; and (3) Strong cattle bullying, and consequently starving the weak ones.

Dishorning should be practised on all cattle that are to be housed in this way, as they persistently torment one another, and frequently inflict severe injury by horning their neighbours. When the horns are well developed and strong, the sharp tops are frequently nipped off by a pair of powerful shears. This method is quicker, more simple and less painful, because shorter in duration, than that of sawing the horn; but the bruised condition in which the wounded horn-core is left is objectionable, as it is liable to lead to serious after-consequences. In the case of calves and young animals, the budding horns should be wholly removed by a knife inserted well down underneath the base of the core of the horn. Or, still better, when the animals are between two and five days old, the skin over the tip of the budding horn should be firmly rubbed, after moistening, with a stick of caustic potash, which, if properly used, prevents the horn from growing.[1] When the operation is delayed for twelve months or more, a fine saw, such as is used for severing the bones in butchers' meat, should be employed, the animal having been thrown in the usual way (Fig. 7) with ropes, and made fast.[2] The operation is not a pleasant one to witness, but the pain, though acute at the time, is over in a few seconds; the temperature as a rule does not rise above normal, unless in the case of a limited number of animals, in which suppuration

[1] See the Board of Agriculture Leaflet, No. 81, "A Substitute for Dishorning."

[2] See illustration on page 243.

supervenes ; and the opening into the frontal sinuses made by cutting into the hollow base of the horn-core is closed by clotted blood, and the wound heals and skins over in a few days. When the work is properly and skilfully executed, the

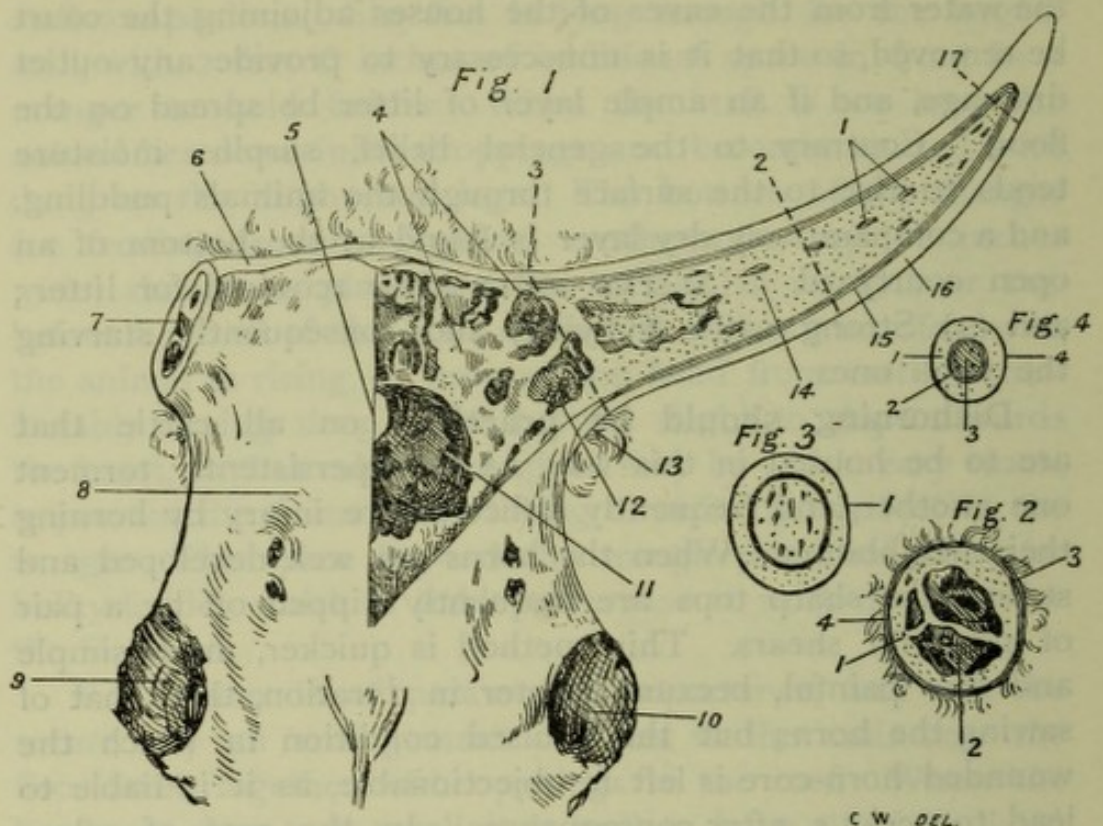

FIG. 10.—**Skull and Horn of an Ox, to illustrate the operations of "Dishorning," "Half-horning," and "Tipping."**

ILLUSTRATION * exhibiting a triangular section of the Frontal Bone excised to show the bony structure behind; the Right Horn removed as it ought to be, in Dishorning; and the Left Horn bisected to show its internal parts.

Fig. 1.—1. Blood-vessels; 2. Cut made in "Half-horning"; 3. Cut made in "Dishorning"; 4. Bony Walls of Frontal Sinuses; 5. Position of Spinal Column; 6. Skin; 7. Part from which the Right Horn has been excised; 8. Frontal Bone (Forehead); 9. Orbit of Right Eye; 10. Orbit of Left Eye; 11. Brain Cavity (2½ inches in this case from the Wound made in Dishorning); 12. Frontal Sinuses (or Cavities in the Skull containing air, and opening into the Nasal Cavity); 13. Region where the Trunk Nerve and the two main branches of the Artery enter for the supply of the Horn; 14. Bony Horn-core (insensitive when healthy, but extremely painful when diseased or congested); 15. Corium, a sensitive membrane, corresponding to the true skin; 16. Insensitive Horn; 17. Cut made in "Tipping." **Fig. 2.**—Section made by "Dishorning." 1. Bone; 2. Sinus; 3. Skin. **Fig. 3.**—Section made by "Half-horning." **Fig. 4.**—Section made by "Tipping." 1. Horn; 2. Corium; 3. Bony Horn-core.

* After a drawing by C. Ward, M.R.C.V.S., made under the direction of Prof. W. O. Williams.

pain and bleeding are reduced to a minimum, the gain to the owner is distinctly appreciable, and the reduction of the sufferings of the animals from the savage dispositions of the stronger among them is enormous. It was estimated

about 1890 that no less than two hundred thousand cattle and horses were killed annually in the United States of America by "horning" or "hooking," which must be accompanied by a terrible amount of suffering on the part of the unfortunate victims. It is a relic of barbarism of the worst kind, for which there is no excuse, to shut up in a close place, where escape is impossible, a number of fully armed beasts so that they can maltreat and maim one another at will. Polled cattle have been appreciated on the American prairies because of the immunity enjoyed from the enormous losses caused by cattle goring their neighbours, and because horns are liable to become frost-bitten and diseased, and the animals bearing them worthless in consequence.

Dishorning is practised chiefly as a preparation for the shutting of cattle in confined courts, but it is capable and deserving of extension, more particularly in the Irish branch of our live-stock trade, owing to the close proximity of animals during shipment, and to the evil dispositions which they display in a great measure as a result of the cruel treatment they receive while being collected from all parts of the country, and formed into herds, the individual members of which are strangers to one another. It has been estimated that there is a loss of 10s. to 15s. per head, due to horn wounds and bruises during transit, on Irish cattle brought over to this country. With us the operation is almost exclusively confined to steers, but in the United States of America, where it has become deservedly popular in recent years, even high-grade Channel Islands and other horned cows are artificially polled in the manner indicated, without any perceptible injurious results. There is a decided general tendency to produce strains of polled cattle of well-known horned varieties, and thus to breed the horns off in preference to cutting them off. It is somewhat anomalous that by the laws of Scotland and Ireland dishorning is legal, while in England it is illegal, unless it be confined to means used to prevent horn development.

In the North, **cattle should be housed** by the end of September; in the South, before the beginning of November. It is a fatal error to leave feeding beasts out at night in early winter without proper protection from the inclemency of the weather. Not only do they lose flesh rapidly, but

when housed they take a considerable time to recover from the shock or "backset" received before they begin to thrive.

Regularity in feeding is of the first importance. A man at 20s per week can tend thirty to forty bullocks tied in stalls, if the food be close at hand. He can undertake the feeding and management of sixty to seventy if they are untied. Too much should not be given at one time, and any food that is left should be carefully removed. Each supply of food ought to be consumed before the animal leaves the feeding-trough. Time is thereafter allowed for rest in which to chew the cud and to prepare for the next meal. All changes of food should be made gradually. Liberal allowances of turnips given without due preparation are liable to produce scour. Clover, if wet and in excessive quantity, produces hoven and often death, from rupture of the rumen, or more usually from suffocation induced by the pressure of the distended stomach suspending the action of the diaphragm. **White and yellow turnips** should be consumed first, as swedes are sweeter and keep better for winter and spring use. With fattening cattle one can never return with success to an inferior food; therefore, in the gradation of changes in food materials, whether roots, cake, meal, or long fodder, the last to be used should always be the most attractive to the animal's palate. Of the various common roots, mangels keep best and are best for spring use. Carrots, not so frequently in evidence, resemble them in keeping power. Roots should not be stored in pits in autumn before they are properly ripened, nor should they be exposed to severe frost: in either case they are injurious to all classes of stock. A few degrees of early frost before pulling make turnips more mellow to taste, and a safer food. Roots are usually given only in quantity sufficient to supply water to the system—1 cwt. per day to an ox is the usual limit, while ¾ cwt. is often enough. Potatoes should not be washed (as earth, in this instance, acts as a corrective or aid to digestion) or given in large quantities, as they are, on account of their starchy nature, difficult of assimilation.

Roots may be given whole to excite the digestive faculty of the animals, or sliced (as some bullocks, with a specially anxious or greedy disposition, are liable to leave their troughs disagreeably wet, owing to the escape of saliva

during their consumption of whole roots), or pulped and mixed with chaff the day before, and left to ferment slightly, to raise the temperature in cold weather. Some feeders think cattle like the mixture best when newly prepared, while others object to the practice except with young store beasts, saying that the quality of flesh in cattle coming into prime condition is reduced in market value by giving pulped roots. This, indeed, is a general impression among Lothian farmers and butchers in Edinburgh.

The concentrated foods should be chosen according to what is cheapest in the market, those being avoided that contain irritating impurities such as mustard seed, or that are at times poisonous. They may consist of a selection from the following or other suitable food stuffs:—Cotton, linseed, or other oil cakes, maize meal, "Indiana" or "Paisley" meal, wheat, oats, barley, beans, peas, gram, lentils, and linseed, ground into a fine state of division, to be more easily digested. Whole grains that have escaped the action of the teeth[1] come through cattle undigested. All the above substances, to which may be added brewers' or distillery grains, may be given dry, spread on the chaff in the feeding-troughs; the rough and the short food are then consumed together. When the fodder is inferior, as in the case of barley straw in Norfolk, the chaffed straw and the meal may be mixed in a heap on the floor, and boiling water sufficient to wet it, though not to drain away, thrown over it. By covering up the heap and leaving it till next day the whole mass becomes well cooked, palatable, and more digestible.[2] A little locust-bean meal may be added to the mixture to sweeten it: too much causes the animals to neglect the unsweetened food. Treacle is a good fattener, and may be employed, when cheap, as a relish. It is useful in moderate quantities, say 1 to 2 lbs. daily to each animal, for maintaining the digestive organs in a healthy state; and it is quite as effectual, when necessary, in restoring them to a natural condition, if 6 to 8 lbs. be

[1] In the Western States of America, pigs, two to each bullock, are often kept solely on Indian corn which they pick out of the droppings of cattle. In other cases, when the corn is bruised, they eat the dung.

[2] For full details of the marked success of this system of feeding, see a lecture by the Author, printed in the *Journal of the Newcastle Farmers' Club* for 1886.

given once, or a second time within a few days, mixed with a little hot water to reduce its viscosity and make it flow easily. "Molascuit," an Argentine product (Hughes' patent), consisting of 80 per cent. of pure cane-sugar molasses soaked into 20 per cent. of selected cane fibre (three-fourths of which is digestible), is convenient to handle as a food stuff, and is well liked by all classes of farm stock. Cane sugar[1] is, if possible, better liked by cattle than treacle, and it is more easily manipulated, but it is too expensive for ordinary feeding. As a rule, the best mixture of concentrated food is half cake and half meal. Some prefer giving pure cake for one feed in the day, to make greater variety in the food. Having begun with a little (say 2 lbs. per day, if given for the first time), good breeders gradually increase the supply every few weeks, as a fixed quantity of concentrated food gradually loses its full effect; 8 lbs. per day is a good final amount to reach with a good-sized bullock near the finish, 10 lbs. being now regarded by the best authorities as distinctly wasteful, with the comparatively low prices ruling for beef and high prices for purchased feeding-stuffs. The return, after a certain point is passed, is in inverse proportion to the amount supplied. Much forcing of young animals, even for fattening, is under ordinary circumstances a mistake, and it is infinitely worse in the case of breeding stock. It is best simply to keep them thriving throughout, and give them a little more time.

Chronic indigestion is not uncommon among house-fed cattle when the food is too dry and fibrous. Affected animals do not feed or ruminate naturally, and may grind their teeth and grunt. They may be either distended with flatulence or tucked in in the belly, constipated, or passing fæces in small quantities. Salts and treacle, followed in a day or two by linseed oil, are the usual common and available purgatives. Strength should be maintained with drenches of oatmeal gruel, to which 1 oz. of powdered gentian, 1 oz. of powdered sulphur, and ½ to 1 oz. of carbonate of ammonia may be added. Long fodder is withheld, but for a short time, as rumination will not be restored without it.

Acute indigestion is not so common as the chronic form,

[1] See a paper by J. B. Lawes in the *Journal of the Royal Agricultural Society of England*, 1885.

except among town dairy cows that are very heavily fed, but it is apt to occur with often startling symptoms when the food is suddenly changed. The animal suffers from great thirst, and will not eat or chew the cud, but it groans and paddles with the hind feet from pains in the belly, and irritable passage of fæces occurs. In a bad case the acute symptoms are expressed by the animal standing with arched back and with all four legs drawn together, a dry staring coat, high temperature, rigors, and saliva streaming from the mouth. Occasionally brain affections—coma and delirium —occur. The treatment is to give a purgative followed by stomachics — carbonate of ammonia, and tincture of nux vomica or gentian in 1 oz. doses in oatmeal gruel. Day's drenches are much in repute with cowkeepers.

Heifers feed faster than bullocks, especially when young. The great drawback is their coming in season and not feeding for a day or two each time they do so, and, if loose, keeping others that jump on them from settling to feed properly. The ancient and excellent practice of "spaying" or de-sexing heifers or cast cows for feeding purposes has been to a great extent discontinued in this country; but it is clearly one of those simple old-time practices the revival of which would lead to an important conservation of wealth to the owners of grazing cattle.

Tied-up cattle ought to be regularly groomed, especially about the rump, shoulder-head, and neck, or on such places as they cannot easily or at all reach with the tongue to lick. They should be kept quiet, and at a uniform temperature of about, but not over, 60° F. If the hair be very rough when they are first put up (as is often the case when the animals are left during the first part of the winter in a strawyard, until room is made in the stalls by the sale of those that finish first), the back, half-way down the ribs, the thighs, neck, and tail, may be clipped bare. This removal of hair prevents excess of sweating, which naturally takes place at first on cattle being introduced into a warm shed from an open court, and allows of their being more easily kept clean; they, consequently, also feed faster; but in some markets where the practice is not understood the appearance produced might be a drawback in selling.

A heifer or bullock that would yield 40 to 45 stones of

dressed beef if in an open yard with a shelter shed, and put up to increase 12.2 lbs. of beef per week,[1] may receive on an average 6 lbs. of a mixture of cake and meal per day (beginning with 4 lbs. and finishing with 8 lbs.), ¾ cwt. roots, 12 lbs. straw (partly chaffed), or, when expedient, a limited portion of this replaced by hay of equal money value—a small foddering once a day; but it will not pay to give fattening cattle hay worth £4 or £5 per ton. In boxes or covered courts a saving of ¼ cwt. of roots might be effected. As cattle in open though sheltered courts not only eat more but often gain more weight than those entirely under cover, it remains an open question which is the more economical system. The breed of the animal will usually make all the difference one way or the other.

The following was **M'Combie's method of feeding**:—At 6 A.M., or earlier, half the artificial mixture was given; in about an hour, when this was eaten, one-third of the roots; at 12 o'clock another one-third of the roots; at 5 P.M. half the mixture of cake and meal; and at 9 P.M. the remaining roots, and perhaps a little rough hay in the racks. Uncut straw was provided during the day as well as chaff.

The late **Walter Elliot,** of Hollybush, Galashiels, N.B., fed cattle that got a good start as calves to go away fat before losing their calf teeth, clearing them out as stirks between October and January. Having tried stalls, single and double loose-boxes, open and covered courts, he preferred covered courts to any of the other arrangements, because the cattle agree better than in open courts, and the superior quality of covered court manure pays good interest on the cost of the extra roofing when it is put up on a good principle. One man attended to sixty cattle in yards. About ½ cwt. of turnips was allowed to each animal per day, with clover hay,

[1] Classes are provided at Chicago for cattle under a year old, a practice not followed at Smithfield. The greatest daily gain in weight is made by calves under a year old, and the Chicago results show that a Shorthorn calf weighing 993 lbs. at the age of 335 days had gained 2.96 lbs. daily; a Hereford, weighing 934 lbs. at 330 days, came next, having gained 2.83 lbs. daily. The weight of the calves at birth is here included. The weight of an ordinary Shorthorn calf is about 75 lbs., but some are much heavier. An Aberdeen-Angus calf, the property of A. D. Mitchell, West Loch, Eddleston, Peeblesshire, was born in 1906, which measured 36 inches round the heart and weighed 164 lbs.

etc., an assortment of four or five kinds of cake, and meal and a little treacle mixed together. When well forward in condition the animals got whatever they could eat of the mixture, but when they had two or three months' time before them the amount given was at first restricted. The last feed in the day was given at dusk; and at 8 o'clock, when the last visit of inspection was made, the cattle were usually stretched out and groaning. See also the late James Biggar's method, p. 181.

John Ross, Meikle Tarrel, N.B., with unsurpassed feeding experience, condemns a ration per day for a bullock of 6 lbs. rising to 10 lbs. of concentrated feeding stuffs, as above a paying amount, if young, well-bred, moderate-sized animals, to suit the market demand of the present day, be bred and fed at home and the calf flesh retained by good management. "Such animals should be ready for the butcher at 18 to 24 months old without ever in any one day of their lives consuming 6 lbs. of cake or meal." Profit can now be secured only "along the lines of careful, economical diet, making the most of the best of the home produce, and using merely what is necessary of imported food to balance the deficiency of oil or albuminoids."

Depending on the condition of the store animal at first, three to five months may be taken to finish prime, and an increase of from about 15 to 28 stones may be made by the following method of treatment:—

Calculation showing Cost of Feeding per Week.

		s.	d.
Per day	3 lbs. cake* and 3 lbs. meal, or 42 lbs. a week, at ⅜d. per lb. =	2	4
	¾ cwt. roots, or 5¼ cwts. per week, at 4d. per cwt. =	1	9
	12 lbs. straw, or 6 st. per week, at 1½d. per st. =	0	9
Attendance		0	6
	Cost of producing 12.2 lbs. of beef	5	4

About 6s. 2d. per imperial stone of 14 lbs., or 49s. 4d. per cwt. of dressed beef.

* Cake or meal at 1d. per lb. = £9, 6s. 8d. per ton; at ¾d. per lb. = £7; at ⅜d. per lb = £6, 4s. 6d.; roots (consuming value) at 4d. per cwt. = 6s. 8d. per ton; straw and litter averaged at 1½d. per st. = £1 per ton consuming value on the farm, or half the price to a cowfeeder in town.

Sir J. B. Lawes and Dr Gilbert showed by experiment many years ago that it required from 12 lbs. to 13 lbs. of dry

Smithfield Club[1] Steer Carcase Tests—First Prize, £15; Second, £10; Third, £5; Fourth, £3

The Four Best Steers, not exceeding 2 years old, each year for 5 years.

	Exhibitor and Breeder.	Breed. (Sire first named.)	Fasted Weight.			Carcase Weight.	Suet.	Fat.	Hide.	Age.			
			Cwt.	Qr.	Lb.	Lb.	Lb.	Lb.	Lb.	Y.	M.	W.	D.
1901.													
First .	Col. H. Platt, C.B. (P. Jones)	Welsh	14	2	0	1070	20	59	83	1	11	3	0
Second .	J. D. Fletcher of Rosehaugh, N.B.	A.-Angus Hereford . . .	12	0	11	884	16	40	97	1	11	1	1
Third .	P. F. R. Saillard of Buchan Hill, Crawley . .	Sussex	11	1	0	829	14	45	92	1	8	0	1
Reserved	H. G. Murray Stewart of Cally, Gatehouse, N.B. .	Galloway	9	1	7	718	12	23	67	1	9	3	3
1902.													
First .	G. Young of Cadboll, Fearn, N.B. (J. Young) . .	Shorthorn Galloway . .	9	2	15	693	16	25	75	1	5	0	0
Second .	His Majesty the King, Balmoral	Aberdeen-Angus . . .	9	0	14	641	7	18	76	1	9	1	5
Third .	J. G. Young of Cadboll (C. Macintosh) . . .	Shorthorn Galloway . .	11	0	3	769	8	15	83	1	8	0	0
Reserved	J. D. Fletcher of Rosehaugh, N.B.	A.-Angus Hereford . . .	11	3	12	892	17	29	90	1	9	0	5
1903.													
First .	R. M. Greaves of Wern, Portmadoc	Welsh	10	1	7	756	15	32	83	1	11	3	5
Second .	G. Young of Cadboll	A.-Angus—A.-A. and S. Cross .	9	3	11	696	12	21	70	1	8	3	4
Third .	P. F. R. Saillard of Buchan Hill, Crawley . .	Sussex	11	2	9	874	16	24	80	1	5	3	0
Fourth	L. E. Longmore of Baldavie, Banff	Shorthorn	10	2	12	771	17	28	74	1	11	1	4
1904.													
First .	W. J. Nimmo of Castle Eden	Shorthorn—A.-Angus . .	12	3	16	966	15	24	95	1	9	1	2
Second .	G. Young of Cadboll, Fearn	A.-Angus—A.-A. Shorthorn .	10	2	16	759	13	23	77	1	9	0	0
Third .	J. G. Young of Cadboll, Fearn	Aberdeen-Angus . . .	9	3	12	715	11	22	79	1	5	3	0
Fourth .	Sir Oswald Mosley, Bart., of Rolleston . . .	Shorthorn (?) Galloway . .	9	0	24	653	14	18	74	1	9	2	2
1905.													
First .	R. M. Greaves of Wern, Portmadoc	Welsh (twin)	12	0	2	873	20	35	92	1	11	3	4
Second .	Sir Oswald Mosley, Bart., of Rolleston . . .	Shorthorn Galloway . .	11	2	14	835	20	39	90	1	10	0	0
Third .	G. Young of Cadboll, Fearn	A.-Angus—Shorthorn Cross .	10	2	24	788	13	29	78	1	10	1	0
Fourth .	J. G. Young of Cadboll, Fearn	Shorthorn—A.-Angus . .	10	3	0	749	15	29	76	1	8	3	0

The Four Best Steers, above 2 and not exceeding 3 years old, each year for 5 years.

1901.													
First .	His Majesty the King, Abergeldie Mains . . .	Aberdeen-Angus† . . .	12	1	16	914	15	23	97	2	10	2	3
Second .	G. Young of Cadboll, Fearn, N.B.	A.-Angus—Shorthorn Cross .	12	0	24	885	12	28	92	3 (under)			
Third .	Sir W. Gilbey, Bart., of Elsenham Hall . . .	Kerry	12	0	27	881	18	50	93	2	8	3	0
Reserved	Thos. Biggar & Sons of Chapelton, Dalbeattie .	Galloway Highland . . .	11	0	20	820	17	52	86	2	7	1	0

[1] See *The History of the Smithfield Club, 1798*

1902.												
First .	R. M. Greaves of Wern, Portmadoc	Welsh	15	0	18	1091	24	58	101	2	11	2	0
Second .	His Majesty the King, Balmoral	Aberdeen-Angus . . .	10	3	26	838	15	26	70	2	6	1	2
Third .	J. G. Young, Cadboll, Fearn, N.B.	A.-Angus—A.-A. Shorthorn .	13	2	16	994	17	27	102	2	10	1	0
Reserved	The Duchess of Newcastle, Clumber . . .	A.-Angus—Kerry . . .	12	1	12	925	23	39	84	2	11	0	0
1903.													
First .	R. M. Greaves of Wern, Portmadoc	Welsh *	13	0	24	967	20	45	107	2	11	4	0
Second .	J. D. Young of Cadboll, Fearn, N.B. . . .	A.-Angus—A.-A. Shorthorn .	12	2	3	924	19	29	86	2	8	1	1
Third .	The Duchess of Newcastle, Clumber . . .	Kerry	10	2	20	753	22	48	90	2	7	3	0
Reserved	His Majesty the King, Balmoral	Aberdeen-Angus . . .	11	3	23	898	15	24	78	2	6	2	0
1904.													
First .	G. Young of Cadboll, Fearn	A.-Angus Shorthorn * . .	13	3	26	1067	17	26	86	2	9	2	0
Second .	J. G. Young of Cadboll, Fearn	Aberdeen-Angus . . .	13	1	3	972	16	29	98	2	8	1	3
Third .	The Duchess of Newcastle, Clumber . . .	A.-Angus—Kerry . . .	12	1	6	878	27	54	83	2	8	2	5
Fourth .	J. Brown of Hermitage, Dalbeattie (D. Morton)	Galloway	11	3	24	886	18	35	76	2	7	3	2
1905.													
First .	R. Hughes of Bron-y-Maen (H. Owen) . . .	Welsh *	13	0	14	952	26	55	114	2	11	0	0
Second .	G. Young of Cadboll, Fearn, N.B.	A.-Angus—A.-A. Shorthorn .	13	0	2	928	24	39	97	2	8	0	0
Third .	Sir W. Gilbey, Bart. (R. Savage)	Shorthorn Dexter . . .	9	0	0	635	16	30	65	2	8	3	0
Fourth .	R. M. Greaves of Wern, Portmadoc	Welsh	14	3	4	1055	21	49	104	2	10	2	6

The Four Best Heifers, not exceeding 3 years old.

1901.												
First .	His Majesty the King, Balmoral (D. Reid) . .	Aberdeen-Angus * . . .	12	0	4	889	18	36	79	2	7	3	2
Second .	G. Young of Cadboll, Fearn (unknown) . . .	Shorthorn A.-Angus Cross .	10	3	22	790	17	43	65	3 (under)			
Third .	The Duchess of Newcastle, Clumber . . .	Shorthorn Kerry . . .	11	3	8	856	21	39	79	2	10	0	0
Reserved	J. Douglas Fletcher of Rosehaugh	A.-Angus Hereford . . .	7	2	25	541	8	18	64	1	6	4	1
1902.													
First .	His Majesty the King, Balmoral (A. Cooper) . .	Aberdeen-Angus * . . .	11	3	16	908	15	30	66	2	9	3	6
Second .	The Earl of Rosebery, Dalmeny Park . . .	Aberdeen-Angus † . . .	9	3	14	710	13	19	70	1	10	0	0
Third .	G. Young of Cadboll, Fearn	A.-Angus—A.-A. Shorthorn .	11	3	23	873	16	35	72	2	9	0	0
Reserved	Sir Walter Gilbey, Bart., of Elsenham Hall . .	Dexter	7	0	15	508	15	27	54	2	8	2	2
1903.													
First .	G. Young of Cadboll, Fearn (W. Ross) . . .	A.-Angus—Shorthorn Cross † .	10	1	13	762	19	30	69	2	8	0	0
Second .	H. G. M. Stewart of Cally (H. Cunningham) . .	Galloway	11	3	4	872	19	39	67	2	9	1	3
Third .	His Majesty the King, Balmoral	A.-Angus—Shorthorn Orkney .	10	3	0	781	18	25	74	2	4	2	1
Reserved	Sir Walter Gilbey, Bart., of Elsenham Hall . .	Dexter	9	0	6	662	20	44	62	2	8	2	0
1904.													
First .	The Earl of Rosebery, Dalmeny Park . . .	Aberdeen-Angus † . . .	10	1	12	741	23	30	59	2	0	3	0
Second .	Sir Walter Gilbey (Alexander Crow)	A.-Angus Shorthorn . .	15	0	1	1115	29	54	78	2	7	2	6
Third .	Sir W. O. Corbet, Bart., of Acton Reynold . .	Red Polled	9	0	0	659	19	26	62	2	3	4	1
Fourth .	R. M. Greaves of Wern, Portmadoc	Welsh	11	1	8	823	18	33	78	2	11	2	0
1905.													
First .	J. D. Fletcher of Rosehaugh, Avoch . . .	A.-Angus—Shorthorn . .	11	0	15	812	21	31	78	1	9	0	0
Second .	The Duchess of Newcastle, Clumber . . .	A.-Angus—Kerry . . .	10	1	12	752	24	32	77	2	2	1	1
Third .	Sir W. O. Corbet, Bart., of Acton Reynold . .	Red Polled	10	1	9	743	21	35	65	2	1	2	1
Fourth .	R. M. Greaves of Wern, Portmadoc	Welsh	12	1	2	880	29	48	87	2	11	3	2

* Champion of three Classes. † Reserve Champion of three Classes.
A.-A. Shorthorn is a Cross Cow between an Aberdeen-Angus Bull and Shorthorn First Cross.

to 1900, by E. J. Powell, Secy., 1902.

substance of food to produce 1 lb. of increase of live-weight in oxen. A number of American experiments have reduced the proportion to 10 lbs. of dry food substance to 1 lb. of total increase, but these were conducted during but a short period, and are not therefore generally applicable.

Applying the rule (of, say, 1 lb. live-weight per 12.5 lbs. of dry food) in the following calculation, we arrive at the results shown below :—

Calculation showing the Amount of Food Consumed and the resulting Product in lbs. of Beef.

(1) *Concentrated Food :—*

Cake 3 lbs. – 12 p.c. water } average, 13 p.c. water,
Meal 3 lbs. – 14 p.c. water } leaving 87 p.c. dry.

6 lbs. per day, or 42 lbs. per week.

100	:	87	: :	42	:	36.5
		(p.c. dry).		(lbs. natural cake and meal).		(lbs. dry cake and meal).

Dry cake and meal . . . . = 36.5 lbs.

(2) *Roots :—*

¾ cwt. = 84 lbs. per day, or 588 lbs. per week – 89 p.c. water, leaving 11 p.c. dry.

100	:	11	: :	588	:	64.68
		(p.c. dry roots).		(roots, natural).		(total dry roots).

Dry roots (say) . . . . 64.5 lbs.

(3) *Straw :—*

12 lbs. per day, or 84 lbs. per week – 14 p.c. water, leaving 86 p.c. dry.

100	:	86	: :	84	:	72.2
		(p.c. dry).		(lbs. straw, natural).		(lbs. dry straw).

Dry straw (nearly) . . . . 72.2 lbs.

Total dry food . . . 173.2 lbs.

173.2 ÷ 12.5 = 13.08 lbs. increase of live-weight. Live-weight brought to dead-weight at 88.4* p.c. = 100 : 13.08 : : 88.4 : 11.56 lbs. of dressed beef laid on per week.

* Warington gives 60 p.c. as the proportion of dressed beef from a prime fat bullock's fasted live-weight, and Lawes says 50 p.c. from a store bullock, if killed at the time of putting up to feed. The ordinary butchers' animal, it should be remembered, is only "moderately fat," and will not give more than 57 p.c. of dressed beef.

The following table of Smithfield results of beef produced by animals belonging to seven of our best beef-producing breeds shows that the age of the animal materially affects the rate of increase per day on a given amount of food. Other things being equal, the cost per unit of beef produced increases with age. Dressed meat to live-weight also increases with age on the average about one per cent. each year for three years.

The **daily live-weight increase** of a good general-purpose bullock up to a year old, according to the Smithfield results, will average per day in round figures 2 lbs. for a yearling, about 1¾ lbs. for a two-year-old, and a little over 1½ lbs. for a three-year-old.[1]

The maximum gains that were attained during the first five years of this century by the leading house-fed beef-producing breeds in this country, at the great annual contests, may be seen from the accompanying table of results of Smithfield carcase competition.

Age and Weight of Steers slaughtered at the Smithfield Fat-Stock Show, 1888-95 (HENRY)

	No. of Animals.	Age.	Average Daily Gain.	Live-Weight at Slaughtering.	Dressed Meat to Live-Weight.
SHORTHORN—		Days.	Lbs.	Lbs.	Per cent.
1 year old	5	642	2.11	1355	66.13
2 years old	18	963	1.92	1842	67.48
3 years old	16	1321	1.70	2251	69.38
HEREFORD—					
1 year old	16	663	1.97	1308	65.08
2 years old	13	1020	1.78	1817	67.15
3 years old	8	1349	1.64	2218	69.18
DEVON—					
1 year old	13	634	1.75	1112	66.01
2 years old	19	1045	1.51	1583	67.73
3 years old	16	1311	1.37	1796	67.32
ABERDEEN-ANGUS—					
1 year old	26	668	2.04	1366	65.37
2 years old	21	1008	1.74	1765	66.67
3 years old	2	1346	1.59	2138	67.39
SUSSEX—					
1 year old	17	677	2.15	1452	65.42
2 years old	18	989	1.86	1837	68.18
3 years old	12	1285	1.61	2064	67.98
RED POLLED—					
2 years old	12	1002	1.64	1631	65.73
3 years old	6	1362	1.49	2022	65.77
GALLOWAY—					
2 years old	7	1027	1.64	1688	64.45
3 years old	4	1344	1.47	1969	64.84

[1] Henry puts the daily gain of choice cattle for exhibition at 2·63 lbs. up to 297 days old; after that the gain declines to a daily gain on the whole period of only 1·51 lbs. at the end of 1283 days.

In the case of **a bullock of 8 cwts. live-weight,** which if slaughtered would yield 53 per cent. of dressed beef, fed for $4\frac{1}{2}$ months = 18 weeks, the total gain would be 220.5 lbs. live-weight, or = $1\frac{3}{4}$ lbs. per day during the 18 weeks. The original 8 cwts. = 896 lbs., becomes 1115.5 lbs. of total weight when the animal is prime fat.

At 60 per cent. the carcase dresses to . .	669.9 lbs.
Deduct the original estimated dressed beef .	475.0 „
Total beef gained in passing from store to prime	194.9 „

Of the increase, 88·4 per cent. is dressed beef as below :—

220.5 lbs. (gain live-weight) : 194.9 (gain of beef) : : 100 lbs. : 88.4 lbs. (dressed beef)

The cost of producing 1 cwt. of dressed beef is as under :—

12.2 lbs. (beef gained weekly) : 112 lbs. (or 1 cwt.) : : 5s. 4d. (cost per week putting on 12·2 lbs.) : 48s. 11½d. (say 49s.) (cost per cwt. of dressed beef)

And the cost of beef per cwt. live-weight as follows :—

100 : 57 (per cent. of beef dressed) : : 49s. (cost of dressed beef) : 28s. (nearly) (cost of beef per live cwt.)

American method of cutting up a carcase of beef illustrated.

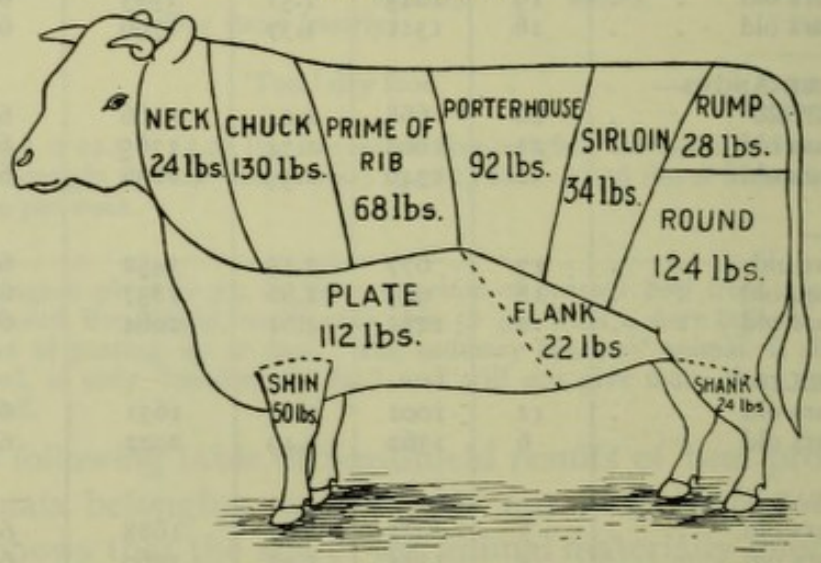

FIG. 11.

The following are three examples of wholesale prices supplied by leading butchers in different parts of the country. The extent of the variation is probably due to the fact that

the method of classification shown in the above figure differs considerably from that illustrated on opposite page.

	Weight of Cut.	Prices per lb.		
		Example No. 1.	Example No. 2.	Example No. 3.
	lbs.	1	2	3
First quality cuts :—				
3. Prime of rib . . .	68	6½d	5d	7d
4. Porterhouse . . .	92	7½d	7½d	8d
5. Sirloin	34	8d	7d	8d
6. Rump	28	8d	7½d	1s
11. Round	124	6d	7d	10d
Second quality cuts :—				
1. Neck	24	3½d	2½d	4d
7. Plate	112	4½d	4½d	3d & 5d
8. Flank	22	2½d	2½d	4d
2. Chuck	130	4d	4½d	5d
9. Shin	50	2½d	1d & 3d	4d
10. Shank	24	2½d	1d & 3d	4d

British method of cutting up a carcase illustrated.

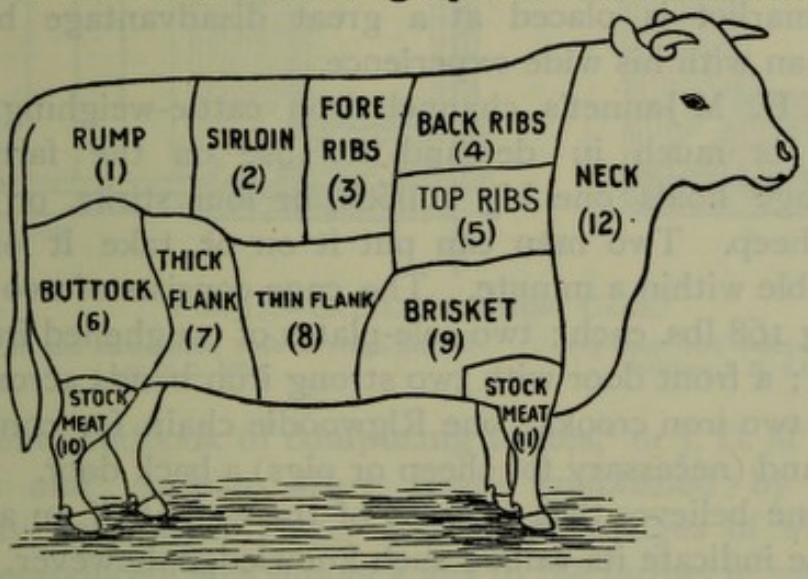

FIG. 12.

Name of Part.	Retail Price per lb. of English Beef.	Name of Part.	Retail Price per lb. of English Beef.
(1) Rump . . .	1s 3d	(7) Thick of flank .	11d
(2) Sirloin . . .	10½d	(8) Thin of flank .	5½d
(3) Fore ribs . .	10½d	(9) Brisket . .	6½d
(4) Back ribs . .	8d	(10) Stock meat . .	7d
(5) Top ribs . .	8½d	(11) Stock meat . .	7d
(6) Buttock . .	10d	(12) Neck . . .	6d

The practice of selling fat and store animals, and even at times horses, **by live-weight** has long been successfully carried on in America, and in this country it is making slow but sure progress. It is now rendered possible by the facilities that Government has offered by passing an Act making the erection of machines for weighing live stock compulsory in all places where tolls are charged. Two men who have done much to popularise the use of the weighbridge in this country are John D. M'Jannet of Stirling, N.B., and the late Westley Richards, of Oakham. Weight-guessing competitions at shows and sales are now very common and well supported, and have fully demonstrated how little the farmer with ordinary experience of live stock knows by the eye of the weight of fat animals.

The scales form a ready means, by which the farmer can satisfy himself, of a chief factor in settling the question how much money his beasts are worth.

To ascertain the weight is an extremely important point, as without such help the farmer with his slender experience in the market is placed at a great disadvantage by the middleman with his wide experience.

John D. M'Jannet's channel iron cattle-weighing cage (p. 285) is much in demand for use on the farm. A 9-foot cage holds one big bullock, or four stirks, or seven to ten sheep. Two men can put it on or take it off the weigh-table within a minute. The cage consists of two sides, weighing 168 lbs. each; two sole-plates of roughened iron, 42 lbs. each; a front door with two strong iron bands across and hung on two iron crooks; one Rigwoodie chain for confining cattle; and (necessary for sheep or pigs) a back door.

No one believes that a record of the weight of an animal will alone indicate its value; such knowledge, however, along with a settled conviction of the quality indicated by the breed of the bullock and the state of forwardness of his condition, makes the road to the calculation not only easy, but reasonably certain to be accurate.

The Board of Agriculture Report for 1904, in the *Journal* of March 1905, shows twenty-one markets in Great Britain scheduled under the Act, with 1,177,717 cattle entering them, against 1,262,301 in 1903. This decrease in numbers was the first slight check to "the slow but steady progress of the practice

of weighing cattle." Scotland has taken more freely to the use of the weighbridge than England. The number weighed in Scotland "represented 34·71 per cent. of the cattle entering the Scotch markets, as compared with only 7·77 per cent. in the case of England." "The number of fat cattle sold at an agreed-on price per stone or per cwt. was 10,711, as compared with 11,439 in 1903. More than half these transactions were reported from Glasgow."

"At Edinburgh nearly 3000 store cattle were weighed, and four-fifths of them were sold at an agreed-on rate per live cwt."

Either the late Sir John Bennet Lawes' elaborate and

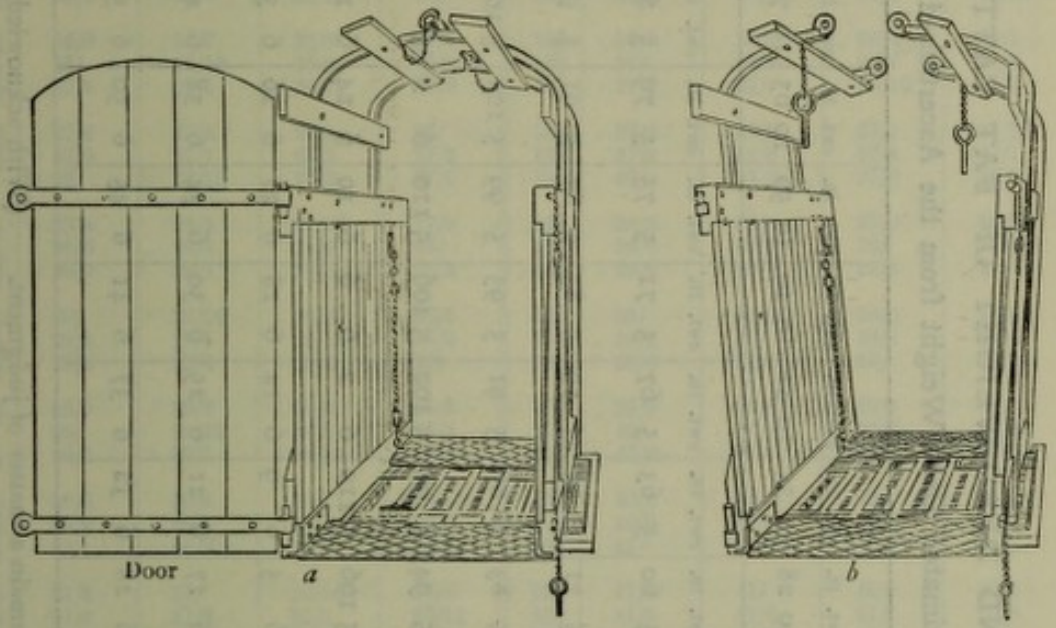

FIG. 13.—CATTLE-WEIGHING CAGE.[1]

(*a*) Bolted and immovable, with a weigh-table 9 or 10 ft. long.

(*b*) Open and removable in two sections, 6 ft. 4 ins. high.

excellent handbook of **computing tables,**[2] or J. D. M'Jannet's *Tables and Auction Mart Guide* (published by Æneas Mackay, 43 Murray Place, Stirling), two pages of which are here reproduced, now supply a key to the farmer in estimating the weight and value of his live stock. It may be reckoned that (1) bullocks in prime fat condition will yield 60 per cent. of dressed beef from their **"fasted live-weight."**[3] The

[1] Made by W. Smith & Coy., Engineers, Barony Place and New Broughton, Edinburgh, for £17 cash.

[2] Published by the Royal Agricultural Socy, 16 Bedford Square, W.C.

[3] "Fasted live-weight" in America means that an animal has consumed no food for twelve hours; but the British acceptation of the term is here adopted, viz., that the fast has lasted for twenty-four hours.

LIVE- AND DEAD-WEIGHT OF FAT CATTLE

Table giving the Estimated Dead-Weight from the Ascertained Live-Weight

Live-Weight of Animal.	cwt. lb. 10 0	cwt. lb. 10 7	cwt. lb. 10 14	cwt. lb. 10 21	cwt. lb. 10 28	cwt. lb. 10 35	cwt. lb. 10 42	cwt. lb. 10 49	cwt. lb. 10 56	cwt. lb. 10 63	cwt. lb. 10 70	cwt. lb. 10 77	cwt. lb. 10 84	cwt. lb. 10 91	cwt. lb. 10 98	cwt. lb. 10 105
Dead-Weight. When Animal is estimated to dress	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.	cwt. lb.
54 per cent. of the Live-Weight.	5 45	5 48	5 52	5 56	5 60	5 63	5 67	5 71	5 75	5 79	5 83	5 86	5 90	5 94	5 98	5 101
55	5 56	5 60	5 64	5 67	5 71	5 75	5 79	5 83	5 87	5 91	5 95	5 98	5 102	5 106	5 110	6 2
56	5 67	5 71	5 75	5 79	5 83	5 87	5 91	5 95	5 99	5 102	5 106	5 110	6 2	6 6	6 10	6 14
57	5 78	5 82	5 86	5 90	5 94	5 98	5 102	5 106	5 110	6 2	6 6	6 10	6 14	6 18	6 22	6 26
58	5 90	5 94	5 98	5 102	5 106	5 110	6 2	6 6	6 10	6 14	6 18	6 22	6 26	6 30	6 34	6 38
59	5 101	5 105	5 109	6 1	6 5	6 9	6 14	6 18	6 22	6 26	6 30	6 34	6 38	6 42	6 47	6 51
60	6 0	6 4	6 8	6 12	6 17	6 21	6 25	6 30	6 34	6 38	6 42	6 46	6 50	6 54	6 59	6 63
61	6 11	6 16	6 20	6 24	6 28	6 32	6 37	6 41	6 45	6 50	6 54	6 58	6 62	6 66	6 71	6 75

N.B.—Condition of Animal must remain a matter of judgment. (With acknowledgments to J. D. M'Jannet.)

Table for ascertaining either the Price of the Animal or the Price per Live Cwt. when the weight of the Animal and one of the Prices referred to is known—say at an Auction Sale.

The Price Bid.	Live-Weight of Animal.			
	80 stones or ct. qr. lb. 10 0 0	80½ stones or ct. qr. lb. 10 0 7	81 stones or ct. qr. lb. 10 0 14	81½ stones or ct. qr. lb. 10 0 21
£	Price per cwt.	Price per cwt.	Price per cwt.	Price per cwt.
13	26/	25/10	25/8	25/6
13¼	26/3	26/1	25/11	25/9
13½	26/6	26/4	26/2	26/
13¾	26/9	26/7	26/5	26/3
13⅛	27/	26/10	26/8	26/6
13⅜	27/3	27/1	26/11	26/9
13¾	27/6	27/4	27/2	27/
13⅞	27/9	27/7	27/5	27/3
14	28/	27/10	27/8	27/6
14¼	28/3	28/1	27/11	27/9
14½	28/6	28/4	28/2	28/
14⅝	28/9	28/7	28/5	28/3
14¾	29/	28/10	28/8	28/6
14⅞	29/3	29/1	28/11	28/9
14¾	29/6	29/4	29/2	29/
14⅞	29/9	29/7	29/5	29/3
15	30/	29/10	29/8	29/6
15⅛	30/3	30/1	29/11	29/8
15¼	30/6	30/4	30/1	29/11
15⅜	30/9	30/7	30/4	30/2
15½	31/	30/9	30/7	30/5
15⅝	31/3	31/	30/10	30/8
15¾	31/6	31/3	31/1	30/11
15⅞	31/9	31/6	31/4	31/2
16	32/	31/9	31/7	31/5
16⅛	32/3	32/	31/10	31/8
16¼	32/6	32/3	32/1	31/11
16⅜	32/9	32/6	32/4	32/2
16½	33/	32/9	32/7	32/5
16⅝	33/3	33/	32/10	32/8
16¾	33/6	33/3	33/1	32/11
16⅞	33/9	33/6	33/4	33/2
17	34/	33/9	33/7	33/5
17⅛	34/3	34/	33/10	33/8
17¼	34/6	34/3	34/1	33/11
17⅜	34/9	34/6	34/4	34/2
17½	35/	34/9	34/7	34/5
17⅝	35/3	35/	34/10	34/8
17¾	35/6	35/3	35/1	34/11
17⅞	35/9	35/6	35/4	35/2

The Price Bid.	Live-Weight of Animal.			
	80 stones or ct. qr. lb. 10 0 0	80½ stones or ct. qr. lb. 10 0 7	81 stones or ct. qr. lb. 10 0 14	81½ stones or ct. qr. lb. 10 0 21
£	Price per cwt.	Price per cwt.	Price per cwt.	Price per cwt.
18	36/	35/9	35/7	35/4
18¼	36/3	36/	35/10	35/7
18½	36/6	36/3	36/1	35/10
18⅝	36/9	36/6	36/4	36/1
18⅛	37/	36/9	36/7	36/4
18⅜	37/3	37/	36/10	36/7
18¾	37/6	37/3	37/1	36/10
18⅞	37/9	37/6	37/4	37/1
19	38/	37/9	37/6	37/3
19¼	38/3	38/	37/9	37/6
19½	38/6	38/3	38/	37/9
19⅝	38/9	38/6	38/3	38/
19¾	39/	38/9	38/6	38/3
19⅞	39/3	39/	38/9	38/6
19¾	39/6	39/3	39/	38/9
19⅞	39/9	39/6	39/3	39/
20	40/	39/9	39/6	39/3
20⅛	40/3	40/	39/9	39/6
20¼	40/6	40/3	40/	39/9
20⅜	40/9	40/6	40/3	40/
20½	41/	40/9	40/6	40/3
20⅝	41/3	41/	40/9	40/6
20¾	41/6	41/3	41/	40/9
20⅞	41/9	41/6	41/3	41/
21	42/	41/9	41/6	41/3
21⅛	42/3	42/	41/9	41/6
21¼	42/6	42/3	41/11	41/8
21⅜	42/9	42/6	42/2	41/11
21½	43/	42/9	42/5	42/2
21⅝	43/3	43/	42/8	42/5
21¾	43/6	43/3	42/11	42/8
21⅞	43/9	43/6	43/2	42/11
22	44/	43/9	43/5	43/2
22⅛	44/3	44/	43/8	43/5
22¼	44/6	44/3	43/11	43/8
22⅜	44/9	44/6	44/2	43/11
22½	45/	44/9	44/5	44/2
22⅝	45/3	45/	44/8	44/5
22¾	45/6	45/3	44/11	44/8
22⅞	45/9	45/6	45/2	44/11

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carcase weight is got by multiplying the live-weight by 3 and dividing by 5. (2) Fair killing animals yield 57 per cent. of carcase: multiply by 4 and divide by 7. (3) Wastefully fat exhibition animals yield 70 per cent. of dressed beef: multiply by 7 and divide by 10. (4) Extra prime show-beasts yield 66·6 per cent.: multiply by 2 and divide by 3. (5) Old fat cows and young store cattle dress to half their live-weight, two-year-old stores to 53 per cent., and three-year-old stores to 56 per cent.

When cattle are weighed at home, allowance should be made in accordance with the following data for the loss which is sure to occur while they are being taken to market. Sir John Lawes estimates the loss by fasting twenty-four hours at about 5 to 5½ per cent. of the gross live-weight = 50 to 55 lbs. in an ox weighing 1000 lbs. John Swan & Sons, of Edinburgh, from their extensive experience in weighing their live cattle, estimate the loss at about 5¾ to 7 per cent. = 80 lbs. in a bullock of 1400 lbs., or, if in addition to fasting it come by rail a long distance, as much as 100 lbs. The difference is easily accounted for by the greater rapidity with which a bullock is "emptied" when excited by travelling. The loss of original total live-weight may fairly be estimated at from 5 to about 7 per cent., according to the treatment the animal has undergone during the period of fasting.

The prices of cattle in the Edinburgh market in the spring of 1906 were, for one-year-olds, from 28s. to 30s. per live cwt., and for two-year-olds from 28s. to 32s.: three-year-olds, being practically out of the market, were not quotable. Butchers' cattle at the same time ranged from 34s. to 37s. per cwt. live-weight.

The following table shows the **relative proportions and prices of animals** in various stages of development at the Edinburgh sales in the spring of 1889:—

	Store Cattle.			Fat Cattle.
	1 year old.	2 years old.	3 years old.	
Estimated percentage dead to fasted live-weight . . .	50	53	56	60
Prices per cwt. of fasted live-weight	34s.	33s. 8d.	33s.	38s.
Prices per imp. stone, or estimated price, dressed	8s. 6d.	7s. 11¼d.	7s. 4½d.	7s. 10d.

The figures show that at these rates the flesh of young well-bred animals fetched higher market prices than did that of animals ready for the butcher, but it must be admitted that these figures and relations vary from time to time with the condition of the market.

When the animal is young and growing it requires more exercise to keep it in health, and there is in consequence greater waste of food substance than when it is finally shut up to finish. Against this must be put the fact that the food consumed by the young and growing portion of the stock of the farm is, or ought to be, the least costly.

With the reduction in the prices of artificial food stuffs the value of the life of the well-bred animal has been proportionally increased, as will be noticed when it is realised that the price paid for the flesh of a year-old store bullock, costing 34s. per cwt., or 4s. 3d. per stone live-weight, is equivalent to nearly 8s. 6d. per stone, estimating it at 50 per cent. dead- to live-weight.

Should an animal in store condition be slaughtered, the beef being unfinished will naturally bring a low price. It is therefore, as previously stated, the *life* of the animal that is valued, in prospect of what it will ultimately produce when the fattening process is completed.

A great many farmers in this country understand the business of beef production so badly that they sell before the animals are properly fed out, and, while they get 3s. or 4s. a cwt. below the price going for well-finished beef, they flood the market with an inferior article and lower rates all round.

The market value of life in this sense varies according to quality, as the value of beef varies for the same reason, and we find well-bred animals selling at higher prices, weight for weight, than ordinary beasts—the presumption as regards their possible performances is worth so much more to the purchaser.

The dead-weight of a fat animal can be approximately estimated by **measurement.** One of the most simple and useful of the various rules employed in making the calculation is the following:—Multiply the square of the girth in feet by the length in feet, and by ·24, or ·25, or ·26, according as the animal is thought to be in moderate, in

medium, or in prime condition. The answer should be the weight of the dressed carcase in imperial stones.

The Author's attention has been called to an ingenious little instrument, a "Live Stock Computer," patented by G. H. Meire, Eyton-on-Severn, Shrewsbury, which gives at sight the values of animals:—(1) by comparison; (2) at a live-weight price; and (3) at carcase price.

The Hereford-Shorthorn, "Roan Boy," the winner of the championship at the American Fat-stock Show of 1883, was an Illinois steer, sired by a Hereford, and out of a roan half Shorthorn and half native cow. He weighed 2125 lbs. when 1414 days old, equivalent to a growth from birth of 1.59 lbs. per day. On the day of slaughter his live-weight was 2100 lbs., and dressed weight 1450 lbs., or 69·05 per cent. net. "He was a steer," said the awarding committee, "that very nearly approached the highest standard of perfection as a butcher's bullock; compact, blocky, evenly and heavily quartered, and thickly covered in the best parts with firm, mellow, well-marbled meat of the best quality."

The great function of live stock on a farm is not the making of so much profit on so many stones of beef—for this, unless side-issues and secondary advantages are estimated, is frequently absent—but (*a*) the formation of a home demand for crude, bulky, and unmarketable farm produce, and (*b*) the making of farmyard manure to maintain the fertility of the land.

Lithoderm is a comparatively new waterproofing material, invented by J. Wilson Dougal, Linlithgow, which is destined to supersede the common linseed-oil and white-lead paint, for inside as well as outside work on the farm. Put on like paint, it presents a surface little altered in appearance or colour, upon which moisture does not settle; is equally effective on sandstone, cement, wood, or metal, for purposes of preservation and disinfection. A gallon costing 6s. 6d. is capable of giving one coat to 60 to 70 square yards. The sole agents are The Scottish Economic Agency, 100 Princes Street, Edinburgh.

CHAPTER XV

DAIRYING—PASTURE AND FOOD

Conditions, Suitable and Unsuitable—Best Dairying Localities—Cow Pasture—Water Supply—Natural and Artificial Herbage—Weeds—Extent of Dairy Land—Show of the British Dairy Farmers' Association—Data for Calculating the Amount of a Cow's Food—Plan of Arrangements for Feeding 100 Cows on 300 Acres—Winter Dairying—House Feeding for a Town Milk Trade—Examples of Edinburgh and Leith Dairies—Analyses of Morning's and Forenoon's Milk—Tuberculosis—Butter-making without a Churn.

CONDITIONS, **suitable and unsuitable.**—The climate is the only limit to success in dairying in this country, and that on account of the wet and cold of the higher of the hilly regions. All other difficulties—deficient rainfall and clay-soil (such as the heavy clays near London) that, not so long ago, were thought unsuitable—can be dealt with by adopting one of the many varied systems of dairying practised in England. There is a choice of—(1) "soiling," viz., keeping the cows entirely indoors and carrying all green and other food to them, or (2) pasturing during summer, besides (3) many combinations or variations of the two plans.

Dairying is more **remunerative** in some localities than in others, owing to local favourable conditions; but the absence of some of these does not necessarily exclude the practice of dairying as a successful industry. The districts in England of most renown in this respect are—parts of the counties of Cheshire, Derby, York, Leicester, Gloucester, Somerset; and in Scotland—Wigtown, Kirkcudbright, Dumfries, Ayr, Renfrew, and Lanark. Such places possess the soil and the climate suitable for growing good grass, which is the best and cheapest food for dairy cows—grass for summer, and hay for the winter months. Roots were at one time considered indispensable, and it was thought that if roots could not be profitably grown, dairying need not be attempted; but now that the aroma and flavour of milk and its products

receive consideration and attention, for reasons to be explained later, they are not so popular, and the success of silage in places too uncongenial for the growth of roots has made them less essential.

Extremes of heat or cold are disadvantageous, but these are not so great in this country, except on high cold mountain-ranges, that they cannot be overcome by shelter. Summer shelter is necessary for protection against the sun and flies in warm weather, and from wind and rain while it is stormy. This may be secured by tall hedges, belts of plantation, high stone walls, or cheap low-roofed open sheds. Winter shelter is usually given by housing, except in a few mild districts—as in Cheshire, where cows lie out all winter. There the shelters provided in summer prove valuable. Extreme cold reduces the flow of milk; and excessive heat, with its various accompanying irritations, lowers both quality and quantity. There is no animal product of the farm so easily affected by adverse circumstances as milk. Materials for its secretion are provided by the cow only after every other want of the animal system has been supplied; consequently, the maximum of milk production can be attained only when the cow is free from all annoyances or discomforts, so that she may settle to the consumption of a proper quantity of food, and obtain the necessary rest and quiet to enable her to make the best use of it. Moderate **exertion,** as browsing in a field, is advantageous to animals that are to be retained as dairy stock from year to year, for it keeps the limbs and the general constitution in a sound and healthy condition, and checks the tendency to run to fat, which cows acquire if constantly tied up. An immediate reduction in the quantity of milk follows any excess of exertion; this may occur through the cows startling and running frantically from the great gad-fly, *Tabanus bovinus*, and the little grey horse-fly, cleg, or small rain-breeze fly, *Hæmatopota pluvialis*, which appears in July;[1] it occurs also when they are in

[1] "Cattle on hot summer days are driven almost frantic by flies, thin-skinned young animals suffering more torment from their attacks than older ones. The Americans call this season of the year 'fly-time,' and as galloping madly over sun-baked pastures is not good for horses' feet, and there is nothing like peace and quiet for cows, it is best in fly-time to keep such animals in their stalls and sheds by day, and to turn them

season ("bulling"); also if they are hunted in any way, or even driven a long distance to pasture, especially if not permitted to go at the slow pace natural to a cow. More food is needed in these circumstances to make good the extra waste of the system, and all this requires to be deducted from what would have gone, under more settled conditions, to the formation of milk. The milk secreted is also inferior in quality, being poor in heat producers, especially butter-fat, and more liable to spoil in keeping or in the manufacture of its products. This is supposed to arise from the presence of an alkaloid which appears in the systems of animals that are excited or overheated—as in a fit of bad temper, or after being hunted.

The amount of milk given by a cow in the morning as compared with that in the evening (twelve hours elapsing in each case after the previous milking) varies with varying conditions. When cows lie out all night, and when day and night are mild, there is usually more milk in the evening than in the morning. When the nights are cold this disproportion is more marked; but should the nights be warm and comfortable, the days too hot and the cows unsettled, there will be a greater yield of milk in the morning. In moderate weather cows feed more by day than by night, and the result is immediately seen in improved milk production.

Under the conditions in which the **milk trials of the B.D.F.A.** are conducted, the evening is usually less in quantity but richer in quality than the morning yield, yet F. J. Lloyd has shown that in nearly all the breeds the total weight of fat in the morning closely approaches the total weight in the evening milk.

Breeds.	Morning.			Evening.		
	1904.	1908.	1900.	1904.	1908.	1900.
Shorthorns	.85	.91	.82	.89	1.00	.87
Jerseys	.87	.88	.75	.95	.83	.82
Guernseys	.77	.66	.79	.70	.61	.76
Red Polls	.78	.72	.72	.73	.68	.77
Kerries	.74	.72	.57	.66	.67	.54
Crosses, etc.	.99	.83	.87	1.05	.86	.81

out only at night, when the horse-flies cease from troubling and the gad-flies are at rest. The plague of flies is worse in wooded districts and least in pastures near the sea, where the delicate Channel Islands cow may, in fly-time, be seen in Sussex tethered during the day."

A cow pasture is better undulating than flat, provided the banks are not so steep as to cause accidents. It is a mistake to have pasture all thoroughly drained as if it were arable land; unless, indeed, it be arable land soured by stagnant water. It ought to be dry enough for cows to walk over the surface without breaking the sod and poaching it; but the hollows should be left moist enough to encourage the growth of food-plants and grasses different from those that occupy dry land. The moist parts, in conjunction with other land, provide variety of food during the whole grass-season, and are particularly serviceable in a very hot summer, and at all times in autumn. Deep drains are better than open surface-drains, where the land is good enough to warrant the expense of their construction. Large open ditches, especially with steep banks, are most objectionable in cow-pastures, as there is always the danger among horned cattle of their being pushed or horned (Scotch—dunched) into them.

The water supply is of premier importance. The smallest want of water is seen immediately in diminished flow of milk. The water must be pure as well as abundant, for when contaminated by decaying organic matter, more particularly if this be of animal origin, the milk and its products do not keep well, and are liable to be injured by objectionable flavours and smells. A pure running stream, with a hard bottom and gradually sloping sides, is the best possible watering-place; but where drainage or river water is not plentiful, rain water should be safely stored in ponds or in underground tanks in times of rain against the dry season, and in such a way as to preserve its purity. A stagnant pool in which cows can walk and stand is most undesirable. Their solid and liquid excrements are dropped into it, and it soon becomes filthy. Cows are fond of standing in water in hot weather, to keep cool and to avoid flies; but the habit is not only injurious, inducing rheumatism if animals go in while heated by running, but it also involves waste of feeding time, which results in loss of produce.

Natural herbage from good old pasture, being an assemblage of the best perennial grasses, nutritious weedy herbage, and leguminous plants, yields the finest quality of dairy produce; grass forced by high manuring or by irrigation is watery and immature; and when that or "seeds" grass is

used alone, perhaps because there are fewer varieties of plants represented in such cases, there is often a difficulty in the manipulation of the products, more especially cheese. Young grass possesses one special advantage over old pasture, in springing earlier in the season, and it is good in conjunction with old pasture for encouraging the flow of milk. There are many upland grasses and plants, forming the food of mountain sheep, that must not be considered inferior for dairying; as light hardy cows often do well on wild-looking pasture in hilly districts, rented at from 6s. to 10s. per acre, if a wide area be given, so that they may have ample choice of food—say, between 3 and 4 acres of pasture for each, and the aftermath of 2 acres of meadow cut annually for hay. The meadow should produce a little over 2 tons of fodder, or sufficient for a small cow of 8 or 9 cwts. live-weight during winter, without roots or any artificial food, till after calving-time in spring. Subsequently each cow requires mixed meal and cake to the value of 20s. to 25s., to keep up the flow of milk until the grass grows sufficiently to support her.

Of weeds that give a taste and smell to milk or butter, species of *Allium* are perhaps the worst and most common, besides being very difficult to be got rid of, viz., broad-leaved garlic (ramsons), *A. ursinum*, and round garlic (crow allium), *A. vineale*. Garlic mustard (sauce alone), *Alliaria officinalis*, with a small white flower, and several other varieties of wild mustard; also camomile, *Anthemis*, and ivy, *Hedera*, give a taste to milk. As most objectionable weeds grow in the shade and shelter of fences, the injury may be minimised by frequently cutting weeds found in such places. The roots of water-hemlock or cowbane are poisonous, but they are not very accessible, and, moreover, the plant is not a common one in pasture. Buttercups, *Ranunculaceæ*, are thought by some to give a rich golden tint to butter, and by others to produce an acrid taste in milk and its products. Most probably both ideas are wrong, although the first was at one time so prevalent that the familiar name of "John Buttercup" was given to the dairyman. In May and June, the buttercup season, grass-butter is naturally yellow, when cows go on good pasture, even when buttercups are not present. The change to the yellow colour is rapid at this season, forming a marked contrast to the pale "house-butter" of winter and

spring. Cows grazing do not, if they can avoid it, eat the flower stalks and heads of ranunculus. A few leaves taken up with grass or other pasture plants act as a relish in a cow's food, though cases of poisoning have been traced to the consumption of the herbage of acrid species in too great quantity. Buttercups are said to be an indication of good soil, and it is true that good old pastures always include them, but they appear abundantly in both bad and good pasture. The fact is in a great measure to be accounted for by animals leaving them—as it is possible for them to do while browsing—through a preference for grass and other similar herbage. As a rule, the quality of land is not indicated so much by the presence or absence of weeds as by their size and habit of growth; for instance, a well-developed thistle, *Carduus*, or cowslip, *Primula veris*, does not grow on poor land; only small and inferior specimens, though often in great abundance, are to be seen there.

Extent of Dairy Land.—Three acres of good grass (rented at 30s. to 35s. per acre, including taxes) are sufficient to provide for the keep of each cow during both summer and winter; rather more than an acre could be cut for hay, and the remainder grazed along with the aftermath of the hay land. About one-tenth of an acre of roots is at times made to replace a portion of the grass area. If, however, roots are given without concentrated food in autumn, before cows go dry, more milk is produced; but the cows are thus reduced in condition and rendered more difficult to winter. There is danger during spring of milk-fever, if roots are provided along with a full supply of hay, should the latter be of fine quality. The remark is equally applicable to any additional food that would induce the cow to thrive rapidly.

The average annual return of a well-managed dairy of good Shorthorn-cross cows should be about 550 gallons of milk per cow under the treatment described, with the addition of some artificial food in spring. Good Ayrshires on such land are not behind them in milking power. The ordinary Ayrshire on poorer land should give at least 450 gallons. Pedigree Shorthorns do not, as a class, even taking only milking strains, milk so heavily as their crosses and non-pedigreed, though often well-bred relations, such as are usually found in English dairies.

When the "soiling" system and higher feeding and farming generally are adopted, the average annual individual yield of milk may be raised by 150 gallons or more per cow,

Breed.	Period.	Number of Cows.	Lbs. of Milk.	Percentage Fat.	Percentage Solids other than Fat.	Percentage Total Solids.
Shorthorns .	1899	24	46.0	3.74	9.04	12.78
,, .	1900	26	48.1	3.54	8.83	12.37
,, .	1901	18	52.2	3.53	8.96	12.49
,, .	1902	34	46.9	3.86	8.88	12.74
,, .	1903	23	53.2	3.69	8.89	12.58
,, .	1904	22	43.8	4.01	8.89	12.90
,, .	1905	22	49.1	3.85	8.99	12.84
Jerseys . .	1899	20	31.9	5.17	9.34	14.51
,, . .	1900	25	31.0	5.11	9.22	14.33
,, . .	1901	24	28.7	5.35	9.34	14.69
,, . .	1902	30	30.6	5.01	9.24	14.25
,, . .	1903	18	31.5	5.39	9.00	14.39
,, . .	1904	14	35.0	5.17	9.23	14.40
,, . .	1905	13	34.7	5.25	9.14	14.39
Guernseys .	1899	6	28.9	4.43	9.29	13.72
,, .	1900	10	33.2	4.69	9.18	13.87
,, .	1901	11	32.8	4.31	9.19	13.50
,, .	1902	2	30.2	5.01	8.84	13.85
,, .	1903	6	29.2	4.37	9.03	13.40
,, .	1904	7	32.1	4.53	9.12	13.65
,, .	1905	5	31.4	4.81	9.15	13.96
Red Polls .	1899	7	41.8	3.39	8.84	12.23
,, .	1900	8	40.8	3.65	9.10	12.75
,, .	1901	4	45.7	3.47	9.18	12.65
,, .	1902	7	39.2	3.68	9.01	12.69
,, .	1903	7	39.3	3.60	8.89	12.49
,, .	1904	7	37.8	4.10	8.85	12.95
,, .	1905	13	38.5	3.63	8.93	12.56
Kerries . .	1899	8	36.1	3.33	8.86	12.19
,, . .	1900	12	25.7	4.33	9.21	13.54
,, . .	1901	7	33.5	3.69	9.07	12.76
,, . .	1902	10	27.2	4.36	9.23	13.59
,, . .	1903	4	35.1	3.95	9.06	13.01
,, . .	1904	10	33.1	4.26	9.17	13.43
,, . .	1905	8	28.2	4.10	8.96	13.06
Crosses . .	1899	9	51.7	3.76	9.08	12.84
,, . .	1900	8	43.6	3.88	8.94	12.82
,, . .	1901	5	42.2	3.65	8.94	12.59
,, . .	1902	13	42.7	3.97	9.05	13.02
,, . .	1903	13	43.9	3.86	8.85	12.71
,, . .	1904	11	53.4	4.26	8.94	13.20
,, . .	1905	12	45.7	3.82	9.08	12.90

which will repay the extra labour should conditions necessary for such a system be present.

The quantity and quality of the milk produced during seven years by the picked specimens of the most prominent milking breeds at the **show of the British Dairy Farmers'**

Association, held early in October of each year, are shown in the preceding table, reproduced from the report of the milking trials of 1905, in Vol. XX. of the Association's *Journal.*

The milking trials are held under the following conditions :—

(1) One point for every pound of milk, taking the average of two days' yield. (2) Twenty points for every pound of butter-fat produced, as calculated by analysis. (3) Four points for every pound of solids other than fat, similarly calculated. (4) One point for every ten days since calving after the first forty days, with a maximum allowance of 14 points. Deductions are also made of 10 points each time the milk falls below 3 per cent. of fat, or below 8.5 per cent. of other solids, below which no prize could be awarded.

Subjoined is a list of the original standards of points for the different breeds, established in 1901, which were in force for four years; and of the present standards, which took their place in 1905 :—

	Points. 1901-4.	Points. 1905 and later.		Points. 1901-4.	Points. 1905 and later.
Shorthorns, Pedigree	90	85	Guernseys . .	90	85
Shorthorns, Non-Pedigree . .	120	110	Red Polls . .	190	90
Jerseys . . .	95	95	Ayrshires . .	00	90
			Kerries . .	75	75

The **following table,** from the official report on the

	Shorthorns.			Non-Pedigree Shorthorns.			Jerseys.			Guernseys.			Red Polls.			Ayrshires.			Kerries.		
	No.	90 Standard	80	No.	120 Standard	110	No.	95 Standard	85	No.	90 Standard	80	No.	90 Standard	80	No.	100 Standard	90	No.	75 Standard	65
1898 . .	9	0	2	23	3	7	18	2	11	9	2	6	5	2	3	..	..	..	9	4	5
1899 . .	10	3	7	14	4	6	20	4	7	6	0	2	7	3	4	4	1	4	8	3	7
1900 . .	10	2	5	16	5	6	25	2	6	10	3	6	6	3	4	..	..	..	12	1	4
1901 . .	6	1	5	12	6	7	24	5	7	11	0	4	4	3	4	4	0	2	7	4	5
1902 . .	10	3	4	24	8	10	30	3	10	2	0	0	7	2	5	3	0	0	10	3	4
1903 . .	7	1	5	16	4	10	18	7	11	6	0	1	7	1	5	..	..	..	4	2	4
1904 . .	6	1	3	16	1	5	14	6	8	7	1	1	7	3	4	1	0	0	10	6	7
Total 7 years	58	11	31	121	31	51	149	29	60	51	6	20	43	17	29	12	1	6	60	23	36
Percentage .	..	19	53	..	25	42	..	19	40	..	11	39	..	39	67	..	8	50	..	38	60

British Dairy Farmers' Milking Trials, covers seven years. Column 1 shows the number of cows that competed; column 2, the number that reached the fixed standard; column 3, the number (including those in column 2) which reached 10 per cent. below the standard; with percentages for each column.

NUMBER OF CATTLE TESTED SINCE 1896

Breed.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.
Shorthorns . .	17	9	23	21*	22	15	31	18	14	17	22
Jerseys . . .	30	14	17	15	29	25	30‡	20	12	18	13
Guernseys . .	4	3	5	4	7	8	1	5	3	3	2
Red Polls . .	3	7	4	9†	7	2	6	5	4	11	12
Ayrshires . .	2	3	1	2	...	1	1	...	1	3	2
Dutch . . .	...	1	...	...	...	...	...	1	...	...	...
Kerries and Dexters	...	...	1	2	...	1	2	...	2	1	2
Welsh . . .	...	...	1	1	1	...	...	...	...	...	...
Crossbreds . .	5	4	1	6	2	2	11	8	6	11	10
Devon . . .	...	...	...	...	...	...	...	2	2	...	5
	61	41	53	60	68	54	82	59	44	64	68

* Including two heifers.
† Including three heifers.
‡ Including four heifers.

In the **butter tests** conducted by the same Association, the prizes are awarded according to the following scale of points:—One point for every ounce of butter; one point for every completed ten days since calving, deducting the first forty days. Maximum allowance for period of lactation, 12 points. Fractions of ounces of butter, and incomplete periods of less than ten days, are worked out in decimals and added to the total points. In the case of cows obtaining the same number of points, the prize is awarded to the cow that has been the longest time in milk.

Data for calculating the amount of cows' food in a mixed system of summer pasturing and soiling.—As in the grazing example, 3 acres go to one cow, but the grain grown is sold, if it be not thought advisable to use it as concentrated food, which in the other case had to be bought. Each cow requires, besides summer pasture, 2 tons of straw

Prize-winners, Tring Butter Tests and Milking Trials (five years, 1901 to 1905)

Cows of any Breed or Cross, not exceeding 900 lbs. Live-Weight. (*All Jerseys except those specially designated.*)

No. in Catalogue.	Exhibitor, Name of Cow, and Live-Weight in Lbs.	Age.	No. of Days in Milk.	Total Milk Yield.	Butter Yield.	Ratio, viz., lb. Milk to lb. Butter.	No. of points for Butter.	No. of Points for Lactation.	Total No. of Points.	Prizes.*		
										Butter Test.†	Milk Test.‡	
	1901.	Y. M. D.		LB. OZ.	LB. OZ.						Points.	
10	D. Mutton's "Primrose Day" (898 lb.)	7 2 0	67	49 14	2 7¾	20·07	39·75	2·70	42·45	3rd	..	1st
25	Capt. Smith-Neill's "Tuddie's Queen" (863 lb.)	8 2 0	67	47 1	2 11¼	17·41	43·25	2·70	45·95	1st and (2).	..	2nd
23	Hon. Mrs Murray-Smith's "Lorna" (847 lb.)	8 5 0	187	37 2	1 6¼	26·69	22·25	12·00	34·25	..	..	3rd
24	Hon. Mrs Murray-Smith's "Dahlia" (764 lb.)	8 4 0	136	36 10	1 5½	27·25	21·50	9·60	31·10	..	..	4th
7	Viscount Enfield's "Gloaming 4th" (885 lb.)	7 8 0	130	34 11	2 2	16·32	34·00	9·00	43·00	2nd	..	..
6	J. R. Corbett's "Em" (898 lb.)	9 4 0	125	31 9	1 15	16·29	31·00	8·50	39·50	4th	..	..
	1902.											
18	Hon. Mrs Murray-Smith's "Dahlia" (812 lb.)	9 3 0	166	36 10	1 7¼	25·20	23·25	12·00	35·25	..	48·62	1st
21	Capt. Smith-Neill's "Tuddie's Queen" (845 lb.)	9 2 10	108	41 4	2 13¾	14·42	45·75	6·80	52·55	1st and (2).	48·05	2nd
10	Lady de Rothschild's "Lesser Daisy" (813 lb.)	7 6 8	121	38 10	1 13¾	21·12	29·25	8·10	37·35	..	46·72	3rd
7	Dr Watney's "Aurelius' Shrub" (887 lb.)	3 8 15	113	39 6	2 1¾	18·80	33·50	7·30	40·80	3rd	46·67	4th
28	W. C. Cooper's "Havering Glorissa" (879 lb.)	5 2 11	166	34 1	1 14¾	18·01	30·25	12·00	42·25	2nd	46·06	..
26	F. Bedford's "Dora" (871 lb.)	3 6 0	168	28 10	1 10½	17·28	26·50	12·00	38·50	4th	40·62	..
	1903.											
37	Dr H. Watney's "Sharab" (874 lb.)	6 6 18	47	51 0	2 6¾	21·05	38·75	0·70	39·45	..	51·70	1st
53	Lord Rayleigh's "Rachel" (Guernsey, 861 lb.)	4 6 0	146	40 4	2 2	18·82	34·00	10·60	44·60	2nd	50·85	2nd
15	Mrs M'Intosh's "Forget-me-not" (795 lb.)	3 11 27	176	38 3	2 2¼	17·83	34·25	12·00	46·25	1st and (3).	50·18	3rd
30	The Bishop of Ipswich's "Oxford Dewdrop" (847 lb.)	6 4 9	106	43 5	2 2	20·38	34·00	6·60	40·60	3rd	49·91	4th
19	J. Joice's "Oxford Sunrise" (898 lb.)	5 2 3	177	32 15	1 12½	18·49	28·50	12·00	40·50	4th	44·93	..
	1904.											
48	Capt. Smith-Neill's "Doctor" (Cross-bred, 864 lb.)	16 0 0	85	63 1	1 5¼	47·48	21·25	4·50	25·75	..	68·10	1st
46	Lord Rayleigh's "Rachel 2nd" (Guernsey, 863 lb.)	6 0 0	146	40 15	1 11¼	24·03	27·25	10·60	37·85	..	51·53	2nd
18	Lady de Rothschild's "Witch" (840 lb.)	4 2 20	165	38 15	2 2¾	17·92	34·75	12·00	46·75	1st	50·93	3rd
25	Capt. Smith-Neill's "Viola's Beauty" (888 lb.)	8 10 14	165	37 9	1 14¼	19·86	30·25	12·00	42·25	..	49·56	4th
14	J. Smith-Barry's "Nimble" (862 lb.)	3 0 0	141	30 5	2 4¼	13·28	36·50	10·10	46·60	2nd	40·41	..
4	Lady Smyth's "Louisiana Loo" (812 lb.)	4 0 11	130	29 15	2 2½	13·88	34·50	9·00	43·50	3rd	38·93	..
	1905.											
42	Capt. Smith-Neill's "Doctor" (Cross, 860 lb.)	20 0 0	81	64 12	2 3½	29·18	35·50	4·10	39·60	..	68·85	1st
8	Lady de Rothschild's "Lady Dora" (898 lb.)	6 0 0	205	42 6	2 7	17·38	39·00	12·00	51·00	2nd	54·37	2nd
35	Dr Watney's "Violette" (896 lb.)	8 0 0	136	44 12	2 9¾	17·14	41·75	9·60	51·35	1st and (2).	54·35	3rd
23	Capt. Smith-Neill's "Geraldine" (856 lb.)	4 9 18	158	42 0	1 12½	28·57	28·50	11·80	40·30	..	53·80	4th
21	The Bishop of Ipswich's "Oxford Dewdrop" (889 lb.)	8 3 9	121	44 6	2 4	19·72	36·00	8·10	44·10	3rd	52·47	..
32	J. Joicey's "Justitia" (895 lb.)	3 2 21	111	30 4	2 4¾	13·17	36·75	7·10	43·85	4th	37·35	..

Cows of any Breed or Cross, exceeding 900 lbs. Live-Weight. (*All Jerseys except those specially designated.*)

	1901.													
57	Lord Rayleigh's "Trefoil" (1393 lb.)	6 0 0	79	72 10	2	9½	28·00	41·50	3·90	45·40	3rd	..	1st
51	W. Nisbet's "Lady" (Cross, 1065 lb.)	4 0 0	59	58 10	3	6	17·37	54·00	1·90	55·90	1st	..	2nd
63	J. F. Spencer's "Model Mary" (Shorthorn, 1568 lb.)	6 0 0	11	59 6	2	8½	23·60	40·25	..	23·00	..	..	3rd
53	A. Bonest's "Buttercup" (Shorthorn, 1254 lb.)	8 0 0	30	54 12	1	12	31·28	28·00	..	28·00	..	..	4th
39	Dr H. Watney's "Lady of the Sunny Isles" (926 lb.)	9 5 0	125	45 6	2	5¾	19·23	37·75	8·50	46·25	2nd and (1).	..	..
46	D. Mutton's "Miss Lucy 2nd" (1028 lb.)	6 11 0	156	41 4	2	1¼	20·15	33·25	11·60	44·85	4th and (3).	..	..
	1902.													
57	J. Evens's "Burton Margaret" (Lincoln, 1617 lb.)	7 0 0	69	75 0	2	10½	28·23	42·50	2·90	45·40	..	77·90	1st
61	A. Bonest's "Buttercup" (Shorthorn, 1275 lb.)	9 0 0	23	64 10	2	4½	28·52	36·25	..	36·25	..	64·62	2nd
43	Dr Watney's "Sharab" (902 lb.)	5 6 19	128	53 14	3	9¾	14·92	57·75	8·80	66·55	1st and (1).	62·67	3rd
65	Lord Rayleigh's "Aconite" (Shorthorn, 1365 lb.)	6 0 0	36	62 8	1	15	32·25	31·00	..	31·00	..	62·50	4th
55	A. Merry's "Molly" (Shorthorn, 1393 lb.)	6 0 0	25	52 2	2	15¾	17·46	47·75	..	47·75	2nd	52·12	..
40	Viscount Enfield's "Gloaming 4th" (925 lb.)	8 8 0	138	35 14	2	4¾	15·61	36·75	9·80	46·55	3rd and (3).	45·67	..
42	Dr Watney's "Marryatt's Lass" (919 lb.)	8 7 29	203	36 12	2	2	17·29	34·00	12·00	46·00	4th	48·75	..
	1903.													
75	J. Evens's "Burton Nancy" (Lincoln, 1346 lb.)	6 6 0	36	66 0	3	1½	21·33	49·50	..	49·50	2nd	66·00	1st
93	A. Merry's "Judy" (Shorthorn, 1431 lb.)	6 0 0	184	50 12	1	11½	29·52	27·50	12·00	39·50	..	62·75	2nd
96	A. Bonest's "Buttercup" (Shorthorn, 1294 lb.)	10 0 0	29	62 4	2	8¾	24·44	40·75	..	40·75	..	62·25	3rd
77	T. Cundy's "Buttercup" (Cross, 1333 lb.)	6 0 0	148	50 0	2	5	21·62	37·00	10·80	47·80	4th	60·80	..
58	Dr Watney's "Violette" (926 lb.)	6 0 0	141	37 14	2	8	15·15	40·00	10·10	50·10	1st and (1).	47·97	..
60	Miss Standish's "St Helier's Princess" (930 lb.)	8 0 0	128	41 12	2	8½	16·49	40·50	8·80	49·30	3rd and (2).	50·55	..
76	J. Evens's "Burton Ruby Spot" (Lincoln, 1739 lb.)	6 10 0	33	61 10	2	6½	25·61	38·50	..	38·50	..	61·62	4th
	1904.													
78	R. W. Hobbs's "Rose 26th" (Shorthorn, 1476 lb.)	7 5 9	54	72 6	2	2¾	33·32	34·75	1·40	36·15	..	73·77	1st
77	J. Evens's "Burton Cross 2nd" (Lincoln, 1568 lb.)	6 11 20	29	71 12	2	9¼	27·83	41·25	..	42·15	..	71·75	2nd
75	T. Cundy's "Daffodil" (South Devon, 1363 lb.)	10 0 0	165	57 0	2	3¾	25·51	35·75	12·00	47·75	..	69·00	3rd
76	J. Evens's "Burton Fleet 2nd" (Lincoln, 1583 lb.)	7 11 0	38	66 4	2	1½	31·64	33·50	..	33·50	..	66·25	4th
54	Dr Watney's "Blackberry" (917 lb.)	5 0 26	126	37 10	2	15¼	12·74	47·25	8·60	55·85	1st and (1).	46·22	..
52	Dr Watney's "Red Maple" (1031 lb.)	7 11 14	97	55 2	2	12	20·04	44·00	5·70	49·70	2nd and (2).	60·82	..
53	Dr Watney's "Violette" (901 lb.)	7 0 0	98	47 8	2	11½	17·57	43·25	5·80	49·05	3rd and (3).	53·30	..
55	Lady de Rothschild's "Freak 3rd" (948 lb.)	10 10 11	188	35 14	2	4¼	15·83	36·25	12·00	48·25	4th	47·87	..
	1905.													
68	J. Evens's "Buttercup" (Shorthorn, 1316 lb.)	6 0 0	40	71 0	2	8½	28·04	40·50	..	40·50	..	71·00	1st
70	W. Arkell's "Roan Latton" (Shorthorn, 1466 lb.)	8 0 0	61	62 0	1	11½	35·74	27·75	2·10	29·85	..	64·10	2nd
45	Dr H. Watney's "Red Maple" (1059 lb.)	8 11 21	110	56 12	2	12½	20·51	44·25	7·00	51·25	2nd and (3).	63·75	3rd
57	W. R. Wilmer's "Magpie" (Cross, 1053 lb.)	5 1 6	94	53 2	1	10½	32·07	26·50	5·40	31·90	..	58·52	4th
46	Dr Watney's "Guenon's Lady" (1125 lb.)	6 3 18	138	39 12	2	11½	14·62	43·50	9·80	53·30	1st and (1).	49·55	..
48	The Bishop of Ipswich's "Lady Teasel" (952 lb.)	8 6 3	115	48 10	2	8½	19·09	40·75	7·50	48·25	3rd	56·12	..
50	Admiral Hon. T. S. Brand's "Rosina" (969 lb.)	4 9 0	74	35 14	2	10½	13·50	42·50	3·40	45·90	4th	39·27	..

* Prizes for either Milk or Butter.—1st, £20; 2nd, £15; 3rd, £10; 4th, £5. (1). English Jersey Cattle Society's Gold Medal; (2). E.J.C.S. Silver Medal; (3). E.J.C.S. Bronze Medal.

† Butter Test.—Scale of Points: One point for every ounce of butter, and 1 point for every ten days after calving, deducting the first forty days. Fractions worked out by decimals. Maximum points for period of lactation, 12.

‡ Milk Test.—Scale of Points: One point for every pound of milk, 1 point for every ten days after calving, deducting first forty days. Fractions worked out in decimals. Maximum points for period of lactation, 10. Cows must give 3 per cent. butter-fat.

Ernest Mathewes, *Judge.*

and hay for fodder, amounting to 25 lbs. per day during the six winter months, besides concentrated bought food given in spring, such as cake and meal, which might cost from £1 to £2, or more if cake be continued on the grass. In addition, the following roots and forage crops may be given at the various seasons throughout the year:—

(1) One-third of a cwt. of roots per day for four winter months (eighteen weeks), given mostly when cows are dry = 2 tons 2 cwts. per cow, or 1 acre for ten cows—swedes, 15-ton crop; mangels, 27 tons—average 21 tons per acre. (2) One-half cwt. of rye per day for three weeks in April = 10 cwts. per cow in twenty days, or 1 acre for ten cows, with a 5-ton crop. (3) One-quarter cwt. per day of crimson clover, rape, vetches, etc., for twenty-one weeks in summer = 37 cwts., nearly, per cow, or roughly five cows to 1 acre, with a 9-ton crop. (4) One-half cwt. cabbages per day for ten weeks in autumn = 35 cwts. per cow, or fifteen cows per acre, with a 26¼-ton crop.

Plan by which 100 Cows can be Fed on 300 Acres.

100	acres	of arable land farmed on a 4-course rotation.
150	,,	permanent pasture grass.
50	,,	,, grass-meadow, cut for hay.

Annual Crops on the Arable Land.

(1) 25 Acres. Wheat or oats, followed by 20 acres winter catch crops and 5 acres winter fallow.	(4) 25 Acres. "Seeds" cut for hay, 20 acres latter-math pastured, and 5 acres cut for forage.
(2) 25 Acres. Roots and forage crops following catch crops, etc.	(3) 25 Acres. Oats, as a "nurse" for the grass "seeds."

Areas in Acres of Root and Forage Crops, including Catch Crops:—10 roots, 6⅔ cabbages, 10 rye, 20 vetches, clover, and rape: Total, 46⅔ acres.

[1] Sir J. B. Lawes, Bart., and Dr (afterwards Sir Henry) Gilbert, in their pamphlet on *Experiments on Ensilage* (1886), Harrison & Sons, p. 28, give 25 lbs. of "dry substances" of food as the daily amount necessary for an ordinary cow.

The following table gives the numbers of cattle tested for butter-production, 1895-1905, their period of lactation, weight of butter, lbs. of milk to 1 lb. of butter, and points :—

Year.	No.	Breed.	Days in Milk.	Weight of Butter.	Butter Ratio.	Points.
				lbs. ozs.	lbs. milk.	
From 1895 to 1900	106	Shorthorns .	50½	1 11	28.81	...
1901 . .	15	,, .	44	2 0½	26.69	33.69
1902 . .	31	,, .	50	1 11½	27.38	23.89
1903 . .	18	,, .	41	1 11	38.59	28.44
1904 . .	14	,, .	41½	1 10	29.31	27.47
1905 . .	17	,, .	53	1 13½	27.65	31.25
,, 1895 to 1900	126	Jerseys . .	99	1 10¼	19.15	...
1901 . .	25	,, . .	141	1 9½	17.80	34.44
1902 . .	30	,, . .	124	1 10	18.46	33.19
1903 . .	20	,, . .	141	1 11	18.12	36.13
1904 . .	12	,, . .	117	1 13½	19.62	36.79
1905 . .	18	,, . .	134	1 9½	21.86	...
,, 1895 to 1900	23	Guernseys .	71¾	1 9½	21.86	...
1901 . .	8	,, .	81	1 8¾	21.43	29.51
1902 . .	1	,, .	17	1 3¾	21.46	19.75
1903 . .	5	,, .	52	1 1	27.77	18.93
1904 . .	3	,, .	98¼	1 10	20.65	31.91
1905 . .	3	,, .	165⅔	1 6¾	26.84	26.92
,, 1895 to 1900	30	Red Polls .	60½	1 4¾	30.29	...
1901 . .	2	,, .	80	1 8⅝	25.50	28.77
1902 . .	6	,, .	83	1 6⅛	26.84	26.92
1903 . .	5	,, .	124	1 0	39.60	21.39
1904 . .	4	,, .	115½	1 5½	30.34	29.06
1905 . .	11	,, .	74½	1 3½	28.78	22.76
,, 1896 to 1900	8	Ayrshires. .	52	1 13¼	26.35	...
1901 . .	1	,, .	125	1 7½	27.65	32.10
1902 . .	1	,, . .	33	1 3½	18.00	19.50
1903 . .	0	,, . .	...	...	...	...
1904 . .	1	,, . .	116	0 12½	35.20	20.10
1905 . .	3	,, . .	77	1 2½	28.07	22.86
,, 1896 to 1900	3	Dexters and Kerries .	117	0 14¾	40.80	...
1901 . .	1	,, .	83	1 6¼	21.17	26.55
1902 . .	2	,, .	46	1 7⅜	21.28	23.49
1903 . .	0	,, .	...	...	...	...
1904 . .	2	,, .	72	0 14¾	21.31	18.45
1905 . .	1	,, .	149	1 1¼	23.47	28.15
,, 1896 to 1900	18	Other breeds or crosses . .	47	1 11½	24.16	...
1901 . .	2	,, . .	119	1 7¼	30.70	31.02
1902 . .	11	,, . .	56	1 8½	27.18	26.82
1903 . .	11	,, . .	89	1 7¾	31.41	28.69
1904 . .	18	,, . .	113½	1 11¾	27.10	34.14
1905 . .	11	,, . .	103⅔	1 8½	28.18	31.02

Winter Catch Crops and Fallow after a Grain Crop.	Root, Green, and Forage Crops in the Regular Rotation.
5 ac. cleaning for mangels to be sown next spring.	10 ac. roots (5 ac. mangels and 5 ac. swedes).
10 „ trifolium and vetches.	6⅔ „ cabbages.
10 „ rye	8⅓ „ vetches and rape.
20 „ Total catch crops.	25 „ Total.

The above totals make 45 acres of root and forage crops, including catch crops, but 46⅔ acres are required, and can be made up by taking a second cut from 5 acres of "seeds" lands, which is an equivalent of 1⅔ acres of vetches. A second cut of "seeds" should give 3 tons of green food per acre, or one-third of a good vetch crop.

Winter dairying, with the exception of the special object of milk-supply, is little practised in this country. One of the great causes which have led to the ever-increasing importation of butter into England is the reluctance of dairy-farmers to change their system of management in accordance with the change in the tastes and requirements of consumers. Fresh butter is needed not only during summer, but throughout the year, in large and uniform quantities. For two conspicuous reasons the British butter-makers are unable to compete with foreigners—*1st*, a steady supply is not to be had all the year round, because the great bulk of home-made butter is produced during the months when grass is abundant, and when it is supposed that butter can be made at a minimum cost; and *2nd*, there is no means of securing those large uniform quantities that alone can find a place in the great market centres. British dealers found a difficulty in securing from the Continent a supply sufficient to meet the vast increase in the demand for butter; and after a vain effort had been made to awaken the farmers of this country to the fact that a large extension of winter-dairying was the only means left to save them from a still keener competition, attention was turned to our Australasian colonies. So in 1891,[1] Andrew Clement, of Glasgow, the largest wholesale dealer in dairy produce in Scotland, was forced in the interests of the trade to pay a visit of inspection to Australia and New Zealand, with the

[1] In 1891, the amount of foreign dairy-produce imported was valued at over £14,000,000. (See also Table I., page 690.)



A. Shorthorn-Ayrshire (1st Cross), "Lady."
First for butter at Tring in 1901; yield 3 lbs. 6 oz. in 24 hrs.; 2nd for 60 lbs. of milk.
[*C. Reid, Wishaw.*



B. Shorthorn-Ayrshire (2nd Cross), "Polly 2nd," daughter of "Lady."
In 1905, 1st in milk and inspection classes at Suffolk Show, and reserved for the Lord Mayor's Cup at the Dairy Show; yield, 5½ gallons of milk 70 days after calving.
Bred and owned by Wm. Nisbet, Bendyshe, Radwater, Essex.

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object of stimulating trade, and of making business connections. It is interesting to refer to the 1892 report of Wilson, the Victorian Government dairy expert, and to realise the rate at which the early fresh butter export trade grew :—

"In 1889-90, 400 tons of butter were exported, averaging 9d. per lb.; in 1890-91, the quantity exported was 1000 tons, averaging 10½d. per lb.; while for this season the quantity exported will be 2143 tons, the average price being 1s. per lb."

British Imports of Butter for Ten Years ended 30th June 1905, with Figures for 1906.

Year ended 30th June.	Colonial.				Foreign.				Grand Total.
	Australia.	Canada.	New Zealand.	Total Colonial.	Argentina.	Denmark.	Russia.	Total Foreign.	
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1896	8,260	2,100	2,589	12,949	689	61,836	7,110	131,249	146,198
1897	9,978	4,557	3,576	18,111	541	63,466	9,078	138,800	156,911
1898	7,837	5,962	3,933	17,732	867	69,051	9,358	141,426	159,158
1899	9,764	8,151	4,528	22,443	950	74,977	7,704	142,193	164,636
1900	17,653	11,932	7,949	37,534	1,361	71,708	7,588	133,957	171,491
1901	15,556	7,532	8,912	32,000	1,052	75,664	13,016	143,459	175,459
1902	7,449	11,491	8,295	27,235	2,529	82,757	22,408	160,672	187,907
1903	1,053	13,238	9,575	23,866	4,190	88,903	22,180	176,320	200,186
1904	19,655	9,879	15,836	45,370	4,435	88,151	24,849	173,573	218,943
1905	23,368	12,847	15,667	51,882	3,575	83,520	20,159	152,015	203,897
1906	26,950	15,145	15,177	57,272	2,665	81,261	25,327	158,221	215,493

The result of the development of this new industry is that British farmers are losing the slender footing they had in the butter market, and in spite of the increased knowledge of butter-making brought about by the instruction in dairying provided by County Councils throughout the length and breadth of the country, the quality of the home-made article is on the whole very inferior and disappointing. The farmer loses his trade connection at the end of each grass season, and he has to begin afresh in spring to establish himself against the foreigner, who keeps up a steady supply at all seasons of the year. Winter dairying, no doubt, entails more trouble, and involves the employment of a larger amount of capital, as well as a greater annual expenditure than the old system of summer dairying, but the annual total produce is largely increased. The system lends itself chiefly to the

encouragement of the natural tendency of the public to consume daily a larger quantity of full milk.

Richard Barter, St Ann's Hill, Cork, a pioneer in this system of dairying, has—

"Found from carefully kept records that cows calving in December and January give the largest return of milk—for say ten months in milk—as there comes on a second flush of milk when cows get the grass at the end of April and May, and they yield during the summer nearly as well as if they calved in March."

Associated with the increased supply of winter produce, **co-operation** for manufacturing and marketing purposes is in the great majority of small holdings an absolute necessity for success. The co-operative creamery system has proved a great success in the south and west of Ireland, and at the same time an immense advantage to small holders, who individually are powerless to secure a market connection.

House Feeding as practised in the Production of Milk for a Town Milk Trade.

When good non-pedigree milking Shorthorn cows are kept at all seasons in the house, and fed to the highest degree possible, the yield per cow can be made double that obtained under the natural system described—the produce can be raised from 550 to 1100 gallons. This system is not compatible with calving down the cows a second year. Animals approaching their prime, viz., after the third or fourth calf, are selected, which—after milking for nine or twelve months, when the yield of milk becomes naturally reduced, so that it would not pay to keep them longer—go directly to the butcher, without being put quite dry. This is a severe drain upon the supply of our best milch cattle, and it has unquestionably, since the development of the milk trade in towns, tended to reduce the numbers of cattle in this country.

In a typical Leith dairy of 100 cows, yielding an average of 3¼ gallons of milk each daily during summer and 3 gallons in winter, **the daily food of an average cow**—weighing 1120 lbs., which cost £22, and six weeks after calving yielded 43 lbs. of milk daily = 18 lbs. morning, 11 lbs. forenoon, and

14 lbs. afternoon—was specially tested towards the end of March 1906, and found to be as follows :—

Food and Cost per Ton.	Food at 4 A.M.	Food at 9 A.M.	Food at 2 P.M.	Total Food.	Cost per day.
	lbs.	lbs.	lbs.	lbs.	s. d.
Draff, 22s. . . .	7	Mash at blood heat. 13	13	33	0 $2\frac{3}{4}$
Treacle, 105s. . .	...	$1\frac{1}{2}$	$1\frac{1}{2}$	3	0 $1\frac{3}{4}$
Pease-meal, 150s. .	...	2	2	4	0 3
Compound Cakes, 160s.	...	2	2	4	0 $3\frac{1}{4}$
Water (warm) . .	...	2	2	4	...
Turnips, 17s. . .	33	9	33	75	0 $6\frac{3}{4}$
Potatoes, 25s. . .	...	12	...	12	0 $1\frac{3}{4}$
Hay, 40s. . . .	7	...	7	14	0 3
					1 $10\frac{1}{4}$

The charges per cow per week work out, for (*a*) food, about 13s.; (*b*) attendance, 2s.; (*c*) depreciation, 4s. (being a loss of £8 on a cow milking nine months); or a grand total of 19s.

The narrowness of the **margin of profit** to the cowfeeder may be realised, when a yield of 3 gallons per day, sold at 10d. per gallon, realises only 17s. 6d. per week for milk disposed of wholesale. When sold at 1s. per gallon, the profit of 2s. is too small to support a successful business, so that a larger yield than 3 gallons per day or a larger price than 10d. or 1s. per gallon is a necessity, if the flagging town dairy industry is to revive. Probably the best solution of the difficulty, taking all interests into consideration, would be a **Government Order** prohibiting the keeping of cows in populous areas within city boundaries, where they require to be confined under artificial conditions, and necessitating their transfer to the wholesome surroundings and cheaper and more natural food-supply in the country, where milk of the finest quality can be produced at the cheapest rate without sacrificing the lives of the cows before they have passed the maximum period of production. This arrangement would ultimately lead to all milk being delivered cold to consumers and to more of the work of the dairy being done within the ordinary hours of day labour.

Draff consists chiefly of brewers' grains. Distillery grains are worth about 3s. a ton more, but being heavy to digest and more liable to spoil by fermentation, are used only two days a week. There are considerable variations in the analyses of different samples of draff, especially distillery

grains, depending on the class of grain used, and whether it is malted or raw. The following are the highest and lowest results obtained by J. & J. Cunningham, of Leith, during a period of years:—

	Distillery Grains.	Brewers' Grains.
Albuminoids	20 to 26 per cent.	20 to 23 per cent.
Oil	7 to 11 „	7 to 8 „
Carbohydrates	40 to 50 „	41 to 45 „

Treacle in some form is indispensable as a preventive of stomach staggers resulting from over-feeding—the most common ailment of dairy cows under forcing conditions. Nutrimol, which consists of germ oilcake meal, is in high favour with cowfeeders, but molascuit, though not so well known, and not such a complete food by itself, contains molasses in a form in which it can be easily transported and handled.

Analysis of **Molascuit**—*Reeks & Hughes.*

	Per cent.
Sugars	53·19
Digestible Fibre, etc.	15·83
Albuminoids[1]	2·50
Indigestible Fibre	6·27
Ash[2]	6·75
Oil	0·13
Moisture	15·33
	100·00

Analysis of **Nutrimol**—*F. J. Lloyd.*

	Per cent.
Oil	6·10
Albuminoids[3]	20·19
Cane Sugar	20·00
Carbohydrates	25·80
Fibre	6·46
Ash	8·80
Moisture	12·65
	100·00

[1] Nitrogen ·40 per cent. [2] Siliceous matter ·55 per cent. [3] Nitrogen 3·23 per cent.

Pease-meal made from Canadian peas is in greater favour than bean-meal, as it is less liable to induce hoven. Indian peas have too often impurities that make them hot or biting to the taste, and the fear of poisoning by prussic acid also militates against their use. Most dairy **compound cakes** have an attractive appearance, and are believed to give good results, but they are generally too dear. This trade advantage is maintained only because purchasers have not the technical knowledge necessary to enable them to buy the ingredients separately at market value and mix them at home, and they are not infrequently further imposed upon by very finely ground, indigestible, and worthless woody fibre, under the name of cellulose, being added to keep down the price per ton.

Yellow turnips with their leaves attached are preferred during the early part of the season, to be followed as Christmas approaches by stored swedes.

Potatoes are not used if the price rises above 25s. per ton. They are given only in limited quantities once a day, as they are more indigestible than turnips and liable to induce hoven; and moreover, like mangels, they produce pale milk, which looks poor in quality and unattractive to the consumer.

The best first-crop **hay** is preferred if its price does not exceed 80s. per ton. When dearer, a proportion of second-crop rye-grass at 60s., or oat **straw** at an average cost of 45s., is substituted. French wheat straw at 42s. may be employed for litter.

Morning **feeding,** occupying two men, begins at 4 A.M. with a short allowance of draff without water or other food stuffs, followed at 5.30 by a basketful of turnips, and at six o'clock by a foddering of hay. **Milking** is carried on from 4 to 6 by six women, and two men "muck" the byres at the same time. The second feeding and second milking begins at 9 A.M. The warm mash is given first, followed by about three turnips for each animal at 9.30 and potatoes about fifteen minutes later; one man being now sufficient for the mucking, another milker is freed. The third feeding and cleaning out of the byre begins with the final milking at three o'clock. The mash is followed by turnips about three o'clock, and hay about four o'clock. At seven o'clock the man in charge looks in to see that all is quiet, and the doors are then closed for the night.

The following are the **amounts of food** used, and the **results of the practice** adopted in a **dairy of forty-three cows** —one of the most successful in Edinburgh—averaging per stall all the year round, $3\frac{3}{4}$ gallons of milk daily, when the cows milk for nine months on an average. The measured quantities on a test day early in 1906 were 78 gallons at the first milking, and 43 gallons at each of the later milkings, or 165 in all, equivalent (short of 4 gallons) to 7 gallons per cow. The cows cost about £20, and lose £7 between the buying-in and selling-out prices.

Feeding commences soon after 4 A.M. The second feed is given at 10.15 A.M. and the third begins at 4.15 P.M., finishing with hay at six o'clock. The cows are kept quiet, and no

traffic is permitted in the byres between times. To keep the air pure the manure is not moved while the milk is being handled, and the first mucking is delayed till after the first milking. The second cleaning out, which is followed by swilling the floors, takes place half an hour before the last milking. The liquid is drained from the solid excrement at 10.15, but the surface skin of the dung is not broken, so that exhalations do not occur.

The total amounts of food consumed per week by the forty-three cows are—(1) Brewers' grains, 7 tons (winter feed) carted four times a week, costing wholesale an average of £1 per ton; the full quantity is not given during summer when grass is plentiful; (2) half a ton of Canadian pease-meal, averaging from £7, 10s. to £8 per ton; (3) a quarter of a ton of linseed cake at £8, given in three feeds a day, along with, in the morning, (4) a bunch of oat-straw between two cows—or 7 lbs. each for fodder and litter combined—nearly a ton for the lot, at an average of £2, 10s. a ton. (5) The best Canadian mixed hay (grasses and legumes) is given at six o'clock, and a half-cwt. is used daily. (6) The short food is administered in a hot slop. The meal is first soaked with cold water at the time of the previous meal, scalded with boiling water, and mixed with 127 lbs. of common salt, amounting to about 6·7 ozs. per cow per day, and costing 2s. per cwt. It gives the best results when supplied in spring before grass comes. In American practice, 2 to 4 ozs. of salt per day are given to milch cows. (7) Roots are used to the extent of 7 or 8 tons, or about 50 lbs. each per day.

In summer the turnips, straw, treacle, and part of the brewers' grains are replaced by grass from sewage meadows or by green forage—frequently Italian rye-grass forced by dressings of nitrate of soda. The cost of this should be rather under its equivalent of winter food.

The **yield per cow** while in milk varies in different dairies according to the types of milking cows selected, the amount of forced feeding, and the temperature of the byre, from 2½ to 4 gallons per day = 690 up to 1105 gallons in nine months. As each cow is replaced at the end of that time by a "green" or newly calved cow, the average of milk given annually per stall is raised from 1095 to 1460 gallons. The temperature of the byre ranges between 60° and 70°, and the largest yields

are produced at the highest temperatures. The reduction in value of the cow may now (1906) be estimated at £8 between the "laid in" and selling price, a sum far too large to be balanced by the value of the manure.

The decidedly unnatural method of treatment which involves the imprisonment of the cows in comfortable quarters, but deprived of exercise, has led to much discussion as to its influence on the quality of the milk produced.

In the spring of 1900 the late **Dr Stevenson Macadam** threw much light on the question, by a careful and elaborate **series of tests** for the Edinburgh and Leith Dairyman's Association, of average samples of the milk of 123 cows from a total of 681 cows housed in sixteen dairy byres belonging to the great system of milk production in the Scottish Metropolitan centre. The mixed milk samples ranged in composition in 100 parts by weight as follows:—

	Morning Milkings.	Forenoon Milkings.
Total solids,	from 12·51 to 11·19	From 14·08 to 12·53
Fat of solids,	„ 3·72 to 2·16	„ 4·96 to 3·49
Solids not fat,	„ 9·45 to 8·79	„ 9·76 to 8·64
Ash in solids,	„ ·84 to ·71	„ ·85 to ·71

Several tests with smaller numbers of cows indicated that the afternoon or third milking in the day, although much richer than the early morning's milk, was not quite up to the product of the forenoon milking.

The tests have not produced any evidence to break down the rule that the quality of milk can only be immediately affected to the extent of a small fraction of a percentage of cream by the character of the food given. If the sloppy forcing food has any important influence upon the quality of the milk, it must be through its influence in the first instance on the constitution of the animal. The striking difference between the proportions of solids in the morning's milk when contrasted with those of the two later milkings, is to be accounted for by the great length of time which elapses before the morning milking.

Wolff's Feeding Standard for milch cows of 1000 lbs. live-weight was fixed some years before the end of last century at 24 lbs. of dry matter, containing 2·5 lbs. of protein, 12·5 lbs. of carbohydrates, and about 4 per cent. of fat; yield-

ing an albuminoid ratio of 1 : 5·38. The round figures 1 : 5·4 were for a time pretty generally accepted as the standard both in Europe and America. In 1904, **Professor F. W. Woll** of Wisconsin Experiment Station struck an average of 128 rations used in dairies in different parts of the United States, and his results are now accepted as the[1]

American Standard Ration for Dairy Cows of 1000 lbs. live-weight.

(*Wisconsin Bulletin*, 38, *p.* 46.)

Average.	Dry Matter.	Digestible Matter.			Nutritive Ratio.
		Protein.	Carbo-hydrates.	Fat.	
For	Lbs.	Lbs.	Lbs.	Lbs.	
128 herds .	24.31	2.15	13.27	.74	1 : 6.9

This distinctly wider nutritive ratio makes it possible to consume a larger proportion of home-grown produce. It is thus more economical during a period of highly priced feeding cakes like that of 1905-7.

Tuberculosis[2] is a specific disease due to the *Bacillus tuberculosis*, which produces consumption in human beings. It is well known to attack cattle, horses, pigs, and poultry. Goats and sheep have been generally accredited with immunity, but it is now too prevalent among longwool rams confined under cover and forced for public sales in an unnatural and unwholesome atmosphere. Even the naturally hardy Scotch Blackface Mountain sheep is liable to it, shut up and highly fed in a house at home and covered with tarpaulin in the modern showyard. Wild animals are rarely affected,

[1] See also the beginning of Chapter XIV., p. 263.

[2] Valuable information relating to Tuberculosis will be found in :— (1) *The Journal of the Royal Agricultural Society of England*, 1898, vol. ix. part ii., No. 34, p. 323 ; (2) A Leaflet on "Tuberculosis in Dairy Stock," issued by the same Society, free on application to the Secretary, 16 Bedford Square, London, W.C. ; (3) *The Report of the Royal Commission on Tuberculosis*, 1898 (C. 8824), and Minutes of evidence taken before the same (C. 8831), published by Eyre & Spottiswoode, East Harding Street, Fleet Street, E.C., price 4s. 7d. ; (4) *The Transactions of the British Congress on Tuberculosis*, 1901, vol. iv., Veterinary Section, published at 12s. 6d. by W. Clowes & Sons, 23 Cockspur Street, London, S.W.

and, when the disease occurs, it most probably originates by contact with civilisation. Two familiar instances are the Chartley wild white cattle, and wild rabbits at times when they get excessively numerous, especially during certain seasons when they confine themselves much to their burrows. Once introduced, the close atmosphere of the burrow favours its dissemination. Open air, sunlight, and free ventilation are the best safeguards of stock, as of the human species. Excluding animals that are kept out of doors, and calves, about 30 per cent. of all cattle slaughtered in this country are reported to be tuberculous. The disease is rare in animals under one year old, and it is very exceptional to find it in calves under a month old. Of cattle kept on the open camp in Argentina, only about one per thousand suffers from a taint of tuberculosis. In town dairies where cows are crowded together in dark ill-ventilated buildings and simultaneously milked and fed for the butcher, within twelve months 50 per cent. are not infrequently affected. Professor Nocard, the great French authority, who has done much to advance our knowledge of the disease, says that in his experience "15 to 25 per cent. of cows in the country are tuberculous, but that not one calf in ten thousand is diseased." The milk of an affected cow is not perceptibly decreased in quantity, but it is lowered in quality. The responsible bacillus thrives best in darkness, at temperatures from 80° to 105° F. Affected cattle showing no external signs of disease may be a source of infection to others with which they come in contact. The seats of disease in cattle are the various lymphatic glands of the body (early centres of infection are the glands close to the bifurcation of the bronchial tubes), the lung, the intestine, and the udder. Next to the glands in the chest cavity, the lung is by far the commonest seat of the disease, besides being the most likely to act as a means for communicating it. Next in order comes the intestine, and finally the udder. About 3 per cent. of tuberculous cattle have a lesion in the udder, and it is only when a lesion discharges into the flow of milk that danger from it may be anticipated. The bacillus may even then be removed by the use of the centrifugal cream separator, in the slime of which the organisms accumulate.

Animals with pulmonary tuberculosis have a persistent cough. The temperature is slightly raised, and they become

weak and emaciated as the ailment develops. In the advanced stage of intestinal tubercle there is diarrhœa associated with emaciation, and, when the disease is located in the udder, there is a hard, swollen, painless condition of the affected quarter (usually a posterior quarter) and the lymphatic glands above are increased in size and are hard, though painless. The milk from a tuberculous udder is at first normal in quantity and quality, but it soon becomes thin and watery, though the quantity may not be much diminished. Tuberculosis is not now believed to be hereditary; although a tendency to take it is readily communicated by parent to offspring. In a considerable area of the Fens of Lincoln and Cambridge shires it is acknowledged that locally induced tuberculosis is practically unknown in either medical or veterinary practice, but actinomycosis is very prevalent among cattle, and cancer is extraordinarily prevalent among human beings. Too little is yet known about these insidious diseases to permit of inferences being drawn from the bald facts.

Contributing causes to the admission of the organism in sufficient numbers to establish a colony and produce the disease are: (*a*) Hereditary weakness of constitution, very often due to intense consanguineous breeding—as in the case of the Chartley Park Wild White Cattle, and the in-bred Bates' Duchesses, which in America have long been extinct in the pure line of descent; (*b*) dark and insanitary byres; and (*c*) bad ventilation, and the inhalation by healthy cows of the breath of those who have contracted the disease in their lungs. The calves of tuberculous cows can be brought up quite healthy, if kept away from their own mothers and reared on sound foster-mothers, or even if fed on the milk of tuberculous cows, if it be first raised to a temperature of 160° F. Sunlight and low temperatures are inimical to the bacillus, hence the success of the open-air treatment of human patients in the sunny high mountainous districts. All "piners" should be immediately removed from the herd. The tuberculine test, although not infallible, has proved useful as a means by which to detect the disease. All animals reacting should be drafted from the herd and kept apart, and no animals which react should be admitted.

"Tuberculine is described as a simple glycerine extract of the cultures of the bacilli of tuberculosis, cultures which have

been sterilised at a temperature of about 230° to destroy the organisms. That it has failed as a preventive of consumption or as a cure is recognised, but thousands of experiments have shown that it is most reliable as a diagnostic of bovine tuberculosis."

The Netherlands (Dutch) Government have, since 1st January 1905, offered full **compensation** for cows reported by the farmers to be tuberculous, and the regulations, being optional, work well. The flesh is sold, and little loss is sustained by Government. In this country when a carcase is condemned in the public interest, even that of an animal which when alive showed no symptom of disease, the loss falls upon the owner, who may only have bought it the day before in the open market. This seems hardly up to the usual standard of British justice.

Butter-making without a Churn

A remarkable characteristic came under our observation about 1885 in a cross-bred cow, the property of William Lind, Belford. The cow was got by a pure-bred Shorthorn bull, and was then eleven years old. It is believed that the breed of the dam was Ayrshire, although there is no absolute certainty. During the first two years Lind's cow was in profit there was nothing unusual about the quality of the milk, but after the birth of her third calf the milk became specially rich and the cream was readily made into butter by stirring with a thirl-stick for not more than five minutes. For seven years no churn had been used, and in warm weather the cream sometimes formed butter without stirring.[1]

[1] A sample of the milk was sent to Edinburgh for microscopical examination in 1890, but there was nothing abnormal detected except that the fat globules were remarkably large. The total return of produce sold in that year, the last in which a record was kept, amounted to £39, 10s., made up of £33 received for new milk sold at 1s. per gallon, and £6, 10s. for butter of excellent texture and flavour at 1s. per lb. When the animal was at full profit the yield amounted to 28 quarts of milk in the day. The heifer calves of this cow, three in number, by Shorthorn bulls, have been reared, and two of these have inherited their mother's peculiarity. Had this remarkable animal been born in America she would most probably have been selected as the founder of a new and unique breed of dairy cattle, not merely on account of the peculiarity exhibited in the cream, but also owing to the excellence and abundance of the produce.

CHAPTER XVI

DAIRYING—COWS AND THEIR MANAGEMENT

Treatment of Dairy Cows—Milking—Milking Machines—The Universal—Period of Lactation—Guénon's Escutcheon Theory—De-sexed Cows—How to put a Cow Dry—Rules in Purchasing Food—Prussic Acid Poisoning—Effects of Common Food Stuffs—Hoven—Good Permanent Grasses as Food—Breeding and Calving for the First Time—Signs of Pregnancy—Of Parturition—Calving—Protracted Labour—Premature Labour—Means of Preventing Abortion—Straining—Cow Breeches—Protrusion of the Vagina—Milk Fever—Methods of Treatment—Dr Watney's Improved Air Injector—Trembling or Loupin' Ill—Weed—Inflammations of the Udder—Choking—Foul in the Foot—Lameness—Swellings of the Limbs—Mange.

TREATMENT **of Dairy Cows.**—It is of the utmost importance to have the cows, the byres, and everything connected with them kept scrupulously clean, not only because the produce is so easily injured by the presence of any impurity or odour, but on account of the necessity for perfect health and comfort in the animals to attain the maximum of production. Sufficient and well-regulated ventilation maintains the temperature at a few degrees below 60° F., and prevents cows losing their hair and becoming too bare and susceptible to cold when turned out for water in winter or to grass in spring; it also keeps the atmosphere pure and sweet. This may be aided by swilling the gutter daily with water, where means admit of the practice. Regular grooming during winter is necessary with cows, as with all animals that are tied, and are thus prevented from rubbing or licking their skins or being licked by others on itchy parts. General comfort is synonymous with more produce or better condition, with a given amount of food. March and April is the usual calving time for cheese- or butter-making summer dairies, so as to have cows coming to their "flow" within two months on getting a

full supply of grass—May, June, and July being the three best months for abundance. Heifers calve, usually, a month later. Many pedigree cows, being more or less precarious breeders, are permitted to calve at any time; but the best period is soon after the New Year, to give the young as much time as possible to grow before the grass comes, and to secure at the same time an advantageous position for showing by being early in the regulation Herd Book year. Where milk is sold, more cows than in the case of other systems are "calved-down" in autumn, to provide for the winter demand, owing to the necessity of maintaining as far as possible a uniform supply. Cows go to pasture either before or after 1st May, according to the climate, having been gradually prepared by a short daily run over young grass, which is usually early. The amounts and varieties of forage crops sometimes given while cows are being milked have already been stated. Three or four pounds of cake, supplied to each animal daily while on pasture, no doubt increase the amount of produce; but unless in special cases, where the pasture is insufficient or needs manure, it is a question if the practice pays when dairy produce is at ordinary prices, among other reasons, because cows thus treated are more difficult to support in winter, and they also break down more quickly.

Milking is usually done twice a day, in the house if possible, as cattle are there more at rest in the shade and free from flies; moreover, milk is kept cleaner, especially in wet weather, when milking-yards get muddy, and when rain washes impurities into the pail from the skin. All dirt adhering to the udder (more usual in winter than in summer) should be wiped, or, if necessary, sponged off to prevent taint in the milk. Open-air milking may be necessary when cows pasture at a great distance from the farm buildings; and, again, if cows have to be milked in a very close, warm byre, as they run the risk of being chilled when turned out at night in autumn.

It is sometimes necessary to milk three times a day when the vessel is hard and swollen, as it frequently is soon after calving; when there is an excessive secretion and milk running from the teats; or when warm mid-day milk is wanted in a local trade, as in the cases of the Edinburgh and Leith dairies described in Chapter XV. More milk can thus,

on the whole be got, but the additional expense debars the practice, unless when the cow's comfort or the circumstances of trade urgently demand it.

Cows are, as a rule, kept in the house over night when autumn frosts and cold or stormy weather come on, to prevent, it is generally believed, the quantity of milk falling off rapidly, except in those districts where cows are wintered out of doors, with the result that they can easily be put dry at any time. For the first few nights of indoor life the yield shrinks, but it increases as the animals become accustomed to the change, and remains pretty constant for a few weeks. Experiments at Harper Adams' Agricultural College have given results contrary to the general belief, and have repeatedly shown that the best results are got by leaving cows outside until it is time for them to dry off.

During winter they are let out only once daily, or better, twice if the fodder has been salted, to drink water and to lick their skins. They do best of all when water in a highly-set trough is within reach at all times. When the ground is frost-bound and slippery, water should be carried to them. A walk of a quarter of a mile to the water before drinking, and the same in returning, prevents shivering, which frequently occurs when cold water is given in the house. The exercise also keeps the limbs in good condition, and helps to maintain the constitution of the cow in a healthy state.

Blain is a disease to which milch cows are subject, often occurring soon after calving if they be turned out to drink and stand about in cold weather, but the initial cause is to be found in some derangement of the digestion. This is followed by a "disturbance of the nerves of the blood-vessels which allow their fluid contents to escape into the surrounding tissues." There is consequent swelling about the head, particularly of the eyes and muzzle. "Tears flow over the face, and a discharge escapes from the nose, while the breathing is loud and difficult." A powerful stimulant, as whisky and hot water, should be given, followed by a dose of 8 lbs. of warm treacle, or 1 lb. of salts if treacle be not at hand.

Cows acquire the habit, especially if going on the same pasture from day to day, of finding the way towards the milking-place at the right times. The hours for milking should be regularly kept, and should divide the twenty-four

hours into two equal parts. Each cow knows her stall in the byre, and if not disturbed will usually go directly to it, unless by the way she be tempted at times to steal food from a neighbour's allowance.

If cows are constantly milked by one person for a length of time, they often "keep up their milk," or "do not let it down," should another milker be introduced. It is a usual rule in dairies to change the milkers regularly to avoid this chance of loss. The custom has other advantages: it apportions each milker a fair share of "stiff" or difficult cows, as well as of those easy to milk, and prevents an inferior milker "putting the milk off," or "drying" certain cows, by continuation of bad milking.

Milking should be performed as quietly, quickly, and thoroughly as possible. If all these requisite conditions are not attended to, the quantity of milk soon falls off. One of the greatest difficulties of the dairy farmer is to find good milkers. A cow must not be struck or excited in any way; as, in addition to the small quantity of milk given, the quality may be so injured, that when mixed with it, it has been known to affect the milk of a whole dairy.

A calf takes about three or four minutes to suck a cow dry. Milking by hand should come as near this as possible. A good man (or a woman in Scotland) milking ten cows (a usual and ample number) will finish the work in an hour if it be done by contract, except for a week or two at the height of the grass season when the full flow of milk is on. When milking is done in the ordinary way, with no special inducement for haste, nearly two hours are taken up. An hour and a half may be stated as a good average time for a full milking.

A milker should sit on a stool close to the animal, and hold firmly between the knees a "handy" or pail, large enough to contain all the milk, thus doing away with the necessity of rising to empty a portion of it into the receiving- or carrying-can before the operation is finished. The arm next the cow's hind leg should be placed close to it, to be ready to press back should she attempt to kick. To ensure safety from kicking, some nervous milkers tie the hind legs together at the hocks. The practice is as old as the civilisation of ancient Egypt, and, if it were always done without pain to the animal, there would be no objection to it; but

there is the risk of careless milkers doing it roughly, and thereby irritating and chafing the skin. It is better to "dry milk" or handle young cows for some weeks before calving to break them in, and by gentle treatment coax them to stand quietly. Special care is necessary immediately after calving, while the udder is hard and painful. Sometimes a nervous or wicked cow, or one with sore teats from cow-pox, raw from the attacks of flies, hacking from exposure to cold east winds or chilly nights with heavy dews in summer, will stand in no other way than with a man holding her head with a finger and thumb in her nostrils. After a time, in many cases, the presence of a person near the shoulder is sufficient, without holding, showing that if care had been bestowed at first this unnecessary expense and trouble might have been avoided. Sometimes an intractable cow is secured by "bulldogs," "humbugs," or "sister hooks" put in the nostrils, and by a rope attached tied to the railing in front.

There is no "right" and "wrong" side of a cow on which to milk. In double-stalled byres the milker places himself between two cows, milks one from the right side, and then turns round and takes the other on the left. It is well to train a cow, especially a show animal, so that she can be milked from either side, as this tends to keep the udder more evenly balanced, else it may grow heavier on, and hang to, the milking side. The near-hind and far-fore, and far-hind and near-fore teats, should be milked together alternately.

Cows with very small teats, especially when swollen after calving, are very difficult to milk, and tiring for the hands of the milker, as only the forefinger and thumb can be used. Others are "stiff" to milk, from the passages of the teats being small. These can be widened by inserting a form of bistoury, with a cutting surface on the outside of the thinner of two blades that open like a glove-stretcher, but it should be used only by a veterinary surgeon and after careful antiseptic preparation. When this operation is overdone, milk flows without the action of milking. A safer method of improvement, in ordinary hands, is that of using a small cone of metal or wood (in preference to ivory, sometimes recommended), which is greased and left in the canal of the teat to distend it between milking times. The bistoury is



FIG. 14.—BISTOURY (OPEN).

sometimes used, but not often successfully, when a cord forms at the neck of the teat, through the contraction or growing up of the milk diaphragm—usually the result of suppuration. Sore teats should be well smeared, to soften them before milking, with vaseline or hog's lard, and after the operation dressed with carbolic oil, or a lotion of Goulard's extract two parts, olive oil one part, and glycerine one part. If the skin of a teat is very tender the milk may be withdrawn for a few days by a silver milking-tube or syphon, while the sound teats are being milked. A piece of red yarn or tape ought to be tied to the tube to prevent its being lost if dropped among the litter.

Milking machines have been greatly improved in recent years, but it can hardly be said that the combined sucking and boxing action of the calf, which encourages milk-secretion, has been perfectly imitated, or that they give better

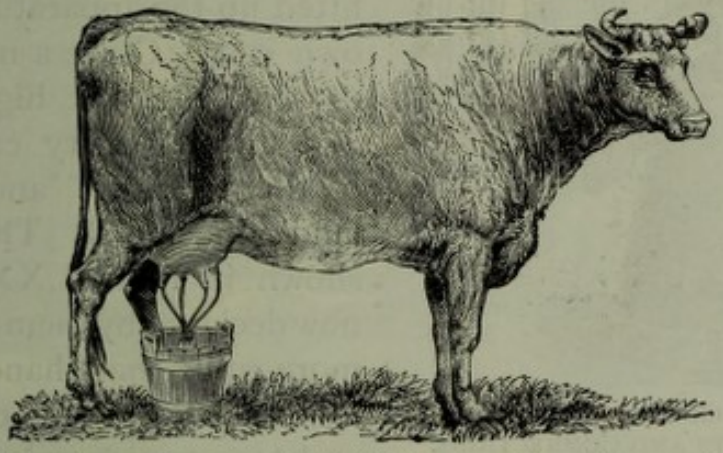


FIG. 15.—The Jersey Creamery Co.'s Self-Acting Cow-Milker.—Price 6s. 6d.

results than are obtained by expert hand-milking. But mechanical-milkers have not to be pitted against experts, but against careless or unskilled and over-paid hand-milkers who are not to be found in sufficient numbers in this country to supply the increasing demand for milkers. In Australia, where labour difficulties are still more acute, the milking-machine is already thoroughly established. In New South Wales in 1905, over 10,000 cows were milked by mechanical means.

There are many **varieties of milking machines,** but in the mechanism of the most successful of them one or other of two principles is usually adopted. In the case of the first, the milk flows by gravitation through perforated syphons

inserted into the teats. This self-acting cow-milker affords relief to an animal suffering from galled teats or a swollen udder, and ought to be more extensively employed in this connection, but it is of no practical utility except as a temporary remedy. The insertion of syphons into the teats except under antiseptic conditions is always liable to induce mammitis.

In the second class of milker, suction is adopted, in imitation of the natural action of the calf, through the creation of a vacuum by means of an exhaust pump.

The Lawrence-Kennedy "Universal" Milking Machine[1] is pronounced to be a practical success by people who are best able to judge, viz., men and their wives who live by dairying and attend personally to the work, and who have fitted up the apparatus at their own cost. Quite a number of those who speak highly of it had unsatisfactory experience of the "Thistle" and Murchland's machines. The milker shown in Plate LXXVIIA. is now declared by them to extract more milk than hand-milking such as they can command, and to exercise no evil effects upon the cattle, which with rare exceptions stand quietly and show evidence of contentment while the milking goes on.

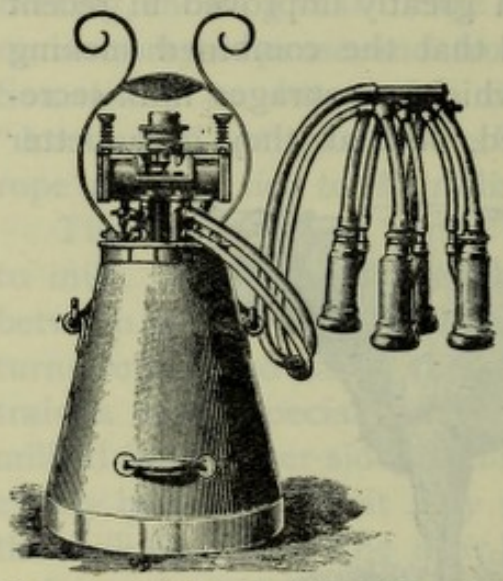
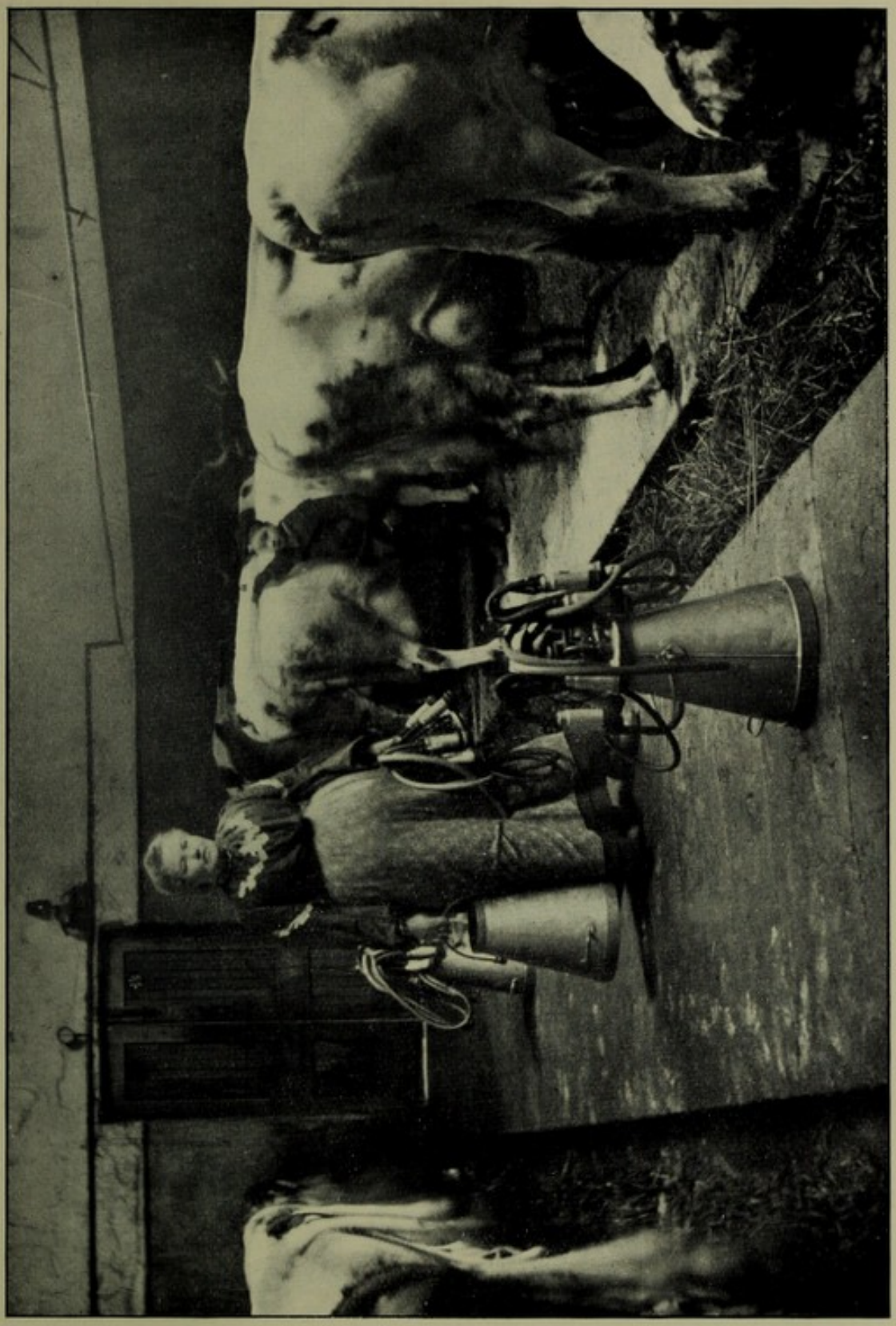


FIG. 16.—MILK-PAIL, PULSATOR, FOUR TEAT-CAPS AND CONNECTIONS.

The machine consists of a specially constructed and hermetically sealed milk-pail, supporting a pulsator, in which there is a right- and a left-hand cylinder with piston, which work alternately and produce the intermittent action or pulsation. Each pail, large enough to hold the milk of two cows which are operated on at one time, has two sets of flexible connections which lead to the cows, and are each terminated by four teat-caps. By another flexible connection the exterior of the milking pail is put in communication with a vacuum pipe extending through the byre above the heads of the cows. This is connected with an air exhauster which

[1] Made by P. R. Fleming & Co., 16 Graham Square, Glasgow.



THE LAWRENCE-KENNEDY "UNIVERSAL" MILKING MACHINE.

draws the air from the pipes and actuates the pulsators.[1] The pulsator in turn operates the teat-caps, which consist of white metal tubes large enough to admit a cow's teats of any size, lined with thin flexible indiarubber tubing, which by a series of contractions and expansions manipulate the cow's teats in imitation of the action of a calf, thereby extracting from the udder, in from six to ten minutes, the milk which runs into the milk-pail. The upper end of each flexible rubber tube is folded back over the open end of its metal cap, which it clasps, to make a close joint to permit of the contraction and expansion of the rubber by means of air forced by the action of the pulsator between it and the metal casing which it lines. Experience has shown that a man or a dairymaid with an assistant to carry away the milk, can with one pulsator easily milk per hour 15 to 20 cows; and an intelligent operator can attend to four pulsators at the same time, consequently the labour of attending four pulsators is little more than that required for one. The apparatus suitable for dairies of 20 to 100 cows ranges in cost from £50 to £100, and the advantages are much greater on a large than on a small scale. In the latter case it is more a matter of convenience when labour is not to be had than one of saving outlays; and it is not likely to rapidly replace the hinds' wives on a mixed arable and dairy farm, who are able and willing to milk for the sum of 3s. 6d. per week. Any of the common sources of power on the farm are suitable to produce the vacuum for working through the medium of an air-pump, which is pronounced more reliable than a steam ejector. The oil-engine has so far proved the most convenient form of power in this country. The apparatus is easily cleaned, and if this be done with reasonable care the milk keeps sweet longer than when drawn by hand, as contact with injurious germs is avoided.

The usual period of lactation is between nine and ten months, giving the cow a rest of two or three months to prepare for the next milking period. Cows naturally take this time, more or less; but they are to a considerable extent affected by the kinds and quantities of food given, and by the general treatment. Some continue to yield milk till the

[1] Another successful machine, made by Wallace, Castle Douglas, N.B., has four pulsators, one for each teat, in place of one.

next calving, but without a rest they are liable not to produce so abundantly the following year—although by continuous milking the danger of milk-fever is reduced.

M. Guénon's "Escutcheon" or "Milk-Mirror" theory[1] holds that the extent of surface of the udder and the thighs that is covered with hairs turning up and out, in place of down like the rest of the body, is an indication of the amount of milk the cow will give. If the surface covered by the reversed hair is large and broad above the udder, extending far on to the thighs, the cow should be a good milker; and, if it be broad and smooth near to the setting on of the tail, the flow should last well out at the end of the season. Great attention is paid by a few enthusiasts to the escutcheon theory in America and in France, but it is little regarded in England. The explanation seems a very doubtful one, viz., that the arteries supplying the udder terminate in the skin, in the region covered by the escutcheon, and turn up the hairs. If there be a large area thus marked, it is supposed to indicate that there are many terminations, and consequently large arteries, devoted to the supply of milk-producing blood to the udder. The size of the milk-veins, carrying away the residue of the blood which passes through the udder in the process of milk-secretion, is a much more reliable indication of the "depth" of a cow's milking capacity.

[1] The system was instituted by Mons. François Guénon, of Lisbourne, the son of a poor gardener, and a great student of Nature as represented in the vegetable and animal kingdoms. As far back as 1814, while tending the household cows, he believed he could trace a relationship between the yield of milk and the form of the "gravure" or escutcheon. After making further inquiries, which tended to strengthen his belief, he began business as a cattle-dealer in 1822, and dealt in cows of different nationalities. The result of his long and careful observations led him to classify animals in three groups according to size—large, middle, and small: the signs he divided into eight classes, and each of these classes into eight orders. From an intimate knowledge of their variations, he claimed to be able to indicate the quantity and quality of milk a cow would give daily, and the length of time she would continue to give a good yield. In 1837 he stated his results before the Bordeaux Agricultural Committee, and in 1838 to the Agricultural Society of Aurillac. His views were accepted after test trials of the system, and by a few who have undertaken the great labour of mastering the details it is pronounced to be an excellent guide in the selection of cows possessed of good dairying qualities.

Robertson, the Canadian dairy-expert, enumerates as follows the leading **points by which to judge a cow**:—

"(1) A long udder lengthwise of her body, and very elastic; the elastic quality means room to make milk. (2) A soft skin—a mellow skin, covered with mossy, silky hair; the skin, if coarse or harsh, means sluggish digestion inside, and that means an expensive cow that does not digest her food or thrive well. (3) A cow should have a large roomy barrel, with broad ribs wide apart, for holding plenty of good, rough, bulky, cheap feed; it should be filled twice a day. (4) The milk-veins under the cow's belly should be prominent; prominence is a far more important indication than actual size would be. (5) Firm muscles in the abdomen mean good constitution; they are the best evidence of endurance and thrift that can be found in a cow, and endurance to stand the strain of giving milk continuously is what is wanted. (6) A cow should have broad loins with long rumps, a rather long lean neck, with clean-cut face and prominent eyes."

De-sexed or "spayed" cows will milk constantly for years, and give, on the aggregate, a larger yield than cows which calve annually in the usual way. They are specially suited to outlying districts in the colonies, where there is grass all the year round, and where settlers' single cows are many miles from a bull. The milk resembles that of farrow cows, being richer than when cows have been some months pregnant; but the great gain is in the conservation of the food and energy necessary to produce a calf.

The best method employed in putting a cow dry, to avoid the risk of losing a quarter through suppuration, is to stop milking, smear the udder with tar (see page 344), and reduce the quantity of food. Milking once a day, every second day, or after a few days when the vessel swells up, is now found to be a mistake. The action of milking encourages the secretion of milk, which would otherwise never form, and only retards the drying process. Bleeding from the jugular vein on either side of the neck is at times adopted, and a dose of 16 oz. of Epsom salts is not infrequently administered. This is the only time that salts may be given to a cow in milk, as they reduce the flow, and, to a great degree, permanently for the season. These extreme measures are most applicable to cows giving a considerable quantity of milk, or that have been put to grass before going dry.

Inferior fodder should be used up when cows are "out of profit" or "resting" from the duties of milk-production. If the fodder be very bad, a few roots require to be given in addition, or it might be necessary to sprinkle it with treacle-water from a rose-can if the taste and smell are not so attractive as they ought to be.

There are three points with regard to which a farmer should satisfy himself before choosing food stuffs :—1*st*, That the price, according to feeding value of the food which he selects, is as moderate as that of any equivalent material he could find in the market. This rule is too often neglected by the farmer, and accounts for the prices of certain well-known feeding stuffs being at times far above their real feeding values. Farmers in this country are slow to learn and loth to make changes, especially in matters where scientific advice should be called in to determine the quality of a new material, and they consequently suffer from the results of this state of inactivity when they come into competition with the more progressive foreigners.

2*nd*, He should employ those foods that do not produce a disagreeable taste in milk or butter—such as cabbages, mangels, and the more common meals and cakes—and avoid as far as possible the use of turnips. Swedes are not quite so objectionable as common turnips, which when given to cows induce a disagreeable taste and smell in their milk and its products. The proper time to use turnips in dairy management is when the cows are dry, or in a case of necessity, as when other descriptions of succulent food are not available, in small quantity immediately after milking, being it is thought at that time less injurious. It is asserted that cutting off the crown of the bulb close to the base of the leaves is a preventive of the worst results. Palm-nut cake or meal, unless given in small quantities, flavours milk, but not very objectionably.

3*rd*, He should use the proper foods to suit the condition under which an animal is placed; for example, cotton-cake given in excessive quantities to cows in calf will at times lead to the death of calves when they are about ten days old. Three lbs. per day may be given with safety—undecorticated cake, if the animals are on grass, as it possesses

astringent properties, and counteracts the tendency to excessive looseness of the bowels. Decorticated cake, ground into a fine state of division on account of its being hard to chew if in lumps, is better given in winter, or, if in summer, on the pasture, mixed with maize-meal.

Prussic acid poisoning was frequent in 1905 and early in 1906, among dairy cattle, owing to the Java bean, *Phaseolus lunatus*, being used to meet a deficiency in the usual pea and bean supply for the dairy. There are three forms of this legume: (1) The cultivated and domesticated variety with white seeds, which are safe to use. (2) A semi-cultivated form, producing seeds "light or dark brown with violet hues or purple patches." These contain small amounts of a glucoside (phaseolunatin) which during digestion evolves prussic acid. And (3) the deadly wild form, in which the seeds are generally violet, though there is also a wide range of colour—dark brown, purple, and light brown specimens being met with.

The *symptoms* of illness after a small handful of the meal has been eaten by a cow, are trembling and twitching, and a rise of temperature to probably 105°. In fatal cases, after an ordinary feed of the meal, the post-mortem reveals "acute inflammation in the fourth (or true) stomach and the bowels, and hæmorrhage all over the small bowels," as seen in cases of acute irritant poisoning.

At Drumbuie, near Sanquhar, N.B., a startling loss occurred on 1st Jan. 1906, in a dairy of pedigree Ayrshires. Within about five minutes after about 3 lbs. of the meal mixed with water had been given to each, the cows "presented the appearance of animals choking, and they bellowed loudly and appeared to suffer acute pain. One after another dropped, and within half an hour twenty-four of the cows were dead."

At Cockerhurst, Shoreham, Kent, and other places in England and Scotland, a limited number of cows died in similar circumstances, but a good many were saved by prompt treatment for irritant poisons. (See page 257.)

Effects of a few common Food Stuffs.—Bean-meal, produced by grinding the common field bean, perhaps to a greater degree than anything else, increases the flow of really good milk, and is only dangerous to give, unless in im-

moderate quantities, to cows under high-pressure feeding.[1] Meals made from leguminous seeds, when consumed in large quantity by animals, have a binding or costive tendency, being deficient in oil. Bran counteracts this tendency, and is itself excellent for encouraging milk-production. Treacle is now increasingly used to fulfil the function of bran. Brewers' and distillers' grains are also "opening" or loosening to the bowels, and greatly increase the flow of milk. When used freely, grains injure the breeding-powers of cows, and are in consequence of most service in town dairies, where the fattening-off process is associated with milk-production (p. 306). A small quantity of malt dust in a mixture gives it relish, and as a food it is also a good milk-producer. Clover, green and wet, is a most dangerous food to give to cattle not accustomed to eat it, as it produces hoven, especially in the case of cows which are ravenous feeders. Clover should consequently be given dry, and at first only in small quantity.

Hoven is the disorder which is induced on the suspension or retardation of the function of digestion. It may be acute, due to some sudden ailment, and dangerous to life; or chronic, the result of a derangement of long standing. In the acute form digestion stops, and gases are evolved in the process of fermentation which sets up in the food contained in the stomach of the animal, more especially if the food be of a green and succulent nature. Pressure is thus brought to bear upon the diaphragm, which is unable to act, and ultimately the animal, if not relieved, dies of suffocation.

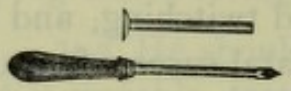


FIG. 17.—TROCAR AND CANNULA.

Treatment.—In the case of "eild" cattle, 1 oz. of turpentine soaked into dry meal, and administered in cold gruel or cold water, may overcome the disorder if given in good time. As turpentine permeates the whole system and flavours the milk, cows "in profit" should be drenched with 2 quarts of hot beer, or a pint or more of whisky made into hot "toddy." In a case of urgency, instant relief is secured by puncturing the rumen with a trocar and cannula, at a point on the left side equally distant from the anterior spine of the ilium, the transverse processes of the lumbar vertebræ, and the last rib. The cannula is left in the wound for a little to form a free vent

[1] Bean-meal has also been given with satisfactory results, when, for some unknown cause, the curd would not adhere in the cheese-press.

for the escape of gas. On its withdrawal, the wound in the stomach contracts on account of the opening having been made when that organ was greatly distended. A clean pocket-knife may be used for the operation in a case of extremity; but as there is nothing left on its removal to preserve the channel, a portion of the food blown from the stomach by the force of the escaping gas is liable to lodge under the skin, and in course of time to produce a suppurating sore. The chronic form of the ailment should be treated by the administration of repeated doses of salts, with 2 oz. of a mixture of ground gentian and ginger, or of treacle along with ½ oz. of carbonate of ammonia or turpentine,[1] as tonics.

A mixture of good permanent grasses and other plants, grown on soil naturally fertile, but in a state of Nature, is by far the best food for making the most perfect dairy products. Grass or forage crops from highly-manured land or irrigation meadows, although they may increase the quantity, diminish the quality of milk, and more particularly its products, and make it often more difficult to manipulate in manufacture. The remark relating to quality (which does not refer to the total amount of solids) also applies to cakes and most other supplementary foods given to cows while on the grass. If there be not an objectionable taste or smell, the natural conditions are not infrequently changed in some other way—a change which would be observed, for example, in the altered texture, and in the keeping power of the butter, or in a greasy condition of the cheese.

Breeding, and Calving for the first time.—The ordinary dairy farmer should not buy, but breed his own stock if possible, paying the greatest attention to selecting the calves of the best milkers to rear for bulls and heifers. When this is done there is less risk from imported disease; and, as a farmer is able to breed better cattle than he can buy, he can with care produce animals of better quality than are to be found in the market. The milking powers of a herd may be vastly improved within a few years by this means.

This is no new doctrine, for Marshall's *Rural Economy of Gloucester* (1789) says, "Dairy farmers should soon be beggared if they had their cows to buy, and that they know what they

[1] Turpentine should not be used too frequently, as animals are liable to die from the effects of turpentine poisoning.

breed but do not know what they buy, as, if a heifer is not likely to turn out well, they sell her ; on the contrary, if they went to market for their cows, they must buy the outcasts of other breeders. Besides, they endeavour to breed from known good milkers, such as milk well, not only soon after calving, but which will *hold their milk* throughout the summer and the latter-math months; whereas in the market they are subject to chance and the deceptions of drovers: the most they have to judge from is the *size* of the bag at the time of the purchase. In suitable situations, then, there can be little doubt of the propriety of every dairyman's rearing his own cows."

The argument used by those who advocate the opening of our ports to the introduction of live **cattle from Canada** on behalf of dairy farmers are entirely fallacious. Selected home-bred cattle can always be depended upon to give annually 200 gallons of milk more than cattle bought in the open market from whatever source, and the cost of feeding an inferior milker is little less than that of a good milker.

To fill up the places of cast cows—those that have become old, or have proved unlucky or unsuitable—**young heifers** to the number of between one-fourth and one-third of the total of the dairy, should be available each year. Whether it is a good practice to "calve-down" heifers at a little over two years, or a little over three years old, is mainly a question of feeding and environment. If cattle are kept in thin condition, as the ordinary Ayrshire is in its native country, the best results are obtained by calving at "three-years-off." At two years, an animal, if poor, is too small, will not milk satisfactorily the first season, and is very liable to "miss the bull" and remain farrow the following season. If heifers are well fed, and made to calve at two years off, as in the case of Channel Islands cows and well-bred milking Shorthorns, the natural development and growth which continue even for years afterwards are led into the lines of milk-production; and the organs which are then most active are not allowed to become atrophied from inaction, or gorged with fat in the attempt of Nature to rid the circulatory system of a super-abundance of fat. Nature indicates the proper course to be followed by well-fed animals, if not over-fat, coming in season sooner and more regularly than those in poor condition. Very fat cows are most uncertain breeders, and when this difficulty is overcome they usually produce small calves.

"**Sterility and infecundity in cattle** may be due to a variety of causes, some of which are irremediable—disease of the ovaries, for instance. Others are capable of being combated when their presence is ascertained. The most common forms of the latter are stricture of the *os uteri* (the passage leading from the vagina to the womb) and infectious abortion. Stricture ought always to be looked for when difficulty is experienced in getting a cow in calf, and the examination made when the cow is bulling. The hand and arm, well greased, is introduced into the depths of the vagina and the entrance to the uterus examined. Under normal conditions the fingers can be admitted into the canal, but when it is constricted a quill pen could not be passed, and fertilisation is then impossible. In very many cases the employment of a large probe at first, followed by the finger, a good deal of force being often needed, is sufficient to ensure dilatation. It may be necessary to use a dilator, or in some cases to incise the walls of the os before the stricture can be removed. The success attributed to insemination is frequently due to the fact that manipulation of the os has caused its dilatation before or during the use of the inseminator."

"Great difficulty is often experienced in getting cows to breed after they have been affected with contagious abortion. It has been suggested that this is due to an acid condition of the vaginal mucous membrane, and hence injections of a dilute solution of bicarbonate of soda are recommended. Solution of perchloride of mercury, ten grains to a quart of tepid water, injected into the uterus and also into the sheath of the bull a few days before copulation is perhaps the best treatment for this form of the trouble, which is no doubt associated with changes resulting from the action of the microbes to which epizootic abortion is due."—WM. R. DAVIS.

The usual **period of gestation** is, in round figures, nine *calendar* months. Lord Spencer's table (see *R.A.S.E. Journal*, 1838) establishes the average period for healthy cows at 280 days.

Signs of Pregnancy.—1. A cow does not come in season when pregnant, otherwise she should do so at intervals of about three weeks.[1] The exceptions to this rule are, that

[1] In summer, œstrum returns about the nineteenth day; in winter, its recurrence is slower by twenty-four or even forty-eight hours.

extremely poor, or, on the other hand, very fat "eild" cattle may not come "a-bulling" so often, while a few continue to bull although they are pregnant. This latter peculiarity has been noticed during the early stages of tuberculosis, should the disease affect the organs of reproduction, but also at times without any apparent cause, but nymphomania.

2. The right side of the belly becomes enlarged, and after a time the calf, in the form of a hard lump, can be felt with the hand near the flank, and seen to "struggle" or "quick" at times, especially when the cow drinks cold water.

Signs of approaching Parturition.—1. Enlargement and firmness of the udder and teats. 2. Fluid may be drawn from the teats of a more milk-like character and less watery than that found in the teats of "eild" cows. 3. Loosening and enlargement of the hinder parts, as the external organs of generation, and relaxation of the pelvic ligaments. Large heavy cows find it difficult at this time to rise or walk. These three indications frequently last for days. 4. Within a short time of calving, which may extend to a few hours, a cow becomes restless, lies down and rises frequently, and whisks her tail, as if in pain. 5. The right side becomes flatter when the calf passes into the pelvic bones as the labour period begins.

Calving.—It is bad practice to assist a cow too soon, and it is equally wrong to leave her in difficult labour until she is worn out and the pains become weak. The head and legs of the young within the mother are doubled up, and it assumes the form of a ball enclosed within a bag called the "amnion," "clean," "fœtal-membrane," or "after-birth." The bag contains a slimy fluid, in which the calf floats, and which lubricates the passage when the membrane is broken. When assistance is given, the hand and arm should be well rubbed with carbolic oil before being inserted. The right position for the calf is with the head and fore-legs "forward," like a man about to dive, the head and neck being stretched out so that they rest upon the limbs. When the hind-legs appear first it is not necessary to turn the calf before pulling as in the case of many other false presentations. The stifle joints may catch on the pelvic bones surrounding the passage and a good pull, first on one leg and then on the other, may be required.

The cow should lie on her side during the operation

(although in some districts she is made to stand in the fashion portrayed in the tomb-paintings of ancient Egypt), and the pulling, which is done by the fore-legs, should not be straight but inclining slightly towards the hocks of the cow, one man distending and freeing the *os vagina* with his hands. A cow should, as a rule, be made to rise immediately after calving to prevent after-straining. If the animal be exhausted and there is no pressing, she may be watched and allowed to rest for a few minutes. She should have a short drink (say 1 gallon) of cold water with a little oatmeal thrown into it, and this may be repeated every few hours until thirst is quenched. It is an unnecessary precaution to warm the water, and a cow will often not drink it warm. All that is necessary is to beware of giving too much at a time to chill her.

In protracted labour stimulants are required, as one pint bottle of whisky, a quart bottle or more of beer, or half an ounce of carbonate of ammonia. A mouthful of cold water is also beneficial.

The Common Causes of Protracted Labour are:— 1. False presentations. 2. Death or deformity of the calf, at times necessitating the cutting up and removal of it in pieces. Sometimes it becomes mummified, and remains in the womb for years: the cow coming in season, but being unable to breed. At other times it rots, and is discharged from time to time in small pieces or as disintegrated putrid matter. In such a case the animal is liable to get into a very lean condition and poor state of health, and may even die of blood-poisoning. 3. Disease, or abnormality of any of the internal reproductive organs.

The "cleansing" hangs for a time after the calf is born, but should drop within a few hours. *Treatment.*—Give opening food stuffs, as linseed tea, bran-mashes, and treacle.

Abortion frequently takes place soon after the cow has conceived, or within the first month, then the circumstance is rarely noticed by the attendant. When a cow calves before her time, usually from the fifth or sixth month onwards, she is said to "slink," "cast," "slip," or "pick" calf. The calf is usually dead, but it may be alive and continue to live if born so early as the seventh month, while calves born at the eighth month die. The loss to the owner is generally great, as there is, as a rule, no adequate preparation by the cow for milking,

but this is a rule to which there are exceptions with certain animals and under special conditions.

Causes of Premature Labour.—1. Eating ergotised grass in autumn. 2. Injury, as from horning by other cattle, hunting by dogs, crushing through narrow doorways, shaking and bruising on a railway journey, etc. 3. Walking through a dung heap, or over boggy or soft land, and getting strained. 4. Very cold or foul water, or too many frosted turnips, especially if given in the house while the animal is not moving freely about. 5. Superpurgation, either natural or induced by physic. 6. Infection arising from association with newly aborted cows which are contaminated with the organism which produces contagious abortion, or from the use of a bull which had served an aborted cow even six months before. This is the most common, most insidious, and dangerous of all the causes of abortion. A good illustration occurred in 1905 among animals belonging to J. W. Wallace, Ford, Thornhill, N.B. On December 20th a Galloway bull that had served an aborted cow on September 20th was put to seven Irish Shorthorn heifers. All aborted, the first heifer three months before she was due to calf. Five went till within six weeks and one within three weeks of their proper periods. No other heifer in the lot of twenty herding together aborted, but they were served by a different bull. This fact also indicates that heifers which have become contaminated with the organism do not communicate it to others until after premature labour. That aborted cattle do communicate the tendency to others was illustrated a few years before on a neighbouring farm, Holme of Blaplain, where cows from a contaminated dairy repeatedly broke through a fence, and mingling with the Holme cows gave them the disease. Without preventive treatment abortion declines, and ultimately dies out in a dairy, and the more quickly if the newly introduced heifers be grazed apart from the others. A cow rarely aborts more than three times, and her tendency is to carry her calf a little longer each time, and ultimately to bear a calf that lives. It is an undetermined question whether or not a cow which has aborted as the result of an accident is capable of communicating the tendency to other in-calf cows.

Indications of approaching labour are usually seen for days, or even a week or two, before the crisis comes on. A

cow should be removed from amongst the others whenever these appear. By taking the temperature the attendant on the outlook for signs of premature labour may receive warning of the approaching danger before any external evidences are visible. The normal temperature of a cow in a byre is not over 103° F., even when kept too warm and without proper ventilation, but it goes higher as abortion approaches if the affection be of a contagious nature. Quiet, and proper dieting, may sometimes avert an impending attack, if the calf be alive.

In cases of abortion the **after-birth** usually adheres firmly to the button-like connections (cotyledons) with the uterus, and, if not removed, part of it remains rotting for weeks. The cow then falls off in condition, and if she be not attended to there is danger of absorption of the fœtid matter into the circulation, septicæmia and death. Should the opening-food treatment not succeed in three to five days, the bulk of the membrane left should be taken away by the hand, which should be well smeared with carbolic oil before being introduced to sever the connections. Tepid water, containing 1 per cent. of pure carbolic acid, or one of the mixtures given later, should be injected to wash out the uterus and vagina twice a day. The operation necessary for the removal of the effete body is dangerous, if rapid decay of the "cleansing" is going on and putrid matter be present. The points of attachment to the uterus are left more or less in the condition of open sores, by which poison may enter the blood. Cows which have been thus treated do not readily conceive in the following season, unless they be disinfected, as described below.

Means of preventing Abortion.—(1) Cut over the seed stems of such grasses in the pasture as are liable to the attacks of ergot; (2) treat the cows gently; (3) supply wholesome food and pure water, and abundance of fresh air and sunlight; (4) keep them in sanitary surroundings, and especially avoid all communication with infected cattle or their droppings, and exhalations of all kinds: to this end, the cleansings from aborted cows should be burned, dipped into scalding water, or, with the calf, buried deeply.

Professor W. O. Williams, writing on the Prevention of Epizootic Abortion, says:—

"Professor Nocard, of the Alfort Veterinary School, who has made the study of epizootic abortion in cattle a speciality,

recommends the thorough and regular cleaning of cow-shed floors and sprinkling with a solution of sulphate of copper (10 drachms to 1¾ pints of water); and vigorous vaginal injections of a disinfecting tepid fluid with a horse enema syringe. Perchloride of mercury in tablets easily dissolved in hot water, 10 grains to the quart, is probably the most simple and effective remedy. Every morning, when cleaning the cows, with a sponge dipped in the fluid, carefully dress the vulva, anus, and anterior surface of the tail of all of them. The intra-vaginal or intra-uterine injection always causes, especially in young cows, apparently violent expulsive efforts —but these in reality do no harm. Nocard has obtained the best results from the employment of this method, and he is of opinion that a single vaginal injection, given at the commencement of the treatment, will establish asepsis, but only when the daily sponging of the vulva and tail is strictly carried out."

Leaflet No. 13, of the Department of Agriculture and Technical Instruction for Ireland, gives in greater detail a modern method of treatment. Concrete floors are strongly recommended in preference to any other kind that might shelter the germs of disease, also lime-washing the walls, and disinfecting the floor as well as the discharges from aborted cows at intervals with a solution of pure sulphate of copper (2 lbs. to 10 gallons of water). Jeyes' Fluid (a good teaspoonful to a pint of water) is cheap and effective for disinfecting both cows and bulls. The bull is easily treated by squirting the Jeyes' solution up his sheath or "shade," about an inch of the end of a common rubber enema syringe being inserted a few times after a diseased or suspected cow has been served. A cow requires to be disinfected several times in the following way:—

"Pass the nozzle of the same syringe into the ring of the calf-bed, which is a small, round opening found about eight or ten inches inside the 'bearing.' One hand should first be oiled with olive oil or butter, and passed in through the 'bearing' with the nozzle: the other hand is kept free to work the syringe. About a pint of the solution should be used each time, and the operation repeated once a day for a week and then once a week for a month, after which the cow may be left alone until about a fortnight before she goes to the bull, when she may have one last injection."

It is claimed that this treatment, together with the sanitary

precautions prescribed, will generally lead to the settling of cows which keep on coming in service, and will also prevent abortion.

Successful results are reported from different districts of the United Kingdom of the administration of *pure Calvert's Carbolic Acid*, No. 5, as a preventative, to cows in a byre where a case of abortion has occurred. It is either injected subcutaneously by a veterinary surgeon or a trained assistant, or given in the food—at first a teaspoonful twice a week. After a cow has got over the disinclination to eat the food, it may be given every second day for weeks till the danger is over; and the posterior extremities should meanwhile be sprayed with Jeyes' Fluid. Aborted cows should be isolated and disinfected. A simple and satisfactory **American method of treatment** is worthy of attention in this country:—

"Irrigate the vagina with a lukewarm 3 per cent. solution of permanganate of potash; then a solution of yeast is injected into the vagina:—One cake of compressed yeast is dissolved in a teacupful of water, and allowed to stand to ferment. To this ferment is added from a pint to a pint and a half of water. This is injected into the vagina, and it has a tendency to stop the discharge from the vagina better than any chemical that has so far been used. It also has the great advantage that it does not produce any irritation, which may occur by the strong use of carbolic acid and other disinfectants. This treatment costs only about 1½d. per cow; and it can be adopted without skilled assistance."

"Pressing," "straining," or "after-pains," producing inversion of the uterus, are very frequent after difficult parturition, being caused by injury to or irritation of the parts involved. The injection of laudanum and carbolic oil—carbolic 1 to 20 of oil—if done early, suffices to allay it. Carbolic oil, used alone in the first tried proportion of 1 to 7, has been known to increase the irritation where a scratch existed, and to drive the cow almost frantic.

When total inversion is imminent, a clean sheet (previously soaked in a disinfectant solution) should be stretched behind the cow to receive the uterus, which should then be smeared by the carbolic mixture recommended, and returned into position—often a matter of some difficulty, requiring strength as well as skill. Strong anodyne draughts, such as chlorodyne or laudanum in 2-oz. doses, are given to soothe

and allay pain. When the displacement of the uterus is noticed, before it protrudes to any great extent, it may be easily replaced by closing the hand (to prevent injury by the finger-tips) and pressing it back gently but firmly. If necessary, the uterus may be washed previous to replacement, tepid water being used on account of its producing less pain than a cold application. The hand is not withdrawn until the normal position of the uterus has been secured. The most effectual way to prevent its reappearing externally is to stitch across from hip to hip with clean white tape or wire drawn through three holes made by a penknife in the skin on each side, the tape passing over the lips of the vulva to give support. The treatment appears cruel, but is an effectual one in serious cases. West's vaginal (spiked) clam now used in veterinary practice accomplishes the object by nearly closing the orifice. To ensure safety, before any symptoms of pressing appear, and also in mild cases after it has begun, **cow-breeches** are of great service, but they are of little value when the pressure is intense, as they cannot be put on sufficiently tight to resist the effects of severe straining. Cow-breeches are made of strong leather, in the form illustrated in the accompanying figure, the four ends being fitted with strong canvas terminations which are not here shown. They are put on to prevent the sudden expulsion of the womb after calving, and openings are made in the leather for the escape of the solid and liquid excrement. The tail of the cow rests in the bifurcation of the two upper ends; these cross over the back, and are carried forward and tied to a strong band or girth fastened tightly round the body in the region of the heart, while the other ends, conducted past the udder (one on each side), cross on the belly and are similarly fastened below. The floor of the stall under the cow's hind-legs should also be temporarily raised.

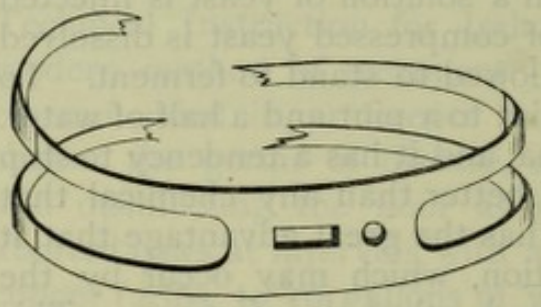


FIG. 18.—COW-BREECHES.

The dangerous operation of **amputation,** best performed by the écraseur, in the hands of an experienced veterinary surgeon is at times necessary to forestall mortification when the uterus

has been inverted, probably without the fact being discovered, and has become so congested that it is impossible to return it.

Protrusion of the Vagina (or the "body" in common language) occurs before and after calving, when some cows that are in high condition and well fed lie down. The proper treatment is to bathe the protruding organs to clean them, and wash with a solution of chloride of zinc, to stimulate the relaxed parts and to prevent the development of objectionable odours. The floor of the stall should be a little higher at the hind than at the fore feet of the animal; and the food given should be concentrated rather than bulky. Animals with such a constitutional and, most probably, hereditary weakness should not be retained.

Milk-Fever or Parturient Apoplexy occurs not so much in fat cows, as is usually supposed, as among cows that are being well fed, and are full-blooded and thriving rapidly at the time. Many fat cows are in this condition, but very many that die of milk-fever cannot be said to be fat. Deep milkers are more liable to it than others, but only in the case of cows of more than one calf. It usually appears within three days after calving, but sometimes, though rarely, before it. Digestion is suspended, fever is not present as the name implies, but a subnormal temperature, serious disturbance of the nerve centres, and consequent loss of muscular power. "The disease probably results from the poisoning of the system by products (ptomaines) absorbed from the udder, and, acting principally on the brain and nervous system, the effects become very similar to those of very strong narcotics."

Preventive means may be used to render remedial treatment unnecessary. It is advisable to restrict the amount of food for six weeks before calving (as by shutting up at night without food a cow that is liable to be attacked), and to keep the bowels open by giving bran or grass. If the udder be large and painful, milking should be done regularly—even ten days before calving. Should these preventive measures not prove sufficient, as would be shown by one cow of a number similarly treated being affected, the animals most likely to become ill may be bled and physicked a day or two before the calf is expected, or merely physicked with 8 lbs. of treacle, or 14 to 16 oz. of Epsom salts, followed in fourteen or fifteen hours by a pint of linseed oil to counteract the

secondary costive tendency of the salts. This practice may be repeated. All the foregoing treatment is directed to the reducing of the plethoric condition of the blood, and the keeping of the digestive system in good order, without at the same time doing anything to permanently reduce the natural flow of milk after calving. The calf, in all cases of danger, should be allowed to suck the cow for the first three days, and the bag during that time should not be drawn.

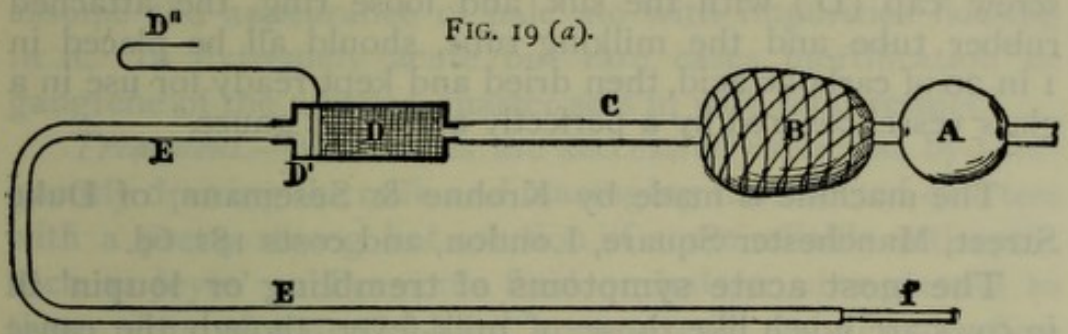
A successful treatment which was in use before the close of last century is that of pumping various solutions into the udder, as some authorities suppose to destroy injurious organism, but according to others to check the reabsorption of milk substances or their deleterious products into the circulation of the cow and thereby to prevent the abnormal condition which induces apoplexy.[1] Iodide of potassium and various other fluids have been used, with good immediate effects, in the majority of cases, although the Report of the U.S.A. Department of Agriculture records 17 to 25 per cent. of deaths under the treatment. In this country many animals which after treatment recovered from the acute stage, pined and died a few months later, and others never regained their original milking capacity. The introduction of oxygen or atmospheric air by the rough-and-ready means of a bicycle pump without sterilisation, has also been attended with beneficial results; but to make a certainty of success in the operation, it is necessary to carry it out with the greatest care. To this end, common air, which was first recognised by Anderson of Skanderbora as the best medium to use, requires to be sterilised and heated, and about a half-pint of it gently passed into each quarter of the udder, which should then be slightly kneaded, so that the air may penetrate by the larger milk ducts through which the milk drains from the secreting glands of the udder. The operation, which should take place under the strictest sanitary precautions, may have to be performed a second, and even a third, time. Herbert Watney, M.D., of Buckhold, Pangbourne, Berks, has perfected the original instrument used, and as the air-injection process when properly applied is of immense

[1] This treatment was introduced by Veterinary Surgeon Schmidt, who about 1898 discovered the effects of udder injections, and the relation between the udder and the disease. He used 1 dram of iodide to 1 quart of water.

importance to the dairy industry of the country, as an almost certain means of saving the best milking animals from a deadly disorder, illustrations of the mechanism with full description in Dr Watney's own words are here introduced from the *Agricultural Handbook and Diary*, 1905.

"This apparatus, Fig. 19 (*a*), is composed of (A) a small india-rubber bag (with a valve), which can be compressed by hand, and acts as a little air-pump—this pump is connected with a second rubber bag (B), which under pressure can

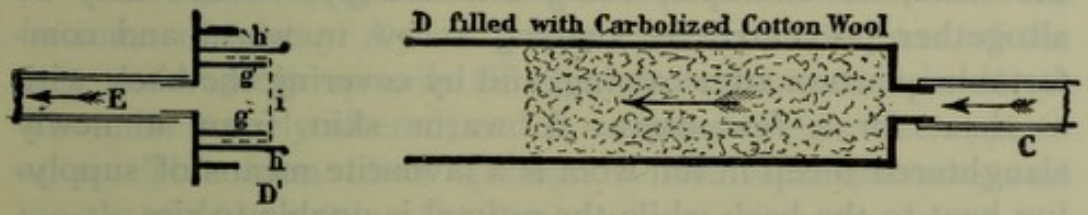
FIG. 19 (*a*).



expand so as to equalise the pressure, and which also prevents too much force being used. This elastic bag is connected by the rubber tubing (C) with one nozzle of a metal cylinder (D) into which antiseptic wool is placed—at the other end of the cylinder is a cap (D′) which screws on and off so that the wool can be put in the cylinder—on the outside of the cap is a nozzle so that by the tubing (E) the cylinder is connected with the hollow milking metal tube (f)—sometimes called a "syphon"—for passing into the teat. The length of the whole is about four feet.

"On to the cylinder is attached a hook (D″), so that the cylinder can be hooked on to the inside of a pail filled with

FIG. 19 (*b*).



water at a temperature of 150° to 160° F., and thus in very cold weather, if the injection is made somewhat slowly, the air pumped into the udder can be somewhat raised in temperature. To prevent any possibility of the cotton wool being pumped into the udder, there is a small contrivance attached to the inside of the screw cap (D′) of the cylinder, Fig. 19 (*b*).

"This consists of (g) a small cylindrical piece of metal,

part of the screw cap, open at one end to the nozzle and open at the other end towards the inside of the cylinder, *i.e.*, towards the cotton wool; on to this cylindrical piece (g) a circle of silk is placed (i), and this is held down and kept in place by a loose ring of metal (h), which when fitted on and pressed down fits tightly on the cylindrical piece (g). The air follows the direction of the arrows; is pumped through the cotton wool, through the fine silk, and through the rubber tube (E) to the milking tube. The silk is so fine that no cotton wool could possibly pass through it. After use, the screw cap (D′) with the silk and loose ring, the attached rubber tube and the milking tube, should all be placed in 1 in 20 of carbolic acid, then dried and kept ready for use in a glass vessel covered by a perfectly antiseptic gauze."

The machine is made by Krohne & Sesemann, of Duke Street, Manchester Square, London, and costs 18s. 6d.

The most acute symptoms of trembling or loupin' ill in cows are much like those of milk-fever, though the cause is quite different. The disease, which is local and infrequent among cattle, is described under "Sheep" at page 673.

Weed, felling after calving, or **adynamia.**—Lean cows often go down and are unable to rise within a few days after calving, if exposed to cold, especially to draughts, and are as helpless as regards ability to rise as those suffering from milk-fever. The great difference of this disease as compared with milk-fever is, that there is no delirium, no pressure of blood on the brain, and the animal often eats and drinks normally, and will even milk heavily for a time. The method of nursing is the same, only part of the treatment is varied to suit the difference of conditions—bleeding, or the application of cold water to the head, for example, being unnecessary. Weed may be altogether prevented by keeping a cow in warm and comfortable quarters after calving, and by covering the back with a sheet for a few days. A warm skin from a newly slaughtered sheep in full wool is a favourite means of supplying heat to the back while the animal is unable to rise.

Inflammation of the Udder, or **Gargot**, is generally due to the presence of pathogenic germs in the milk ducts of the mammary glands, although there are various determining causes, such as exposure to cold, bad milking, overstocking, and mechanical injury, as by horning, or the introduction of a dirty milk syphon. "In mild cases there is little

constitutional disturbance, the cow feeds and appears to be in good health, but the milk contains little masses of curdled material," and one or more of the quarters of the udder become enlarged, and possibly painful. "Serious attacks are accompanied by shivering, loss of appetite, rapid breathing and pulses, and a very high temperature (107°). The cow straddles her hind legs to prevent pressing on the enlarged udder. The milk is greatly reduced in quantity, and thin, with much curdled matter in it. After a few days it may assume the appearance of pale ale with impurities floating in it. In extremely acute but rare cases mortification or gangrene of the affected quarter sets in with fatal results."

Treatment.—Mild cases are successfully relieved by "frequently drawing the milk and massaging the affected quarters with a pretty strong hot solution of some reliable antiseptic, such as Jeyes' or Pearson's fluid or izal—a wine-glassful to three pints of water." Lard, goose-grease, or oil may afterwards be rubbed on to prevent cracking. "Poultices are of little practical value, but good results are got from the application of wool soaked with the antiseptic solution and held against the udder by bands over the cow's back. An aperient with ½ oz. of bicarbonate of potash ought, meanwhile, to be administered, and the ½-oz. doses of the potash in water should be continued twice daily for a few days. In all cases of acute udder inflammation, if no improvement takes place on or about the fourth day, resort should be had to an injection up the teat of the affected quarters of a solution of boracic acid, 2 per cent., or of chinosol, 2 grains to an ounce, or other antiseptics."

There is a **contagious inflammation** of the udder observed in some districts. A hard lump appears at the base of the teat, and rapidly spreads till the whole quarter is involved. The milk is early altered, and it assumes the ale-like appearance. This form often spreads to the four quarters, and mostly ends in ruining the bag.

Yet **another form of the disease**[1] attacks cows that have given milk, but are at the time yeld or dry. Heifers with fleshy udders, but which have never bred, have been known, but rarely, to take it. It appears usually in or after hot weather in August, one-quarter of the vessel swelling and

[1] Locally termed in Scotland "udder-clap."

becoming painful, usually after the animals have been heated by running from flies and probably standing in a draught under the shade of trees. If not promptly treated two or more quarters may be involved and a hind limb affected. At times the enlargement extends along the belly and down the fore-legs. Death is sometimes the result, and in acute cases when this is averted, the loss of at least one-quarter of the udder, and from one-third to half the value of the animal.

The Remedial Treatment is to give a dose of salts, rub and foment the udder, and draw the quarter every day until pus disappears. Should the disease be too far advanced for mild measures, or if daily attention cannot be paid, the teat may be either cut off at the neck, or a good opening made with the knife in the fleshy udder close to it. The only subsequent difficulty would be from attacks of flies on the wound, unless the weather becomes cold for a few days. This form of the disease may be prevented by rubbing the vessel, at least three times, at intervals of two or three weeks, with a mixture consisting of Archangel-tar, two parts, and butter or grease, one part. By beginning in June, the inducing organisms are kept off, and moreover the tar acts as a stimulant or mild blister, although the grease dilutes it sufficiently to prevent blistering.

Erysipelas of the udder is rather uncommon, and its effects are localised for the most part to the skin of the bag and of the internal part of the thigh. The milk is very little altered, though it is diminished in quantity. The patient is excessively lame, walking with difficulty and with legs wide apart.

Impaction of the Rumen or first stomach is not uncommon, when cattle are in poor condition, and the functions of digestion consequently weak. It may be caused by unsuitable food, as when cattle are fed solely on cut straw and pulped roots; when much use is made of dry, concentrated, rich food such as cotton-cake or bruised grains; or it may occur when cattle are turned out to benty land on the hills in spring before young grass has begun to grow. The rumen may not be much enlarged, but on pressing it has a soft and doughy feeling.

Treatment.—A strong purgative must be given except in

the case of weak cattle, preferably Epsom salts and aloes, and the side of the paunch should be kneaded to try to break up the mass of undigested food. Withhold bulky food, and support the animal with gruels, which digest without being cudded like long food; give stimulants, such as ½ oz. to 1 oz. of carbonate of ammonia, and repeated doses of raw linseed oil, castor oil, or treacle, to keep the bowels open.

Persistent impaction may be caused by something hard lodging in the stomach, such as a piece of old shoe leather, which some animals pick up and chew. This can only be got rid of by ruminotomy, *i.e.*, cutting a hole into the stomach on the left side, removing the foreign substance, and following up by giving little food for a few days until the wound heals.

Choking is most frequent when cattle are fed on whole potatoes or small turnips. If an animal is permitted to elevate its head, a piece of the unchewed root is liable to slip over the throat and to lodge in the gullet, which spasmodically closes before it, and the proverbial "lump in the throat" becomes a dangerous reality. A "probang" is not a safe means of relief unless in skilled hands, the gullet being so easily ruptured when force is applied. The most simple and effective practice is to keep the mouth open by introducing a wooden gag like a large bit, to prevent the formation of gases in the stomach, and to avoid choking by saliva, which then runs from the mouth in place of into the windpipe; a little oil and sulphuric-ether, sufficient to lubricate the part, may also be given with advantage. To drench a choking animal with salt and water is a barbarous and dangerous practice (although the violent coughing which is set up, may help to relax the muscular contraction of the gullet), as, the gullet being closed, the solution must find its way into the windpipe and bronchial tubes, and produce great irritation and discomfort, if not organic disease. Choking may be prevented by keeping down the heads of the animals while they are feeding on roots in their stalls by letting drop on the back of their necks a long pole, about three inches in diameter, hinged to and suspended from the rail supporting the upper ends of the stakes to which the cattle are tied. Death in cases of choking is usually due to over-dis-

tension of the rumen by gases, which form there and cannot now escape by the usual means of eructation. The distended rumen, pressing on the diaphragm, presses on the lungs and causes asphyxia.

Where death is threatened from this cause the rumen ought to be at once punctured, a knife being used if the proper instrument, a trocar and cannula, is not at hand.

Foul in the Foot is not unlike foot-rot in sheep, in which abscesses form in the foot, and sloughing of the horn and adjoining structures occurs. It is most seen in the hind feet, and the animal grows feverish and loses condition, becomes very lame, and stands with its claws apart. The causes are, irritating bodies between the claws, an animal grazing on low soft, marshy pastures, or standing in wet and filthy gateways. *The treatment* is to poultice, in order to remove inflammation and draw pus, and then follow by dressing the foot with an astringent lotion, consisting of equal parts of butter of antimony and tincture of myrrh, and binding it up with tow and tar. Foul in the foot is not uncommonly tubercular in its origin, and then is a progressive disease that can only be treated by amputation at the coronet.

Other lamenesses are produced by casual injuries, by something hard, such as a small stone, picked up and fixed between the digits, or by scalding in wet seasons. A hind-leg can be held up for examination and treatment by a man on each side standing close to the cow, and lifting by means of a stick, about the length and strength of a one-horse whipple-tree, which is placed across between them in front of the animal's hock. A strip of strong canvas, drawn backward and forward between the hoofs, should be used to clear away all dung, earth, or other foreign matter which may have lodged there, to admit of a thorough examination of the part, and to prepare for a caustic mixture, or some other stimulating dressing, which should then be applied by means of a thin splinter of wood. Cows or bulls which are not allowed much exercise, become lame through the hoofs not being naturally worn by walking, so that they grow long and turn up at the toes. The over-growth of horn may be removed by sawing, followed by using a pair of long-handled powerful shears for dressing or finishing.

Swellings on the hind legs and lameness occur among heavy cows tied in stalls which are not bedded with litter, from injury usually about the hocks, due to pressure and irritation produced by lying on cold bare stones. Enlarged knees from watery accumulations also result from lying on a hard floor, especially if the surface be uneven from projecting points. *Remedial treatment* of the knee consists in cutting through the skin near the lower edge of the swelling to allow the fluid to drain off, and to get the forefinger in to extract coagulated material, which requires to be removed before normal conditions can be restored. A cow at pasture must be kept in the house for a few days after the operation till the smell of blood goes off, else her neighbours are liable to attack her in obedience to the natural instinct of animals to become excited and kill members of the herd that come by serious injury. A seton dressed with equal parts of turpentine and oil passed through the swelling on the knee is often efficacious. A cover of fibre matting or some commoner form of litter is a complete protection for the knees. Cows thrive and milk best when means are taken to prevent them lying on bare floors, which draw heat from the body.

Mange in Cattle is a parasitic affection due to the presence of one or other of three species of Acari (mites) *sarcoptes*, *psoroptes*, and *symbiotes*. The different forms of mange are consequently named "sarcoptic," "psoroptic," and "symbiotic." Sarcoptic mange is almost unknown in this country, but it was discovered by W. R. Davis, M.R.C.V.S., in 1896 (see *Veterinary Journal*, February 1896), and his diagnosis was confirmed by Professor A. Railliet, Alfort Veterinary College, Paris. It is reported to be present on camp cattle in Argentina and on the range cattle of the Canadian North-West, and it forms one of the diseases which the existing restrictions against the importation of live cattle into the United Kingdom have the responsibility of excluding from the herds of the country. The psoroptic and symbiotic forms are common among milch cows, and frequently exist together.

Mange appears mostly about the root of the tail, on the neck and withers, and when neglected, the psoroptic form may become generalised and spread all over the body. Symbiotic mange is of little gravity, and is usually located on

the hind pasterns and at the root of the tail. The hair is liable to be rubbed off the itchy parts and red and yellow scurf appear on the skin. Animals in low condition from milking heavily or from the presence of a lingering disease like tuberculosis, are most susceptible. Fat cows and those thriving quickly on fresh grass in spring so reduce the attack that it may not be observable; but unless they are thoroughly cleaned they harbour a sufficient number of the parasites to account for the reappearance of the affection in autumn when the cattle are housed.

Sarcoptic mange of cattle affects the same parts as the other forms of mange, but readily spreads more widely and has a much more pronounced action on the skin, which becomes thickened, cracked, and wrinkled.

Treatment.—The affected parts should be clipped, the hair burnt, and the skin thoroughly disinfected. "The animal should then be well rubbed all over with soft soap, to which a small quantity of creolin may be added," followed after a lapse of several hours by a thorough dressing with one or other of the following preparations:—(1) Oil of tar, one part; linseed oil, twenty parts, with as much flowers of sulphur as the mixture will incorporate, heated gradually to near the boiling point, and, when cooled, rubbed well into the skin, there to remain for some days before being washed off and another dressing put on; (2) Helmerich's pomade, consisting of sublimed sulphur 200, potassium carbonate 100, and lard 800, applied as described, but not smeared over too great a surface of the skin at one time to avoid suppressing its functions; (3) Creosote 10 parts, alcohol 10 parts, with 25 parts of water, or creosote 1 part, and vegetable oil 30 parts; (4) Zundel's formula = crude carbolic acid or creolin 53 oz., quick lime 36 oz., carbonate of soda 107 oz., soft soap 107 oz. dissolved in 57 gallons of hot water (coal oil and benzene, although effective, often produce persistent skin irritation); (5) kerosene emulsion, consisting of hard soap ½ lb., water 1 gal., kerosene 2 gals.—the oil and soap put in when the water boils, and constantly stirred till cool, and then dissolved in 60 gallons of hot water.—Extracted from the Report on Mange, of J. G. Rutherford, Vet. Director-General, Ottawa, June 1904.

The stalls and all surfaces that the affected cattle touch require to be thoroughly disinfected.

CHAPTER XVII

PIGS[1]

Pigs—The European Pig, *Sus scrofa*, and the Chinese Pig, *Sus indicus*—The Wild Hog, *Sus aper*—The National Pig Breeders' Association, and other Societies—General Show Points of Improved Breeds—The Bacon-curer's Pig—Changes in Feeding and in Curing—Rolled Bacon—Distinguishing Characteristics—**White Breeds**—Large, Small, and Middle Yorkshires—Lincoln Curly Lopears—Scotch White Pigs—**Dark Breeds**—The Large Black—The Berkshire—The Essex and other Small Black Breeds—The Tamworth or Staffordshire Breed.

PIGS are divided into two groups—*Sus scrofa* and *Sus indicus*.

The latter, or Chinese pig of several types, is by far the more improved (refined) of the two, from the modern breeder's point of view. The *scrofa*, the European pig, is sprung from and resembles the wild boar. As compared with the *indicus* type, it is longer, leaner, narrower, coarser in bone, in hair, and in every way; the nose is longer and the forehead narrower, but these defects in form are correlated with greater activity and a hardier constitution.

Although it is the fashion to use these classifications, there is no doubt but that all pigs that breed freely together, of whatever colour, size, and form, must have originated from one common stock, and had for a common parent the Wild Hog, *Sus scrofa*, which possessed a wide geographical distribution, being indigenous to Europe, Asia, and North Africa. Sanders Spencer refers to the **Wild Boar** of Europe "as of a russety-grey colour when young, deepening as the pig reaches maturity, and becoming a dark chestnut-brown, with

[1] For a list of the Herd Books, see Appendix D. See Bulletins Nos. 47 (Parts I., II., and III.), 69, and 77 (Part III.), U.S. Department of Agriculture, Bureau of Animal Industry; *Pigs, Breeds, and Management*, by Sanders Spencer, Vinton & Co.; *The Book of the Pig*, by James Long; and, the *Rational Pig-keeper to ensure Profit*, by W. J. Malden and William A. May, 1906.

its hairs tinged with grey at the extremities as old age crept over it." The shade is darker in hot than in temperate climates, and even the pigs which have broken loose from domestication become more russety or slate-coloured in the tropics than in temperate climates. In the Argentine the Camp Pig, not descended from modern imported blood, has a dark or black skin, except under the belly, even although (as in Plate LXXVIII.), the greater part of the body is covered with strong white hair. **The Wild Boar** is an extremely active and, when roused, dangerous animal. It is not long since specimens of it were preserved in some of the enclosed parks of the country. Wild pigs in Chartley Park were so nimble that they hunted rabbits as successfully as an English terrier dog.

Improved pigs in this country are usually divided into three classes—black, white, and red or chocolate. The great divergence in colour in stock of one descent was no doubt due to the results of an inherent tendency to changes aided at first by the influence of environment, and in recent times by the artificial selection of breeders following their fancy, fashion, or so-called work of improvement. The modern Berkshire is a striking illustration of a breed being fundamentally changed in colour in less than a human generation.

The whites prevail in Scotland and the north of England; the blacks in southern England. Between the two, in central England and Wales, are to be found the russet colours and combinations of the three colours, the result of crossing. All have been improved by crossing the native *scrofa* pigs with specimens of imported *indicus* (which is not, however, so prolific), and by selection. The Berkshire and Essex breeds, for instance, were improved before the middle of the eighteenth century by the use of a number of imported pigs belonging to an Italian breed, the Neapolitan—a black breed which had been dashed with *indicus* blood.

Improved breeds possess a much greater tendency to fatten, and they have more symmetrical forms; but they are not so active and hardy in constitution as the older kinds.

Porcine interests in Great Britain and Ireland are mainly under the fostering care of the following **Pig Societies**:—

(*a*) The National Pig Breeders' Association, incorporated in 1886, with the objects of maintaining the purity and improving the breeds of swine, investigating pedigrees and issuing a Herd Book, supplying reliable information relating to swine, settling questions of difference and of disputes referred by contending parties, holding shows, and offering prizes for swine at leading shows. This body has the three white Yorkshire breeds and the Tamworth breed specially in charge, but receives entries of other breeds, more particularly from members of the Association.[1]

(*b*) The Large Black Pig Society, incorporated in 1899, which in 1905 had issued six volumes of its Herd Book; and

(*c*) The British Berkshire Society, with its majority volume published in the same year.

[1] The following is a list of **prominent members of the N.P.B.A.**, who are also office-bearers or life members of the Association, which numbered over 200 in 1907:—Right Hon. Lord Amherst of Hackney, Didlington Hall, Stoke Ferry, Norfolk; J. Ashforth, The Rookery, Dronfield, Sheffield; A. A. Avis, Stoke Bardolph, Nottingham; W. E. Balston, Barvin, Potter's Bar, S.O., Middlesex; Sir Thos. Barrett-Lennard, Bart., 7 Lewes Crescent, Brighton; P. Bosanquet, Ponfield, Hertford; Hon. D. P. Bouverie, Coleshill House, Highworth, Wilts; D. R. Daybell, Bottesford, Nottingham; Right Hon. Earl of Derby, Knowsley Hall, Prescot, Lancs; Sir H. F. De Trafford, Bart., 13 Charles Street Berkeley Square, London, W.; (late) C. E. Duckering, The Cliffe, Kirton Lindsey, R.S.O., Lincs; Chas. Ecob, Park Farm, Sutton Scarsdale, Chesterfield; A. S. Gibson, The Elms, Ruddington, Nottingham; Sir G. Greenall, Bart., Walton Hall, Warrington, Lancs; W. T. Hall, Highclere Farm, Newbury, Berks; Jos. Hallas, Higher Walton, Warrington, Lancs; E. de Hamel, Middleton Hall, Tamworth, Staffs; S. Heaton, Worsley, Manchester; N. J. Hine, Newnham Hall, Baldock, Herts; A. Hiscock, junr., Manor Farm, Motcombe, Shaftesbury, Dorset; A. Hughes, Packwood Grange, Knowle, Birmingham; Robt. Ibbotson, The Hawthorns, Knowle, Birmingham; W. H. Mitchell, Elmdene, Kenilworth, Warwickshire; Right Hon. Lord Moreton, Sarsden House, Oxon; Sir Oswald Mosley, Bart., Rolleston Hall, Burton-on-Trent; Oswald Mosley; E. Howard Moss, Ravenscroft, Middlewich, Cheshire; H. H. Owtram, Newland Hall, Ellel, Lancaster; D. W. Philip, The Ashes, Whitacre, Birmingham; Henry Smith, The Grove, Cropwell Butler, Nottingham; H. C. Stephens, Cholderton, Salisbury; H. Swithinbank, Denham Court, Bucks; C. Howard Taylor, Middlewood Hall, Barnsley, Yorks; A. C. Twentyman, Castlecroft, Wolverhampton; T. Price Willis, Winslow, Bucks; E. S. Wilmot-Sitwell, Cattistock Lodge, Dorchester; I. N. Woodiwiss, Tamworth House, Duffield, Derby; Sam Woodiwiss, Graveleys, Great Waltham, Chelmsford.

There are many mixed or small local breeds in Britain, but only a few of the leading ones need be described.

Points generally applicable to all Breeds.

(*Showyard standard.*)

In judging, it is best to begin at the feet and legs, as these are most important, on account of their having to carry the weight when the animal is fat and heavy, and to insure firm, free action. The *feet* should be proportionate and neat; the *pasterns* strong; the *legs* perfectly straight and well set, level with the outside of the body, with plenty of fine flat bone, fleshed well down in both fore and hind quarters; *feet* wide apart; *loin* strong, and as broad as the *shoulder-head*, which should be compact and free from any opening or looseness; the *back* broad all the way, straight and level, not drooping too much at the *rump* when the animal walks, and extending over the neck. Pigs are all liable to arch in the back and droop at the rump when standing. The *under line* should be parallel, and continued below the jowl; the *chest* wide and deep; the *belly* full, but not flabby; the *quarters* long and wide, and straight from hip to tail; *hams* broad, full and deep to hocks; the *flank* thick, full, and well let down; the *ribs* well sprung, and *sides* deep; the *neck* thick, especially towards the shoulders, and of proportionate length; the *ears* vary from a foot long to a few inches, each breed having its own special size, shape, and position; the *head* broad between the eyes; the *nose* long or short, according to breed; the *under jaw* shorter than the upper; the *cheeks* full; the *eye* not too small, quick, but mild; the *tail* stout and long, and set high, but not coarse, and a tuft of long fine hairs on its tip; the *body* well covered all over with flesh, and of a rectangular shape from all points of sight, deep and wide before and behind; the *skin* medium in thickness, and covered with a sufficient *coat* of characteristic *hair*.

Though the points enumerated are those looked for at shows, it has been most forcibly pointed out by Sanders Spencer,[1] one of the most successful breeders and exporters of white pigs in England, and also by those interested in

[1] Paper read at the Irish Conference of the British Dairy Farmers' Association, May 1887, by S. Spencer, Holywell Manor, St Ives.

the bacon-curing trade, that the most economical pig to breed, and consequently the one which ought to be encouraged in the showyard, should be long in the body, a good medium depth in the ribs, light in the neck and fore quarters, and heavy and deep behind in the hams or gammon; or, as A. W. Shaw of Limerick has tersely put it: "What is really wanted, is a pig that is neat in the head, light in the neck and shoulders, deep in the heart, thick in the loin, stout in the thighs, and short in the legs,"—the reason being that changes in the curing trade and pork market have resulted in certain parts of the animal being of greater value per lb. than other parts, as will be seen from Fig. 20 (page 354), after an original diagram exhibited by A. W. Shaw. The shoulder and neck being of least value, it is shown that it is a waste of food substance to transform it into flesh of inferior quality, if by selecting animals with tendencies to greater development in the more valuable parts a greater amount of material on the higher division of the scale of market values can be produced.

A great change has within comparatively recent times come over the system of feeding pigs, as well as of curing their carcases. A generation ago it was the custom to kill pigs about two years old, at enormous weights, after the flesh had become coarse. The method of curing left the lean portion gorged with salt, hard, indigestible, and uninviting: then it was an advantage to have a large proportion of fat to lean. Now, however, the system of mild-curing renders the flesh sweet and juicy, and all efforts are directed towards the production of as great a proportion of lean to fat as possible. The large increase of the consumption of fresh pork has also encouraged the demand for young, lean bacon; and, on the other hand, the change of fashion which has put young and tender pork on the market has helped to increase its consumption.

The ideal type of animal for these purposes, of whatever breed of pigs, is well described in a recent bulletin of the University of Illinois.[1] It is the one which originated in

[1] Reviewed in the *Times* of 17th April 1905. A Canadian bulletin, No. 10 of The Department of Agriculture (Branch of the Live Stock Commission), on *The Production of Bacon for the British Market* (December 1905), also deals very fully with the subject.

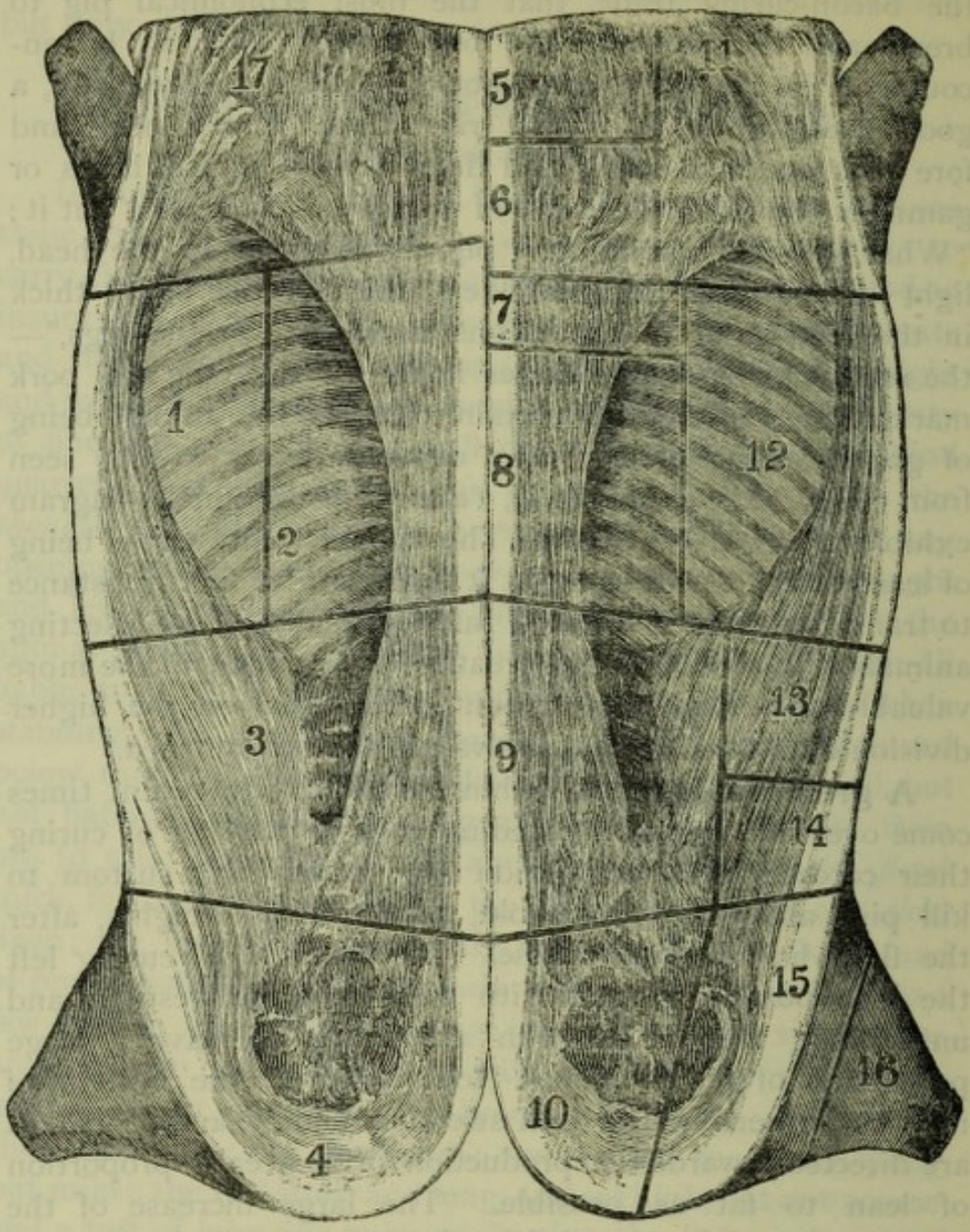


FIG. 20.—MODEL SIDES OF BACON.

No.	Current Prices per lb.	No.	Current Prices per lb.
1. Streaky Quarter	11d.	10. Fillet	10d.
2. Rib Quarter	11d.	11. Shoulder	8d.
3. Middle Quarter	8½d.	12. Prime Streaky	11d.
4. Ham Quarter	8½d.	13. Thin Streaky	8½d.
5. End of Neck	7½d.	14. Flank	6½d.
6. Middle of Neck	8½d.	15. Middle of Gammon	11d.
7. Thick Back and Sides	10d.	16. Knuckle of Gammon	7d.
8. Prime Back and Ribs	11d.	17. Fore-End	6d.
9. Loin	10d.		

Reproduced from the paper mentioned in footnote, p. 352. Though the prices are not changed they fairly represent current rates, which vary according to local circumstances in different places or localities.

American pork or bacon may be known by the roots of the hairs or bristles being arranged in groups of two or three hairs together, while the hair on the skins of pigs reared in the British Isles is more regularly distributed.

Great Britain, Denmark, and Canada, and is being adopted in the United States as a result of the systems of breeding and feeding adjusting themselves to market requirements.

"A hog of this type must be long in body and deep in side, with comparatively narrow back, light and narrow hams and shoulders, and light, muscular neck. This form is desirable because it is the side of the hog that furnishes the best and most expensive cuts, and it is necessary to have as much as possible of this at the expense of the other parts. This hog must also afford indications of having firm flesh, must be well covered with lean meat or muscle, and must not have an excess of fat on the outside of the carcase. The fat on the outside should not be more than 1 in. to 1¼ in. thick, and should be evenly distributed over the entire carcase. The weight must be between 160 lbs. and 200 lbs., in order to afford the most desirable cuts as to size, firmness, and flavour. A hog smaller than the specified weight would furnish a side of bacon too thin, and one larger, a side too thick. A hog old enough, that with good care and breeding will weigh from 160 lbs. to 200 lbs., furnishes the best-flavoured bacon. A hog lighter than this would probably be too young, and one heavier than this too old, to yield bacon of the best flavour. In firmness of flesh, also, the bacon hog of 160 lbs. to 220 lbs. is likely to be the most desirable. A hog younger than is required to produce this size would have too much water in its flesh, for the younger the animal the more water it has incorporated in its system; and this excess of water not only detracts from the firmness of the flesh, but reduces the food value, because the meat has less 'substance.' When a hog is heavier than 220 lbs. he is not so good for bacon purposes, because when over the age required to produce this weight there is a greater tendency to lay on fat, not only on the outside of the carcase, but intermixed also with the lean meat, thus producing too much fat in proportion to lean meat for the best bacon. After this age, there is, moreover, an increased tendency to lay on fat unevenly and in patches; where this occurs it is impossible to produce good bacon."

According to the latest available **statistics,** hogs of the known or scheduled parts of the world number a grand total of 117 millions. The United States is credited with 47

millions; Germany, 17 millions; Russia, 11 millions; Hungary, 7 millions; Great Britain, 4 millions; Canada, 3 millions; and Spain and Roumania, 2 millions each. In the Western States of America, including Ohio and Kentucky, which constitute the great maize-growing region (the centre of the densest hog population in the world), the numbers of hogs "packed" in one year exceeds 25 millions; to this, some 3 millions packed in the Eastern States fall to be added. But the total killed per annum for all purposes is more than double these numbers combined, as it is estimated that "16 per cent. more pigs are killed in a year than are enumerated at a particular date in the year, the average duration of a pig's life being less than twelve months." **Butchers' hogs** form an important item. They are chiefly "barrows" in greater request at higher prices than sows, the best of which are kept for breeding. The fresh-meat trade absorbs most of the butchers' hogs—about one-fourth of the hogs sold in the stockyards of Chicago (the largest daily hog market in the world) belong to this class, and the best-fed variety ranges in age from six months for light to twelve months for heavy weights. The majority of American pigs, which are fed almost exclusively on maize, belong to the excessively lardy or all-fat kind, which the packing trade has developed, but which will in future have to share public favour more equally with the lean-meat varieties.

"The type of hog reared in the United States is unlike the bacon hog of England, Denmark, and Canada, in that the most valuable parts of the American hog are the hams, back, and shoulders. It consequently happens that these parts are developed at the expense of the sides, the result being an animal differing in essential details from our own bacon pig—for the former has a broad back, wide and full hams and shoulders, with heavy neck and jowls, and a large proportion of external as well as internal fat. Most of the swine of the United States are reared in the 'corn belt'—that is, the zone in which the cultivation of maize is chiefly pursued. This section of the country has consequently taken the lead in the development of swine of the fat or lard hog type, and has determined their characteristics. When the United States was settled, swine were, of course, taken over from Europe, and they have undergone gradual modification to suit the

climatic and other conditions peculiar to the corn belt. Three principal reasons have influenced the development of the fat or lard hog—(1) the abundance and relatively low price of maize; (2) the American home demand for cured meats; (3) the foreign demand for cheap meats. The fat or lard hog of the United States thus came to be produced, not only because he could be reared more cheaply than the bacon hog, but because there was a demand for just such an animal."

"Bacon hogs, as their name indicates, are used for the production of bacon—that is, pork that has been salted and then smoked. Where this kind of meat is prepared from a carcase, the hams and shoulders are sold separately. Much of the 'English bacon' is cut into what is called a 'Wiltshire side'; this is the whole side, with merely the head and feet cut off. The bacon hog that is representative of this class belongs primarily to Great Britain, Denmark, and Canada. In recent years this hog has been introduced into the United States, and is rapidly establishing for itself a market class."

We now pay over £12,000,000 yearly for **hog products sent to us** by America[1] as follows:—

	Quantity.	Value.
	Cwt.	£
Bacon	2,806,108	6,209,009
Hams	1,042,669	2,606,129
Lard	1,669,996	3,041,846
Fresh Pork	119,259	262,450
Salted Pork	76,977	119,423

The best quality of pork is produced in moderately cold weather. The low temperature renders the flesh firm; it is also produced at a slower rate in cold weather, and is in consequence more mature. There are striking differences in the market requirements in the local pork-consuming centres of the United Kingdom. For the Newcastle trade, pigs weighing from 5 to 9 stones are in best request; for Birmingham, they require to be of medium weights—10 to 15 stones—and for Bradford and Manchester, heavy weights of from 14 to 20 stones are in most demand. There has in recent years been a tendency to boom small porkers, as there

[1] This figure can be brought down to date from time to time by referring to the Annual Returns of the Board of Trade.

has been a run upon small-sized cattle and small-sized sheep. Carcases of moderate dimensions are no doubt more easily manipulated, and more easily disposed of in a limited business, or to people with small families; but there is no question that for excellence of quality, the flesh of a pig weighing 20 stones is much finer and more mature for the purpose of making into bacon than one of half the weight. A large proportion of the pork now consumed is eaten fresh, or made into sausages.

Rolled bacon is a product of the south of Scotland coming into favour in the larger centres of population—Glasgow, Edinburgh, and Leith—and superseding the dry salted article. It is not yet in much demand in England. It was made in a small way in Ayrshire about the beginning of the last quarter of last century. The practice extended to Lanarkshire, and began to expand rapidly in the nineties. It came to Dumfriesshire with the present century, and one of the chief centres of production is Alexander Kirkpatrick & Son's newly erected factory at Thornhill, fitted with freezing plant and other modern appliances by the Douglases of Putney, London.

Pigs bought in the surrounding districts are there "felled," bled, skinned, and cleaned, without plotting or scraping, and hung up to cool for twelve hours. The bones are cut out by experts, and the quartered carcases are put for three days into brine strong enough to float a potato. The quarters are then ready to lace tightly into separate rolls with strong twine, and in muslin bags, to be marketed for immediate consumption, as Dumfriesshire rolled bacon. The best sizes are pigs of 9 to 11 up to 15 stones of pork. The following are the products derived from fifteen pigs, brought from a distance by rail from a milk factory in September 1905:—The fasted live-weight before shipment was 225 sts. The rough weight, including skins and feet (17 sts. 2 lbs.), was 167 sts. 2 lbs., leaving a skinned weight of 150 sts. (15 sts. each). From this figure deduct bones, 17 sts.; lard, 5 sts. 10 lbs.; heads, 8 sts.; (total, 30 sts. 10 lbs.) to get the net weight, 119 sts. 4 lbs., put into the pickling tank. The price paid was 5s. per stone live-weight (which was rather above market rates), nearly equivalent to 6s. 9d. rough weight, and 7s. 9d. with the skin off. It was sold wholesale as rolled bacon at 77s. per cwt.

The selling of **live pigs**—which superseded the practice of thirty years ago, of marketing, usually in autumn when the weather began to get cold, dead carcases that had been killed at home, plotted, and scraped—is in turn giving way to the killing of pigs at home and delivering them cleaned but unskinned at the rolling factory. The practice of sending milk into town or to the factory has led in some districts to the reduction of the number of pigs. The skins, worth about half a crown each, are used for bicycle saddles, etc. During the South African War they fetched 3s. each.

DISTINGUISHING CHARACTERISTICS

White Breeds

The Large White or Large Yorkshire is the largest breed of white pigs in the United Kingdom, if not the largest of any breed. Its long coat of moderately fine texture should be free from black hairs, and the skin as far as possible free from blue spots. It is pretty directly descended from the original pig of the country without having been so much as others crossed with foreign blood. It has been vastly improved within recent years, but still it inclines even in its modern form to exhibit the points of the more direct descendants of the wild pig, viz., a hardy constitution, long neck, full towards the shoulders, large head, long nose, face slightly dished, broad snout not too much turned up, jowl not too heavy, long, thin ears, slightly inclined forward, and fringed with fine hair, strong bone, flattish sides, and, when the great length and weight of the Yorkshire are taken into account, proportional narrowness as compared with the Berkshire. Large white pigs do not develop their points till they are a year or more old. "Both size and quality are most important. Black hairs, black spots, a curly coat, a coarse mane, short snout, inbent knees, hollowness at back of shoulders," are grave objections.

The type of **pig wanted for the American trade** must be free from the rose or swirl of hairs over the kidneys resembling a cow-lick—a characteristic which is often reproduced in the young—though it is appreciated in Yorkshire in pigs for home use. It must not be broader over the shoulder than over the loin, and the head must be longer

than is wanted at home. The ears must stand well up, and be of a good size, with a big fringe of hair round the edges. The body hair should be abundant but fine; coarse hair along the back of the neck is very objectionable. The tail should be strong but not coarse, straight, and hanging perpendicularly like a cow's.

The prices for young boars from well-bred herds, six to eight months old up to eighteen months, are from 5 guineas up to 25 guineas each. A boar can serve about 30 sows in the season.

The size to which the animals are now reared has been much reduced within the last generation, but this is more a matter of change in the system of management than a change in the character of the breed. It was no uncommon sight at the Royal Agricultural Society's Shows a few years ago to see large Yorkshires estimated to weigh over 50 imperial stones, or as much as a bullock.[1]

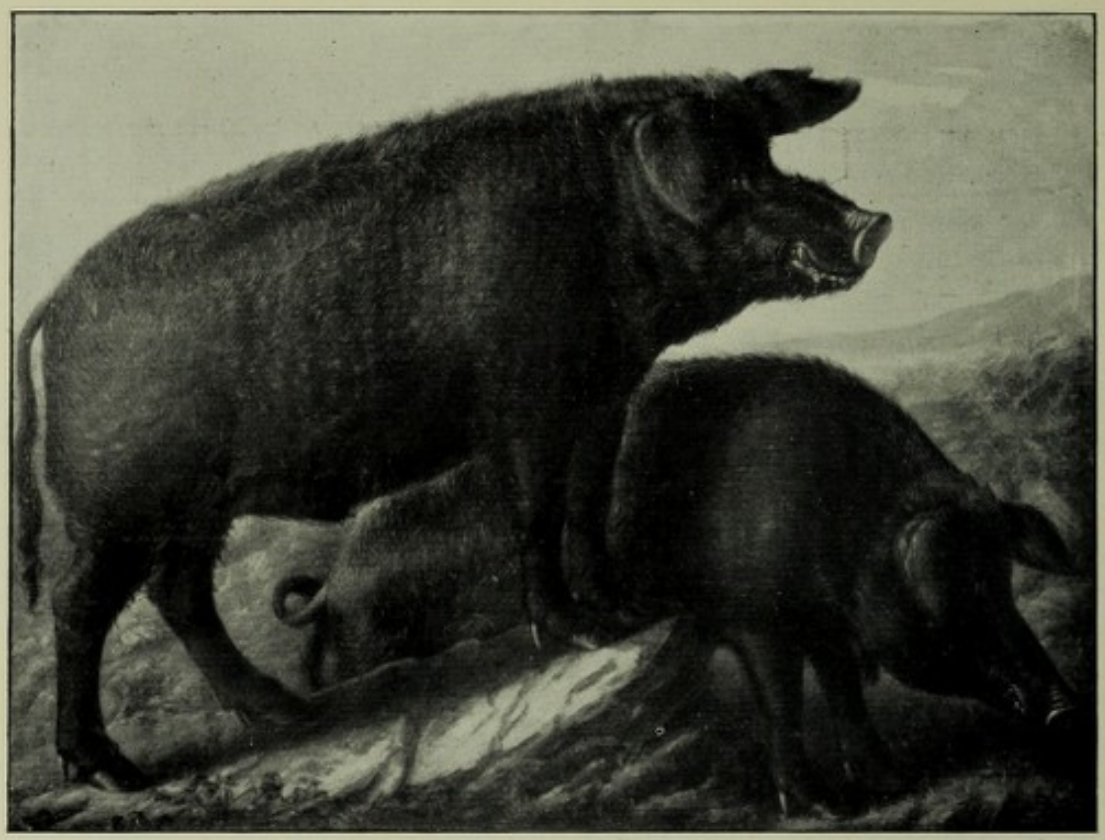
The tendency to early maturity, arrived at by care in breeding and good feeding and management, has yet left as an attribute of the breed the property of lean flesh production as against fat production.[2] It is thought that the general improvement of the large breed of White Yorkshires was initiated by crossing with improved Leicestershire white pigs, which had themselves been improved by Bakewell, who applied to pigs the system of breeding explained at page 106.

The *Journal* of **The Department of Agriculture, etc., for Ireland,** for October 1904, says:—

"Recent experience has gone to show that no other pig is so well qualified to meet the requirements of the feeder and owner in Ireland as the Large York. Among other desirable points, good specimens of the breed possess the following:—(1) A neat head; (2) light neck and shoulders; (3) a good girth, and plenty of depth through the heart; (4) well sprung ribs, with moderate depth of side; (5) great

[1] Sanders Spencer's boar, "Sampson VI.," winner at the Royal Society's Shows at Carlisle and Derby, weighed 9 cwts. as he walked.

[2] Referring to the foreign trade, S. Spencer, writing to the Author in 1889, says that during the last four years breeding pigs (boars especially) have been sent by him to many important centres of bacon-curing in Ireland, Canada, Germany, Holland, Denmark, Sweden, and quite recently to Russia, where the Government are assisting in the establishment of bacon-curing factories.

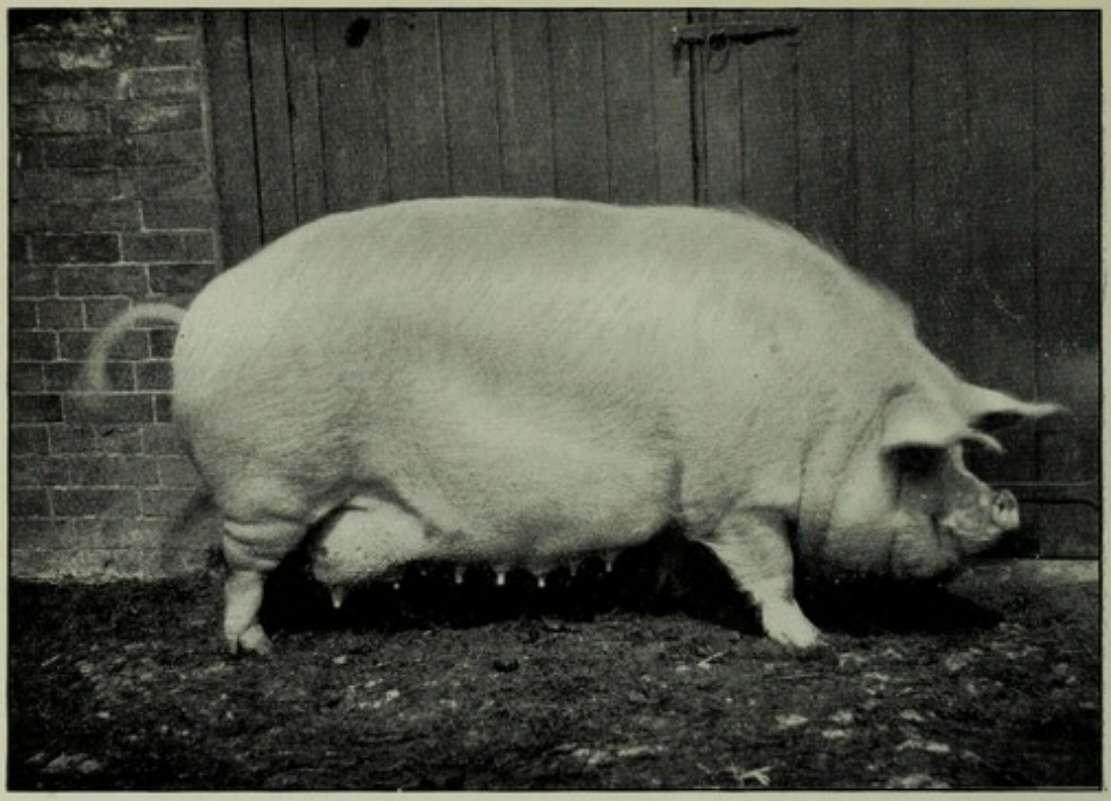


A. Wild Boar and Sow, *Sus scrofa*, from Portugal.

[*From a painting in the Low Collection, University of Edinburgh.*

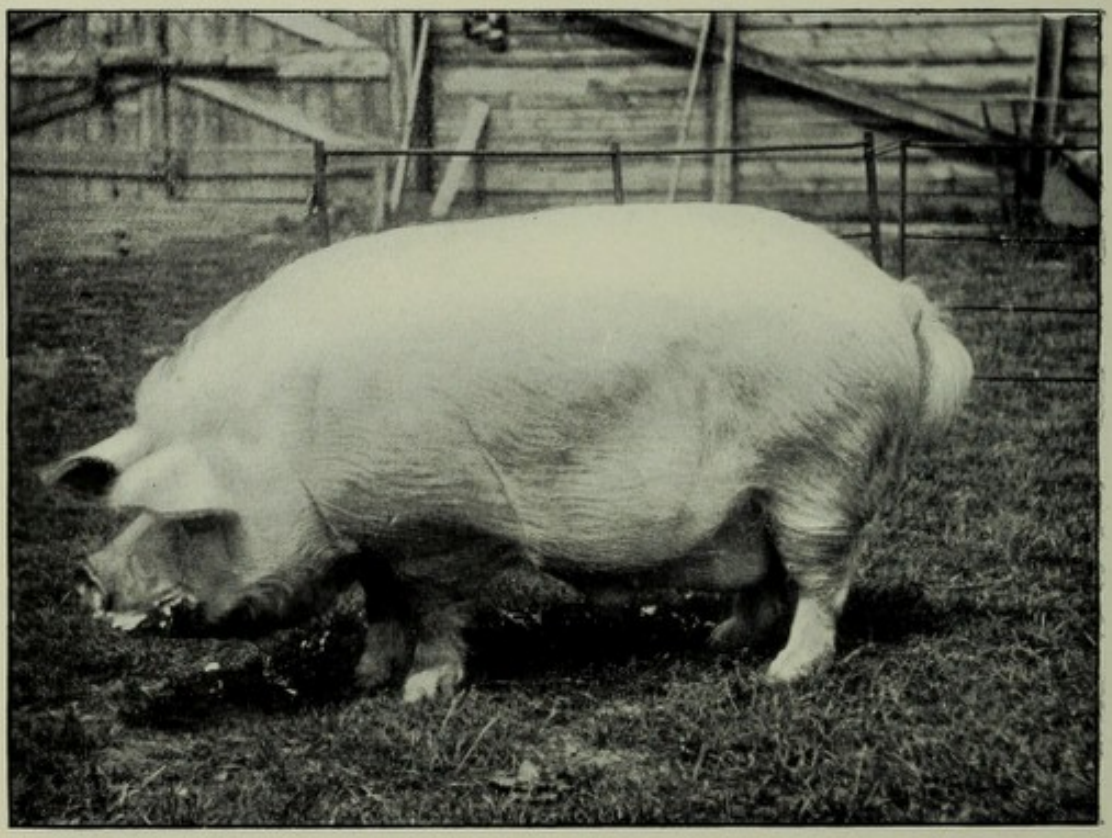


B. Argentine Camp Sow, with Black Skin under its White as well as its Black Hair.



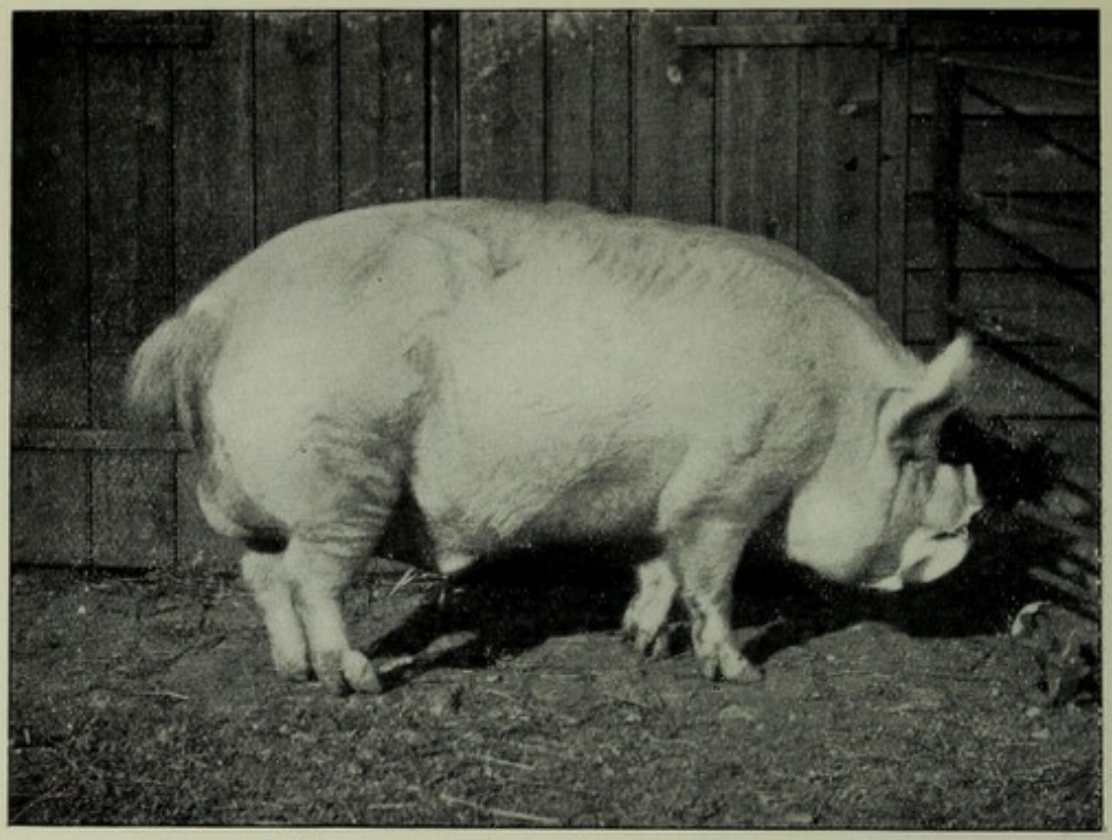
A. Large White (Champion) Sow, "Colston Lass" (11216).
Owned by R. Millington Knowles, Colston Bassett, Bingham, Notts.

[*C. A. Fernley, Ratcliffe-on-Trent.*

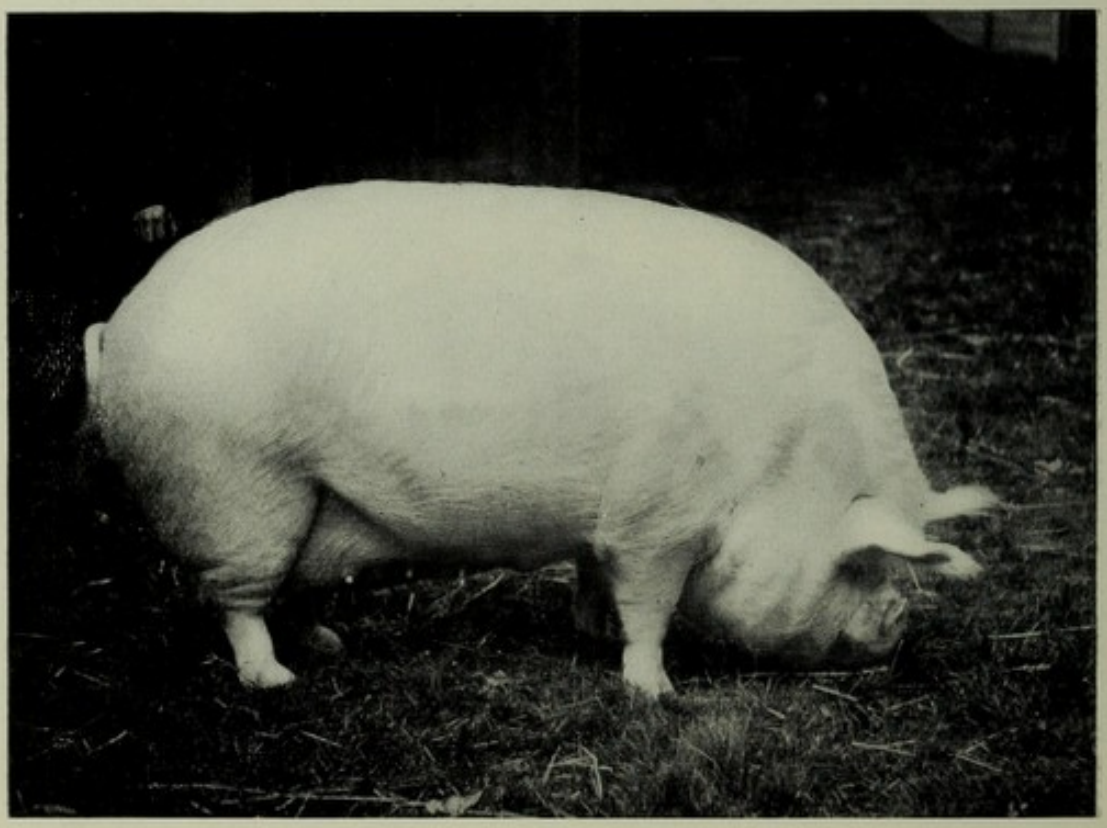


B. Large White Boar.
Six First prizes in 1905.
Owned by T. Price, Onston, Ellesmere, Salop.

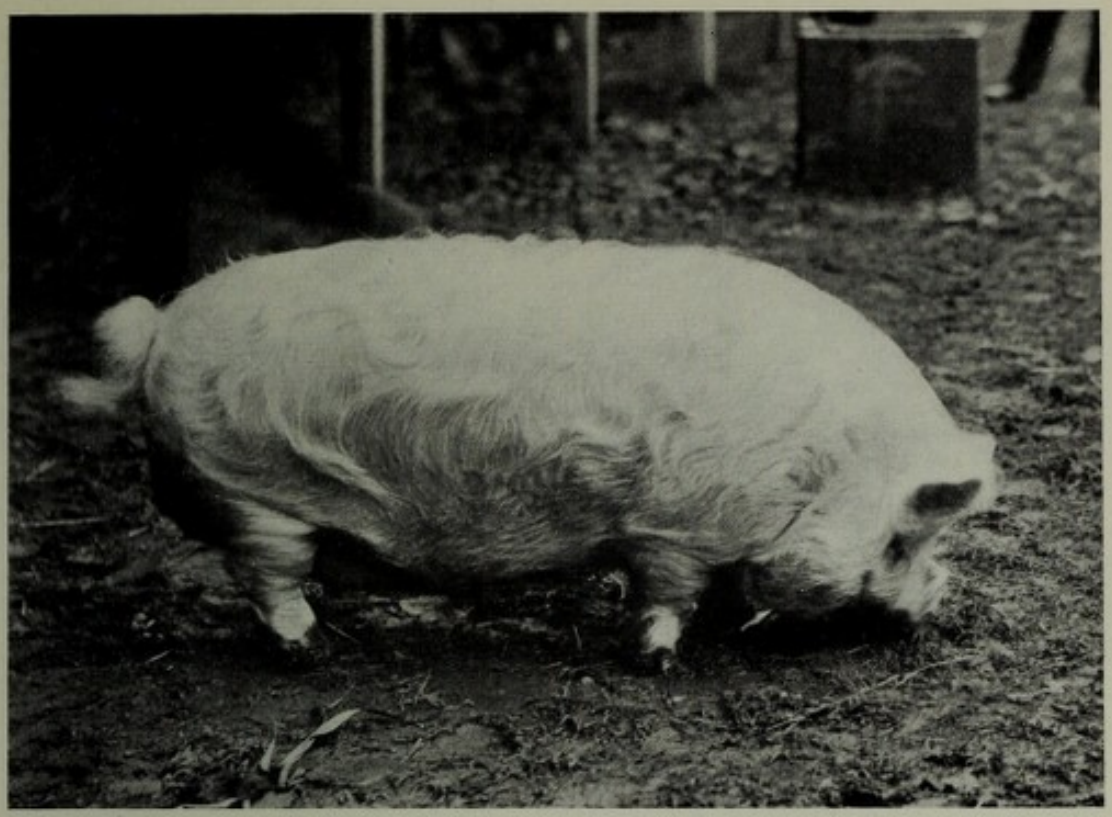
[*G. H. Parsons, Alsager, Cheshire*



A. Middle White Boar, "Holywell Rosador II."
Numerous prizes, and a Royal winner.
Bred by Sanders Spencer, Holywell Manor, St Ives.
[*Scott & Wilkinson, Cambridge.*



B. Middle White Sow, "Walton Jewel II."
Gold Medal, B. and W. Show in 1905, etc.
Bred by Sir Gilbert Greenall, Walton Hall, Warrington.
[*G. H. Parsons, Alsager, Cheshire.*



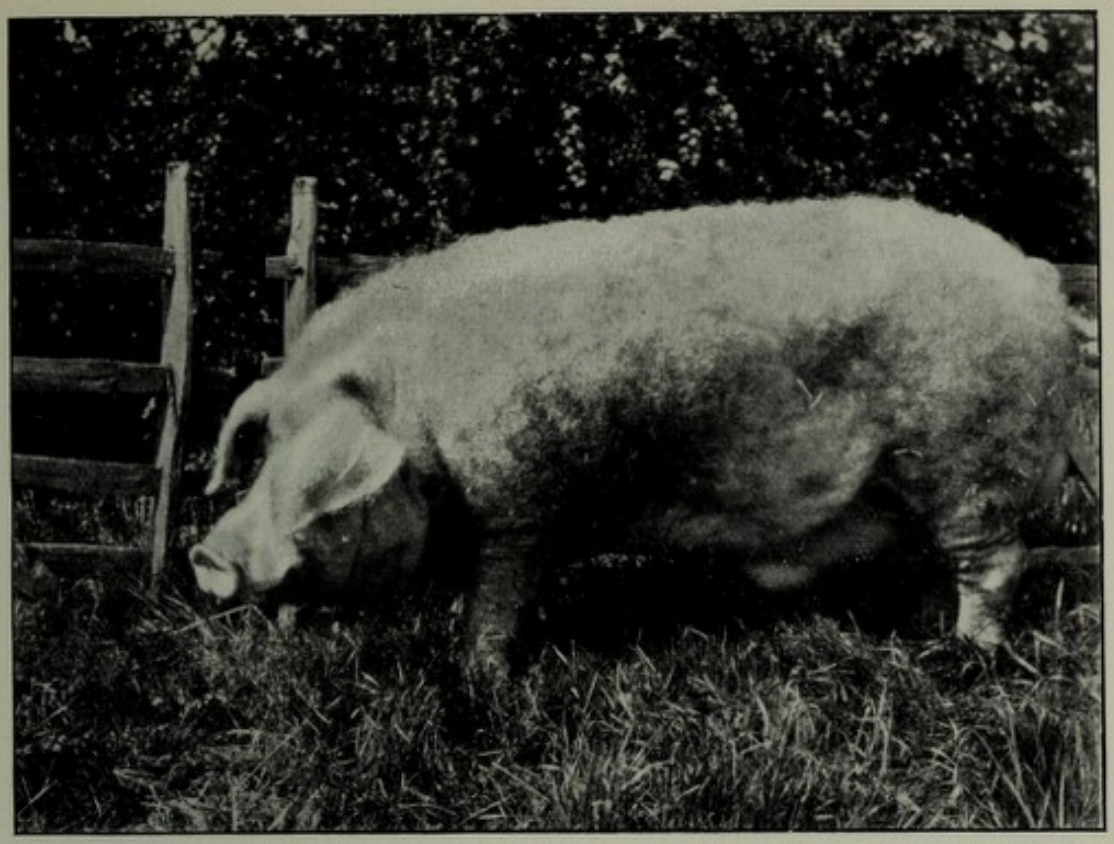
A. Small White Sow.
First, R.A.S.E. Show, Park Royal, 1903.
Owned by Hon. D. P. Bouverie, Coleshill House, Highworth, Wilts.



B. Small White Boar, "Walton Pippin."
Champion, R.A.S.E., 1902. Owned by Sir Gilbert Greenall, Bart., Walton Hall, Warrington.

[*Both photos by C. Reid, Wishaw.*

[*pp.* 360 *and* 361

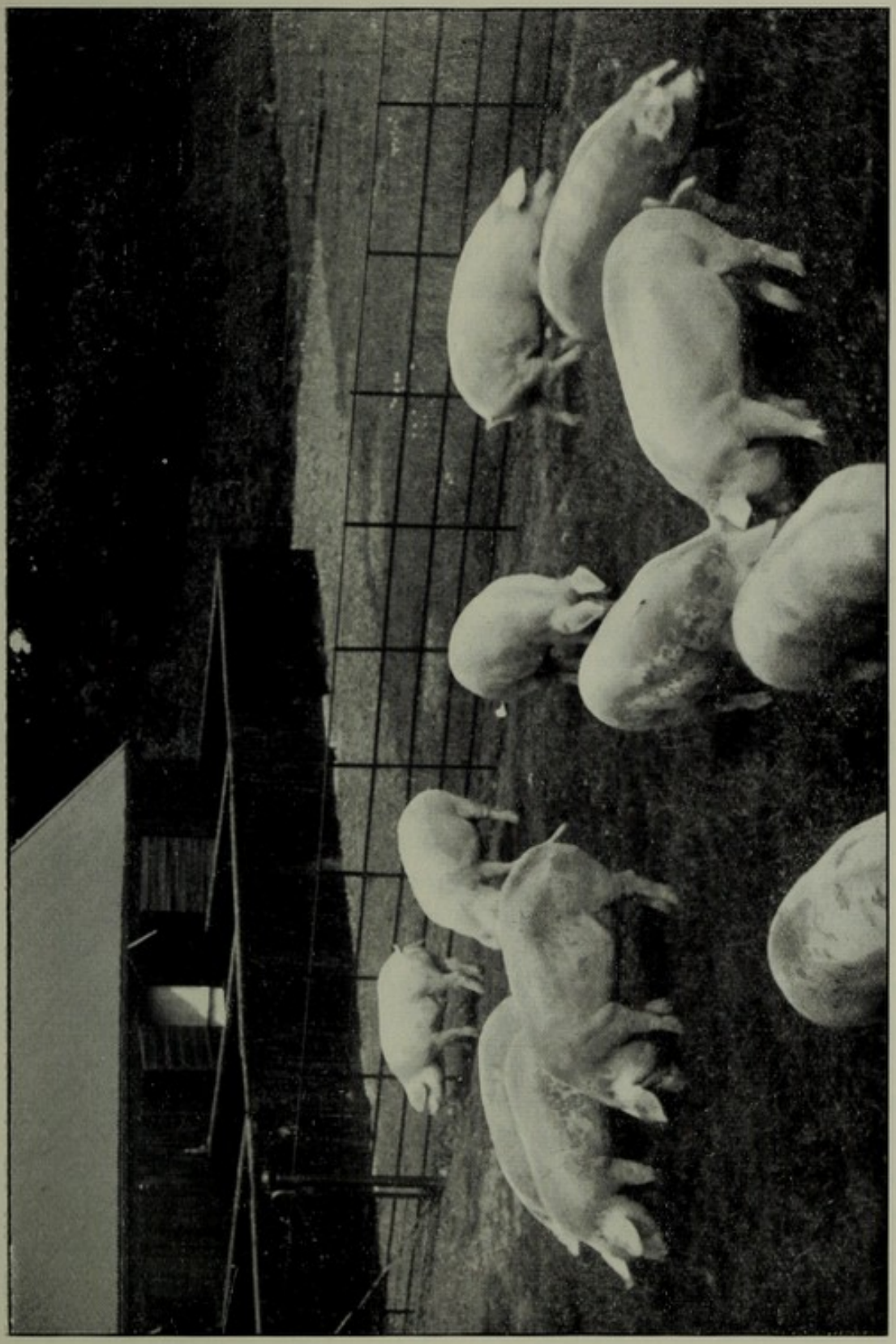


A. Curly Lop-eared Lincoln Boar, "Midville Bob."
First at Lincoln Show, 1906.



B. Curly Lop-eared Lincoln Sow, "Midville Bess II."
Winner at Lincoln Show, 1906.

[*pp*. 360 *and* 361



WELSH SPOTTED CROSSES.
Lancashire County Council Farm, Hutton, near Preston.

[*pp.* 360 *and* 361

length of body; (6) thick loins; (7) stout thighs; (8) short legs; (9) long silky hair; (10) a moderately thick skin, free from wrinkles."

The Small White is descended on one side from the same native ancestors as the large Yorkshire, nevertheless the two breeds resemble each other in little but colour. The small breed is noted for its refinement and beauty, its small bone, and its tendency to fatten—qualities which have been acquired through its ancestors crossing with Chinese pigs.

The Small White occupies among white pigs the position which the Southdown sheep holds among the Down breeds. It is not, when bred pure, so much a tenant's pig as a landlord's or a gentleman's pig. It produces excellent fattening animals by crossing with common pigs, or even with the Berkshire. It has been used for crossing in the improvement of inferior breeds.

Points.—The skin and hair are pure white and the body rounded, plump, symmetrical, and free from wrinkles; the head short, on a short thick neck, and the jowl very full; the ears small, short, erect, and inclining forward; the face excessively "dished"; the snout straight while the animal is young, but, although broad, becoming longitudinally much contracted and quite turned up after a time, like the nose of a pug dog; shoulders full and wide; the back very broad, and the belly deep and near the ground. "The general appearance of the animal is small, thick, and compact when compared with other breeds."

The leading drawbacks to the breed are the small number of young usually produced at a birth, and the general delicacy of constitution, necessitating extra care and attention, especially in their early stages. Both points of weakness are no doubt due to close-breeding; but in the matter of hair the animal does not seem to have suffered in at least one of the ways in which the injury from in-breeding usually shows itself, the small breed being famous for a profusion of long and silky hair. Its refined character of flesh adapts it for producing porkers, but the want of a due proportion of lean flesh to fat, besides a want of balance of parts in the animal according to the demands of the bacon-curing trade, excludes it from being a favourite with bacon-curers, and

its numbers are so reduced that, like the Small Black, it is doomed to extinction.

The Middle White is the big-jowled and often uncouth product derived from crossing the large and the small Yorkshire breeds. As might have been expected, in accordance with the general laws and principles of breeding, the small and so-called improved breed has stamped its likeness more distinctly on the produce of the cross than the large and less-refined Yorkshire. The Middle breed is little more than a large variety of the Small White, being only slightly modified in form through its relationship with the larger animal. Theoretically, it ought to combine the good qualities of the two distinct breeds, but as yet the want of uniformity of type and the uncertainty as to the character of its progeny are not fully overcome.

The recent changes of fashion in the market have been rather in favour of those qualities which are produced in the most perfect form by the Large Black, the Large White, and the Tamworth breeds as against the quality for which the small breed is prized, viz., that of producing at a rapid rate quantities of over-fat meat.

Sanders Spencer describes and compares the three breeds as follows:—

"**The Large White** should have a good coat of straight white hair of fine quality, and a white skin, with sometimes a blue spot or two. This last characteristic is being bred out by those who have a connection with the foreign trade. The foreigner looks upon it as an indication of cross-breeding, although it is not necessarily so, as large white pigs of the purest strains will occasionally throw a pig with a few spots. A cross of Berkshire blood indicates its presence by the appearance of black spots, both on skin and hair, in the second generation.

"In size, the Large White pig cannot be too large, unless size is gained at the expense of quality. The head should be of fair length, and wide between the eyes; the jowl light; the lower jaw slightly curved; the ears inclined forward; the shoulders no wider than the hips; the ribs well sprung; the carcase deep; the flank thick; the quarters lengthy; the gammon or second thigh reaching to the hocks; the legs straight and well apart, and possessing no more bone than is sufficient to support and transport the carcase.

"Improved Large White pigs are ready for the butcher at any age, and if properly fed and allowed sufficient exercise they will furnish bacon of the quality now most in demand. They are not only prolific, but they are excellent mothers, and rear large litters. A sow bred at Holywell Manor, St Ives, and sold to Mr Hawes of Derby, reared forty-eight pigs as the produce of four farrowings.

"**The Middle White** is a shorter, thicker, and more compact pig. In the matter of quality (except that the carcase is not quite so lean) it is very similar to the Large White. In comparing the points of the two breeds in detail, the head of the Middle-bred pig is shorter and heavier; the ears more upright, or pricked; the nose more turned up; the legs shorter; the hair more abundant, finer, and softer. It is not quite so prolific as the Large White, nor does it make such rapid growth when young, although it fattens as quickly when it reaches the age of six months.

"**The Small White** is now but very little bred in this country. The enormous increase in the demand for lean bacon has led to a complete change in the form and style of pig sought for by feeders within recent years. The Small White, when well grown, will convert meal into pork at less cost than any other breed of pig, but it grows slowly when young, and the sows rear but small litters, although they are often prolific. The form of a Small White is much like that of the Middle-bred, only on a smaller scale. The ears are pricked, and the jowl heavier. Blue spots are looked upon as a sure indication of a cross having been introduced by one of the large varieties."

The **Lincolnshire Curly-coated or Baston Pig** is a purely local breed of great size and merit, chiefly confined to the east of Lincolnshire from the sea-coast as far inland as Louth, Lincoln, Grantham, and Spalding. It is believed to be the modern representative of the breed that Low referred to in the eastern counties as being of "a large size, white colour, and with pendent ears." The colour of the skin and hair is white, but most pigs have blue spots which, however, must grow white hair. The hair is abundant, long, and curly when the coat is full grown. The face is shorter than that of the Large Yorkshire, fine, and quite straight in the nose. The ears fall over the face (hence the name "lopeared"), but must not be too long and heavy, and on no account pricked like the Yorkshire. It is maintained by its advocates that no other breed of pigs will produce, at least in its own district, equiva-

lent weight and quality for age, being equally good as a "sucker" and a bacon pig, and producing the right class of animal for the pork butcher, at 8 stones (of 14 lbs. dressed pork), 12 stones, 18 stones, or any weight up to 40 stones. A sow easily reaches 30 to 35 stones at twelve months old; 40 stones at twenty months after rearing a litter of pigs, and 60 stones at three years old. The breed, although criticised for being too heavy in the fore-quarters, and round and coarse in the bone, is noted for hardiness and thrift, as well as for exceptionally heavy weights, and for being prolific. Seven is a usual number at a first litter, and ten to twelve for a full-grown sow bearing two litters each year. As the milk is poorer after the rearing of the sixth litter, few sows are kept after that time.

Crosses are successful with other British breeds, especially the Berkshire, Large Yorkshire, and Large Black.

A Lincolnshire Curly-coated Pig Breeders' Association (with *Herd Book*) was started in 1906 with a membership of over 100. This important step will lead to the breed being better known, and, on its merits, more widely appreciated. The Hon. Secretary is Chas. Ed. Williams, Thornbayes, Sleaford, and the following are a few of the **principal members**:[1]—

J. S. Barber, Horbling, Folkingham; J. Cartwright, Dunston Pillar, Nocton, Lincoln; F. Casswell & Son, Dunsby, Spalding; H. Casswell, Quadring, Spalding; H. Caudwell, Midville, Boston; Wm. Dennis, Kirkton, Boston; W. M. Epton, Croft, Wainfleet, S.O. Lincs; G. Freir, Deeping St Nicholas, Spalding; G. Godson, Asgarby, Heckington; C. E. Harris, Great Hale Fen, Heckington; F. Martin, Hubbert's Bridge, Boston (Chairman of Council of L.C.C.P.B. Assoc.); R. Mowbray, Gosberton, Spalding; B. Rowland, Wainfleet, S.O., Lincs; W. R. Sharpe, Swineshead, Boston; F. Ward, Quarrington, Sleaford; J. Ward, Moulton, Spalding; T. Ward & Son, Carrington, Boston; W. H. Ward, Carrington, Boston.

The Common White Pigs of Scotland possess some of the characteristics of the Large Yorkshire—for example, long

[1] Indebtedness for details of the breed is acknowledged to Frank Martin, Henry Caudwell, and Thos. W. Lane. The superior strains in the possession of the two first-named authorities have been in their families for many years.

noses and long legs—but they are hardier than pigs of the improved pure breeds. They are slower feeders than South-country pigs, but milk well, and breed excellent crosses by the improved Berkshire or the Yorkshire boar. The cross, when fat, or large enough to weigh 12 stones of dressed pork, yields about 1 stone less offal than the pure Scotch pig did. Yorkshire boars have been so frequently used that the Scotch pig has become a hardy cross with the less robust Yorkshires.

The old Welsh breed was very long in the face, with long lop ears, a long body, and a hardy constitution. Welsh pigs of the present day are mongrels of superior types, containing in different localities admixtures of at least four of the most useful of our English pigs, viz., Large Whites, Large Blacks, Berkshires, and Tamworths, grafted on the original stock of the Principality. They are credited with producing a large proportion of lean pork in proportion to fat, are very hardy, and thrive better altogether than pure-bred pigs do when exposed to the rough and tumble of an ordinary farm where pigs receive only a minimum of attention. They are in favour in Lancashire, where many are grazed and fed in the open. The characteristics of the breed are best seen in a sow that has had two or three litters. Then her great length of head and snout, and length of body (a correlation on which much store is put) have had time to develop. The ears should be thin and clear, and very large, the neck long, the shoulders comparatively narrow, the back long, the sides deep, and the hind quarters good. The colour varies considerably: it is sometimes white; but at times white with large patches of blue skin growing white hairs; occasionally black and white, but not often; and in some districts chestnut takes an important place. An excellent class of pig is bred in the Island of Anglesea, where the common breeding sows, which still exercise a considerable influence on the type, are crossed by a boar of Tamworth and Berkshire origin; in proportion of blood about two of the former to one of the latter. The people interested do not care for the Large White nor yet for much Berkshire blood. The latter's chief function is to widen the back when it tends to become too narrow. In the district surrounding Bridgwater the cross has been made

with the Large Yorkshire and the Large Black pig, known locally as the Cornish long-eared. They make long and heavy pigs of twelve score weights, which bacon-curers want, but are rather big-boned. In the Oswestry neighbourhood the predominating colour is red with black spots all over; but it diminishes, owing to the use by some breeders of pure-bred Tamworth boars. Pigs of this variety, for which even the distinction of a breed has been claimed owing to its antiquity, grow very large. Most farmers keep three or four every year to kill, about twelve months old, averaging some twenty score, and going up to twenty-five score or more. The surplus they usually sell as stores (weaners and shots) from 25s. up to 50s. each, many of which find their way to the considerable monthly fair at Llanerfyl.

Spencer says of the descendants of the old **spotted breeds of the Midland Counties** like those of Northampton, Leicester, and Oxford shires:—"The breeders can claim that they are prolific, good sucklers, hardy, good rustlers, and make splendid pigs for cottagers, as they have considerable storage capacity: but their fattening qualities are capable of being improved." Many have been crossed with Berkshires, and have become nearly all black, while others blended with Tamworths are rusty coloured, but very hardy.

Dark Breeds

The Large Black pig[1] is one of our oldest breeds. No history of its evolution exists. It has only recently emerged from comparative obscurity, as, prior to 1900, its showyard appearances were confined to classes at the Royal Cornwall Agricultural Society, the Devon County Agricultural Association, the Suffolk Agricultural Association, and a few local shows. Since that time, classes for Large Blacks have been instituted at the Shows of the Royal Agricultural Society, the Bath and West, and the Smithfield Club.

Large Blacks have been carefully bred in Cornwall since before the middle of last century by R. S. Oliver of Trescowe, George Lucas of Leigh Barton, and their forebears; but the Kenwards of Pilt Down, Sussex, are credited with maintaining

[1] Indebtedness is acknowledged to the Historical Statements issued (1904) by the Large Black Pig Society (incorporated 1899), and written by the Secretary, Ernest Prentice, 64 Oxford Street, Ipswich.

the purity of their strain for over one hundred years. Breeders with registered herds are established in over twenty counties of England, and one in Scotland, and the list of members of the society in 1904 numbered 220. Of these about 90 belong to Suffolk and Essex and about 60 to Devon and Cornwall —the two main centres interested. The wide distances apart, and till recently the want of combination and intercourse among the breeders, have led to different types being established.

Prominent Breeders.—T. Bannister, Haywards Heath, Sussex; Kenneth M. Clark, Sudbourne Hall, Oxford, Suffolk; Ephraim Gimblett, Davidstow, Camelford, Cornwall; J. H. Glover, Cornwood, Ivybridge, Devon; John Goddard, Tunstall R.S.O., Suffolk; Thomas Goodchild, Great Yeldham Hall, Essex; John Grose & Sons, The Manor, Quedgeley, Gloucester; H. J. Kingwell, Great Aish, South Brent, Devon; A. S. Mann, Little Bentley, Colchester, Essex; C. F. Marriner, Thorpe Hall, Hasketon, Woodbridge, Suffolk; J. M. Moubray, Sutton Farm, Lewes, Sussex; J. Oscar Muntz, Goodameavy, Yelverton, R.S.O., Devon; R. S. Oliver, Trescowe, Par Station R.S.O., Cornwall; J. Robinson, Rings Hill, Borstal, Kent; J. and H. Robinson, Iford, Lewes, Sussex; R. R. Rothwell, Fulwood Hall, Preston, Lancs; William Townsend, The Manse, Stroud, Gloucester; Harold Wardlaw, Holway Farm, Sherborne, Dorset; John Warne, Treveglos, St Mabyn, Cornwall; Thomas Warne, Trevisquite Manor, St Mabyn, Cornwall.

The **West country pig** is the larger and finer bred, while it is claimed for the **East country type** that "they are possibly more hardy and prolific"—qualities which a few years will probably blend to the advantage of both types.

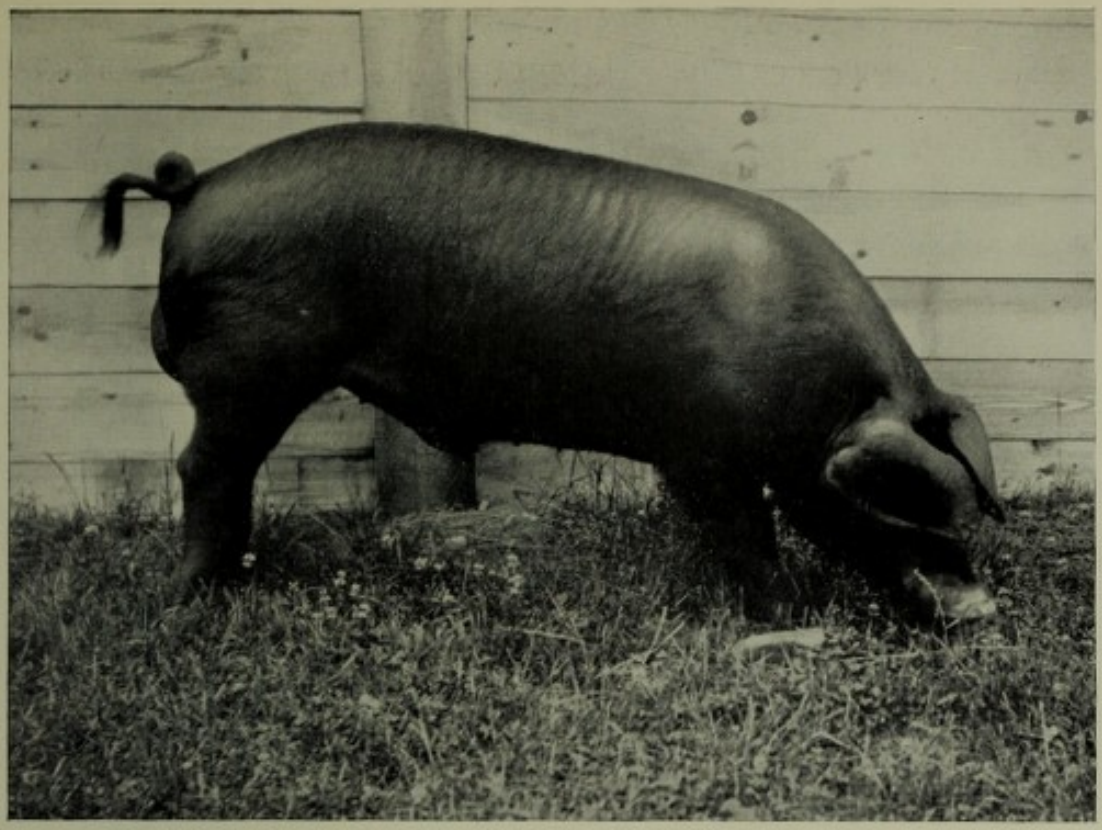
Distinguishing Characteristics.—A whole black colour of a mealy hue, easily cleaned, and not liable like white to sunscald; head broad and of medium length; snout long and straight; ears long, thin, and inclined well forward over the face (in rather than out) and set on wide apart; jowl medium in size; back long and level (a slight rise in the centre not objected to); tail set high, the larger the better, but not coarse; legs short, straight, and set wide; skin fine and soft, with a moderate quantity of straight, silky hair.

The **chief objections** are any unshapeliness or deformity,

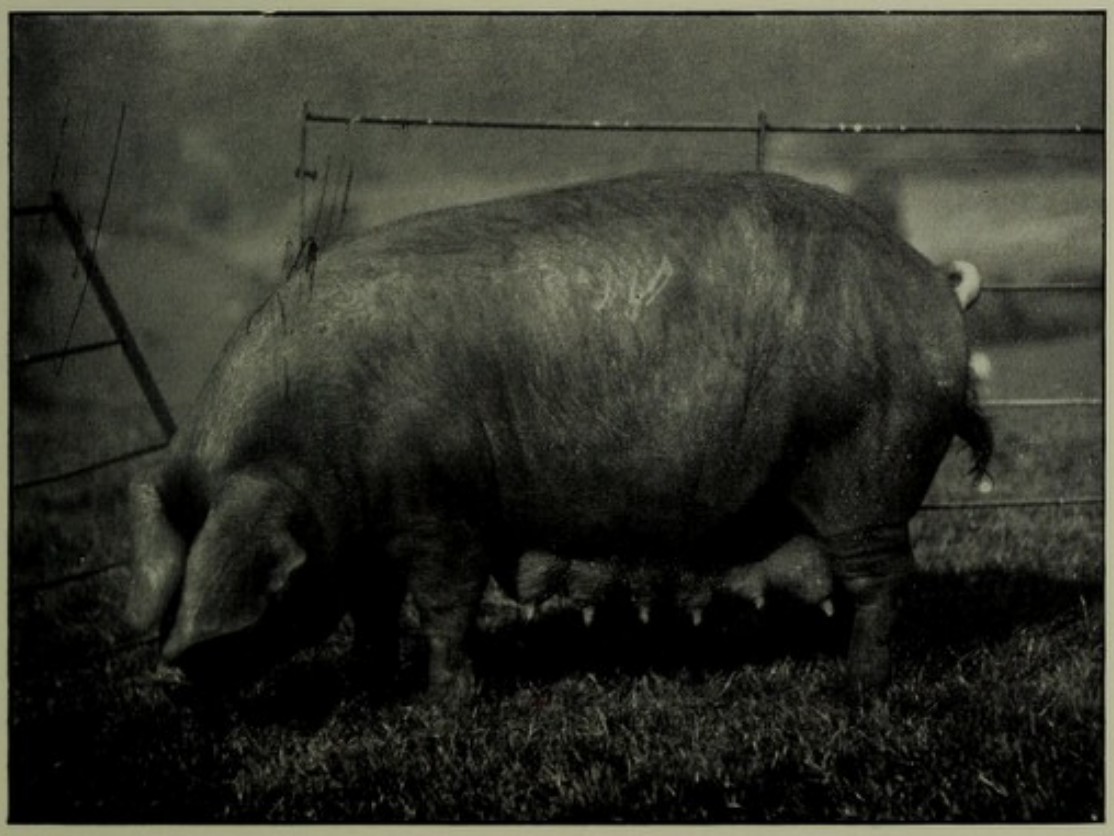
especially about the limbs, a narrow forehead or dished nose; thick, coarse, or prick ears; curly or coarse coat, resulting in black hair-roots being seen in the belly flesh, or bristly mane; and any other colour than black. A tendency to a red hue on the thinner skin, as about the roots of the ears, is not wanted. Large Black pigs are docile in disposition, very active, and specially adapted to field grazing. The large ears keep them from seeing things at a distance. Twenty years before the society for the breed was formed, many Large Blacks were permitted to grow to maturity and fed to enormous weight, forty score and upwards; but, to meet the requirements of modern times, they are killed at an early age and yield a long deep-sided carcase, rich in lean flesh, light in the shoulder, jowl, and offal; weighing 160 lbs. to 190 lbs. dead-weight. The sows are good milkers and very prolific, producing ten to sixteen young at a litter. Large Blacks are peculiarly well suited to warm countries, and they have already been exported to Australasia, Russia, Canada, Switzerland, Austria, Germany, Italy, Spain, Poland, Denmark, France, Jamaica, British Guiana, the Transvaal, Orange River Colony, and Argentina.

The Berkshire is black, with a pinkish skin; a little white on the nose, the forehead, feet, and the tip of the tail. In size it is intermediate.

The following is a **scale of points** which may be taken as a type of the scales applicable to the leading British breeds:—*Colour*, as above stated, 10; *head*, moderately short, wide between the ears, 4; *ears*, thin, pricked, and fringed with fine hair, 3; *jowl*, small and light, 2; *neck*, long and muscular, 3; *chest*, wide and well let down, 5; *shoulders*, oblique and level on top, 4; *girth*, around the heart, 4; *back*, long and straight, 5; *sides*, deep, 5; *ribs*, well sprung, 4; *loins*, strong, not drooping, 2; *belly*, full and thick, with at least 12 teats, 3; *flank*, thick and well let down, 2; *quarters*, long and wide from hip to tail, 6; *hams*, broad, full, and meaty to the hock, 8; *tail*, set high, not coarse, 2; *legs*, straight and with flinty flat bone, 5; *ankles*, strong and compact, 3; *pasterns*, short and yet springy, 3; *feet*, firm and strong, 2; *evenness*, freedom from wrinkles on skin, 14; *coat*, fine and long, 3; *action*, strong, 4; *symmetry*, general style and

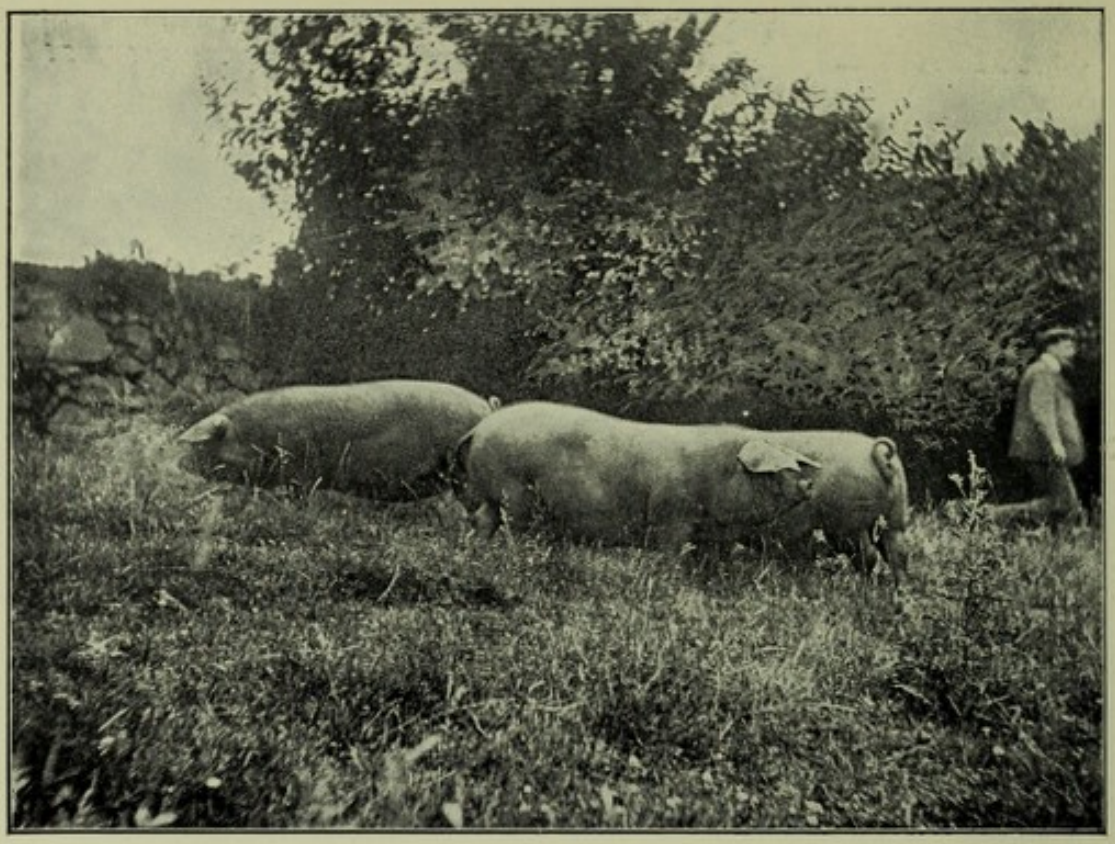


A. Large Black Boar.
First at the R.A.S.E. Show, Cardiff, 1901.
Owned by Arthur H. Cobbold, Eldo House, Bury St Edmunds.
[*C. Reid, Wishaw.*

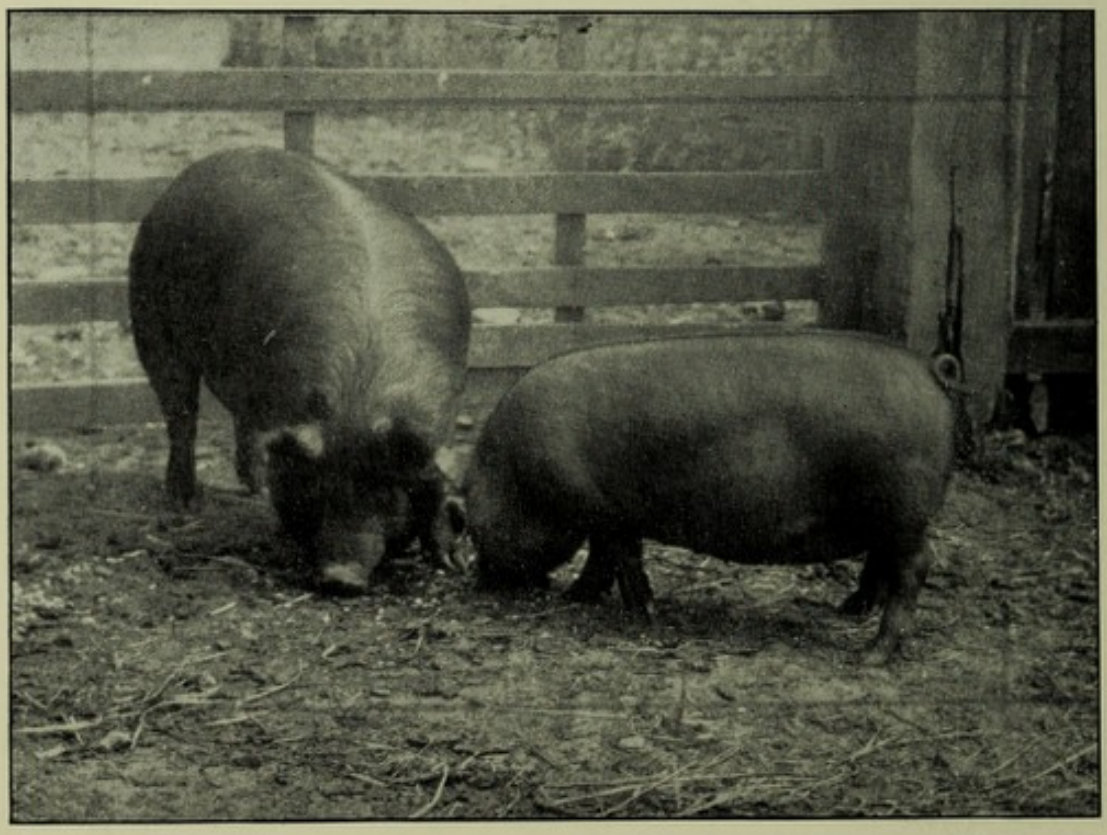


B. Large Black Sow.
First, Cheshire Counties Show, etc. Owned by C. Pedley, Buglawton, Congleton.
[*G. H. Parsons, Alsager, Cheshire.*

[*p.* 368



A. Large Black Gilts.
First at the Royal Agricultural Society's Show, 1905.
Bred by Hy. J. Kingwell, Great Aish, South Brent, Devon.



B. Suffolk Small Black Pigs.
Bred early in the nineties of last century by the Duchess of Hamilton, at Easton Park, Wickham Market.

[*p.* 368

contour, showing evidence of careful breeding, 4; total points, 100.

Defects that are objections in Berkshire pigs and generally in other breeds:—*Forehead*, narrow; a short pug *nose*; *ears*, thick, coarse, white, or much inclined forward; *jowl*, fat and full; *neck*, short and very thick and fat; *chest*, narrow, with both forelegs apparently coming from almost the same point; *shoulders*, coarse, heavy, or wide and open on the top; *girth* light round the heart, and *foreflank* light; *back*, weak and hollow when the pig is standing at rest; *sides*, shallow, not well let down between the forelegs; *ribs*, flat or short curved; *back rib*, light; *loin*, narrow and weak; *belly*, flaccid, or wanting in muscle, or gutty, or podgy; *flank*, thin, and not well let down; *quarters*, short, narrow, or drooping; *hams*, narrow, wanting in depth, or deficiency of muscle in second thigh; *tail*, coarse and set on low; *legs*, crooked, weak, and with round and coarse bone; *ankles*, extra large, round, and weak; *feet*, flat, splayed, and extra wide or large; *unevenness*, wrinkles on sides, neck, or shoulders; *coat*, coarse, curly, bristly, or maney, with fringe along the top of the neck and shoulders; the *hair*, when too hard and strong, shows want of breeding, a thick skin, coarse offal, slow feeding; when not abundant, or weak and soft (especially in the boar), want of constitution, probably the result of too close in-breeding, which leads also to the progeny becoming small, weak, and uncertain in breeding and liable to scrofula and other diseases, as well as to the loss of the tail, if the animal escapes being deformed or still-born; *action*, sluggish and clumsy; *symmetry*, predominance of certain points, especially heavy shoulders or fore quarters generally, with weak loins and light hams. **Disqualifications**:—White or rusty patches of hair; in boars, rupture, or one testicle only down; in sows, deficiency in or very irregularly placed-on blind teats; injured or diseased udders.

Berkshires have been favourites where the climate is not too cold—the boars being valuable for crossing with common stock. They are widely distributed throughout both England and America, and they are a prominent feature in the great Hog Market of Chicago, where the lard-producing pig is in the ascendant. Ireland owes more to the Berkshire than to any other British pig. The produce of a Berkshire sow by a

white boar is almost invariably white, though dark and broken colours frequently appear in after-crosses.

The "tawny or reddish colour" in this breed referred to by Lowe and illustrated in his collection of paintings in Edinburgh University, has disappeared; but it comes out in second or later crosses from white sows, and it remained long in evidence in the pure breed in the form of reddish patches—all being an indication of the relationship of the breed to the chestnut-coloured native pig.

The breed is to some extent indebted for its world-wide popularity to the prominent position gained for it mainly by the persevering efforts of William Hewer of Sevenhampton and the Rev. H. Bailey of Swindon, two enthusiastic and successful breeders, as early as 1862, when the Royal Agricultural Society of England gave it a separate class at the show. Hewer, before the days of sensational prices, sold the year's produce, newly weaned, of one sow at £150, or £10 apiece. The next **prominent breeders** were Captain Stewart of Gloucester; Russell Swanwick, Royal Agricultural College Farm (who sold "Sambo II." to go to Canada at £75 about 1870, and frequently sold sows at £25 and £30); William Hewer, junior, Wheeler & Son, and Fowler of Aylesbury, and Heber Humfrey, then of Kingstone Farm, Shrivenham, Berks. The latter was one of the first breeders to refine the rough type of Berkshire, winning prizes at Bristol Show in 1864. He was a first-rate judge, kept a very large herd of pigs, which took hundreds of prizes, and he exported many to America. He was chiefly instrumental in the promotion and formation of the Breed Society, of which he was, for twenty years (till his death in 1904), Permanent Secretary, and the compiler of the *Herd Book* or Annual Volume of pedigrees. His son, Edgar Humfrey, was appointed to succeed him.

The following is a list of the **names and addresses of the early breeders** who, on August 25, 1884, signed the Memorandum and Articles of Association of the British Berkshire Society:—

Alfred Ashworth, Tabley Grange, Knutsford; Nathaniel Benjafield, Shortsgreen Farm, Motcombe, Shaftesbury; Heber Humfrey, Shippon, Abingdon, Berks, Secretary; John Pittman King, Rectory House, North Stoke, Wallingford; Robert

Harvey Mason, Necton Hall, Swaffham, Norfolk; Alan Stewart, Saint Bridge Farm, Gloucester; Russell Swanwick, Royal Agricultural College Farm, President of the British Berkshire Society, Cirencester.

The following are a few of the names of **leading breeders of the present day**:—

Alfred Ashworth, Horsley Hall, Gresford; William A. Barnes, Hasluck's Green, Shirley; N. Benjafield, Short's Green, Motcombe, Shaftesbury; Admiral Hon. T. S. Brand, Glynde Place, Lewes (agent, Thos. W. Pickard, Home Farm, Glynde); Alfred Brown, Hill Farm Dairy, Southampton; Edward Burbidge, Ford Farm, Bradford-on-Avon; Lord Calthorpe, Elvetham Castle, Winchfield (agent, A. D. Bruce, Winchfield); Earl of Carnarvon, Highclere Castle, Newbury (agent, W. T. Hall, Highclere Farm, Newbury); W. J. Chick, Stratton, Dorchester; R. P. Cooper, Shenstone Court, Lichfield; Lawrence Currie, Minley Manor, Farnborough, Hants; Her Grace the Duchess of Devonshire, Compton Place, Eastbourne; George Drummond, Swaylands, Penshurst, Kent; Julius A. Fricker, Burton, Mere, Wilts; Sir R. G. Glyn, Gaunts, Wimborne (agent, F. R. Cornelius, Woodcutts); Sir Alexander Henderson, Bt., Buscot Park, Faringdon; Arthur Hiscock, Manor Farm, Motcombe; Hon. A. Holland-Hibbert, Munden, Watford; F. A. Holman, Wemley Manor, Whitchurch, Hants; R. E. Horwood, Drayton Beauchamp, Tring; R. W. Hudson, Danesfield, Great Marlow; G. Talfourd Inman, Highmoor Hall, Henley-on-Thames; John Jefferson, Peel Hall, Chester; Jas. W. Kimber, Fyfield Wick, Abingdon; J. Pittman King, North Stoke, Wallingford; James Lawrence, Stall Pitts, Shrivenham; Exors. of late Col. McCalmont, Cheveley, Newmarket; Middlesex County Asylum, Tooting, London, S.W. (agent, Isaac Garbutt, M. C. A. Farm, Tooting); Hon. Claud B. Portman, Child-Okeford, Blandford; Earl of Sefton, Croxteth Park, West Derby, Liverpool (agent, Giles W. Lloyd); C. Collins Smith, Kingstone Common, Wantage; Henry Stanfield, Barford Farm, Wimborne; Russell Swanwick, R. A. C. Farm, Cirencester; John Thomson, Woodperry, nr. Oxford; R. B. Vincent, Compton Valance, Dorchester.

The Essex pig is altogether black. Though not so widely known as the Small White, it is well bred, and possesses excellent points, including a compact symmetrical figure and a small well-formed head. Like other varieties of the same black type, notably **Dorsets and Suffolks**, it has become by natural selection well suited to local conditions. All these breeds are improvements on the old forms of the localities which give the names.

The Sussex breed is more blue or slate colour than black, and it is a local breed of very "distinct type and character." It is not so compact and shapely as the other small dark breeds, but it is well adapted to the conditions prevailing in its own county.

The Tamworth or Staffordshire Breed, from the neighbourhood of Birmingham, seems to be the most direct descendant of the aboriginal pig of the country. If crossed with the imported Neapolitan and Chinese pigs, which were used in the improvement, or more correctly the refinement, of all the other breeds of this country, the influence of the cross has not been so distinct, as may be seen from the natural activity or restlessness of the Tamworth, the greater length of snout, and the greater tendency to grow a large proportion of lean bacon. In this respect the Tamworth resembles the Large Yorkshire and the Large Black, and in its improved form it is a favourite with bacon-curers, who object to a great proportion of fat, a heavy jowl, and excessive breadth of back. The common uncared-for specimens of the breed are undoubtedly leggy, ungainly in appearance, and slow-maturity animals, but these defects have within the last twenty years been greatly modified, it is said, by crossing with the Yorkshire breeds. The improved pigs still retain the great length of snout and hardiness of constitution of the original breed, and are through selection attaining the power to lay on flesh rapidly. They have rather large ears, carried rigid, and inclined slightly forward, with a fine fringe; a fairly long and muscular neck, especially in the boar; strong and shapely legs with good bone, and an abundant coat of long, straight, and fine hair. The colour of the breed is reddish or chestnut, sometimes a tawny grey with black

spots, but should rather exhibit "golden red hair on a flesh-coloured skin, free from black." Curly or black, or very light and gingery hair, a coarse mane, or black spots are all objections. The great function of the Tamworth breed as a bacon-producer, ought to be to breed crosses by animals of the Berkshire or Yorkshire breeds. By this means good pigs for fattening purposes can be secured. This is a breed which has come but recently from local obscurity into public favour. Separate classes for Tamworths have been formed since 1885 at the shows of the Royal Agricultural Society.

CHAPTER XVIII

GENERAL MANAGEMENT OF PIGS

General Management—The Boar and the Breeding Sow, and their Treatment—Fattening Pigs—Feeding—Cooked *v.* Uncooked Food—Warington's Estimates of Dead to Live Weight—Berkshire Crosses and their Yield—Cost of producing One Stone of Pork—Number of Pigs kept in a Dairy—Diseases of Pigs.

THE Breeding Sow should be lengthy rather than short, yet not out of proportion, and there is no objection to her being one of a first litter. She should possess the characteristic points of her breed, and, as a sucking pig, be conspicuous in the litter for size and quality. She should be of a family noted for good milking properties, as the quality of milk differs among pigs nearly as much as among dairy cows. She may be put as a hilt or gelt to a young, well-developed boar of her own age when large enough to breed, say at seven to nine months old, and during these months she should not be forced but fed to develop bone and flesh. If not impregnated (in common language "missed"), she will come in season in exactly three weeks. She remains in heat about three days, and is best served the second or third day. The condition is easily recognised by redness and swelling behind and by the animal mounting on others. A secretion may be observed on the first day of a milky appearance. A sow with large flat teats, which are invariably blind, should be rejected. **Boars** should not run with their sows, but be kept separate to avoid accidents and liability to exhaustion through too frequent matings. One complete service is most effective. A boar is capable of attending to at least fifty sows in the year, but instances of serving 120 to 150 a year are claimed in Denmark. Bad-tempered boars are dangerous, and should be got rid of. "A strong, vigorous boar, from one to four years old, may be fed chiefly on swill, stirred with a very little barley-, pea-, or bean-meal, twice

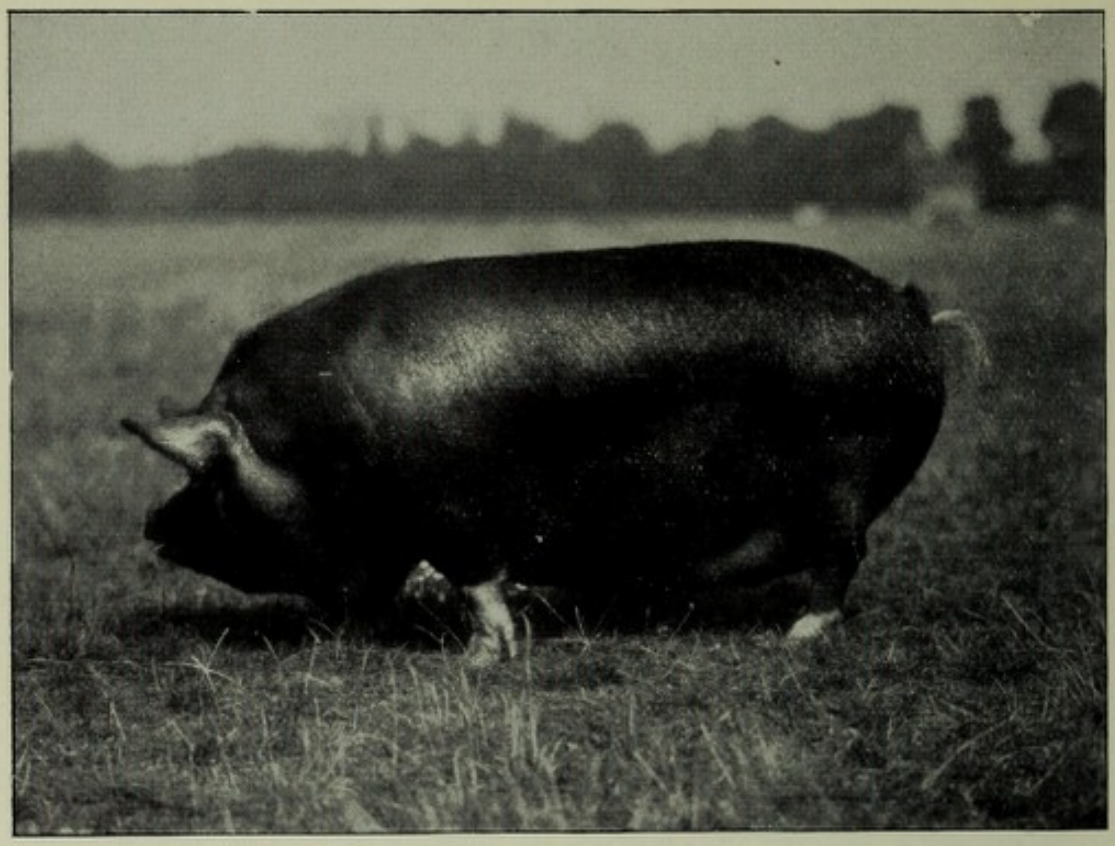
a day. The remainder of his food may consist of grass, green clover, tares, or lucerne, or a limited quantity of cabbages in summer; and turnips, swedes, kohl-rabi, and mangels during the eight months from the end of August to the end of April." An excess of cabbage or of kohl-rabi is liable to produce constipation, especially in pigs that have little exercise.

Breeding Swine should always be treated gently, and run out till near farrowing time to save expense, and to get plenty of exercise and abundance of green food; but richer milk-making food should be added a week or two before the litter is expected. The period of a sow's gestation is sixteen weeks. There ought to be six or eight pigs reared in the first litter, and ten to twelve or even more in each after-litter, if the sow has teats enough. It is bad practice to permit a brood-sow to suckle more pigs at a time than the number of her teats, as the weak ones are invariably kept back by the strong, starved, and stunted in growth, so that they do not pay to feed if they live. Milk goes away if a teat is not required and not sucked, but it returns next time should the litter be larger. Four sharp little needlelike tusks, which appear in some young pigs, have to be broken off to prevent them injuring the teat and making the sow restless. A bad milker, or one which kills or eats her young, ought to be fattened off. Gentleness of disposition is an essential to success. Sows kept to breed pigs for fattening pay best if fed for bacon after the second or third litter is weaned. Pigs are usually weaned when about six or eight weeks old, and a sow comes in season for the first time after breeding (according to condition) about three days to one week after the pigs are removed. Forty-six to fifty weeks are thus occupied, according to the age of weaning. Although we do not advocate the practice, as it is unnatural, a sow may be made to have five litters in two years, in place of two litters in one year, by beginning to feed the young on milk at two or three weeks old, gradually thickening the milk with oatmeal porridge, and, after a little, turning the mother out during the day and feeding her liberally. She should then take the boar before the pigs are weaned, when they are about five weeks old. When milking very heavily, an animal is not in that condition in which she is most likely to come in season or

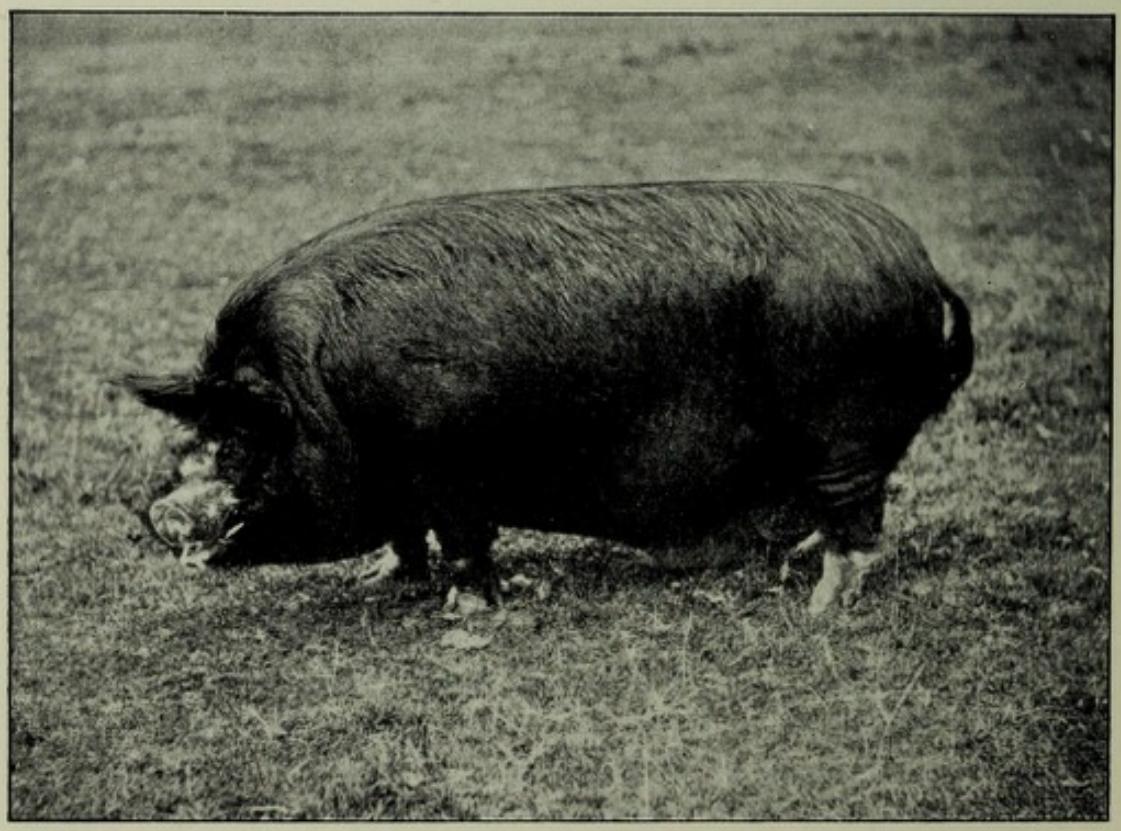
conceive. October, November, and December pigs do not usually thrive as well as those born at other periods of the year.

All pig-houses should be warm in cold weather. No animal of the farm is more injuriously affected by cold or damp than the pig. Warmth may be given by placing a thatched hurdle or other warm covering 3 ft. or 4 ft. above the platform on which the pigs should lie. "Sows" should be managed so as to have the young born when the weather is neither too hot nor too cold, and ready at the season of the year when there is plenty of food. Spring and early autumn are the usual periods when two litters a year are produced.

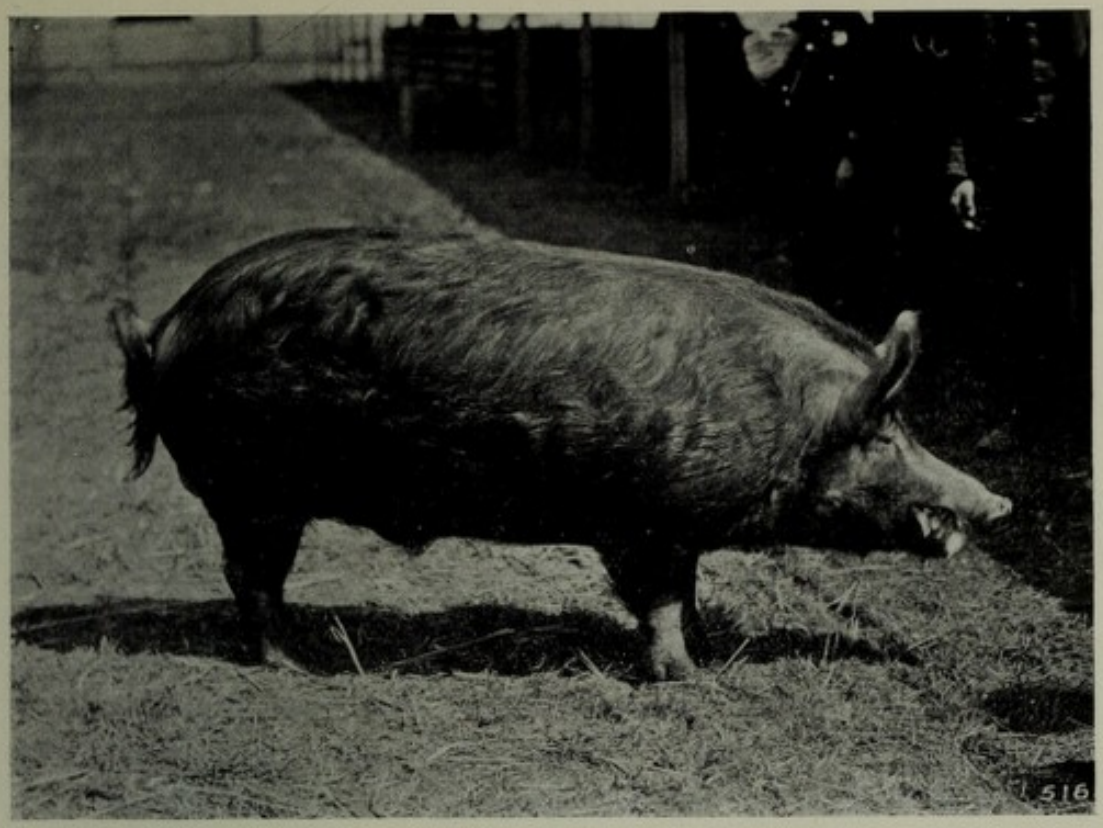
A few days before farrowing, a sow should be put by herself into a sty, the floor of which is about 10 feet square, fitted round with a strong rail or plank placed horizontally, projecting a foot from the wall, and elevated 8 or 9 inches from the floor, to prevent her lying close to the wall and smothering the young pigs by overlying them. The plank also forms a protection from cold in frosty weather. One section should be floored by a raised wooden platform of 1-inch boards to keep the bed dry. A raised area in the concrete floor is sometimes substituted, as, if it is not attended to, and the platform regularly lifted and cleaned underneath, the sty may become unwholesome. The person who attends at farrowing should act with patience and gentleness, and he ought to take charge of the sow from the time she is separated from the others. The place should be well littered with straw cut into 6-inch lengths. The sow takes up straw in her mouth to make a bed within a few hours of farrowing. The operation of farrowing may extend over hours, but the sow requires no assistance: she is very sick and quiet, and should lie all the time. It is a rare occurrence to see a pig dropped while the sow is standing. When restless, she is very troublesome and liable to crush the young pigs. Sometimes they are put at once into a warm basket to be safer than by the mother's side. They should have a suck as soon as possible, and be watched day and night for three days. A safety-lamp may with advantage be left hanging at night after this for some time. The food of the mother should be sloppy, and for the first two or three weeks after farrowing largely composed of sharps and bran, but afterwards made more nutritious by the addition of barley-, oat-,



A. Berkshire Sow, "Danesfield Huntress."
Owned by R. W. Hudson, Danesfield, Marlow.

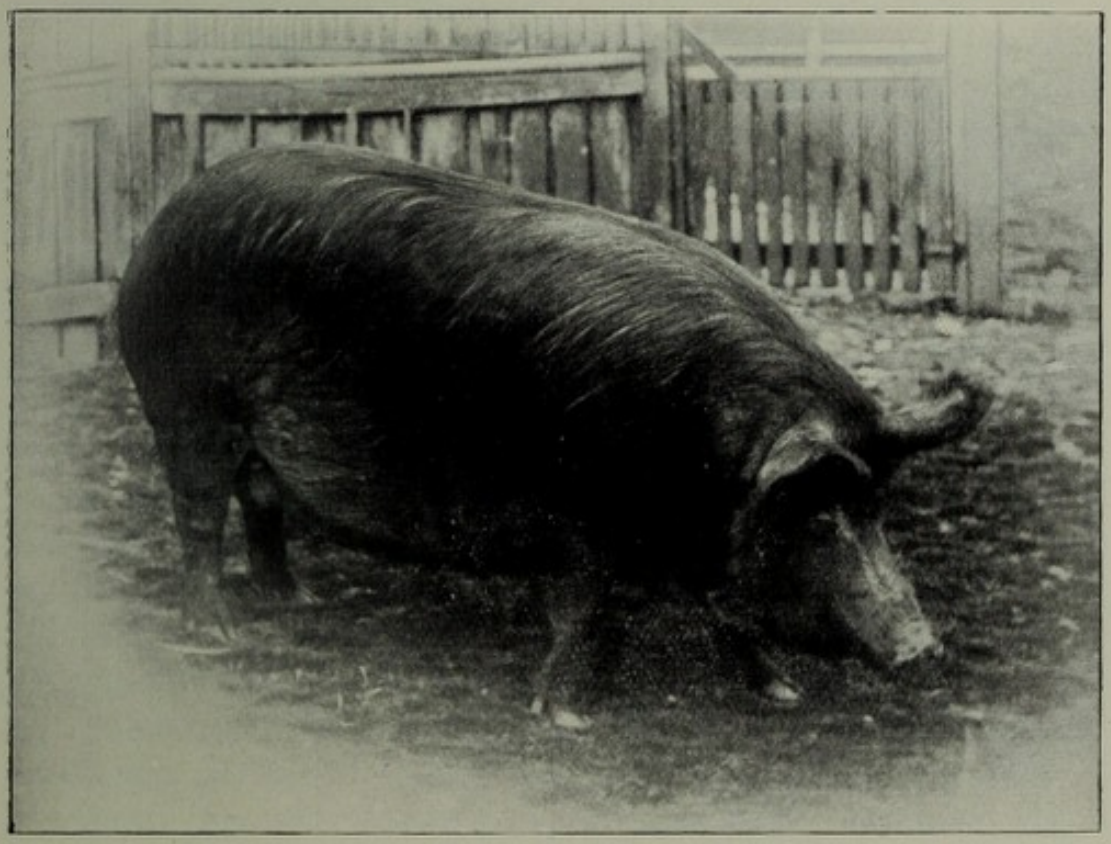


B. Berkshire Boar, "Lyneham Lad."
Winner of numerous prizes, and Champion at Park Royal.
Owned by Sir Alex. Henderson, Bart., Buscot Park, Faringdon, Berkshire.



A. Tamworth Boar, "Knowle Warrior."
First, R.A.S.E. Show, Park Royal, 1903.
Owned by Rob. Ibbotson, The Hawthorns, Knowle, Warwickshire.

[*C. Reid, Wishaw.*



B. Tamworth Sow, "Whitacre Cactus" (13562).
Winner of many prizes, including First, Great Yorkshire, and Champion, Royal Lancashire, 1904.
Owned by D. W. Philip, The Ashes, Whitacre, Birmingham.

[*pp.* 376 *and* 377

wheat-, or rye-meal. If whey be given to the mother without being boiled or soured, it is liable to induce diarrhœa in the young pigs. Young pigs grow very quickly during the first few days. Those which maintain possession of the teats nearest the fore-legs are usually the largest and strongest. Each has its own teat or teats, although they steal from each other whenever an opportunity occurs. They cannot draw milk at all times, but only when the sow permits. She then lies flat on one side, and utters every now and then a subdued grunt, while the young ones suck with an avidity peculiarly their own. When the litter is about three weeks old, they should begin to eat from a trough, and be first supplied with full milk, gradually changed to skim milk thickened with pollard and boiled potatoes; and the sow also requires a more nourishing diet, to prevent her losing flesh.

The scurf which collects on the skins of pigs may be removed by washing with a mixture of one of paraffin to eight of water, stirred all the time and not rubbed in hard. This wash destroys hog lice (*Pediculus suis*, Lin.), which resemble somewhat the common lice of sheep (p. 644), but it is liable to blister the tenderest parts, as those behind the roots of the ears. (See Bulletin No. 69, Bureau of Animal Industry, U.S.A., 1905.)

Fattening Pigs.—A farmer or dairyman should breed his own pigs, for then he secures the whole profit and reduces the risk of importing hog-cholera (the bane of the pig-breeder's life), or other diseases. Young pigs vary much in price—12s. to 30s., or more, at weaning—1 guinea being a good average, and leaving a satisfactory profit to the breeder. A pig-house to hold five or six pigs ought to have a southern aspect, and stand in a sheltered and dry position, and consist of an inner compartment and an outer court, each 8 to 10 feet square. Six pigs of 12 stone estimated dead-weight each, have ample room to feed at one time from a trough 8 feet long. It is better to feed in the outer court rather than under cover, as pigs then keep the place they select to lie on cleaner, by leaving their droppings in the court. There are great differences in individual pigs in the matter of cleanly habits. Some deposit their solid excrement in one corner of the sty, while others drop it anywhere, but when the house is constructed on a good principle, cleanly

habits are those most likely to be formed. No bedding is required if the floor be smooth concrete with a fall inside of 2 inches towards the doorway, and if it be swept out every day and periodically washed. The outer court floor should have a greater fall into a sink-hole in the centre over a covered drain if water be available to swill it daily. In the absence of an abundant water supply, the drainage of the pigsties should be carried off by an outside surface channel. Another serviceable floor is made by paving a layer of movable open-jointed bricks above a layer of dry sand, which drinks in the liquid that finds its way into the open joints. Feeding-troughs are best made of fire-burnt clay, with a division for each pig, to prevent the weak being driven out and starved by the strong. At dairy-factories, where fifty or sixty pigs are placed in one large house and fed from long troughs, a number of weak ones are always kept back till the others are satisfied, and in consequence do not thrive. Male pigs are castrated when about four weeks old and after fasting for twelve hours, but not during frost. Those for breeding are turned into a yard or field, and left to grow for a few months, but all newly weaned pigs should have plenty of exercise, as a safeguard against apoplexy, especially if they are undergoing forcing treatment. A ring is put through the gristle above the nostrils to prevent their exercising the instinctive habit of digging or grubbing up the surface in search of roots and the larvæ of insects. Mangel-wurzels, turnips, cabbages, clover, vetches, or silage may be given uncooked and alone, or with a limited supply of other food.

Pigs going at large at a considerable distance from the homestead should be provided with a shelter shed. A convenient form is shown in the accompanying figure, capable

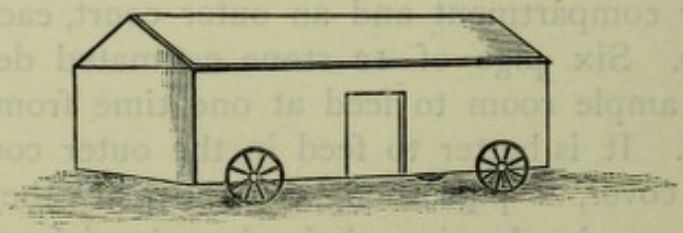


FIG. 21.—SHELTER SHED ON WHEELS, FOR PIGS.
9′ × 5′ × 3′ to the Eaves, costing about £3.

of accommodating five or six well-grown pigs. It can be easily moved to a new site when necessary, and placed so

that the one opening shall be on the lee side, to secure warmth.

Feeding.—After weaning, which should be done gradually, as before described, pigs can be fed for months on sour whey as the only food, and do fairly well. As milk in a sweet condition induces constipation, any skim-milk used should also be soured by being put into a tank or barrel tainted with the natural acidity which arises in a vessel left unwashed after containing milk. It pays well, while feeding with these or with buttermilk, to thicken the food, which by itself is too liquid, with meal, raw or steamed. A *mixture* of meal is best, and may contain beans, peas, gram, lentils, vetches, wheat (including bran, germs, and pollards), barley, oats, maize, or Indiana—the refuse from corn-flour works, viz., the outside or most nutritious part of the grain. The selection should depend on what possible ingredients are cheapest in the market at the time. Small and inferior grain is usually selected. Oatmeal is preferable for the feeding of show pigs. Costiveness is avoided by mixing bran with the food. The dung of a thriving pig should be soft and unformed. Roots are also frequently given, such as mangels, turnips, carrots, parsnips, as well as small potatoes and cabbages. Roots are best given uncooked, even to fatteners; but raw potatoes ought never to be given to a pig of any kind. A little common salt is a necessary seasoning in cooked food. "Fallen" flesh (as that of a horse or other animal of the farm) strengthens the boiled mixture and improves its flavour; but if too much flesh be used (as at a slaughter-house), or if the other foods are given without enough of meal, the pork will be soft and inferior. Leguminous seeds, particularly, solidify the flesh. Maize consumed alone is in this country an unthrifty food-stuff, although when cheap it forms a suitable ingredient in a complex meal-mixture. Cooked food should be given slightly sour and cool, but not cold. Many breeders disapprove of boiling or steaming meal, and prefer to give it soaked for some hours in cold water. When there is a danger of forcing the pig to consume too much moisture, as while grazing, the meal should be given dry, even at the risk of a little waste. There is little to be gained by wetting meal immediately before use, but the practice of mixing it with pulped roots to lie

from one food-time to another, has given good results in winter time. Important experiments conducted in the United States and Canada have produced results decidedly in favour of uncooked food. Uncooked meal, if wetted, should be given in a much drier condition than boiled meal, else it is liable to be swilled through the stomach too rapidly. Fattening pigs are usually fed at least three times a day, but it is better to feed four times, and when they are newly weaned, five or six times daily. As much food as is eaten at once, and no more, should be supplied. A few coal ashes or earth thrown now and then into the outer yard for the pigs to eat, improves their powers of digestion. Sometimes pigs are washed or brushed once a week. When kept perfectly clean, they will not roll in the mire, unless for the sake of coolness in hot weather. They seem to go into mud for the purpose of cleaning themselves. The mud adheres to the skin, cakes as it dries, and in falling off carries scales and dirt with it.

Warington says that "83 per cent. of the fasted live-weight of a pig (fattened for pork) should be butchers' carcase"; and also that "91 per cent. of the increase from 100 lbs. to 200 lbs. will be carcase." About 5 or 6 lbs. of meal consumed by a pig should produce 1 lb. of increase of live-weight. Pigs are the most economical meat-producers on the farm. They consume more food per 100 lbs. live-weight than either sheep or oxen, and have much greater capacity in the intestines for assimilation, although their stomachs are small. They consequently require a good proportion of concentrated and digestible food.

Berkshire Crosses with Scotch and other common pigs will, if properly fed and skilfully managed in summer when the weather is mild, weigh 6 stones dead-weight each at four months old; and at six months, 12 stones. The average age at which pigs are killed is probably about seven months. They are usually disposed of for small bacon when they dress to 12 or 14 imperial stones, and sell at from 6s. to, at times, 7s. 6d. per stone. A good twelve months' pig should weigh 24 stones, about 16½ score, or 14 lbs. less than 1 lb. of increase per day, for the last six months (182 days : 168 lbs.); while for the sixty-one days, between four months and six months, it lays on 1·377 lbs., or roughly, 1⅓ lb. per day, of dead-weight (61 days : 84 lbs.).

A pig produces flesh fastest when from about 9 stones to 12 stones weight, and will then consume about 10 lbs. to 12 lbs. of meal, and increase over 2 lbs. live-weight, or nearly 2 lbs. dressed pork, per day. It is thus most profitable to kill when a pig is estimated to weigh about 12 to 14 stones dead-weight. Any of the improved breeds should do about the same as the above. It is the usual practice to give pigs rather more time to grow, and to allow them to run freely about while young. This permits of their being fed upon home-grown green food. At eight months old, after going into close confinement for the purpose of feeding off, they ought to reach the weight of 12 stones. The flesh of pigs fed entirely under cover is soft and inferior as compared with that of those which have access to open air and to sunlight and heat. The hair on the latter also develops better, and the animals are altogether more healthy both in look and in reality.

The price of mixed pig-meal, exclusive of grinding, should not average more than ½d. per lb. (£4, 13s. 4d. per ton), which gives the following cost of producing a stone (14 lbs.) of pork, with labour estimated at 7s. 6d. for each 12-stone pig:—

Cost of producing a Stone of Pork.

	£	s.	d.
Labour	0	0	9
14 lbs. × 5 lbs. = 70 lbs. grain at ½d. = 2s. 11d., *Ergo*, 83[1] : 100 :: 2s. 11d. :	0	3	6
Grinding grain per ton 8s., and carriage, say 6s. 6d. = 14s. 6d., or per stone of pork	0	0	6½
Average price of a young pig, £1,. 1s. = 3 stones live-weight = 2½ stones of pork at 6s. = 15s. 21s. − 15s. = 6s. for the life; 6s. ÷ 12 (the number of stones) = cost of life per stone	0	0	6
	£0	5	3½
Deduct for offal 1s. per £1 of the price (12 stones at 6s. = £3, 12s.), viz., 3s. 6½d ÷ 12 (stones) . . .	0	0	3½
Average cost per stone	£0	5	0

[1] The rule which adopts 83 p.c. of dead to live-weight is here taken in place of the one showing 91 p.c. of increase of carcase, as the calculation is intended to indicate the average cost of producing pork at all stages in the life of the pig.

This calculation leaves a net profit to the producer of 1s. per stone, or 12s. per pig, in addition to the manure; but to the cottar the pig is also his bank, and to the small Irish crofter he is "the gintleman that pays the rint." The great advantage in feeding pigs is in the utilisation of light or inferior grains which cannot be marketed unless at a price below their feeding value, small or injured potatoes, or the refuse produce from the dairy, more especially whey and butter-milk. It ought to be possible to secure a greater price for separated milk in large towns or on rail than 1d. per gallon, which is more than its full value for feeding pigs. It is a fact, nevertheless, that the consumption of skim-milk in the large centres of population has greatly decreased since milk-separators have been so generally introduced, and since the full-milk trade has expanded to the working classes; but much separated milk is used in the baking of fancy breads, and an increasing demand exists for it in certain centres for drying by the Just-Hatmaker process.

One gallon of sweet-milk-whey may be valued at ½d., and as equivalent to 1 lb. of meal if given in pig-feeding along with solid food. It is usual to estimate 550 gallons of milk as a good average yield per cow in a well-conducted summer dairy. One gallon of milk weighs 10 lbs. 4 oz., and 1 lb. of curd is removed in cheese-making from 1 gallon of milk, leaving about $\frac{9}{10}$ of the original weight as whey, or say 495 gallons, which, calculated at ½d. = 20s. 7½d., or roughly, £1 per cow. When meal for pig-feeding was rated at ¾d. per lb., whey per cow was estimated to be worth 30s., and would be so again, should a rise take place in the prices of grain stuffs. **Fjord's Danish experiments** show that in fattening pigs 1 lb. of rye or barley-meal is equivalent to 6 lbs. of skim milk, or 12 lbs. of whey and 1 lb. of meal is the equivalent of 8 lbs. of mangels or 4 lbs. of potatoes.

The number of pigs which may be kept in connection with a dairy of sixty cows, when sufficient meal is supplied to make good pork, is about seventy—if they be killed at six months old, weighing about 12 stones each (fifty being finished off in the summer half-year, and twenty in spring and autumn)—in addition to ten young breeders and a boar. The extra pigs reared but not required to feed should be sold at five or six weeks old.

Diseases of Pigs

Diseases are not so numerous as in the case of most animals, but pigs are much more difficult to treat when ill than other farm stock. If fat, a pig should generally be killed on the first symptoms of ailment appearing, if the flesh be fit for food, as, at the best, no improvement in condition need be expected for a time.

It is a difficult matter to administer a **drench** to a pig. A ready and simple appliance to use is an old shoe with the toe cut off, pressed well into the mouth to keep the jaws open. The drench is poured into the shoe, and passes into the throat of the animal from the opening made at the toe.

Fat pigs suffering from the **effects of heat** on the way to market are much relieved by bleeding close under the root of the tail by means of a penknife.

By improper housing, or exposure to cold and wet, pigs readily contract **rheumatism and catarrh.**

Diarrhœa often accompanies bad feeding. The *treatment* is, change to good food; give a purgative (epsom salts, 3 oz.) and 5 or 6 drops of oil of peppermint.

Anthrax in pigs is the same specific deadly disease produced by a microscopic rod-like organism multiplying in the blood, which insidiously attacks other farm animals, from eating the raw remains of which pigs usually contract the disorder. It is very sudden and fatal in its action, running its course in from a few hours to two or three days. "A rise of 3 or 4 degrees of temperature is the first symptom, followed by sudden and extreme prostration. The ears, head, and tail droop, and the animal wears a dull, dejected appearance. If made to walk, its gait is rolling and it soon becomes paralysed in the hind limbs, though it retains the power for a time of raising itself on the fore limbs. Swelling of the throat and neck follows and rapidly extends over the head and face, giving to the latter a bloated, hideous aspect." Breathing becomes difficult, and "the animal sits on its haunches with open mouth and protruding tongue, wheezing and gasping for breath, or lies prostrate." *Remedial treatment* is of no avail, but the precautions described at page 248 should be strictly adhered to, to prevent the return of the disease.

Foot-and-Mouth Disease, or aphthous fever, now happily stamped out of the United Kingdom, is communicated by contact with affected animals, including cattle and sheep, to which pigs can also communicate it. Rats, poultry, and human beings frequently carry the virus to healthy animals, in which the period of incubation usually varies from two to five days, although young pigs have died in eighteen hours after drinking infected milk, which is the most infective and fatal medium of communication. In the adult it is not dangerous to life, though it leads to heavy loss through retarding progress in growth and improvement of condition. An eruption of vesicles or blisters may appear on the snout, lips, and feet, the hoofs are liable to slough, and for a time the animal cannot move about. *Treatment* :—Salicylic acid lotions or carbolic acid and glycerine—½ dr. of acid to 10 or 12 oz. of glycerine—are applied to the feet, epsom salts (2 to 3 oz.) administered, and sloppy food or milk given.

Scrofula or tubercle usually affects the lungs, and the animal after a time dies of consumption ; but it is more liable to be generalised through a pig's body than through that of a bovine or other farm animal, and this involves a greater danger to the consumer of underdone pork than other forms of butcher meat. The disease is oftenest seen when pigs are in-and-in bred, but it is also encouraged by exposure to cold and wet. It may be in a great measure prevented by importing fresh, healthy blood to weaken the abnormal susceptibility to the disease by strengthening the constitution ; and by taking every precaution to disinfect the sties after a case has occurred ; and by the isolation or slaughter of suspected animals. "Feeding on tuberculous-tainted offal is not an uncommon cause of the disease, as also is the giving of milk from tuberculous cows. The fact that the post-pharyngeal glands are early affected points to contagion coming by the way of the mouth."

Protrusion of the Rectum is liable to occur when flesh is too abundant in a pig's diet and in young pigs affected with diarrhœa. *The treatment* is simple, viz., to wash the parts well and return them to their proper position ; to introduce stitches, crossing the anus from hip to hip, and to feed altogether on milk and treacle for a time.

Measles, also called "pig typhoid," is one of the most common diseases among swine. It is accompanied by a red

rash, a cough, and fever, and the animal ceases to feed. *Treatment*—Keep warm, open the bowels with castor or linseed oil, and the skin with sulphur (1 oz. daily), and act on the kidneys with 2 drs. of sweet spirits of nitre.

Measly pork has no connection with the foregoing ailment, but is due to the presence in the flesh of the pig of a tape-worm, *Cysticercus cellulosus*, in the early or bladder-worm stage. In Germany and other parts of Western Europe, where pork is insufficiently cooked, tape-worm in man is a common ailment.

Hog Cholera or Swine Fever is an eruptive disease caused by a micro-organism possessing very considerable vitality. The temperature rises to 104° to 106°. It is the great scourge of pigs' life, not only in America but in this country. It is most contagious and deadly, the acute form among young animals generally ending fatally in about three days. In the chronic form "the animals die in from one week to three. They may, however, recover, or drag on for two months or more in an emaciated condition. The symptoms usually take four to eight days to develop after the animal has been in contact with infected animals. In countries where the disease has been long established an infected animal sometimes appears to be in normal health." Ulcers about the size of a threepenny piece are present throughout the alimentary track, "particularly round the junction of the ileum with the cæcum." Through the application of the system of stamping out by the immediate slaughter of all in-contact animals as soon as it is discovered, it is believed the country will in time be freed from the disease, although it has proved to be a much more formidable enemy to tackle than pleuro-pneumonia or foot-and-mouth disease. Powers for doing the work are conferred upon the Board of Agriculture and Fisheries, under the Diseases of Animals Acts, 1894 to 1903. The Board is "only empowered to pay compensation for swine slaughtered when it is thought necessary to prevent the spread of the disease. Compensation is never paid to indemnify a pig-owner for the losses sustained by him by reason of the outbreak of disease amongst his swine."

It is believed by many practical authorities interested in the matter that there is not a sufficient inducement offered

to those who should report suspected outbreaks of the disease to do so without delay.

It is pretty generally recognised that until a more thorough system of **cleaning and disinfecting railway waggons** in which pigs have been carried is instituted, the local stoppage of pigs traffic from infected areas will only be partially successful.

Symptoms.—Costiveness in the first, and diarrhœa in the later stages, dullness, shivering, great thirst, listlessness, the skin covered with red and black patches, and the internal organs more or less ulcerated.

Treatment.—Slaughter without delay, and burn the carcases by the aid of a few ounces of paraffin oil. Washing out, disinfecting, and whitewashing contaminated places must be resorted to, to destroy all the germs of the disease.

Swine Erysipelas, produced by a bacillus, is not a scheduled disease.[1] In the mild form of **rash** it is not uncommon in this country. It does little mischief except in the rare instances in which it assumes, generally in hot weather, the virulent type, as in the case of the outbreak in Lincolnshire in July 1905. Then the *symptoms of serious illness in pigs* occur, viz.: "rise of temperature, shivering, loss of appetite, and vomiting." Death may supervene in 24 to 48 hours, but generally a longer period passes. *Post-mortem*—"The membranes of the stomach and intestines show red patches, and are often swollen. The intestinal glands on the membrane are red and enlarged; sometimes the surface over these glands is abraded, but the distinct ulcer of Swine Fever is never seen. The lymphatic glands throughout the body are swollen and red. The spleen is often enlarged. The lungs are congested." The few pigs which recover generally suffer from lameness, the result of arthritis (inflammation of the joints). Isolation and strict sanitation are essential to success in combating the disease, as the bacillus lives long in the ground. An attenuated virus, first prepared by Pasteur and Thuillier in 1882, by passing the microbes in series through rabbits, is unsatisfactory in that it is attended by considerable risk of introducing the disease among healthy pigs, and "immunity takes about a month to establish itself." By

[1] See *The Report of Proceedings* of the Board of Agriculture and Fisheries for 1905 under the Diseases of Animals Acts, p. 20. Published in 1906 at 1s., by Wyman & Sons, Limited, Fetter Lane, E.C.

combining with it a preliminary injection of a serum prepared from a horse, that acts immediately and confers immunity for about ten days, satisfactory results can be obtained by sero-therapy skilfully carried out.

Poisoning by Common Salt is not unusual among pigs, which are peculiarly susceptible to its effects. It occurs through the admixture of brine containing salt and saltpetre with pig-swill, which produces acute gastritis. Arsenic and other **mineral poisons** present in sheep-dip also induce this ailment.

"*The symptoms* are—great thirst, loss of appetite, intestinal pains, paralysis across the loins, diarrhœa; frequently convulsions; the skin becoming purple. A sedative, as laudanum, should be given if the animal be in convulsions, and whisky if it be paralysed.

The treatment consists in giving the stomach a rest from solid food, and administering cold linseed tea, or very thin well-boiled oatmeal or flour gruel. Should gas result from fermentation of the partially digested food in the alimentary canal, give a few drops of carbolic, mixed with a little glycerine, in linseed tea.

Outbreaks of **diarrhœa among dairy cows** are not infrequently associated with a mild form of common salt poisoning. "The occurrence of the symptoms is found to synchronize with the opening of a new pit of grains, the top layers of which have a superabundance of salt. An ounce or two of laudanum usually checks the disorder."

CHAPTER XIX

THE HORSE—EXTINCT HORSES—FOSSIL HORSES—THE WILD HORSE

The Horse—Early History—Fossilised Remains—Sub-genus *Equus Asinus*—Evidence of the Existence of a South American Wild Horse—Ridgway on Horse Ancestry—Wild Horses—Piétrement and Ridgway's Books on Horse History—Classification of the *Equidæ*—Horses all from a Common Ancestry—Prejevalsky's Wild Horse—Skeleton of the Domestic Horse, and Points of a Horse with Explanations—Jumping Records.

THE early history of the horse is written only on the pages of the rocks and of ancient deposits, if we except the pictures of horses carved by "cave-dweller" artists upon horns and antlers. Remains of the ancestor of the domestic horse have been found in the Swiss lake-dwellings, showing that it must not only have existed, but have been of service to man at a very remote period. Before the horse was captured and domesticated, he was evidently used as a source of food, as in many *palæolithic* stations the bones of the horse with those of the reindeer have been found in quantity. In some of the bone deposits in France as many as 20,000 to 40,000 skeletons are represented in a single place. The primitive horse here referred to was a diminutive animal of between thirteen and fourteen hands high. (See a highly speculative but interesting and suggestive paper on "The Multiple Origin of Horses and Ponies" by Professor J. Cossar Ewart in the *Transactions* of the Highland Society, 1904.)

In North America **fossilised remains** exist of animals resembling specimens of the *Equidæ*. Ridgway[1] says:—"The lower Pleistocene of America exhibits a great variety of races ranging in size from horses far more diminutive than the smallest Shetland to those exceeding the very largest

[1] See Ridgway's *Origin and Influence of the Thoroughbred Horse*, published by the University Press in the Cambridge Biological Series, 1905.

modern draft breeds, yet all these races became extinct, not surviving into the human period, as was the case in South America. The relation of these North American races to those of South America and of Asia and Africa is a subject requiring further investigation." The most ancient forms had four toes on the fore foot and three on the hind foot, all touching the ground. More recent species exhibit three toes on both fore and hind limbs, with an increase of size in the central, as compared with the lateral toes, but still all formed for action in walking. Those of a later date have the two lateral toes functionally useless, and carried up from the ground with the middle toe well developed. In the horse of the present day, as well as in that of the fossiliferous remains of Pleistocene and recent times, the lateral toes are still further reduced, being represented by splint bones, which do not appear external to the skin, or only do so in the cases of monstrosities which occur from time to time.

Ridgway continues—"It is generally admitted that the ancestors of the living *Equidæ* passed from America into the Old World, for before the Ice Age it was perfectly possible for American horses to cross into Asia by land bridges in the vicinity of Behring Strait; thence they extended into Europe, and finally reached Africa either from Asia or by the land bridges which then linked Europe to North Africa." "It is believed that in the Pleistocene period Europe was inhabited by several species of horse, as Africa now possesses several species of zebra." It is of special interest to us in this country that "the Pleistocene beds of Essex yield bones and teeth of a large-headed, heavy-built horse, which probably sometimes measured over fourteen hands high. From the elephant bed at Brighton, portions of a slender-limbed horse have been obtained; and Kent's Cave, near Torquay, has yielded numerous fragments of two varieties or species which differed somewhat from the Brighton and Essex species."

The true horse is in scientific language termed *Equus*. It is distinct from another sub-genus of the family *Equidæ*, viz., *Asinus*, to which asses and zebras belong, and which are represented by a good number of well-known genuine wild forms. *Asinus* is distinguished from *Equus* by the contracted as compared with the rounded and well-developed hoofs, by the long hair of the tail being confined to a terminal bunch,

and by the absence, with a few exceptions, of callosities on the hind legs. Cossar Ewart has discovered another exception to this general rule in the absence of callosities on certain of the ponies in the Western Islands of Scotland, to which he has given the distinguishing name of "Celtic."

Wild Horses.—All horses met with in a wild state are generally supposed, with one exception, to have broken away from civilisation. The Tartar horse, for example, has been clearly traced to Russian horses which were employed in the siege of Azoph in 1657, but turned loose for want of forage. This implies that "no horses, either wild or domesticated, existed in any part of America at the time of the Spanish Conquest, which is all the more astonishing, having regard to the favourable conditions of soil and climate, as demonstrated by the thousands of horses now ranging the Pampas of South America, all descended from seven (Andalusian) stallions and five mares introduced by the Spaniards" (1535).[1] But an amount of evidence worthy of consideration exists which some authorities argue goes a long way to establish the assumption that herds of wild horses roamed over the plains of South America before latter-day communication had begun between Europe and the New World. It appears that on the **map** of Sebastian Cabot, "*Pilota Mayor*" of Charles V. of Spain, which was executed prior to 1546-47, the objects of interest discovered by Cabot in 1527 on the east coast of South America are represented by drawings. In the upper reaches of the river La Plata, which was first explored at the period referred to, the horse is given with other animals which are known to have existed in that region. It is therefore possible that herds of native horses held possession of those plains now included in the territory of the Argentine Republic and of Paraguay, and that the last wild horses in that region were their descendants crossed with imported Spanish horses. It is regarded as improbable that in the short space of twenty years which elapsed between the discovery of Peru and the time of Cabot's explorations in the La Plata, horses could have broken away in Peru and penetrated the "vast forests of the Andes" so rapidly as to

[1] Ridgway, on the authority of Azara, *Natural History of the Quadrupeds of Paraguay and the River La Plata* (Eng. trans.), pp. 4-5, 18.

reach those southern plains in time to be observed by the explorer. Youatt (1837) indicates the existence of **methods of defence** employed by these animals which we are not aware of among the descendants of horses that have broken away from civilisation. He says :—" All travellers who have crossed the plains extending from the shores of La Plata to Patagonia, have spoken of numerous droves of wild horses, three thousand in one troop, under the command of a leader, the strongest and boldest of the herd. The lion, the tiger, and the leopard (local names for inferior beasts of prey) are their principal enemies. At some signal, they either close into a dense mass and trample their enemy to death ; or, placing the mares and foals in the centre, they form into a ring and welcome him with their heels. In the attack their leader is the first to face the danger, and when prudence demands a retreat, they follow his rapid flight." Professor Angelo Heilprin[1] says, " It would appear not exactly improbable, from certain references contained in old narratives, that at least in South America the animal still lingered on even after the advent of the Europeans." John Lawrence also remarks,[2] " The non-existence of the horse in America, previous to its discovery by Europeans, has, however, been disputed, but I recollect not by whom or upon what grounds." In W. H. Flower's work on the Horse, an independent reference is made to Cabot's supposed discovery, which is regarded as possible in the light of the fact that forms undistinguishable from *Equus caballus*, so far as their osteological structure is concerned, " existed in America before its introduction by the Spaniards." Whether Flower's information is reliable or not, " it is certain," says Professor Cope, " that man was contemporary with species of *Equus* on the North American Continent."[3]

The alleged total **extinction** of all **equine species** in America is by Ridgway attributed not to the great carnivora, but to the " insidious inroads of far meaner foes, for we must not forget that there are no feral horses in Paraguay, because an *Hippoboscus* or an *Œstrus* attacks the umbilical

[1] In *Distribution of Animals*, 1887.

[2] In the *History and Delineation of the Horse*, 1809.

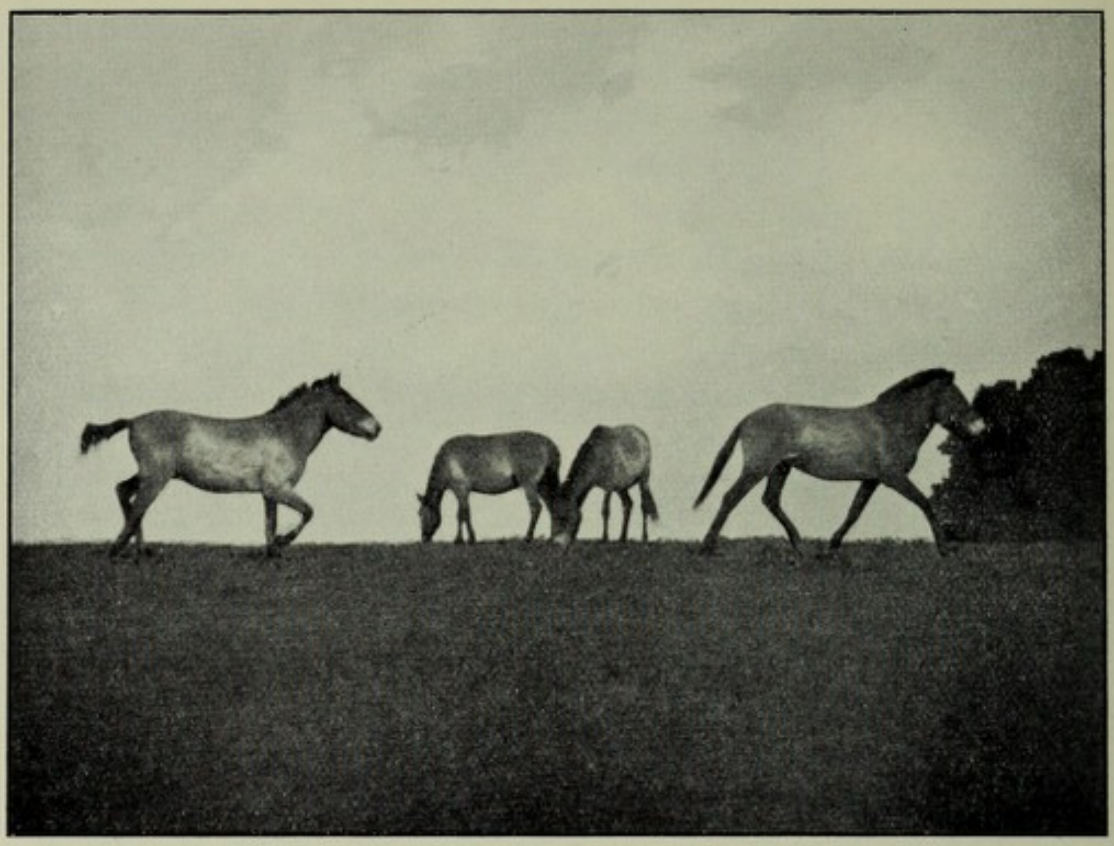
[3] See the May 1892 vol. of *Wallace's Monthly*, Rialto Buildings, Chicago, to which the Author is indebted.

region of young foals, and produces ulcers, which invariably cause death unless human aid is interposed."

There are **two monumental works** on equine history worthy of special notice, one French, and the other English—*The Prehistoric and Historic Horse*, by Piétrement, 1883, and, *The Origin and Influence of the Thoroughbred Horse*, by Professor Ridgway of Cambridge, the distinguished archæologist, 1905. Piétrement maintains that the home of "the wild horse of the Old World was confined to Northern Europe and to those regions of upper Asia which lie north of the Caucasus and of the mountain range joining the Caspian Sea with the Himalayas." The plain-dwelling Asiatic horse he divided into two distinct breeds, the Mongolian, with convex forehead and low-set tail, to the east, and the Aryan "with the straight or upturned profile and tail set on high," to the west of the Altai Mountains. These horses are supposed to have accompanied the primitive Mongols and Aryans in their separate migrations—the Mongol type ultimately going with the Phœnicians to the African coast of the Mediterranean, and the Aryan type to ancient Greece, and to become the Arabian Kehailan of the present day. The fact that all horses scrape with their fore feet when snow covers their food, supports Piétrement's theory that the ancestors of all the varieties of the horse of to-day came from the far North. Horned cattle do not possess this instinctive characteristic, and are consequently believed to have originated in a snowless region.

Ridgway adopts the following **Classification of the Genus** *Equus*:—(1) *Equus caballus*, the horse; (2) *E. celticus*, the Celtic pony, named by Cossar Ewart; (3) *E. przewalskii*, Prejevalski's horse; (4) *E. kiang*, the kiang; (5) *E. onager*, the Indo-Persian wild ass; (6) *E. hemippus*, the Syrian wild ass; (7) *E. asinus*, the African wild ass; (8) *E. somalicus*, the Somali wild ass; (9) *E. grevyi*, Grévy's Imperial or Somali Zebra; (10) *E. zebra*, the mountain zebra; (11) *E. crawshayi*; (12) *E. foai*; (13) *E. granti*, Grant's zebra; (14) *E. chapmani*, Chapman's zebra; (15) *E. burchelli*, Burchell's zebra; (16) *E. quagga*, the quagga, which is supposed to be extinct.

Darwin held the belief that all forms of horses that breed freely together and produce fertile progeny are descended from a common stock, no matter what the colour, the size, or the

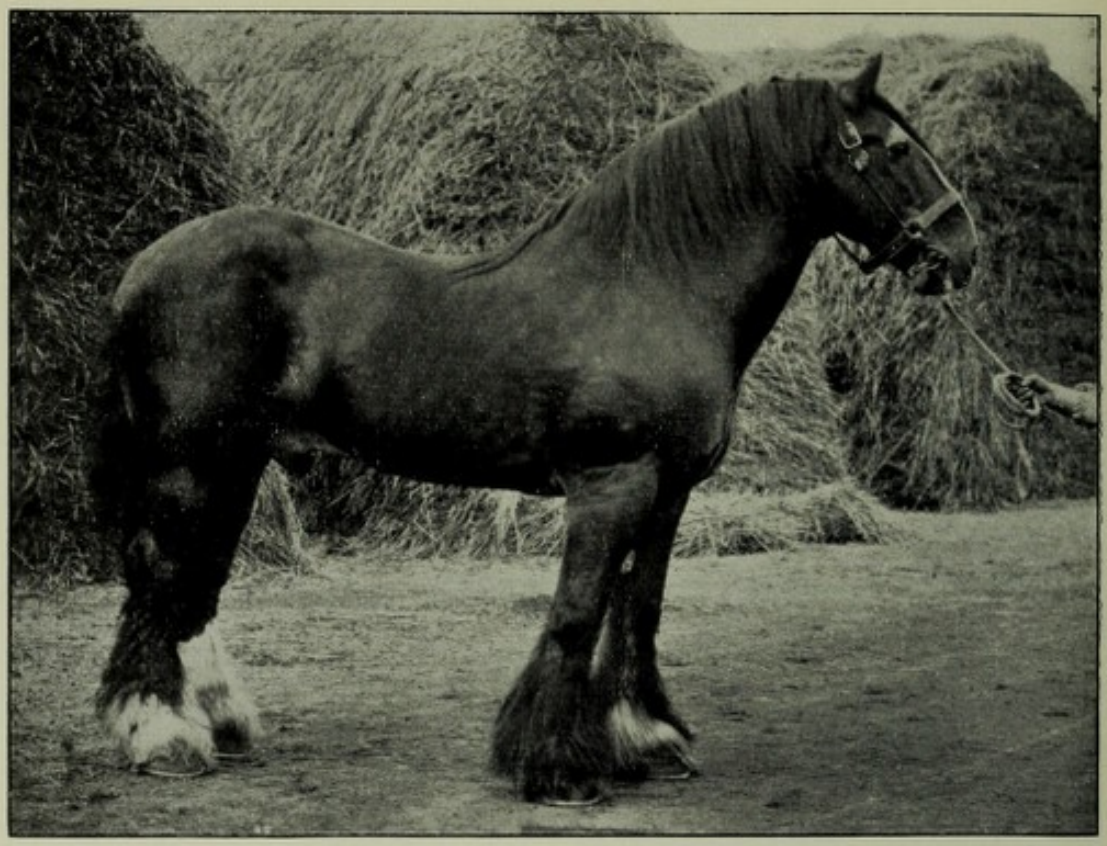


A. Prejevalski's Wild Horse at the Trot.



B. Prejevalski's Wild Horse.
Two mares and a foal bred in captivity at Woburn, Bedfordshire.

[*Both from photos given by His Grace the Duke of Bedford in* 1905, *by Thos. Fullar.*



A. Clydesdale Stallion, "Prince of Wales" (673).
Famous old horse, foaled 1866. First at the Royal and the Highland in 1869, and First at Kelso in 1872.
For further particulars see page 410.



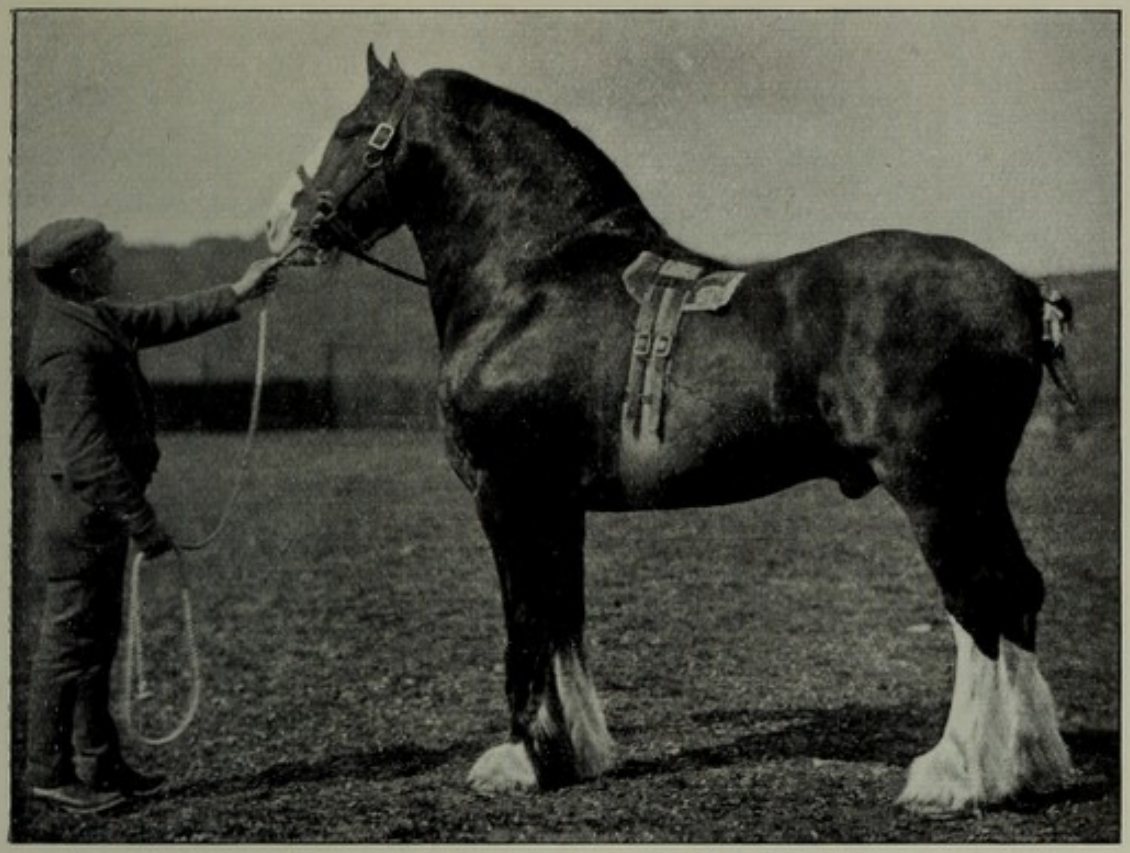
B. Clydesdale Stallion, "Darnley" (222).
While the property of David Riddell, won the Highland Society and the Clydesdale Horse Society Championships in 1884, etc.
Bred by Sir Wm. Stirling-Maxwell, Bart.

[*Both by C. Reid, Wishaw.*

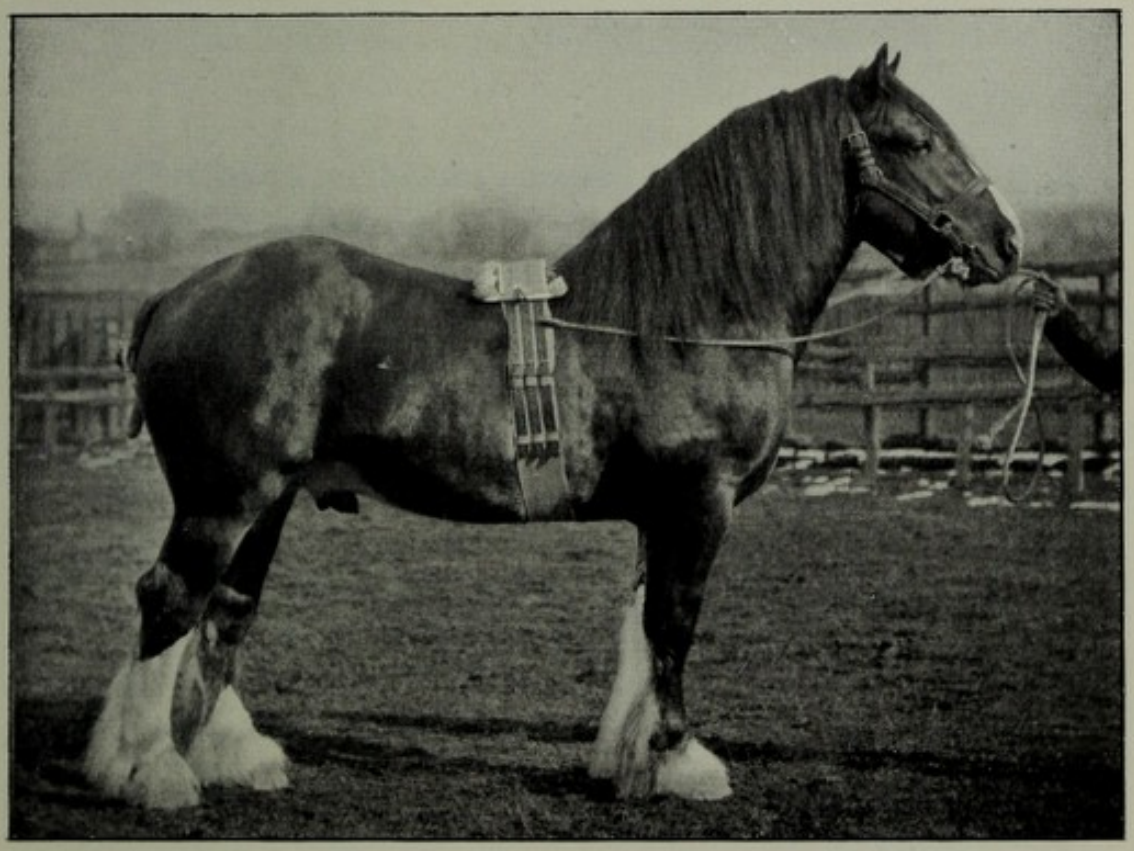


Clydesdale Mare, "Sally," with Colt Foal by "Britain."
Typical specimens of the breed in the middle of last century.

[*pp.* 392 *and* 393



A. Clydesdale Stallion, "Baron's Pride" (1922).
Said to be "the greatest Clydesdale sire that ever lived."
The property of Andrew Montgomery, of Netherhall, Castle-Douglas.
[*Brown & Co., Lanark.*



B. Clydesdale Stallion, "Prince of Carruchan."
Owned by Peter Crawford, East Field, Dumfries.
[*C. Reid, Wishaw.*

[*pp.* 392 *and* 393

other external features may be, a belief which has generally and rightly been accepted since Darwin's time. It is inconceivable to think of functional identity in two such complex organisms as the procreative parts of two types of horses being maintained indefinitely when it is seen that the ass, the horse, and the zebra, although also derived in the very remote past from a common parentage, are incapable of producing fertile hybrids. Darwin thought that the original colour of the wild horse was dun, but Ridgway finding no dun-coloured specimens in the superior type of Libyan bay horse, adopts the view that the progenitors of the Libyan horse have had a line of descent different from that of all other horses and ponies. He says:—"It will be observed that those who hold a single origin for all domesticated horses base their belief on the fertility of the most distinct breeds when crossed. Yet this cannot be regarded as a true criterion, for animals which are admittedly distinct species, such as the dog, the wolf, and the jackal among carnivora, and the common ox, the zebu, *Bos gaurus*, and the yak, *Bos grunniens*, among herbivora, freely interbreed and produce fertile offspring." Such an unlikely suggestion is, from a practical point of view, a blemish in a book that, from the historical and archæological side of the question, must rank as the foremost work in English on the subject.

Prejevalski's wild horse, *Equus przewalskii* (Poliakof), is now admitted to be the only genuine wild horse.[1] It was heard of in the deserts of Central Asia by the famous traveller whose name it bears, and it was first described by Poliakof in 1881. Its present known habitats lie almost in the centre of Asia, in the Gobi Desert, and in a rectangular space of moderate dimensions on the north-west border of Mongolia in the vicinity of the Altai Mountains, bounded west and east by long. 84° and 90° to 91°, and north and south by lat. 48° and 46°. Four varieties of the type are reported to exist, with different shades of colour of hair. In 1902 Carl Hagenbeck of Hamburg (under commission for the Duke of Bedford) succeeded by the help of about 2000 Kirghis in securing 32

[1] In a paper read before the Royal Society of Edinburgh on 6th November 1905, Cossar Ewart draws attention to the existence of five lumbar vertebræ in the wild horse in place of six in our domesticated breeds, as evidence connecting it with the wild Tarpan of Central Asia.

foals (17 horses and 15 fillies) which were reared by common Mongolian pony foster-mothers. This was the first of two consignments successfully landed in this country. The illustrations (the Frontispiece, and Plate LXXXVIII.) are from photographs, taken in 1906, of four-year-old **specimens retained at Woburn Park,** where two varieties of colouring are represented in what is believed to be one type of the breed. The head, the neck, and the back half-way down the ribs are of a russety-brown colour. A dark brown dorsal band of varying breadth and distinctness extends from the short upright hog-mane into the hair on the upper part of the tail. The beard or fringe under the jaw is coloured like the upper part of the body, but on the belly, thence half-way up the sides, and on the buttocks the hair shades off into a stained white. In two or three cases, stripes on the shoulders, shorter than those of a donkey, descend from the withers but incline more forward at the points. Alternate dark and light sections of the hog-mane indicate a tendency to banding on the neck. There is no forelock, only the termination of the mane appears like a peak between the ears, which are of good size but short and horselike, tapered by gracefully curved lines to a sharp point. The neck is massive and of good length, carrying a large but extremely well-proportioned and attractive head, broad between the eyes, full and square at the muzzle, which in one of the two varieties represented is surrounded with a mealy ring or broad rim of light-coloured short hair, with frequently a dark peak descending into it above the nostrils. A smaller number have instead a narrower tan-coloured ring, which is correlated with a darker shade in the general colour of the hairy coat.

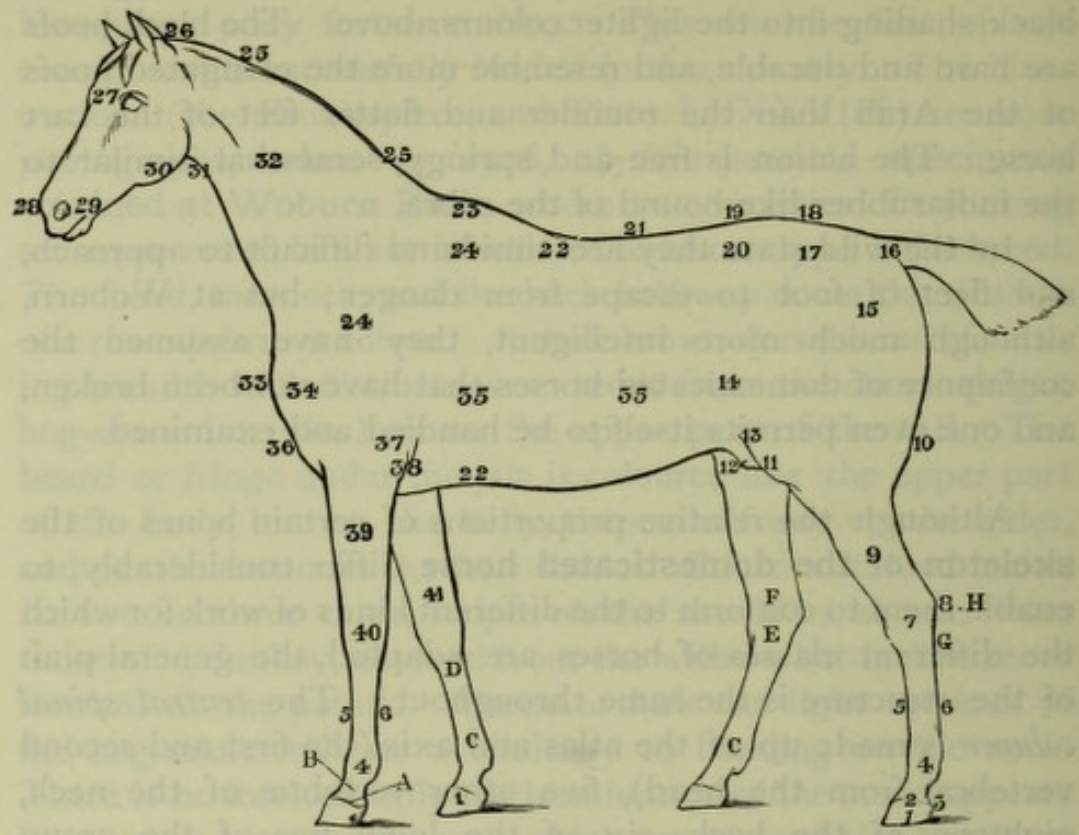
The body is thick-set, and the back straight and strongly coupled with deep, rounded ribs and a good heart-girth. The withers are low and the shoulders upright. The hind quarters are extremely short, very broad behind, flat on the plate, drooping at the croup, and generally formed like those of the common donkey. The tail with one or two exceptions is set on low, and, the hair on the upper part of it being shed annually when the winter coat falls off, it assumes during summer the characteristic appearance of the tail of a donkey. Both fore and hind limbs are well formed and well set on, and are furnished with chestnuts. The joints are of good size and

the hocks somewhat straight. The socks and the legs are black, shading into the lighter colours above. The black hoofs are hard and durable, and resemble more the elongated hoofs of the Arab than the rounder and flatter feet of the cart horse. The action is free and springy, somewhat similar to the indiarubber-like bound of the zebra.

In the wild state they are timid and difficult to approach, and fleet of foot to escape from danger; but at Woburn, although much more intelligent, they have assumed the confidence of domesticated horses that have not been broken, and one even permits itself to be handled and examined.

Although the relative proportions of certain bones of the **skeleton of the domesticated horse** differ considerably, to enable them to conform to the different kinds of work for which the different classes of horses are adapted, the general plan of the structure is the same throughout.[1] The *central spinal column* is made up of the atlas and axis (the first and second vertebræ from the head), five other vertebræ of the neck, eighteen of the back, six of the loins, five of the croup (*sacrum*), and from thirteen to twenty of the tail. All have joint movement except the segments of the croup, which are anchylosed in the adult animal. The *withers* are elevated by the upright spines of seven or eight dorsal vertebræ behind the first, the summit conforming to that of the fifth. Withers that are high and extend far back are generally associated with a good carriage of the head and neck, free movement of the shoulders, long and sloping shoulder blades, and strength in the back and loins. It is a drawback to a hunter to be higher behind than at the withers, because too much strain is then put on the fore legs. Although the withers should be the same height as the croup in the race-horse, they may be 2 or 3 inches higher with advantage in the hunter, as this indicates a light forehand, and consequently greater facility in taking off and getting away after landing. Low withers are usually correlated, as in many mountain ponies, with heavy, short, and perpendicular shoulders. The chief function of the withers is to "afford attachment for the suspensory ligament of the head and neck, for muscles which extend the head

[1] The following notes are given with acknowledgments to Hayes' *Points of a Horse*, published by Hurst & Blackett, Limited, 1904.



[*D. G. Steele.*

FIG. 22.—POINTS OF A HORSE.[1]

1. Hoof.
2. Coronet.
3. Heel.
4. Fetlock or Pastern Joint. B. The Pastern.
5. Cannon-bone.
6. Back Sinew or Tendon.
7. Hock.
8. Point of Hock.
9. Second Thigh or Gaskin.
10. Haunch or Lower Buttocks.
10 to 20. Thigh.
11. Stifle.
12. Sheath.
13, 14. Flank.
15. Hip Joint.
16. Root of Tail or Dock.
17. Rump.
18. Croup or "Quarter."
19. Loins.
20. Point of Hip bone.
21. Back.
22, 22. Girth or Chest-Measurement.
23. Withers.
24, 24. Shoulder Blade (*Scapula*).
25, 25, Crest.
26. Poll.
27. Forehead.
28. Muzzle.
29. Nostril.
30. Jaw.
31. Throat or Windpipe.
32. Neck.
33. Point of Shoulder.
34. Shoulder.
35, 35. Front Ribs and Short Ribs forming the Barrel.
36. Chest or Breast.
37. to 34. True Arm (*Humerus*)
38. Elbow.
39. Arm (so-called, or Fore arm).
40. Knee.
41. Chestnut, Castor or Callosity.

SEATS OF COMMON DISEASES.

A. Side Bone.
B. Ring Bone.
C. Wind-gall.
D. Splint.
E. Spavin.
F. Thorough-pin
G. Curb.
H. Capped Hock.
I. Ergot.

[1] For fuller details see *The Exterior of the Horse*, by Armand Goubaux and Gustave Barrier, translated from the French by Simon J. J. Hardger, V.M.D. Published by Lippincott Co., London and Philadelphia, at 30s.

and neck, for muscles that draw the shoulder blade forward, for the powerful muscle that runs along the top of the back and extends the vertebræ, and for a muscle which aids inspiration by bringing the ribs forward." The withers are lower in mares than in horses. Castration does not hinder their development. There are eighteen pairs of *ribs*, all attached to dorsal vertebræ, but the eight *true* ribs on each side are individually connected by cartilages to the breast bone, while the ten *false* ones have only an indirect cartilaginous

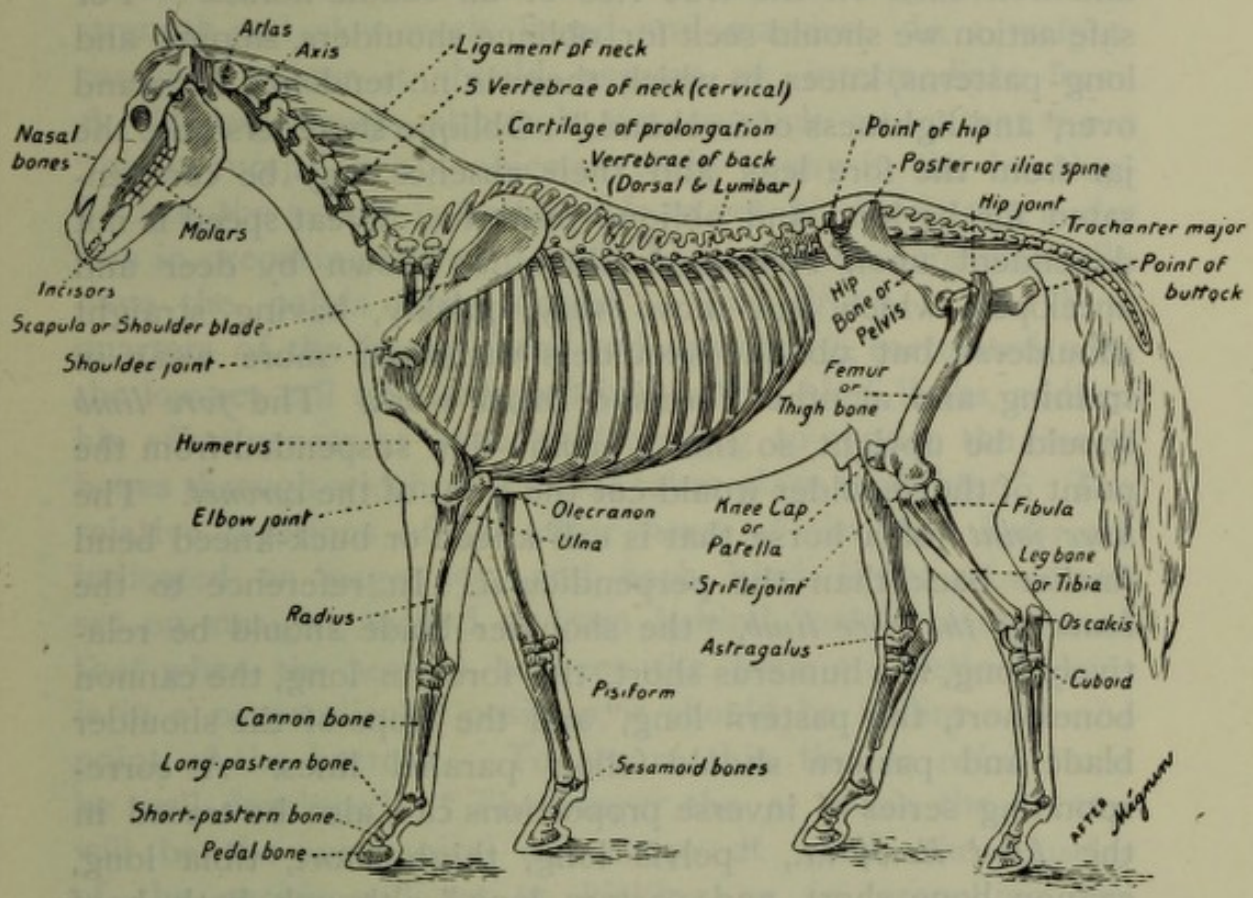


FIG. 27.—SKELETON OF THE DOMESTIC HORSE.

connection with it. [The *floating ribs* in other breeds of animals have no cartilaginous attachment, see page 559.] The ribs ought to be long, to give a good depth to the body—a point of importance in all kinds of horses—and those posterior to the scapula, chiefly the false ribs, should also be well-arched, to give ample room for the lungs. Horses with long posterior ribs are said to be "well ribbed up"—a conformation indicative of staying power. The expression "well ribbed home" implies a short space between the last rib and the point of the hip—seen in well-coupled horses. Expansion

of the chest is secured during rapid breathing by the middle portions of the ribs (especially the middle false ones) being pulled forward by muscles attached to them, making them pivot round in the joints they form with the spine, and in some cases with the breast bone. The *shoulder blade* or *scapula* is a flat spatula-like bone, with a narrow ridge or spine bisecting its outer surface and dividing the muscles which flex from those that extend the shoulder joint. The *scapula* should be long in all breeds of horses, and lie closely and well back on the true ribs of all saddle-horses. "For safe action we should seek for oblique shoulders, sloping and long pasterns, knees in which there is no tendency to 'stand over,' and lightness of forehand." Oblique shoulders take the jar from the fore legs, and their absence may be compensated for by long and oblique pasterns. Great speed is not dependent upon oblique shoulders, as shown by deer and antelopes, which can move very quickly, having straight shoulders; but oblique shoulders withstand more wear in training and at other forms of hard work. The *fore limb* should be upright, so that a plumb-line suspended from the point of the shoulder would cut the front of the *coronet*. The *knee joints* of a horse that is calf-kneed or buck-kneed bend further back than the perpendicular. In reference to the *bones of the fore limb*, "the shoulder blade should be relatively long, the humerus short, the forearm long, the cannon bone short, the pastern long," and the slope of the shoulder blade and pastern should follow parallel lines. A corresponding series of inverse proportions can also be traced in the *hind limb*, *i.e.*, "pelvis long, thigh short, tibia long, cannon bone short, and pastern long," although both hoof and pastern behind are more upright than in the forehand. Similarly, in the *longitudinal axis* of the body of the racehorse, the head should be short, neck or reins long, back and loins short, croup long, bones of the tail short. The *back and loins* behind the saddle should be wide and flat, even when the animal is in thin condition. The top line of the *croup* should always be convex, unusual straightness or concavity indicating weakness. A "*horizontal croup* and a *high-set tail* are points of beauty in the saddle-horse," and they are also indications of speed, as a horizontally placed *pelvis* permits of full extension of the hind limbs in galloping.

The pelvis is a single bone in the adult animal, although it consists of two halves, each including three bones (*ilium*, *pubis*, and *ischium*). Each half carries a socket for the head of its corresponding thigh bones. "The *point of the hip* or *haunch* on each side is the front and outer corner of the pelvis. Its two inner corners are firmly connected with the *sacrum*, upon which they rest. They form the highest point of the bony framework of the croup." The *posterior points* of the pelvis underlie the *points of the buttock*. For speed, the pelvis requires to be narrow when viewed from behind, and for strength and slow work, broad and massive. In a weight-carrying hunter it should assume an intermediate form. A *drooping rump*, although not to such an extent as a "goose-rump," is not objected to by many in the hunting-field, as the animal is better able to get his hind legs under him in preparing to jump, and "high-class chasers generally have the pelvis fairly sloped." The droop in the hind quarters of the heavy farm and dray horse, correlated with the low-set tail and comparatively short hind limbs, adds to his effectiveness at work by "tending to render the line of bones through which propulsion takes place straighter." The relative positions of the *other bones of the hind limbs* are indicated on page 397, and each hind limb should be set on straight, looked at from behind, and so constructed that when the section between the hock and fetlock joint is in a perpendicular position, it should be in line with the point of the buttock. To secure this, the *os calcis* must be well developed. "The longer the *os calcis*, the greater will be the mechanical advantage at which the muscles of the *gaskin* will act in kicking or in propelling the body forward," the length giving increased leverage in the hind limb. Moreover, it gives a cleaner appearance to the hock, and removes a tendency to thoroughpin. It is less objectionable to have a horse's hocks *turned in* than out, as it enables him to clear the belly with the stifles when galloping. The *face* consists of the *forehead* above the lower corners of the eyes to the root of the *forelock* and the *nose*, or the continuation of the forehead to the *nostrils*. The *muzzle* is the lower end of the head. The *bars of the mouth* lie between the molar teeth and tushes of the lower jaw. The *chin groove* is the depression outside above the under lip.

The *occipital crest* is the crown of the head, and the *poll* immediately behind it on the neck ; the *crest,* the arch of the neck ; and the *jugular* or *cervical grooves* (one on each side), the troughs running parallel to the windpipe. The *breast* is the forward part of the *chest* bounded by the *humerus* on each side and an imaginary line drawn across from the shoulder points. The *chest* is, properly, the cavity containing the lungs and heart, separated from the abdomen by the *diaphragm.* The *collar groove*, which should be hardly recognisable in saddle-horses, is the hollow on each side marking the dividing line in harness and heavy-draught horses between the front of the shoulder and its junction with the neck. The *forearm* is the part of the fore limb between the knee and the *point of the*

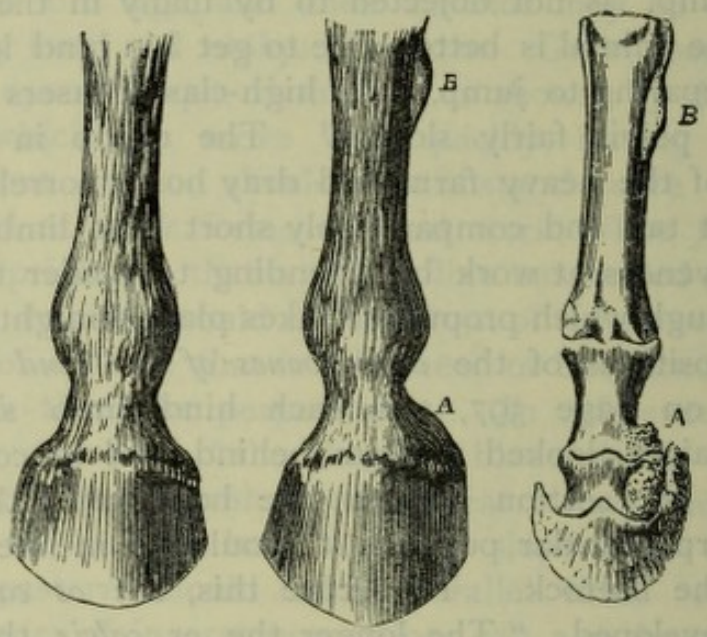
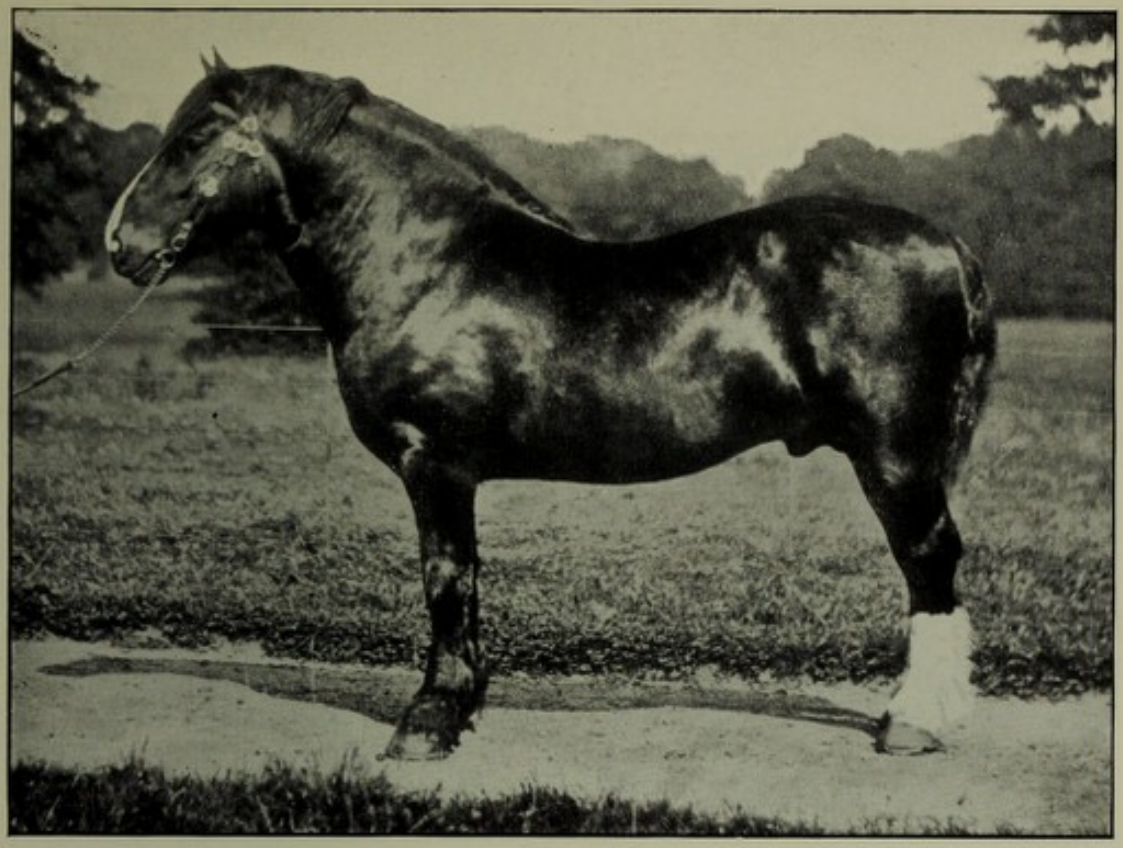
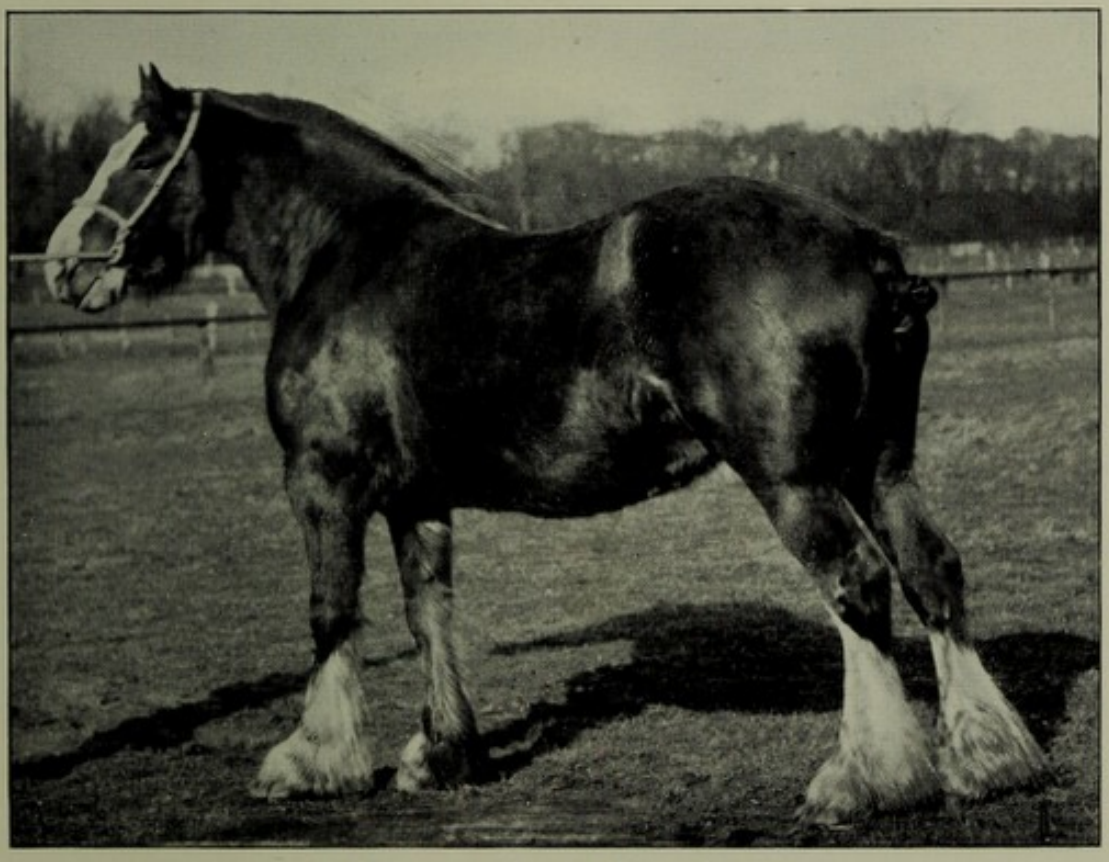


FIG. 24.—HEALTHY LEG.—A, SIDE-BONE (BEHIND) AND RING-BONE—B, SPLINT. After *Mégnin.*

elbow which is located below a prominent *lump of muscle* at the bottom of the shoulder. The *forehand* is the anterior end of the horse in front of the rider. The *pisiform bone* forms the lump behind the *knee joint.* The *shank*, consisting of the *cannon bone* and the outside and the inside splint bones between the knee and the fetlock, has a fibrous cord called the *back tendon or sinew* behind it. To be "tied in" below the knee or the hock is a serious defect ; *knees* and *hocks* cannot be too large, if they be well formed and the bones clean. **Side bone** is the result of the ossification of cartilage, and its seat is confined to the coffin bone, or

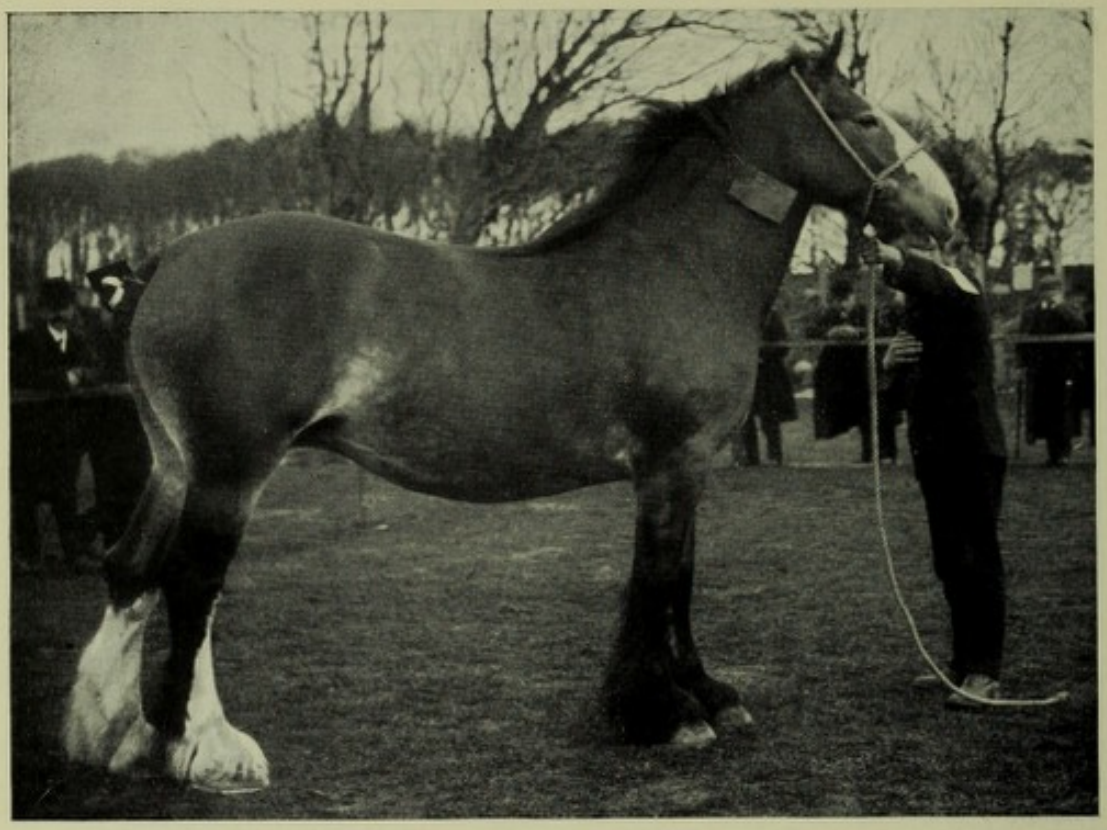


A. Clydesdale Stallion, "Britain."
A typical sire and prize-winner in 1854-56.

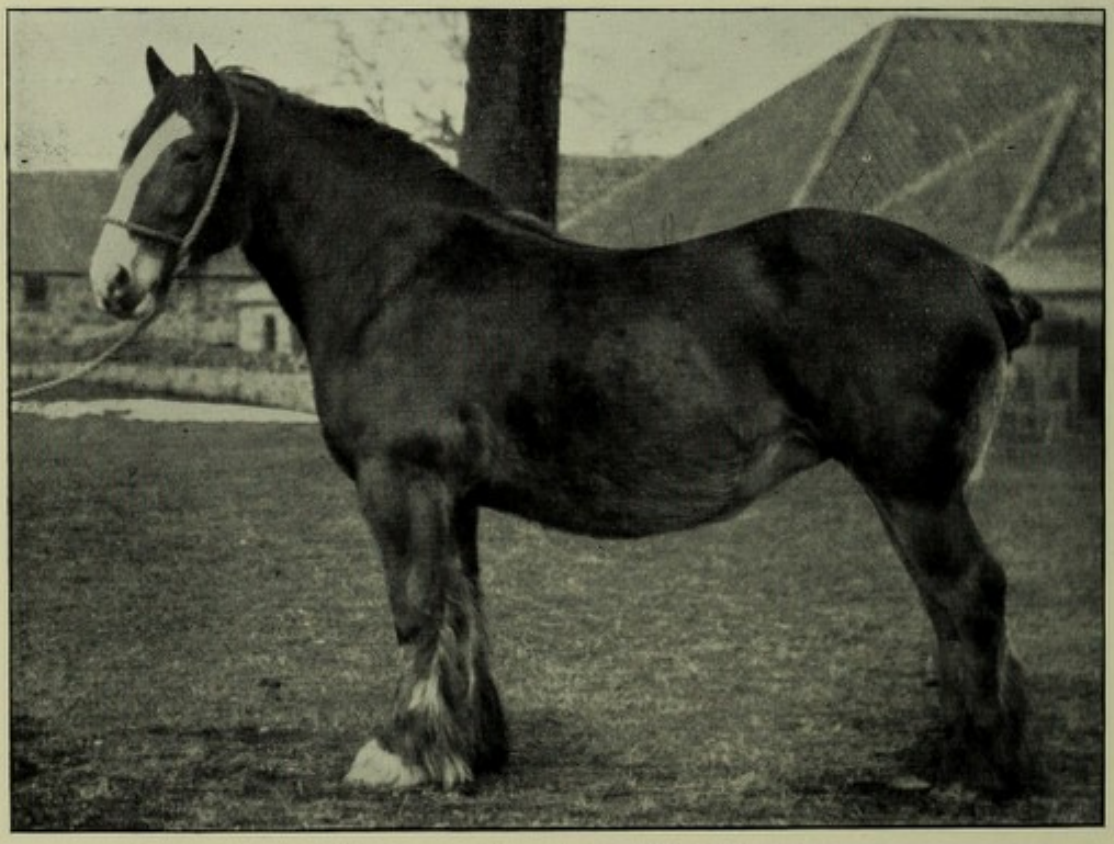


B. Clydesdale Mare, "Royal Ruby."
Twice First at the Highland Society's Show.
Owned by Thos. Smith, Blacon Point, Chester.
[*G. H. Parsons, Alsager, Cheshire.*

[*p.* 400



A. Clydesdale Mare, "Floradora."
First, Highland Show in 1904, and Champion at Ayr in 1905 at 5 years old.
Bred by the late Wm. Park, and owned by Robert Park, Brunstane, Midlothian.



B. Clydesdale Mare, "Moss Rose" (6203).
A famous brood mare and prize-winner.
The property of Sir John Gilmour, Bart., of Montrave, Leven.

[*Both by C. Reid, Wishaw.*

[*p.* 400

the largest bone of the foot. **Ring bone** is of a similar nature, but it ultimately involves one or both of the adjoining articulations.

Wind-galls, or **soft tares** (French, *vessigon*), in whatever site, are distensions of "articular or tendinous synovial sheaths" due, like bony tares (spavins, curbs, and side bones) to fatigue and strains which have irritated their lining membranes and caused an excessive secretion of synovia (albuminous lubricating fluid). Although not usually causing lameness when soft and not very large, they are liable after hard work to get

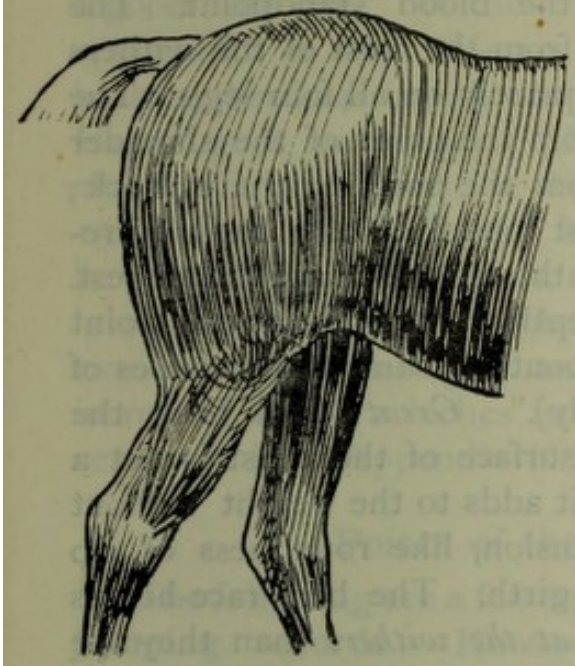


FIG. 25.—COMMON HIND QUARTERS.

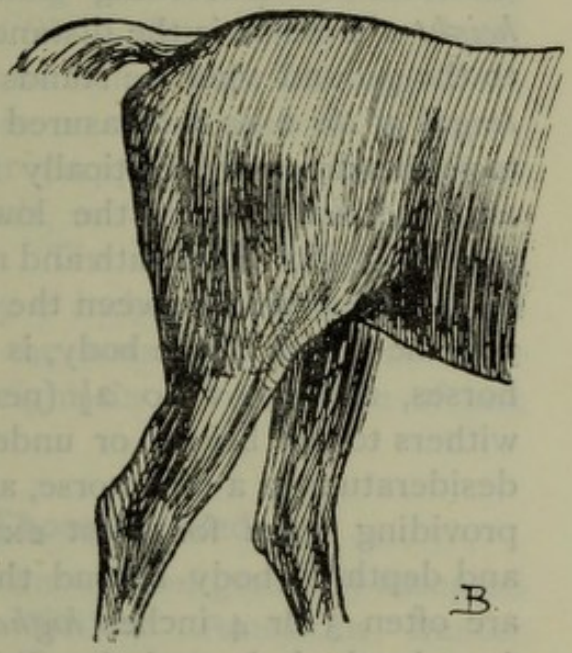


FIG. 26.—WELL-BRED HIND QUARTERS, for a thoroughbred or Arab horse.

From Galvayne's *Twentieth Century Book on the Horse.*

very tense and give rise to troublesome lameness, necessitating blistering or firing. They have been known to calcify.

Bandaging is at once a prevention and a cure, and it is sometimes associated with cold-water irrigation through the hose-pipe or sea or salt-water bathing. The "Newmarket" stable bandage without seam or hem is of proper width and length, and can be conveniently used wet or dry to bandage the fore leg up to the knee joint. Smoothly and uniformly put on, it should give sufficient pressure to support the weak parts without interfering with the blood circulation.

The *hollow of the flank*, or "*melt*" hole, is the upper part of the flank, or the depression between the last rib and the

point of the hip ; the *belly*, or *abdomen*, the under part of the body not protected by bones; and the *brisket*, the under side of the chest. The *point of the hip* is the anterior point of the pelvis, and the *point of the buttock* the posterior part of the pelvis. The *thigh* is the greater area of the *hind quarter* in front of the buttock, and between the *croup* and the *gaskin*, or *second thigh.* The *hamstring* or *tendon Achillis* forms the posterior boundary of the gaskin or *true leg*, and unites the point of the hock with the lower extremity of the thigh. The *dock* is the solid centre of the tail. A long dock indicates underbreeding from the blood standpoint. The *height* of a horse is the distance from the crest of the withers to the ground when he stands squarely on all four legs. The *length of the body* is measured from the point of the shoulder to a line dropping vertically from the point of the buttock; and the *depth*, from the lowest point of the back corresponding with the eighth and ninth ribs, which are the longest. "The proportion between the depth of the body at this point and the length of the body, is about the same in all classes of horses, namely, 1 to 2½ (nearly)." *Great depth* from the withers to the brisket or under surface of the chest is not a desideratum in a race-horse, as it adds to the weight without providing room for chest expansion, like roundness of rib and depth of body behind the girth. The best race-horses are often 3 or 4 inches *higher at the withers* than they are *long in the body*, and the Shire horse as much as 9 inches longer. "The *length of the neck* indicates the length of the muscle which draws the fore limbs forward," consequently the more we want speed and clever jumping, the longer the neck should be, its thickness being limited by the amount of work the muscles have to do. A short body is desirable in a racer, a chaser, or a hunter, as it is more easily controlled by the *loin muscles*, or *rearing muscles*, placed immediately under and behind the cantle of the saddle. They are not propelling muscles, as is generally supposed, but "consist principally of those muscles that straighten the hock, draw back the thigh, and extend the vertebræ of the loins." It is for the same reason that the head, neck, and shoulders of those classes of horses should be light, although the neck should be long in proportion to the limbs. "The combined working of oblique shoulders, well-sloped pasterns, and strong rearing muscles,

by preventing the forehand going down at each stride, aids in obtaining the much admired '*level*' *action* in the race-horse." The advantages of a lightly built forehand and absence of superfluous weight, provided there is sufficient strength in each part to fulfil its own proper functions, are equally conspicuous in horses that have to raise their bodies on their hind quarters to jump. Hayes puts the **limit of height** for heavy cart-horses at 17.2 hands, and for racers at 16.3 hands. Lower heights, that it is well not to exceed, were also stated, in spite of the admitted fact that "a good big one will beat a good little one." Without taking notice of the value of the appearance of such animals as Sir Walter Gilbey's 17-hand hackney-bred carriage-horses shown in Plates CX. and CXI., Hayes goes on to say: "It is no advantage for a racer, chaser, hunter, hack, or light trapper to be more than 15.3 hands, an Arab 14.2 hands, or a heavy cart-horse to be higher than 16.3 hands. . . . The average English horse is at the present day probably 6 inches taller than he was two hundred years ago," and the horses in England have increased about 2 inches in height since the middle of last century. (See Appendix M.)

Points of the Thoroughbred.

The following are a few well-known and generally accepted **jumping records**:—Howard Willets' American hunter "Heather-bloom" made three record high jumps that still hold the field. At a Chicago show he cleared a solid wooden rail fence 7 feet 4½ inches high, but mended this record first to 7 feet 8 inches, and in the end to 8 feet 1 inch. Major Peel's "Chandler" is said to have made the long jump record of over 38 feet at Warwick in the seventies of last century, beating the record of 37 feet 5 inches over a marl pit made in 1857 by Lord Ingestre's "Leather," with the Patchley Park hounds, and another record of 36 feet, over water with a stiff hedge on the take-off side, made by "Emblem" in 1863, in the Birmingham Steeplechase at Sutton Coldfield. "In the Curraghmore Plate Race (1880), 'Woodbrook,' bred by the late Marquis of Waterford, cleared 35 feet over the post and rail and bush fences"; and on "Poulaphonca," a Grand National winner, the Marquis, riding 18 stones, cleared 26 feet with the Quorn Hounds on Ragdale Bottom.

CHAPTER XX

FARM HORSES—CLYDESDALES, SHIRES, AND SUFFOLK PUNCHES

The Clydesdale—History—Importation of English Blood—Clydesdales and Shires Types of one Breed—Should be combined in one Stud Book—"The Prince of Wales" and "Darnley"—Service Fees—Points—Test of Prominent Breeders—**The Shire Horse**—Points—Names and History—The Stud Book—Select Test of Shire Studs—**The Suffolk Punch**—History compiled by the Stud Book Society—General Characteristics—Test of Prominent Breeders—Cart-Horse Parade.

BRITISH work horses are usually classed as belonging to three breeds—the Clydesdale, the Shire, and the Suffolk Punch.

THE CLYDESDALE HORSE.

History.—Like most of our well-known breeds of live stock, the Clydesdale is the result of the successful union of selected specimens from various other breeds, none of which possessed the good qualities in the same degree of efficiency as are now common among well-bred Clydesdales. Prolonged care in breeding has admittedly had its influence in raising the standard of quality. The value of constitution is so important in a work animal that intense in-breeding has not been practised among Clydesdales to any great extent, although relations of the cousinship degree are common enough. In connection with the origin of the breed, little credence is now given to the story told in 1810 by Aiton, of Strathaven, who also doubted the accuracy of the report which he merely chronicled, to the effect that "one of the Dukes of Hamilton imported from Flanders, about the middle of the seventeenth century, six fine black stallions, which he kept at Strathaven Castle for the use of his tenantry and vassals." It would seem that the Upper Ward of Lanarkshire has long been famous for a breed of powerful draught

horses, the character of the soil for producing frames of superior size having no doubt been the chief primary cause of its distinction in this respect. After the union of the crowns of England and Scotland in 1603, an important droving trade in cattle and horses sprang up between the two countries, which continued for over two centuries until it was checked by the development of the railway systems of the country. The Scotch cattle-drovers going south with their herds of store bullocks, frequently brought back with them choice specimens of English colts and fillies, so that in this way the original stock of the country, before the name of Clydesdale was used with reference to the breed, would be blended with English blood, by animals, some of the ancestors of which had been imported perhaps a century before from the Continent of Europe. The splendid success as a sire of a black Flemish stallion imported from England by John Paterson, of Lochlyoch, about 1750, is strong presumptive evidence that the mares to which this horse was put were nearly enough related to him to prevent the appearance in the progeny of that tendency to variation which accompanies the crossing of animals of distinctly different breeds. Though the credit of establishing the Clydesdale breed is now generally given to Lochlyoch's black horse, it is probable that he was merely the first out of many horses of a similar kind regarding which any written record was kept. But for the fact that the Paterson family possessed the then unique custom of recording important events in writing, we should probably have known as little of this famous horse as we now know of his presumptive predecessors. The Lochlyoch mares descended from this horse and belonging to "the most noted breed in the Upper Ward of Lanarkshire during the eighteenth century," are recorded in the Stud Book as having been

"Generally browns and blacks, with white faces and a little white on the legs; they had grey hairs in their tails, along with occasional grey hairs over their bodies, and invariably a white spot on their belly, this latter being regarded as a mark of distinct purity of blood."

This no doubt gave origin to the impression that a pure Clydesdale ought to possess a white mark, however small. It is interesting to notice that white hairs appear scattered

throughout the dark coats of many of the best Clydesdales of the present day.

It is a matter for conjecture whether some coaching blood was or was not introduced into the breed by a stylish black horse "Blaze" (named from the white marking on his face), which belonged to Scott of Brownhill, Carstairs; but the ancestry of "all the best and noted Clydesdale horses of the present day" can be traced to "Glancer" (335), *alias* "Thompson's Black Horse," bred about 1810 by Somerville, Lampits Farm, Carnwath, where was built up the most noted breed of the early part of last century. "Glancer" belonged to the Lochlyoch strain, and was consequently descended from the Flemish horse. He was said to be "a very complete horse in all points except the hocks, which were considered to be a little full." Both hind legs were white, and "his clean sharp bones were fringed with nice flowing silken hair." From "Broomfield Champion" (95)—the first foal of a grey mare subsequently rendered barren by high feeding—and the great-grandson of Thompson's "Glancer," "The Prince of Wales" (673) and "Darnley" (222) were both descended.

A considerable impetus to the breeding of good Clydesdales was given when the Highland Society began in 1827 to hold open shows and offer premiums for horses. One of the Society's rules was that all horses eligible for competition must be either "black bays or brown bays." James Frame of Broomfield, one of the most successful stallion owners of the day, set an example to breeders by castrating all grey colts, thereby stimulating the desire which then existed for bays and browns, and reducing the number of grey horses in the country. The embargo on grey has long been removed, and since the middle of last century "grey stallions have taken some of the best prizes of the Society," but now grey in common with chestnut is not a favourite colour.

Another well-known early authority on Clydesdales was William Fulton, of Sproulston, on the Ayrshire border of Renfrew—the breeder of the famous sire "Clyde," *alias* "Glancer" (153), and of his son "Clyde" or "Prince of Wales" (155), the sire of "Lothian Tam" (506). Discussing the merits of two predominating strains of the breed, he said: "Frame's kind have plenty of style and good action; but

Elder's kind have bigger and better bones and more hair." The latter, through the Drumore breed, were strongly represented in the Galloway Clydesdales of the seventies of last century, when (as in the case of the peninsula of Kintyre, the county of Banff, and a few other local centres) Galloway claimed a noted strain of Clydesdale blood as its own.

Among prominent early owners not yet mentioned should be included Samuel Clark of Manswares, Renfrew, who owned "Clyde" (155); John Craig of Burnbrae, Hamilton, who bred "Clydesdale Tam" (175), a 17-hand horse of "great strength of bone and stout legs"; and John Barr of Barrangry, Erskine, Renfrewshire, who owned "Prince Royal" (647), a noted prize-winner and, through his grandson "General Williams" (326), the progenitor of many of the best brood mares of a generation ago. It is recorded of "Prince Royal" in the Stud Book that he "never got a black foal; but he had them of all other colours, including a number of greyish chestnuts, *i.e.*, chestnuts with a few grey hairs."

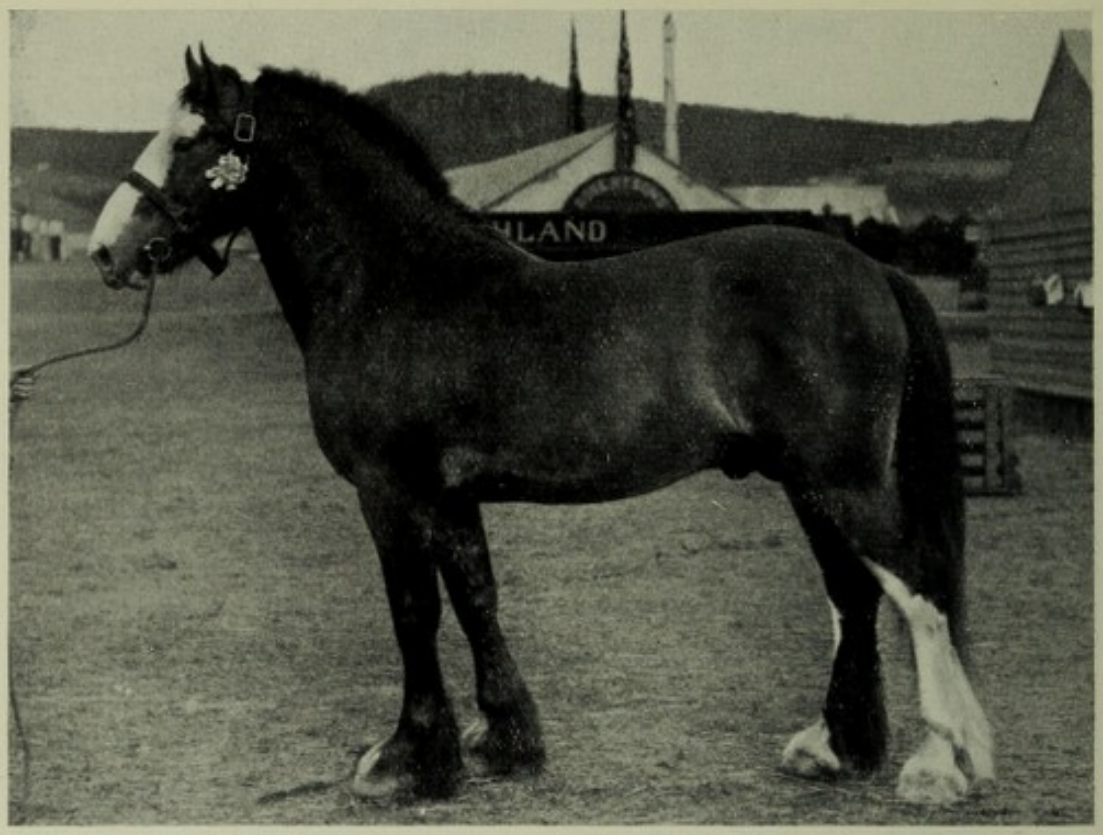
"Baron's Pride" (9122), the most noted sire of the present day (1907), was not thought much of while in the hands of his breeder, John Findlay of Springhill, Bailieston, Lanarkshire. But his "get" have taken more prizes than all other competitors put together. He has a fine temper. He is a little narrow in the chest, but few of his progeny are narrow. Being rather feminine in appearance, he has not bred any very outstanding sires, although he is the sire of many grand mares. It is interesting to contrast his type with that of "Briton" (86), Plate XCII., bred by Findlay of Easterhill, but sold and sent to England, where he became famous in the stud. This horse was only once shown when, at the Royal Agricultural Society's Show at Chelmsford, he won against all breeds first prize for the best draft stallion. His stock frequently took prizes at subsequent shows. Not so much hair is now wanted as at that time, but it must be straight and fine and placed up the back of the legs.

The importation of English blood was not confined to the domain of ancient history. "Tintock," a Shire horse imported by Galbraith of Croy Cunningham, Killearn, about

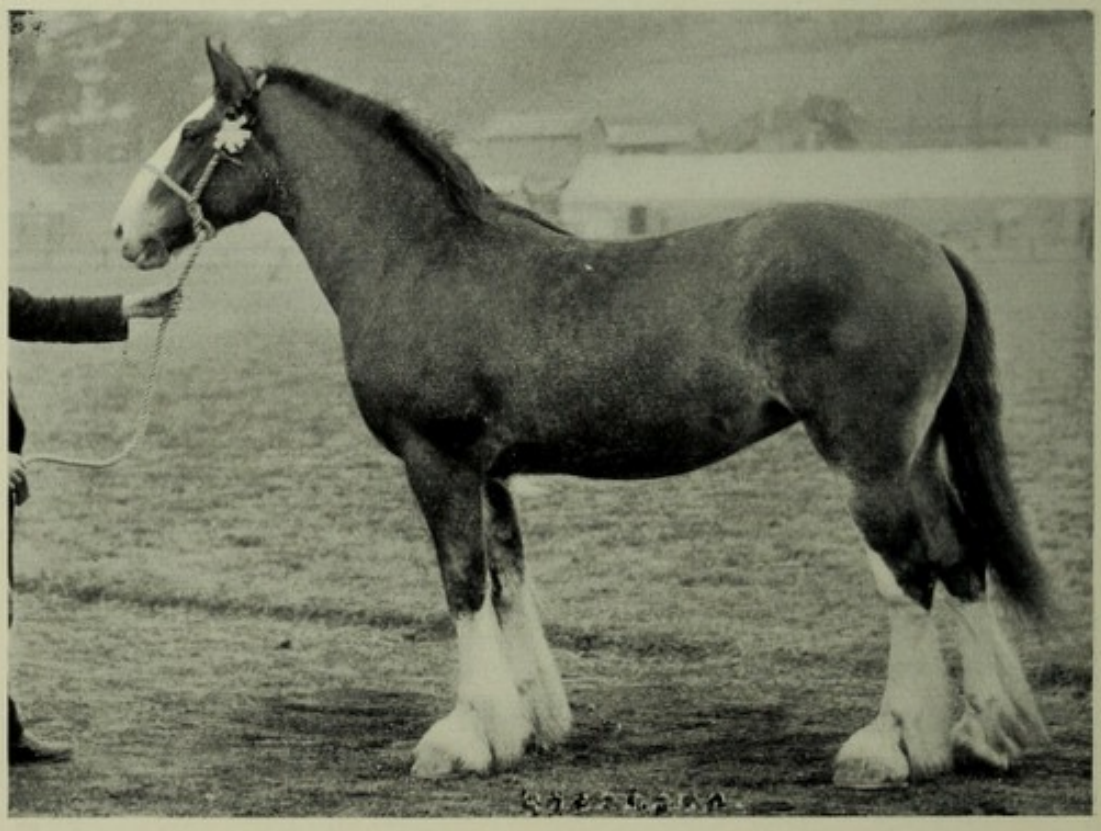
the seventies of last century, left a number of good fillies, his stock being more famous on the female than on the male side. From one of these was bred "Damsel," which was for a time the champion mare of Scotland, in the possession of Martin of Auchendennan, and was sold at his sale for exportation for 500 guineas. Another Tintock filly was the dam of "Lord Salisbury," who was also a champion, and sold for export at £1500. "Tintock" took the second prize at Glasgow show in 1867, and travelled in the Strathendrick district during the same year. He was ultimately exported to Canada, where he was given the name of "Conqueror." "Old Brickhouse" was bought at Horncastle Fair (21 miles east of Lincoln) by Fergus of Brickhouse, and sold to William Park of Dalmuir, to breed Clydesdales. She left three fillies by different sires, which were all champions at Glasgow Show, and two of which were first both as "eild" and brood mares at the Highland Society's Show. Lawrence Drew's[1] "Prince of Avondale" (not in the Stud Book)—dam an English mare, and sire "The Prince of Wales"—left two champion mares, "Sunray" and "Rose of Bank-knock," both got in the same year. No Clydesdale sire, before or since, ever got two such mares for substance and quality in one season. The grand-dams of "The Prince of Wales" (673) were both brought from Carlisle and sold in Dumfries market as English mares; but as the traffic in horses between the two countries involved the carrying of colts and fillies from Lanarkshire into England, it cannot be denied that these mares and other animals imported into Scotland were most probably to some extent of Clydesdale origin. The most rational view to take of the position of matters, after setting aside all narrow prejudices of nation or of breed, is to regard the heavy draught horses of England and of Scotland to be different types of the same breed. The difference between the two so-called breeds amounts to nothing more than what may appropriately be covered by the term "different type."

Scotch breeders are rather proud that a number of successful English breeders attempt to follow the Clydesdale

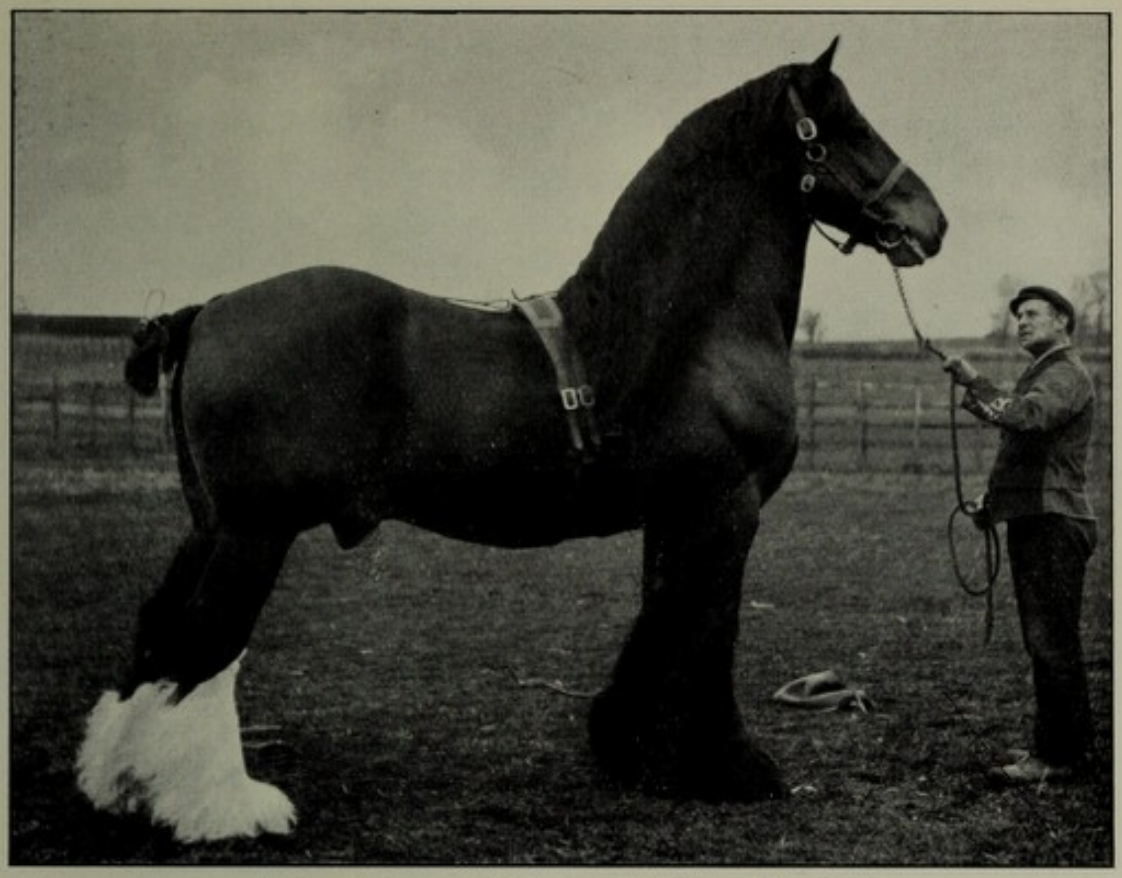
[1] When Lawrence Drew resigned the agency of the Duke of Hamilton and went in for Clydesdale breeding on his own account, his friends presented him with "The Prince of Wales" (673). He bred the old horse to good Shire mares and ignored the Clydesdale Stud-Book.



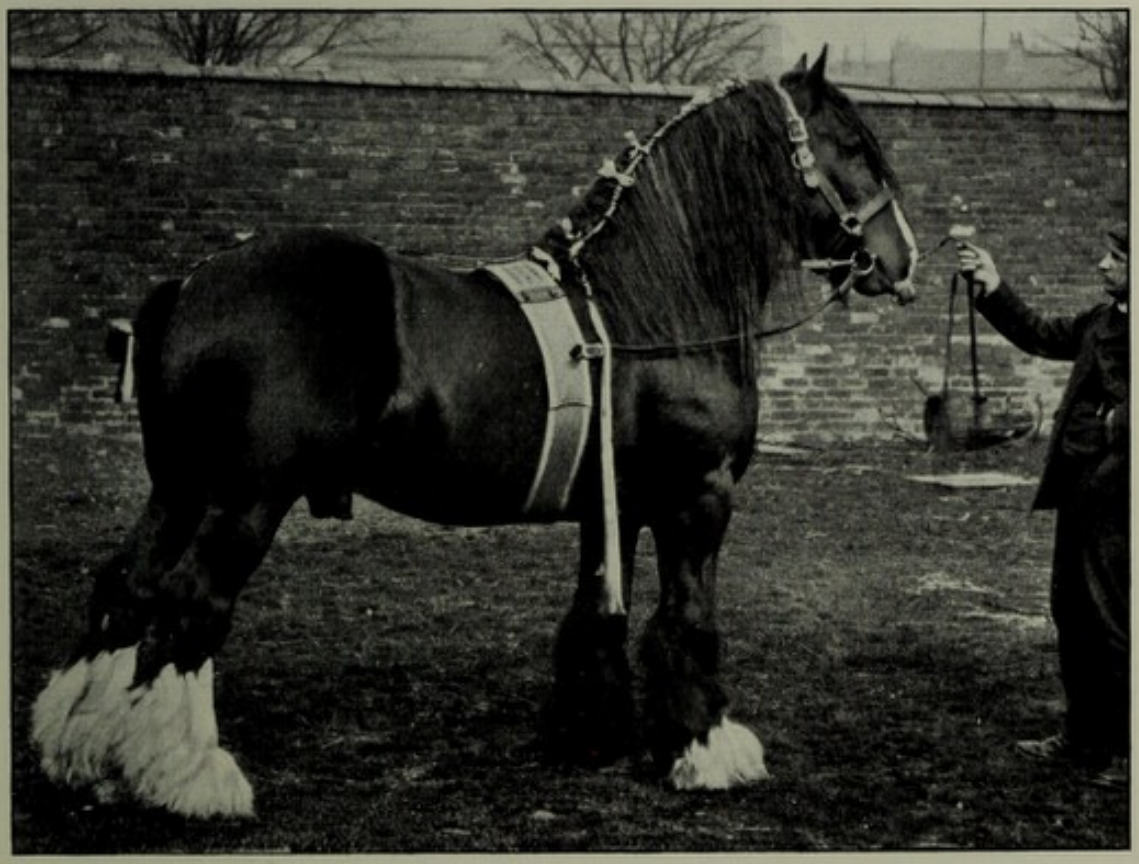
A. Clydesdale Stallion, "Marmion" (2 Years Old).
By "Prince of Brunstane," s. of "Rosadora," and full brother to "Flyadora."
Champion at Edinburgh, and First at Ayr as a Two-year-old. Bred by Wm. Park.
[*C. Reid, Wishaw.*



B. Clydesdale Mare, "Rosadora" (2 Years Old).
Won Cawder and Durham Cups for the best Female, 1905.
Bred and sold by Wm. Park to Bryce, for N.-W. Canada, at nearly £500.
[*C. Reid, Wishaw.*



A. Shire Stallion, "Markeaton Royal Harold."
Champion at the Shire Horse Show in 1897. Owned by Sir Alex. Henderson, Bart., Buscot Park, Berks.



B. Shire Stallion, "Markeaton Loyal Harold."
S. "Markeaton Royal Harold," d. "Magnate," by "Maharajah"; s. of hundreds of winners.
Hired by Newcastle (Staffs) and District Shire Horse Society, 1903 and 1904.
[Both by G. H. Parsons, Alsager, Cheshire.

[*pp.* 408 *and* 409

type by selecting and breeding from Shire animals showing strong Clydesdale points. James Forshaw, for example, with "Bar None" (2388), a horse of this description, secured the first prize at the London Show in 1882.

And all the successful prize-winners of the breed in Argentina—to be found in the famous stud of Miguel A. Martinez de Hoz, of Chapadmalal, near General Preyrrendon —are distinctly of Clydesdale type and Clydesdale action.

In the best interests of all concerned, the fact that the two strains of British rough-legged work horses belong to one breed should be openly and fully acknowledged and declared, and the Stud Books, which at present stand in the way of their being freely blended, joined into one Register, or opened to receive entries of animals of either kind. Such a consummation would act beneficially in two directions—

(1) The Clydesdale would impart to the Shire the fine quality of bone and hair and the freedom of action for which it is famous and in which so many Shire animals are deficient, and would receive in return the size and substance for which the Shire breed is remarkable. The ideal mating would be the Clydesdale stallion on Shire mares, which are better quality than Shire horses; but there is no visible reason to doubt the success of breeding in the reverse order of the sexes.

(2) The breeders would benefit by acquiring a better result than is generally attainable by keeping the two strains apart. Without the union of the Stud Books the blending process would be unremunerative, as the product would not find favour with foreign and colonial buyers, who are now such important factors in the successful marketing of pure-bred stock of all kinds, and who invariably require a registered pedigree.

The Clydesdale breeders, who are probably at present in the more favourable position of the two—owing to the popularity of their animals in Canada and Argentina and other foreign parts, notably Russia—have a greater chance of losing in the end because, while the size of the Clydesdale is shrinking, the quality and movement of the Shire horse are rapidly improving.

Although many of the best Clydesdales of the day are

probably heavier than the corresponding animals at any previous period in the history of the breed, still there is a tendency to diminished size in **the fashionable type,** viz., that derived from the Darnley mares and the descendants of the "Old Prince of Wales." "Floradora," the champion mare bred by the late William Park, Brunstane, Midlothian, combines substance and quality, like the two noted mares got by "Prince of Avondale," and possesses the action of a hackney.

In the keen competition for supremacy which took place between the two famous founders of the fashionable Clydesdale blood, "Darnley" had the better of the "Old Prince of Wales" for a time in the show-ring, but the "Prince" fully regained his position in the estimation of the public as soon as the quality of his stock by the Darnley mares was recognised.

"The Prince of Wales" (673), foaled 1866, was bred by James Nicol Fleming, at Drumburle, Kilkerran, Ayrshire, and became the property (1) of David Riddell, Kilbowie, Duntocher; (2) of Lawrence Drew, Merryton, Hamilton; and (3) of David Riddell, (then) Blackhall, Paisley. The following is his showing record as given in the Clydesdale Stud Book:—

"First prize at the Highland Society's Show at Edinburgh in 1869; second at Dumfries in 1870; first at Kelso in 1872; and first at the Royal Agricultural Society's Show at Manchester in 1869."

He was sold at the Merryton sale, when eighteen years old, for £945.

"The Prince" was a horse of splendid action, much better in this respect than "Darnley," described below, although he was defective in his hocks, from the symmetrical point of view—being too straight and "corked," as if he had thoroughpin. He showed his English connection in the conformation of his head, in his prominent nose, and his small and somewhat defective eye. The "Prince" had a will of his own, and his somewhat intractable disposition has been transmitted to many of his progeny.

"Darnley" (222)—also bay like "The Prince of Wales,"—foaled in 1872, was bred by Sir William Stirling-Maxwell of Keir, Bart., near Dunblane, and bought by David Riddell. His prize record in the Stud Book is:—

"Second at the Highland Society's Show at Stirling in 1873; the premiums of Glasgow Agricultural Society in 1876 and 1877; first at the Highland Society's Show at Edinburgh in 1877; and the champion cup at the Highland and Agricultural Society's Show at Dumfries in 1878; also second at the Royal Agricultural Society of England's Show at Kilburn, London, 1879; first at the Royal Agricultural Society's Show at Carlisle, 1880; first at Highland and Agricultural Society's Show at Glasgow in 1882, as sire of the best family of five aged animals exhibited; and first and champion cup at Highland and Agricultural Society's Show at Edinburgh in 1884."

"Darnley" was said to owe much to the wonderful quality of his dam. His chief defects were lightness in the thigh, and a slightly "sideways" gait both in walking and trotting. It has, nevertheless, been asserted that he was the best "walker" of any horse of his time despite the cast in his fore feet.

"The Prince of Albion" (6178), for which Sir John Gilmour, Bart., of Lundin and Montrave is reported to have paid £3000, was by a daughter of "Darnley," although he was sired by the "Old Prince of Wales." "The Macgregor" (1487), and "Flashwood" (3604), two of the most celebrated horses of their time, were got by "Darnley."

The highest price, 1000 guineas, ever paid for a two-year-old Clydesdale filly was given at Montrave sale in 1892 for an animal of the same fashionable blood, "Montrave Rosea," the offspring of the two champions, "Prince of Albion" (6178) and "Moss Rose" (6203).

Great credit was due to Lawrence Drew for purchasing at a high price and retaining "The Prince of Wales," and to David Riddell for securing "Darnley" for the benefit of the breed of horses in this country, at the time when high prices could be secured for such animals for exportation.

Characteristic Features and Points of the Breed.—Under this heading there appears the following suggestive paragraph in the historical and descriptive introduction in the "Retrospective Volume" of the Clydesdale Stud Book:—

"The oldest judges of Clydesdale horses in the Upper Ward of Lanarkshire, are of opinion that the Clydesdale horses of the present day (1878) differ little from those which were sold at Lanark and Rutherglen Fairs. Few of them will allow that they have been improved during the last

thirty or forty years; and many maintain that horses in old days were better furnished with bone, their legs better fringed with hair, and in general much sounder than those for which high prices have been paid during recent years."

The Clydesdale was authoritatively described in 1881 from the Shire breeders' point of view "as high on the leg, with a long, low back, and short flat ribs. He is high couraged, active, with good, hard, flat legs, long pasterns, and firm feet."

While the foreign demand, which resulted in a large number of high-priced horses being shipped abroad, was suspended about 1890, yet the owner of a really good horse had substantial inducements offered to keep him in this country. For example, the Glasgow Society prize horse of the year 1889, "Sir Everard" (5353), may be calculated as follows to have earned £700 to his owner during the season —May, June, and July :—

The Society's premium . .	£150
Service fees of say 100 mares @ £3 .	300
50 mares estimated to prove in foal, @ £5 .	250
	£700

The "Prince of Carruchan" (8151) would earn over £1200 for his owner, Peter Crawford, in 1892, with a covering-fee of £10, and an additional £5 on sight of a foal. These were very different returns from those recorded in the Stud Book relating to the early years of last century, when the Clydesdale breed was practically confined, if we except Ayrshire, to the Upper Ward of Lanarkshire, "where nearly every farmer kept a number of mares, from each of which it was his object to breed a foal for the purpose of supplying the demand of the more advanced agricultural counties." About one stallion was required for every 80 mares. He was not overfed as horses too often are now, and he did his share of farm work. The fee was ten, fifteen, or twenty shillings on proof of foal, and one shilling to the ploughman, who might have to unyoke the horse from the plough to cover a mare. Modern returns are very variable. Montgomery's "Baron's Pride," a grand foal-getter—throwing 60 per cent. good—stands at 20 guineas for service. "Flashwood" (3604) has earned as much as £1050 in a year, and "Hiawatha" will net

£1500; but what is now considered a good annual profit for say 5 per cent. of the best entire horses is about £300.

The exportation of so many entire horses during the eighties of last century reduced the natural supply of the best kinds of dray horses in the market, and complaints are yet made that certain classes of horses are only to be got with difficulty.

A large number of Clydesdales of both sexes have recently been sent to Canada, as the subjoined figures show.

Exportation to Canada.

Year.	Quebec.		Ontario and the E. Provinces.		N.-W. Territory.		Total.
	Male.	Female.	Male.	Female.	Male.	Female.	
1904	10	4	120	197	50	16	397
1905	9	11	161	229	47	12	486[1]
1906	14	20	191	652	79	95	1054[2]
	33	35	472	1078	176	123	1937

The total numbers exported to all parts during the first nine months of 1906 was 1110.

Points of a Clydesdale.

The *colour* is usually bay or brown—dark shades and dapples preferred—sometimes black or grey, more rarely chestnut or roan. The two last colours are not in favour and are sometimes regarded as indications of impurity of blood. The *height* averages about 16 hands in the case of mares, and 16.2 in that of horses—few exceed 17 hands; the *temper* should be mild, though the animal should nevertheless be possessed of plenty of muscular vigour and nervous energy; the *head* medium size; the *jaw* broad, but not too large or loaded with flesh; the *nose bones*, if not straight, slightly arched, not "dish-faced"; the *muzzle* not too refined or tapering; the *nostrils* wide and open; the *eye* bright and dark, full and vigorous, yet mild; the *forehead* full between the eyes and broad, tapering gradually upwards in the direction of the

[1] Including 4 horses and 13 mares that went to Nova Scotia.

[2] Exclusive of 3 mares that went to South America.

ears; the *ears* a good length, neither hanging, showing sluggishness, nor "prick-eared," but with frequent motion, indicative of a good disposition; the *neck* medium in length and massive, slightly arched in the male, and also in the female when she becomes old or is in high condition; the *back* straight and broad, and not so long as to make it weak; the *tail* not too drooping; the *ribs* well sprung, round or barrel-like, the last one being a good length. Shortness in the posterior ribs is not an uncommon defect in Clydesdale horses, making them too light in the belly and leggy to appearance. The *hind quarters* broad and long, low set, well packed, and rounded and the *thighs* muscular; the *second-thighs* well developed and broad; the *girth round the heart* good: the *body* is then deep, and the height of the animal greater than it looks; the *chest* broad and deep; the *shoulder* (*scapula*) closely knit at the top and oblique, though not necessarily quite so much so as in a hunter; the *humerus* should form an obtuse angle with the *scapula*, else the animal cannot put its leg well forward in moving, or practise the long quick step for which the breed is renowned.[1] The position is indicated in Fig. 23. The *fore legs* ought to be straight, not bending back at the knee —a defect described as "calf-kneed." This defect, however, minimises the bad results of short pasterns. The legs should also be strong, and not too far back under the body, showing that the humerus is rightly placed; the *knee-joints* broad and flat; the *muscle of the forearm* long and strong, broad from a side view and well developed; the *shank bone of the fore legs* should present a flat side view, and should be thick and slightly rounded in front, tapering to an edge posteriorly, assuming a shape somewhat like a blunt razor, also short and clean (not knotty), but with plenty of substance; the *sinews* of the back of the leg thick, strong, and well defined; the *fetlocks* large; the *feathering*, or long-flowing silken hair of a "pily nature" on the back parts of the legs, neither deficient, too abundant, nor spreading round in front. If fine, long, and silky, it is an indication, along with a fine skin, of good breeding. Short, coarse, and matted hair indicates a

[1] Reference should be made to a paper by the late James Howard, M.P., Bedford, in the *Journal of the Royal Agricultural Society of England* for 1884, who there drew attention to the importance of the position of the *humerus* in the shoulder of a cart-horse.

tendency to grease. The feathering hair is sometimes stimulated in growth by the application of a blister, and to prevent it falling out when a horse is being forced in preparation for show, but the quality is not then so silky.

White feet, though common, are objectionable, being frequently though not invariably softer than the others. They are now so prevalent among the best horses that some authorities go so far as to say that a white foot and sock are essentials in the pure Clydesdale.[1] The feet cannot be too large, if not thin and flat or "down in the soles." In the early eighties too many stallions were lame from *laminitis*, or founder, induced by excessive feeding and insufficient exercise, but the latter years of last century saw a marked improvement which has been since maintained.

The *fore and hind legs and feet* must be sound, as few of their diseases and defects are not hereditary and liable to occur even to the third and fourth generation. All four *limbs* should be set on straight, as they look better and are also stronger. It is less objectionable to have a toe pointed slightly in than out, when strength for work is the object. For exhibition purposes the opposite is the case, as an in-toed horse on being trotted for showing is apt to throw his feet outwards in moving. The tendency then is to exaggerate the defect, whereas an out-toed horse when trotting "in a man's hand" shows to the best advantage.

The *hocks* should be broad in front and not too straight, else there is liability to thorough-pin, and not too crooked, as they do not look well although they may be strong. Any organic defect in a hock constitutes unsoundness. Adjoining muscles should be firm and strong, as fleshy or flabby hocks are objectionable. The leg from the hock to the ground should be "short, broad, flat, clean, evenly, and straight, or slightly inclined forward."

The *pasterns* ought to be medium in length, so as to give

[1] There is a well-grounded objection to white feet and legs in the Argentine Republic; and on the great draught-horse-breeding ranche of J. B. Haggin in California, Clydesdales cannot be reared owing to the liability of the white surfaces to burn and blister in the sun, so that the parts become swollen and painful, more particularly when the animals have access to water in which they can wet the white places. The white blaze or "ratch" on the face is equally objectionable if it involves the region of the nostrils, which is particularly sensitive to sun-burning.

the necessary elasticity to counteract the concussion caused by the characteristically quick firm step. If long, they are weak; if short and upright, they are more liable to bony exostoses. A short pastern and a steep shoulder are often correlated and are only useful for slow work in the field. Splints appear in this breed often without producing lameness or unsoundness.

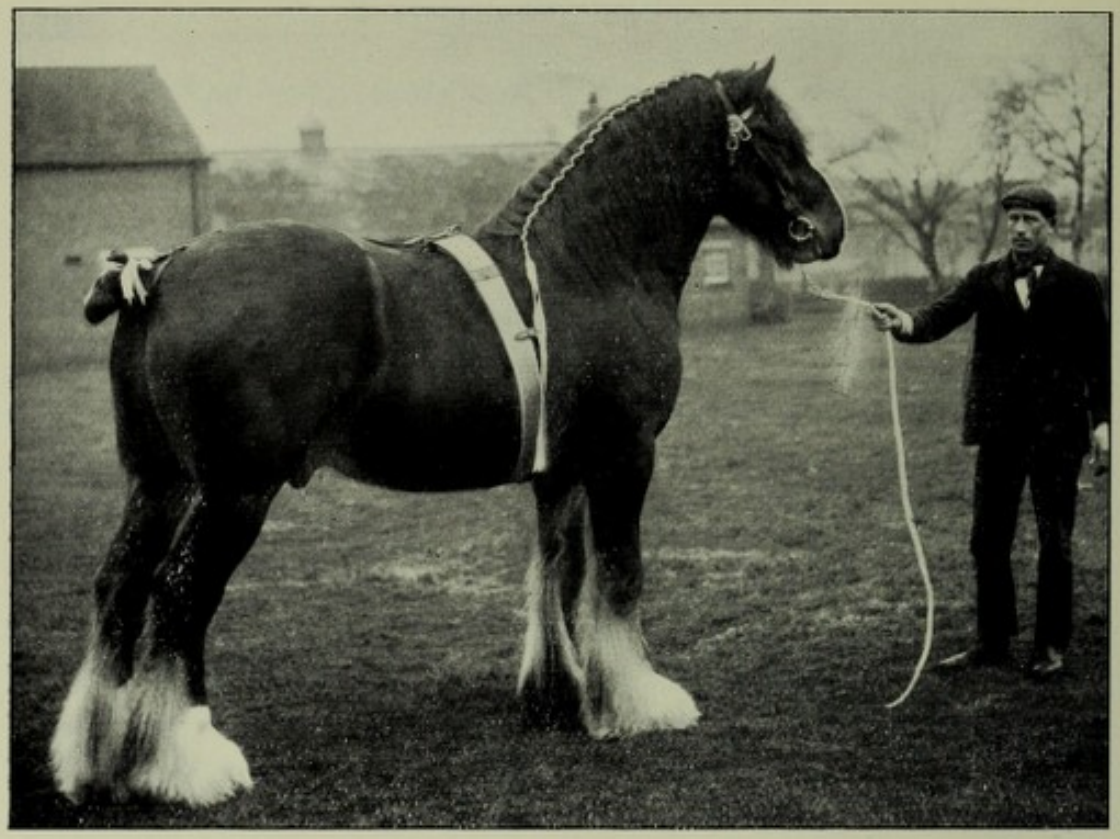
The *action* is quite peculiar, being very free and active, and the *step* long and measured; the animal walking, when unloaded, 4 miles an hour. Young horses will at times surpass this rate, but for an ordinary work horse it is a good pace.

The *sole* should be almost inverted each time it is lifted in either trotting or walking; the *movements* of the limbs free and ample at both knees and hocks, and straight forward. The swinging or twisting out of the fore feet, and the sideways cow-like motion of the hind legs, are equally objectionable.

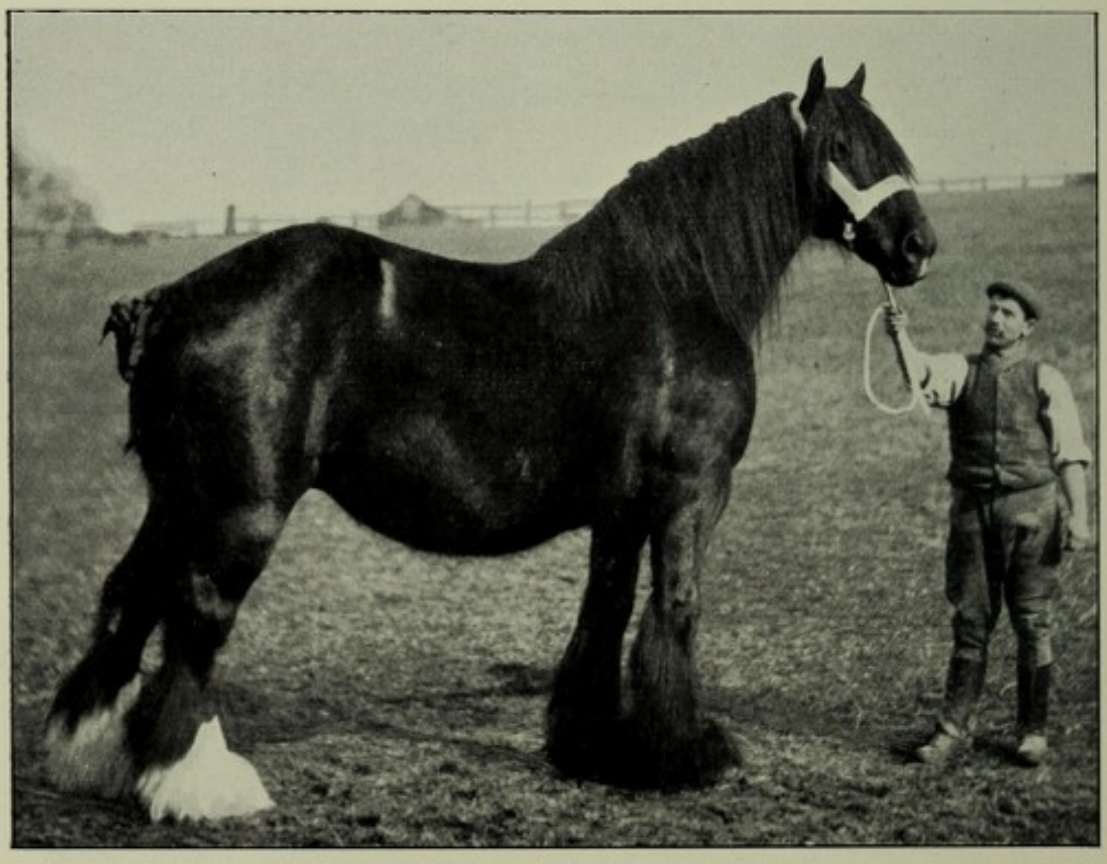
The following is a short list of prominent Clydesdale breeders:—G. and J. Cocker, Hill of Petty, Fyvie; Peter Dewar, Arnprior, Port of Monteith; Wm. Dunlop, Dunure Mains, Ayr; J. Findlay, Springhill, Bailieston, Glasgow; Sir John Gilmour of Montrave, Bart., Leven, Fife; Wm. Hood, Chapelton, Kirkcudbright; J. E. Kerr, Harvieston Castle, Dollar; James Kilpatrick, Craigiemains, Kilmarnock; John Marr, Cairnabrogie, Old Meldrum; H. B. Marshall, Rachan, Peebles; Matthew Marshall, Bridgebank, Stranraer; Wm. Marshall, Lochfergus, Kirkcudbright; A. and W. Montgomery, Banks, Kirkcudbright; R. Park, Brunstane, Portobello; W. S. Park, Hatton, Bishopton; Seaham Harbour Stud (Ltd.), per Robert Brydon, Seaham Harbour; Wm. Taylor, Park Mains, Renfrew; Alex. Williamson, Sypland, Kirkcudbright; Thos. Smith, Blacon Point, Chester.

The Shire Horse

The Shire horse is the largest British breed of cart horses. The larger sorts, bred in the Fen country—Cambridge, Huntingdon, and Lincoln—and also in Derbyshire and Lancashire, are better suited to dray-work than to agricultural work. The best specimens are very like Clydesdale horses. The



A. Shire Stallion, "Leek Advance" (21593).
Of a Clydesdale type. Won many prizes in and after 1902, including the £300 Premium at Crewe, 1906. Owned by A. Nicholson, Highfield Hall, Leek, Staffs.



B. Shire Mare, "Princess Beryl."
First and Champion at the Shire Horse Show, London, 1905.

[*Photos by G. H. Parsons, Alsager, Cheshire.*

[*p.* 416



SHIRE HORSES AT WORK. All pedigreed prize-winners.
The property of Baron Redesdale of Redesdale, Batsford Park, Moreton-in-Marsh.
(The Frontispiece of the 3rd Edition.)

[C. Reid, Wishaw.

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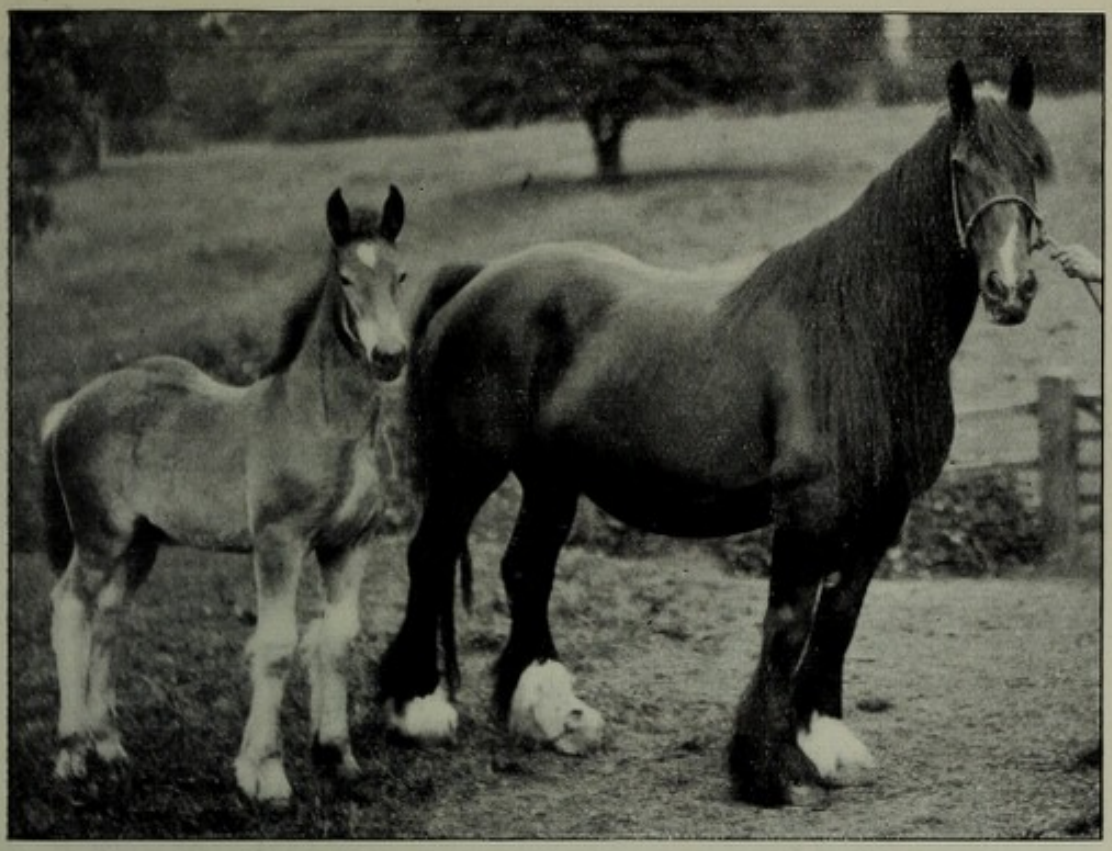
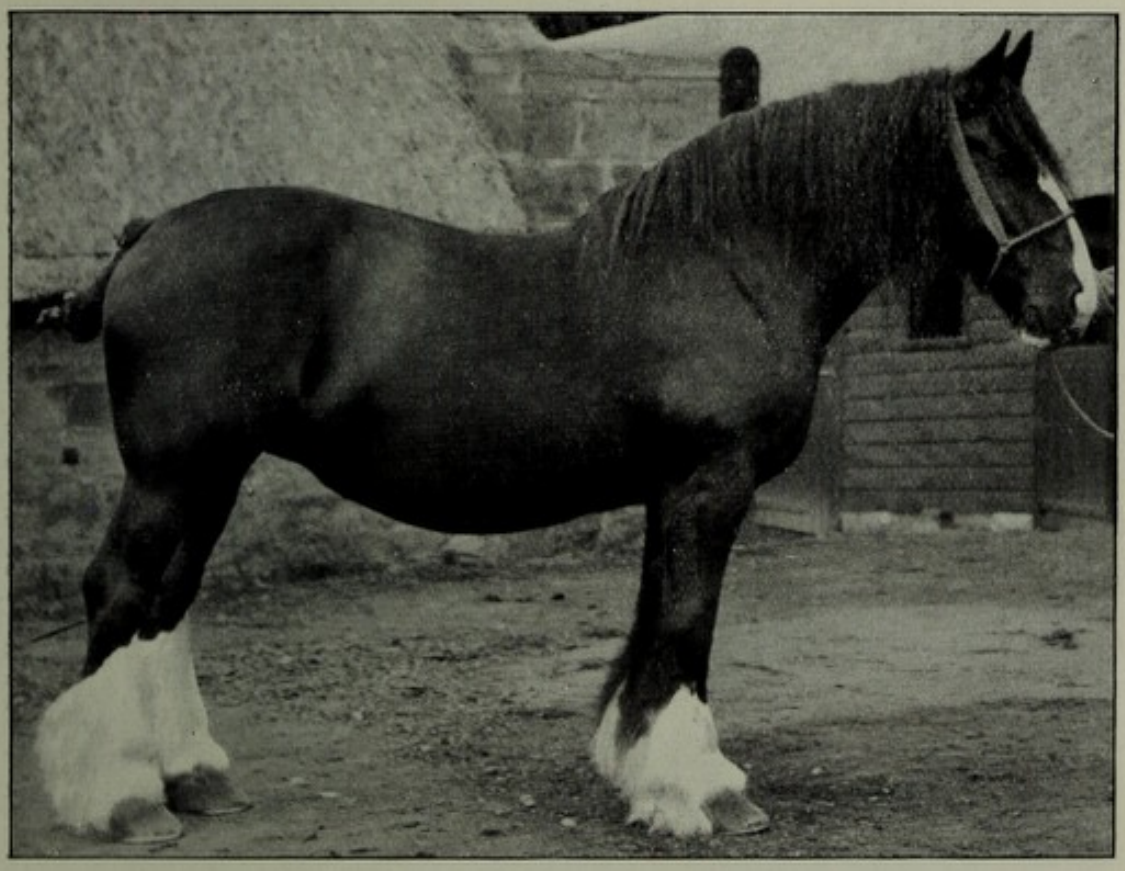


A. Shire Mare, "Lockington Beauty," and Foal, "Merveille."
"The most extraordinarily successful brood mare yet known in the Shire world."—*L. S. J.*



B. Shire Mare, "Chance."
An unbeaten show record, crowned by the late Queen's Gold Medal at Windsor.
Both the property of Baron Redesdale of Redesdale, Batsford Park, Moreton-in-Marsh.

[*Both photos by C. Reid, Wishaw.*

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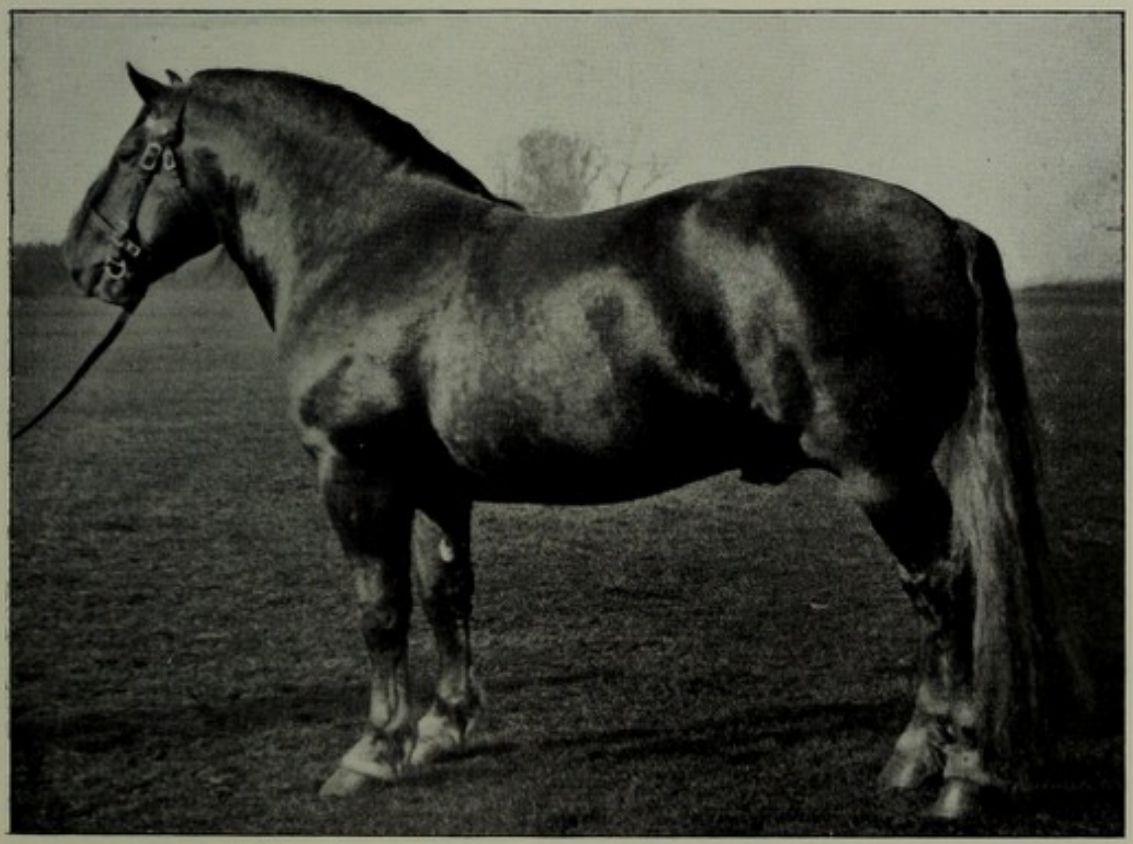
A. Suffolk Punch Filly, "Queen of Trumps" (2702).
First prize (£15), R.A.S.E. Show, Warwick, 1892.
The property of the late Duke of Hamilton and Brandon, Easton Park.



B. Suffolk Punch Stallion, "Wedgwood" (1749).
Queen's Gold Medal and Champion Prize for Best Suffolk Stallion at Windsor Royal Show, 1889.

[*p.* 416

ordinary varieties of the two breeds differ more in appearance than the better sorts, which, as has been explained, are probably more closely related than farmers generally suppose. The late Lawrence Drew believed in crossing Clydesdale stallions and good Shire mares, as among the resulting advantages were remedied the defects of the Clydesdale. The best geldings of the present day are the progeny of a Clydesdale horse and Shire mare; for example, "Oldfield Duke," bred by A. C. Sparkes, Oldfield, Altrincham. Such breeding is quite in accordance with the best usages in the improvement of all breeds, whether equine or bovine. The fact that it has been followed on a considerable scale for many years explains why it may be continued with advantage, as the results will not be those that spring from crossing between two distinct breeds.

From the historical preface, Vol. II., of *The English Cart-horse Stud Book* (1881), written by G. M. Sexton, Secretary of the English Cart-horse Society, the following admirable description of the points of the Shire horse is extracted :—

Feet.—"No maxim was ever truer than 'No foot no horse.' Weak convex feet and ossifications of the cartilages and pasterns are evils which big heavy horses are prone to; therefore the object should be to discourage and eradicate them, by care in breeding and selection. See that both feet are the same size, not what are termed odd feet; rather large than small, the sole concave (avoiding flat or convex soles), the hoofs black." [White feet are associated with white legs (socks or stockings), which are now (1907) too fashionable and too prevalent.]

Fore legs.—"The fore legs should stand straight, turning neither inwards nor outwards. The elbows pinned in are very unsightly; besides, this defect prevents the proper expansion of the lungs, making a narrow chest. The elbows projecting too much is a defect, as the feet then turn in, causing faulty action, called 'dishing,' and this defect also causes the animal to cut the ankles. The natural position of the toe is immediately underneath the point of the shoulder. If it stands much behind this point, weak, round, faulty joints are generally the result. If the toe projects beyond the point of the shoulder the knees stand back, being what is called calf-kneed. Extra strain on the back tendons is thus caused, and with it an incapacity for hard work. The fore legs to the knee should possess well-developed muscles, projecting

considerably at the forearm, which should be moderately long, to give good walking action. The knees and fetlocks should be large; the limb, from the knee to the fetlock, flat laterally, the tendons and muscles at the back of the knee not in the smallest degree contracted, but well-developed and thrown well back from the bone, and capable of being felt with the hand; the pastern moderately long and gradually expanding in an oblique direction to the foot. Short upright pasterns are particularly to be avoided; for it is this malformation that to a near certainty produces that great curse, *side-bones*, and it also retards action.

Hind legs.—"The hind legs should be somewhat straight; being bent, and too much under, or long, and too far behind, are faults. The hock should be broad in front and deep behind, and perfectly free from all puffiness in the seat of bog spavin or thorough-pin, the shank flat, with well-developed tendons, and short to the fetlock. The hind-pastern is as important as the fore-pastern, and should be formed similarly; and immediately below the hock the measurement should be at least an inch more than below the knee, whatever that may be, according to the size and weight of the animal. This is important as a preventive of curbs. The hind toes should stand square with the front ones, neither inwards nor outwards, though the latter, if not excessive, is the lesser fault of the two; if the toes turn inwards, the hocks must turn outwards, which is a point indicative of great weakness, as well as being unsightly. The hocks should go fairly close together when in action. The thigh should be round, and full of muscle, both inside and out, developed well down to the hock.

Head and Neck.—"The head should be somewhat long, with a broad forehead—an indication of energy and courage; the ears rather long and thin, pointing rather forwards; the eye bright, and somewhat prominent (a drooping eyelid is a symptom of periodical attack of inflammation); the neck of medium length, rather too short than too long, or too thick than too thin, and moderately arched.

General formation.—"The shoulder well let down into the chest, and with a moderate slope; it is not necessary to be too oblique, as with a hunter or a racehorse, but just sufficient to insure free action of the fore legs, encased with plenty of muscle, which will enable him to lean into the collar; the withers being low, the back will close in nearly level. The girth should be deep and the chest well developed; for on these two points depends much of the power and constitution. The back should be short and level, not too high nor too

low; the ribs springing from it, round, coupled up close to the hips which should be wide; and the loins wide and muscular. Carefully avoid short, flat ribs (a narrow and shallow-back-ribbed horse is generally irritable and tender), but rather seek to get deep, round ribs and body; the animal has then what the 'yokels' call a good cupboard, which means constitution—a most essential point in a cart-horse. Wide or ragged hips are a great sign of power; the quarters long and powerful, full of muscle, and deep. The tail may be a trifle drooping—if set on too high, which many think a deal of, it is at the expense of the thigh, which is then split up, and thus loses muscle and power. The dock should be thick, stiff, and strong; it is indicative of power and endurance.

Height.—"The mare should be long, low, and lusty; from 15.2 to 16 hands high; short in the leg, and should measure from point of shoulder to full extent of thigh longer than she is high, short in her back, and long in her sides, and be as deep from wither to elbow as from elbow to ground. A horse thus made will deceive the eye as to its height, and it is points in its favour if it appears smaller and lower than it really is: this is a sure proof of symmetrical form. The stallion should be at least a hand higher than the mare, and his points of excellence similar; but his form should be more massive, and, if possible, more compact, his whole appearance masculine, robust, and indicating the possession of great power and vigour in a comparatively small compass, with rather a coarse than effeminate look about him. A cart-horse cannot be a *really good one* without the following cardinal points: good feet, good legs, good walking action, and a robust constitution." [And it might also be added, "size, soundness, and substance," from the heading on Forshaw's stud card.]

Colour.—"A good horse cannot be a bad colour. It is entirely a matter of fancy; blacks, bays, and browns are the prevailing colour of the Shire horse, and the best selling, though there are many chestnuts, roans, and greys. Roan is a favourite colour with some of the large London draymen as an indication of a hardy constitution. A horse of any colour with a few silver hairs is generally hardy. The most valuable colour is probably the dark brown, with a tan muzzle and black legs; but whatever colour is the fancy, it should always be a hard, not a faint one, avoiding by all means light, faint-coloured hairs on the legs and flanks. A very large proportion of our horses have white legs; much white is objectionable—in fact, many foreign breeders will not

buy horses at any price with white legs; it is every day becoming more important, therefore I would caution breeders to avoid it as much as possible."

Shire breeders have not followed the sound advice as to colour of the first Secretary of their Horse Society, but have allowed fashion to override discretion. The prevalence of white legs and feet is so detrimental to the usefulness of work animals in countries where the sun is hot, that it forms one of the cogent reasons why the two great breeds of English and Scotch heavy-legged horses have been worsted in competition with the French Percheron, in the United States and other foreign countries.

The differences in the **ordinary workaday** form of Shire horse, which, within its own numbers, differs greatly in different localities, as compared with the common Clydesdale, are:—Lower and more sluggish *action;* the *ends* bulky; the *belly* or middle larger (the animal being a greater feeder); the *quarters* shorter (more like the Belgian horse), and the *plates* consequently steeper and flatter; the *hocks* wider between than in the Clydesdale, in which they usually incline slightly inwards; the *leg-bones* and *joints* rougher and rounder, indicating a gross constitution and a tendency to grease; the *pasterns* shorter, and the *hoofs* more upright, giving a stilted look. Long pasterns are now sought for in the best horses, no doubt to counteract the weakness in the mares. The *space between the eyes* is frequently not so wide and the *eyes* are not so prominent as in the Clydesdale. There is more long hair or feathering on the back parts of the legs: this also extends round in front, and may include a tassel from the knee of the stallion. James Howard's paper in the *Royal Agricultural Society's Journal* for 1884 points to much hair as a defect, being more or less detrimental to the animal in certain kinds of work, and especially so in a heavy-land district. But it is argued by the advocates of hair, that abundance of hair and great strength of bone go together, and if the one is discarded the other is lost.

The **average** English work-horse might be much **improved** if a greater number of Farmers' Clubs would make efforts to secure the services of good horses in special districts, and not leave this extremely important matter so much to chance individual enterprise.

Names and History.—The Shire horse or its prototype, we are told by Walter Gilbey in his handsome little volume *The Old English War Horse*,[1] was written of a thousand years ago as "The Great Horse." It has been subsequently named the "War Horse," "Old English Black Horse," and the "Strong Horse."

It is within comparatively recent times that horses have all but superseded bullocks in the working of land.[2] The original work of the English horse was to drag a cumbrous war-chariot at a furious pace. Cæsar's account of it shows that even at that early date the breed was maintained in a high state of proficiency, not only as regards physical form and quality, but also in training. He showed a practical appreciation by "carrying many of them to Rome," and for a time they were in much request. At a later period it was necessary to maintain the size and strength of the horse, to enable the animal to carry the heavy plate-armour of the mounted knight, who "often rode more than twenty-five stones." To the efforts made to attain this object we are indebted for the massive frames and powerful limbs of the Shire breed of to-day. Low asserts that it is descended from a black race of horses "which existed in Europe from a remote age," and was the breed "from which the Romans derived the most powerful horses of their cavalry from Belgic Gaul." It maintained its greatest purity in the States of Holland and the Kingdom of Belgium.

"Its typical form (1845) is round and massive, the chest is wide, the neck strong and muscular, the limbs are short, stout, and hairy. It possesses physical strength and safe action, but is wanting in lightness and speed. It presents every variety of size, from the little sturdy German hackney, to the large animals suited for the waggon and the heavy carriage. The same widely spread race extends into England, etc., etc., with its main centre in the fens and midland counties."

The first attempt to improve the "coarse-headed, large-

[1] Vinton & Co., Tim. Bream's Buildings, London.

[2] The earliest record of the use of the horse in field work is preserved on a piece of Bayeux tapestry of the time of William the Conqueror (A.D. 1066), showing the figure of a man driving a horse attached to a harrow. About the end of the previous century, a Welsh law "forbids the farmer to plough with horses, mares, or cows, but with oxen alone." —YOUATT.

eared, thick-lipped, ungainly breed" was made by an Earl of Huntingdon, who imported several Dutch coach stallions, "which with difficulty he got his tenants on the Trent to use." Many years later "Bakewell went himself to Holland and imported several mares to cross with native stallions."

Walter Gilbey, enlarging on Youatt's statement, says:—

"During the reign of King John—1199 to 1216—there exist distinct particulars of the importation into England, from the low lands of Flanders, Holland, and the banks of the Elbe, of a hundred stallions of large stature; and it is from the blending, nearly 700 years ago, of these animals with the English breed, that some strains at least of our heavy draught horses must be said to date their origin."

Youatt records that:—"One hundred years afterwards, Edward II. purchased thirty Lombardy *war horses*, and twelve heavy draught horses. Horses for agricultural purposes were chiefly procured from Flanders."

Gilbey points out that the so-called "Shire" horse, because belonging to the *Shire* counties in the middle of England,—

"Has for centuries, beyond a doubt, been distributed in numbers through the district between the Humber and the Cam, occupying the rich fen lands of Lincoln and Cambridgeshire, and extending westward through the counties" (*shires*) "of Huntingdon, Northampton, Leicester, Nottingham, Derby, Warwick, and Stafford, on to the Severn."

The Shire Horse Society, and the Shire Horse **Stud Book**, dating back to almost 1878, have done much for the advancement of the breed. The foreign demand for Shire horses to go to Germany, North America, and Argentina has raised the prices of the best horses and encouraged breeding.

The following is a select list of the principal Shire studs:—His Majesty The King, Sandringham, Norfolk; Earl Bathurst, C.M.G., Cirencester, Gloucester; Earl Beauchamp, K.C.M.G., Madresfield Court, Malvern Link; H. H. Smith-Carington, Ashby Folville, Melton Mowbray; V. C. W. Cavendish, M.P., Holker Hall, Carnforth; A. C. Duncombe, Calwich Abbey, Ashbourne, Derbyshire; Capt. W. H. O. Duncombe, Waresley Park, Sandy, Bedfordshire; J. T. C. Eadie, Barrow-on-Trent, Derby; Earl Egerton of Tatton, Tatton Park, Cheshire; Earl of Ellesmere, Worsley Hall, Manchester; James Forshaw & Sons, Carlton-on-Trent,

Newark; Sir Walter Gilbey, Bart., Elsenham Hall, Essex; A. Grandage, Bramhope Stud Farm, Leeds; Sir Walpole Greenwell, Bart., Marden Park, Caterham Valley, Surrey; Sir Alex. Henderson, Bart., Buscot Park, Faringdon, Berks; Lord Hothfield, Hothfield Place, Ashford, Kent; R. W. Hudson, Danesfield, Marlow, Buckinghamshire; William Jackson, The Hall, Knottingley, Yorkshire; J. W. Kenworthy, of Castle Hill, Kelsall, Chester; Max. Michaelis, Tandridge Court, Oxted, Godstone, Surrey; Lord Middleton, Birdsall House, York; Sir P. Albert Muntz, Bart., M.P., Dunsmore, Rugby; Lord Rothschild, Tring Park, Herts; Leopold Salomons, Norbury Park, Dorking; R. N. Sutton-Nelthorpe, Scawby, Lincoln; W. & J. Thompson, Barrons Park Shire Stud, Desford, Leicester; and Lady Wantage, Lockinge, Wantage, Berks.

The Suffolk Punch

Is named from its native county, and from its compact and rounded form, its thick-set body, and short, hard, clean legs and fairly short pastern, free from coarse hairs. The colour is chestnut. White legs are very objectionable, or a bald face. It is said that the colour was derived through a cross with imported Norwegian horses, brought, like some of the progenitors of the trotting hackneys, by the early Norse invaders. The form and action of certain of the Norfolk hackneys of the day leave no reasonable grounds for doubting that, however the Norfolk trotter and Suffolk Punch may now differ in size, style, and general appearance, they must have been intimately connected with one another at some period.

Arthur Young, writing in the end of the eighteenth century, mentions the Suffolk Punch as being one of two varieties of cart-horses—the large black, or old English horse, being the other.

Youatt, fully half a century later, says:—"Horses for slower draught, and sometimes even for the carriage, are produced from the Suffolk Punch, so called from his round punchy make, and descended from the Norman stallion and the Suffolk cart mare. The true Suffolk, like the Cleveland, is now nearly extinct. It stood from 15 to 16 hands high, of a sorrel (chestnut) colour; was large headed, low shouldered, and thick on

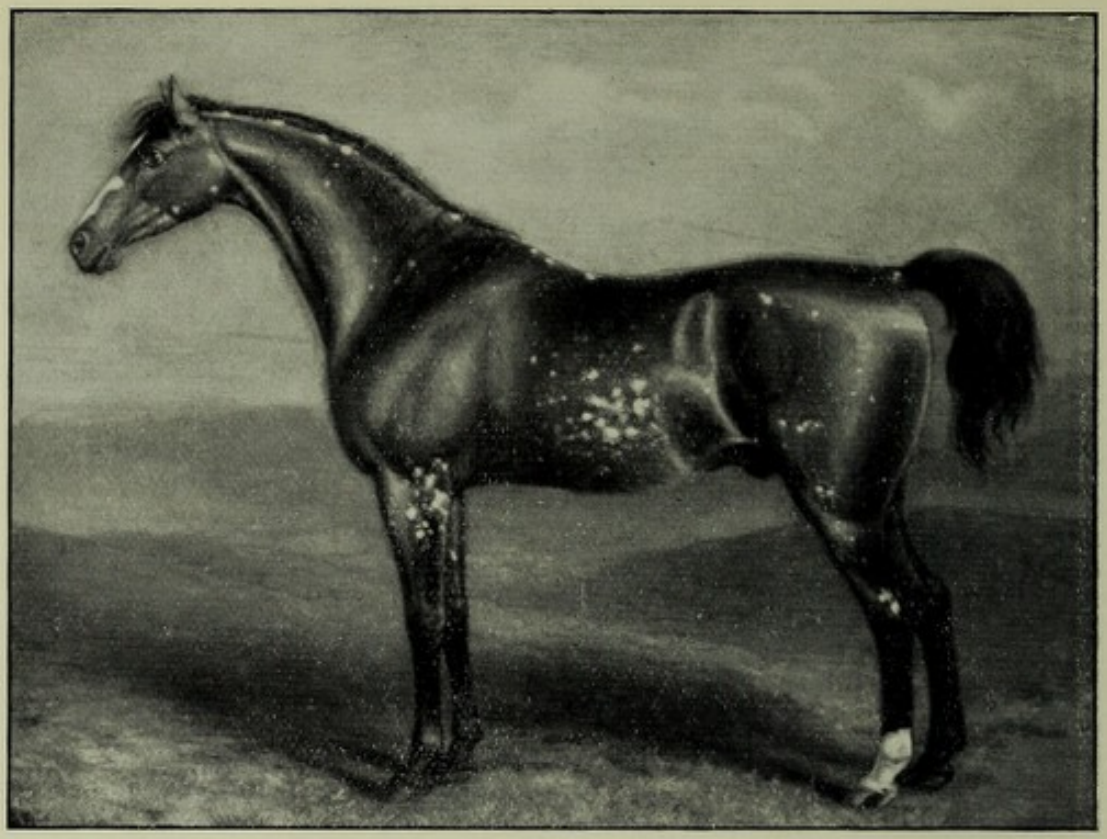
the top, deep round the chest, long backed, high in the croup, large and strong in the quarters, full in the flanks, round in the legs, and short in the pasterns. The Suffolk would tug at a dead pull until he dropped. He was the very horse to throw his weight into a collar with sufficient activity to do it efficiently, and hardihood to stand a long day's work. The present breed possesses many of the peculiarities and good qualities of its ancestors; it is a taller horse, higher and finer in the shoulders; and is a cross with the Yorkshire, half or three-fourths bred."

The Suffolk Stud Book disagrees with Youatt's idea of the origin of the blood introduced to refine the ungainly form of the original Suffolk breed, and shows very conclusively that whatever other crosses had been made, there were two importations of horses from Lincolnshire and one admixture of thoroughbred blood. In 1764, **Andrew Blake,** a well-known breeder of Suffolk horses and owner of stallions, introduced "Farmer" (174) and advertised him as a Lincolnshire trotting stallion. He was a marked success as a breeder, and his progeny realised good prices. By the third or fourth cross they were in turn advertised as pure Suffolks.

In 1801 and 1802, Wright's "Attleborough Farmer's Glory" (1396), believed to be a half-bred Suffolk imported from Lincolnshire, travelled in Suffolk, and "in the first decade of last century there were a good many of the sons of Wright's horse in Suffolk." He was advertised as a "beautiful chestnut cart horse," and "had a little white, and his legs were a little hairy." The horses of the present day are descended from those two animals, Barber's "Proctor" (58), and Crisp's horse (404) of Ufford, the horse of which the earliest individual records exist, foaled in 1768, a year after Blake's "Farmer" was first advertised.

A Historical Notice of the breed, issued by the Society in 1902, says:—

"A curious feature in connection with the Suffolk, is the fact that every animal of the breed now in existence traces its descent in the direct male line in one unbroken chain to Crisp's horse. The form, as described in the advertisements of the time" [15½ hands high; light chestnut, and active; Crisp's noted horse; fit to breed good stock for coach or road] "tallies with the specimens of the present day, with just that modification of form which judicious introduction of more elegant elements would be likely to effect. A detailed description of



A. English Racehorse, "Vestris" (at 11 Years Old).
By "Whalebone," out of "Varennes," d. of "Albert"; to illustrate by comparison the change in type in seventy years.
[*From Low's Collection of Paintings in Edinburgh University made before* 1848.



B. English Thoroughbred, "Rosewater."
[*C. Reid, Wishaw.*



A. Thoroughbred Horse, "Carbine," by "Musket Mersey."
Winner of thirty-three races, including the Melbourne Cup; s. of "Spearmint," winner of 1906 Derby.
Owned by His Grace the Duke of Portland.



B. Thoroughbred Sire, "Orme."
Winner of over £38,000 in stakes; s. of "Flying Fox." A beautifully-formed blood stallion.
Owned by His Grace the Duke of Westminster.

[*Both photos by G. H. Parsons, Alsager, Cheshire.*

[*pp.* 424 *and* 425

a descendant of this horse, foaled in the latter end of the eighteenth century, taken from the lips of an old man who remembered him, varied little from the general character of the horse we now have with us."

Barber's "Proctor" (58) (intended for a riding horse but for an accident in nicking his tail, which necessitated his being docked), the sire of at least half a dozen horses which travelled in Norfolk at the beginning of last century, was the son of Winter's "Stormer," a trotting horse of great substance. The latter was a son of Gooch's blood-horse, brother to "Thunderbolt." The dam of Barber's "Proctor" was a chestnut. This was the foundation of the "Shadingfield" stock, a light-hearted, high-spirited lot and somewhat short-tempered, chiefly dark chestnuts with white legs, though many of the first few generations were bay. They were thin in the shoulders, and light of bone below the hock; but hard fleshed, wiry, active horses, with long lean heads. The mares sometimes bred bay foals.

The "Sampson" tribe, most probably an offshoot from the "Farmer's Glory" stock, formed, with the four great branches of the Suffolk breed already mentioned, the five chief tribes from which the modern Suffolk horse is descended. At the time the Stud Book history was written, 1880, the "Blake" stock was out of favour as sires and was dying out, but the blood still remains on the female side.

The Stud Book notice of 1902, already mentioned, says:—"All extraneous introductions have long since died out in the male line, and those remarkable features—the short legs, the rounded carcase, the longevity with vitality, are still the well-known characteristics of the Suffolk horse."

The essential requisites of a first-class Suffolk, condensed from the **Suffolk Stud Book and History of the Breed,** published in 1880—the most exhaustive and complete record of its kind in the United Kingdom—are as follows:—

"The recognised *colour is chestnut*, of which there are seven shades—the dark (at times approaching a brown-black, mahogany, or liver colour), the dull dark, the light mealy, the red, the golden, the lemon, and the bright chestnut. The last is the most popular, being a lively shade, with a slight gradation of light colour at the flanks and the extremities, and not infrequently shot with white or silver hairs hereditarily distinctive of some strains, and mostly associated

with a star on the forehead, or a thin 'reach,' 'blaze,' or 'shine' down the face. The flaxen mane and tail prevalent about the middle of the eighteenth century, although rare, are usually seen on the bright chestnut. The red, which is almost certain to be a whole colour (also on mane and tail) without variation in shade, is also very popular. The light variety —the cherry red—is said to come of a taint of bay origin. The golden—a beautiful colour, akin to the bright chestnut—is not infrequently associated with a white hind heel. The lemon or 'yellow' is a very light golden shade. The light mealy chestnut is universally condemned as indicative of a weak constitution, soft legs, and a slow phlegmatic temperament. The body is dull, the flanks and underline a mottled ash colour, gradually shading off to a dirty white at the extremities, which are usually covered with soft hair of the same hue. The dark chestnut prevalent in the nineteenth century is in favour with some breeders; but it is mostly a changing colour, varying with the season from almost black to a dark cherry-red, and, although a hardy colour, is not in favour—the dull, dark variety being almost as unpopular as the mealy chestnut. Bay, which is rarely seen, occurs in strains which have a stain in the pedigree. Sorrel was the old name for chestnut. Black, white, grey, or dun is never mentioned among Suffolk horse colours.

"**Quality,** indicated by a thin skin and soft hair tightly fitted, especially over the bones and joints of the legs, has long been a conspicuous feature of the breed.

"**Form.**—The head of the Suffolk has varied considerably in type. Perhaps the big, bold head, long and thin, is the best, but many of the most famous ancestors of the breed inclined to the 'foreign' or Flemish type, showing a short wide head, thick at the chop, the eyes small and slanting downwards, and the ears short, set on low and back towards the neck so as to be barely seen. The neck is strong, rather short and muscular (indicating constitution), deep in the collar, with a fine silky mane on an arched crest, and tapers gracefully towards the setting on of the head. A straight 'ewe neck' is rare and very defective. The excessively muscular development in certain strains of blood is usually associated with a hollow back. The shoulder is muscular, well thrown back at the top, giving the modern comely appearance and smart step to the best horses. A well-rounded rib, deep all the way from shoulder to flank, is a *sine qua non* with a Suffolk horse, and so is a graceful outline of back, loin, and hind quarters. The hind quarters are wide and heavy. The rump may be round, almost circular, from the top of the

croup to the tail down to the back of the quarter by the stifle bone and up to the hips. The tail is thin, usually set on low, but the high hip, drooping rump and angular quarter are never found in a true bred Suffolk, nor the square rump with the tail on the top.

"The height averages 16¼ hands, but varies up to 17 and below 16 hands. The girth behind the shoulders is about 8 feet. One Royal winner taped 8 ft. 2 ins., and Garrett's 'Cupbearer III.' gave ½ in. more.

"The legs are straight, with fair sloping pasterns, big knees, and long clean hocks on short cannon bones free from coarse hair. Elbows that are turned in are regarded as a serious defect. The bone of the Suffolk horse is at times objected to by foreign buyers as too fine, but it is after the texture of the thoroughbred, and does not require to be heavy to the eye—a girth of 10½ inches below the knee being considered ample. One Royal prize-winner measured 11¼ ins., and had no more hairs than a thoroughbred.

"The feet are particularly sound, having plenty of size with good circular form protecting the foot, hard and well formed, as a result of the stringent regulations against unsoundness introduced by the Royal Agricultural Society of England and the Suffolk Agricultural Association during the third quarter of last century. Early in that period the Suffolk horse suffered, like other heavy horses, from sidebones and various other diseases and defects of the foot, but by stringently eliminating such animals from breeding, the tendency to disease was almost obliterated.

"**General Characteristics.**—For power of endurance, constitution, and longevity, the Suffolk horse has long been famous. Arthur Young records the case of Wright of Rockford Hall, who with seventeen horses at work in ten years never changed or added one to these teams, except a stallion. Stallions have been known to travel sixteen and twenty-one years and one even twenty-five years in succession, while a mare has been known to breed till she was 37 years old. In temper they are docile, and they can work exceptionally long hours without food. Continental armies use them for artillery purposes. Some of the cleverest cobs in existence are bred out of light active mares of the Suffolk breed. Many excellent hunters in the field, and still more in the showyard, have been the produce of pure Suffolk mares and a thoroughbred stallion. The Suffolk horse is exported to Canada, the United States; to South America and Australia; to Spain, France, Austria, Germany, Sweden, and Russia. The breed is to be best seen at the shows of the Suffolk Agricultural

Association. Comparatively a limited number have recently appeared at the Royal Agricultural Society's annual show. For all purposes of British agriculture, the Suffolk horse, smart between the shafts in harness, quick at the ends on the plough, a fast walker in the harrows after the drill, and a staunch slave at the collar, be it flour, timber, or chalk behind him, is unsurpassed by any breed of horses. During the first twenty-three years of the Royal Agricultural Society's existence, while the prize was offered for the best horse for agricultural purposes of any breed, fourteen went to Suffolk horses, and the remaining nine to all other breeds."

The modern Suffolk has a body that looks heavy for the limbs, which are clean and fine, with little long hair. He is a long stepping, active walker, but he does not lift so high in trotting as a Clydesdale or one of the better types of Shire horses, and he seems to twist his legs more when moving. "But from the time he is two years old till he is twenty-four, on every soil, at any work, he can hold his own against all comers. In shunting railway trucks, at the heaviest work in the Liverpool Docks, he may be out of place; but for the London delivery van, the miller's flour waggon, or anything requiring power and a quick start, the breeder of Suffolks has little to fear from competition. The Great Eastern Railway Company drove a pair of pure Suffolks for eight years in one of their parcel vans in Ipswich."

G. M. Sexton, on cart-horses, says:—"The Suffolk is suited admirably to the light land district, where he is bred to perfection, and has no superior for the work he is able to perform. He is endowed with a marvellous constitution, which enables him to do an eight hours' journey at plough and return to his stable looking little the worse for it. He is remarkable, too, for carrying his years well, frequently living and working for upwards of twenty years on the same farm, and at fifteen or sixteen years he looks in the prime of life."

The London Cart-horse Parade Society held in Regent's Park on Whit-Monday 1906 its twenty-first parade, with the objects of improving the "general condition and treatment of cart-horses" within the metropolitan postal area; encouraging the humane treatment of the animals, and the use of powerful horses suitable for street work. The numbers entered now

exceed 1000 annually. "In addition to money prizes (including prizes for good conduct and long service—twenty-five years), a handsome diploma, or brass, suitable for affixing to harness, is awarded to drivers who have been recommended by the judges for such distinction; and the Shire and Suffolk Horse Societies award numerous premiums and silver medals for horses of the best type irrespective of breed."

CHAPTER XXI

THE HORSE—THE THOROUGHBRED, ARAB, HACKNEY, CLEVELAND BAY, YORKSHIRE COACH-HORSE, AMERICAN TROTTER

The Thoroughbred—Racecourse and other Selection—Early Improvement—Importation of Roman, Spanish, Arabian, and other Horses—Failure of Early Crosses—Ridgway and Blunt on the origin of Light Horses—In-and-in Breeding—**The Arab Horse**—Names—Strains—Colour—Points—The Royal Commission on Horse Breeding—The Hunter's Improvement Society—The Brood Mare Society—The Harness Horse and Pony Society—**The Hackney**—Origin and Development—The Modern Norfolk Trotter—Yorkshire Trotters—The Exportation of Hackneys—**The Cleveland Bay**—**The Yorkshire Coach-Horse**—The Rule of the Road—The Horse's Prayer—**The American Trotting Horse.**

THE THOROUGHBRED[1]

IS in some respects perhaps the most interesting of our British live stock. It has been bred without admixture of alien blood for more than a hundred years, and during that time it has been subjected to the most rigorous system of selection through individual trials of strength and endurance. No breed has been so effectually tested for the special qualities required of it as the thoroughbred. The showyard test of the cart-horse is very different from this test; the merits in a show competition being determined by external appearance and by inference, not by trial in the work for which the animals ought to be most prized. The endeavour to judge the qualities of a Thoroughbred by external appearances only ends in failure and disappointment in most instances, even when this is attempted by the most skilful. An additional selection over and above the process of natural selection is apparently necessary, when we realise that between

[1] See *The Horse: How to Breed and Rear Him*, by Wm. Day, of Salisbury (Bentley & Sons, 1888), to which the Author acknowledges indebtedness.

1877 and 1893 the Derby was won on five occasions by an unsound animal. (See Appendix M.)

Records exist of racing in this country as far back as the beginning of the thirteenth century, but of the early improvement and management of British horses little is known with certainty. After the formation of good roads, the Romans imported horses of lighter build than the native English horses, with the object of improving the latter for road-work. Athelstan introduced running horses from Germany. Spanish horses were next used before Arabians were brought in. What were called the "Royal mares" were imported by Charles II. About the end of the seventeenth and beginning of the eighteenth century the most **famous of the Eastern sires** were introduced, viz., the "Godolphin Arabian," the "Byerly Turk," and the "Darley Arabian." These horses, mated with the Royal mares and with the best of the native English horses of the time, acquired a very large share in the establishment of the English Thoroughbred. Going still more closely into the origin of the best Thoroughbred horses of the present day, it will be found that nearly all can claim relationship with one or other of the **three famous sires**—"Herod," "Eclipse," and "Matchem."

The superior qualities of the few have been taken advantage of in the improvement of the many. The improvement has been great in the special direction and for the special purpose for which the race-horse is kept. "Two distinguishing qualities of the English Thoroughbred are, great speed with a light weight over a short distance, and early maturity." So much has the element of usefulness been sacrificed in recent years in the interests of baby racing, says one high authority, "it is generally estimated that out of every 2000 horses bred, only about three obtain pre-eminence for speed, strength, staying power, and pluck . . . hundreds of horses being permanently ruined by pernicious premature training." It is true that the length of a race, which in olden times extended over three or four miles, has now been much shortened, and horses are trained to do short distances at high speed; but there is little doubt, nevertheless, that the staying power of the breed is as good as ever, while the pace in later years has greatly increased. Greater speed has been associated with a larger stride and increased height. Sir Walter Gilbey records, on the authority

of Admiral Rous, who wrote in 1860, that the English race-horse had increased an inch in height in every twenty-five years since 1700.[1]

In-and-in breeding, apart from that modified form of in-breeding which has been defined "line-breeding," being thought derogatory to pluck, is not successfully practised among thoroughbreds, but there is no breed in which the advantages of a good pedigree are more seen.

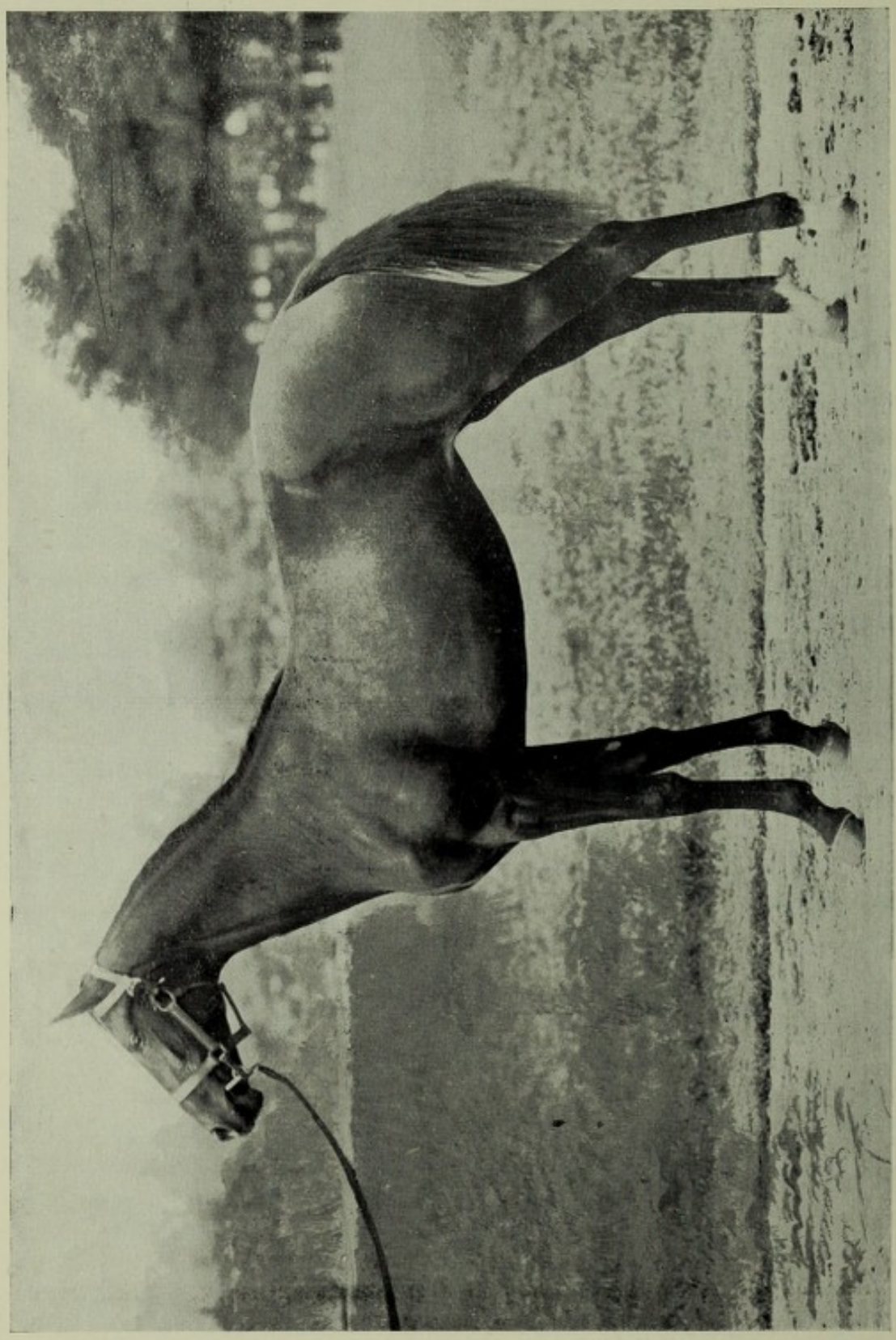
The first or early crosses with Turkish, Arabian, or Barb horses did not prove a success as regards the production of winners, but the improvement due to the distinct impetus given by the cross became apparent in later crosses in the form of animals superior to either the imported or the English horse of an earlier date. Though this is admitted, it is generally accepted in relation to racing, that no advantage could now be gained by crossing with any alien blood not descended from the English Thoroughbred. Arab horses, for example, are supposed to have remained at much the same stage of advancement for the last two hundred years, while the English Thoroughbred racer has been vastly improved.

Professor Ridgway's work, introduced on page 388, created a new interest in this subject. The chief objects of the book have been stated to be two. "The *first*, to set out the evidence to show that the generally received notion of the Arab horse being the ultimate source of our Thoroughbreds has no historical foundation; that the Arabs only got their fine breed of horses from North Africa at a period later than the Christian era; that a thousand years before they ever bred a horse there existed a fine breed in Libya, in North Africa, and that from this North African stock, a variety distinct from the clumsy, thick-set, slow horses of Europe and Asia, have sprung all the best horses of the world. The *second*, to trace the important part played in history by this Libyan horse and its descendants."

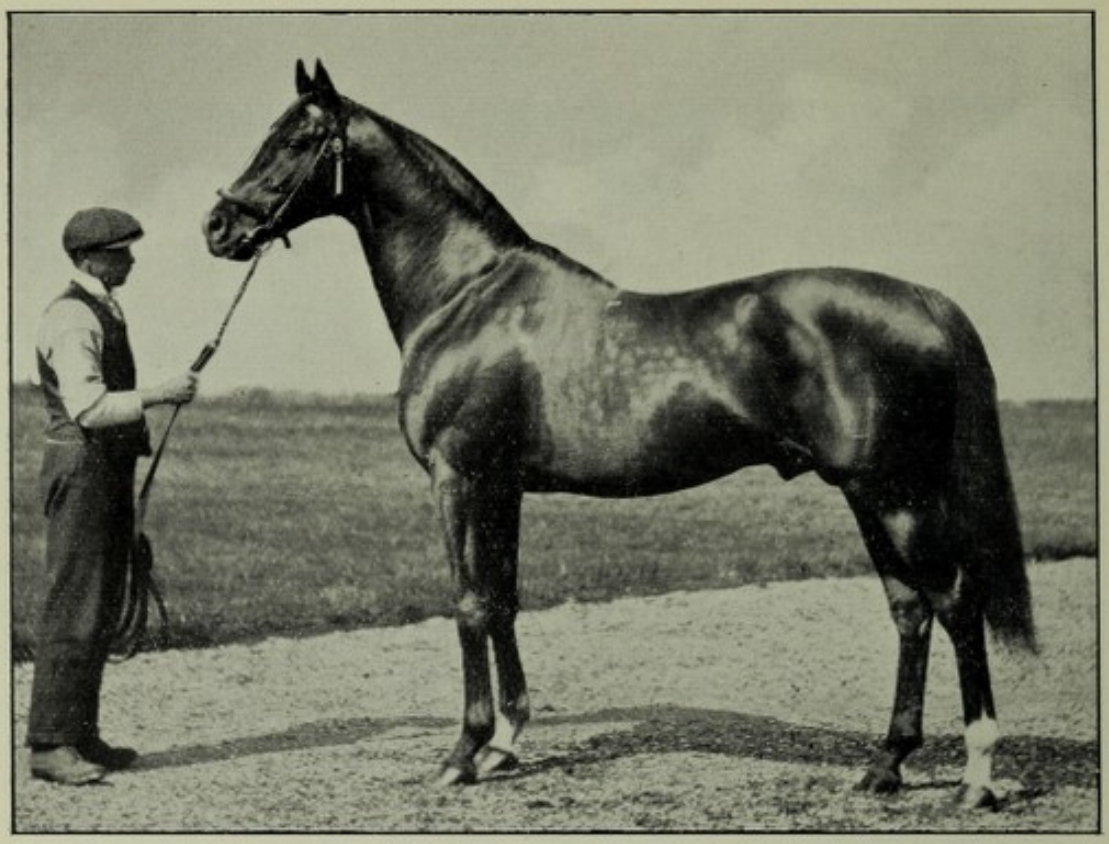
Much of the evidence advanced in support of Ridgway's contentions was freely criticised by Wilfred Scawen Blunt,[2] who possesses a wide personal acquaintance with Eastern countries and Eastern horses. The Libyan horse Blunt

[1] Preface to *The Arab the Horse of the Future*, by Sir James Penn Boucaut (Gay & Bird, London, 1905).

[2] In *The Nineteenth Century* for January 1906, No. 347.



Thoroughbred Yearling Filly.
Owned by T. J. Farley, Ardmore, Blackrock, Co. Dublin.
[*From "The Journal of the Board of Agriculture and Fisheries for Ireland," Oct. 1904.*



A. "Cyllene," by "Bona Vista"—"Arcadia."
Sold for £31,500. Thoroughbred stallion; s. of "Cicero," winner of the Derby, 1905.
[*G. H. Parsons.*



B. Thoroughbred Irish Year-old Hunter Filly.
Owned by Miss Elsie Young, Mount Hally, Killygordon, Co. Donegal.
[*Photo by the Author.*

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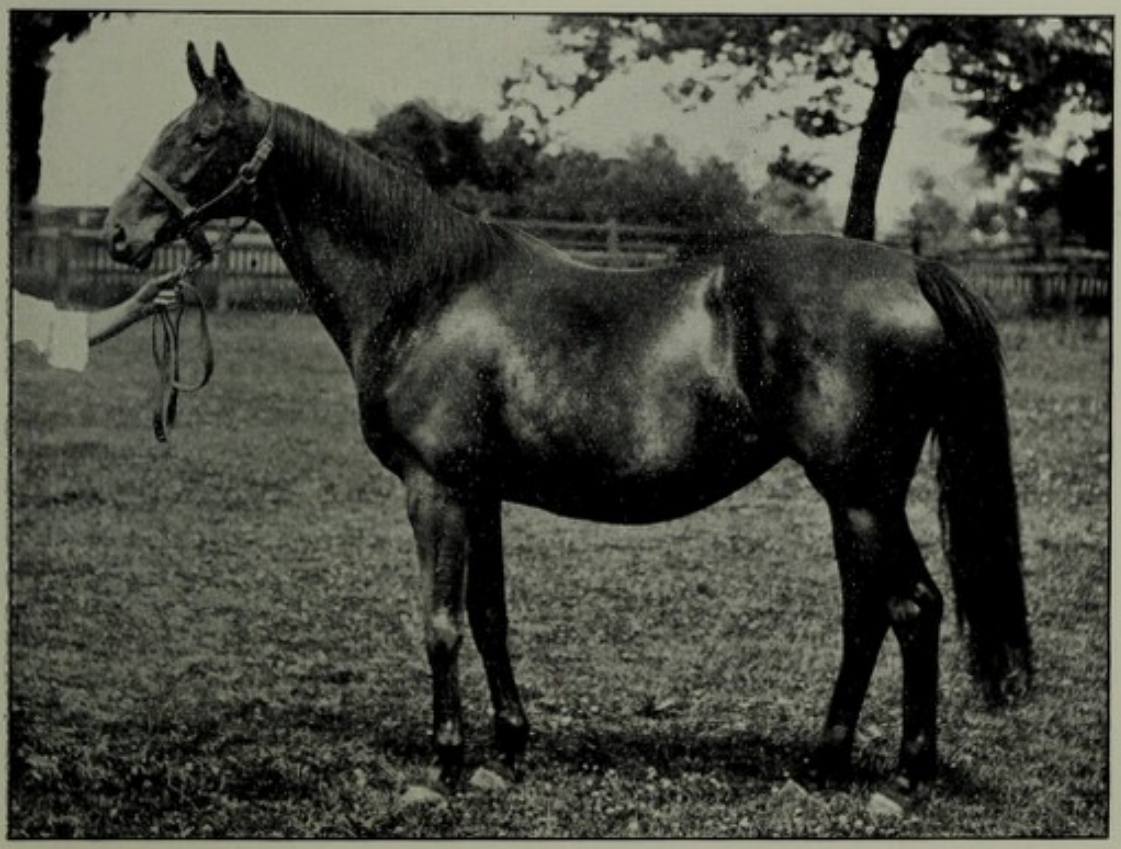
A. Thoroughbred Horse, "Riverstown."
A model Hunter sire.



B. Thoroughbred Mare, "Ornament."
Own sister to "Ormonde," and d. of "Sceptre."
[*Both photos by G. H. Parsons, Alsager, Cheshire.*

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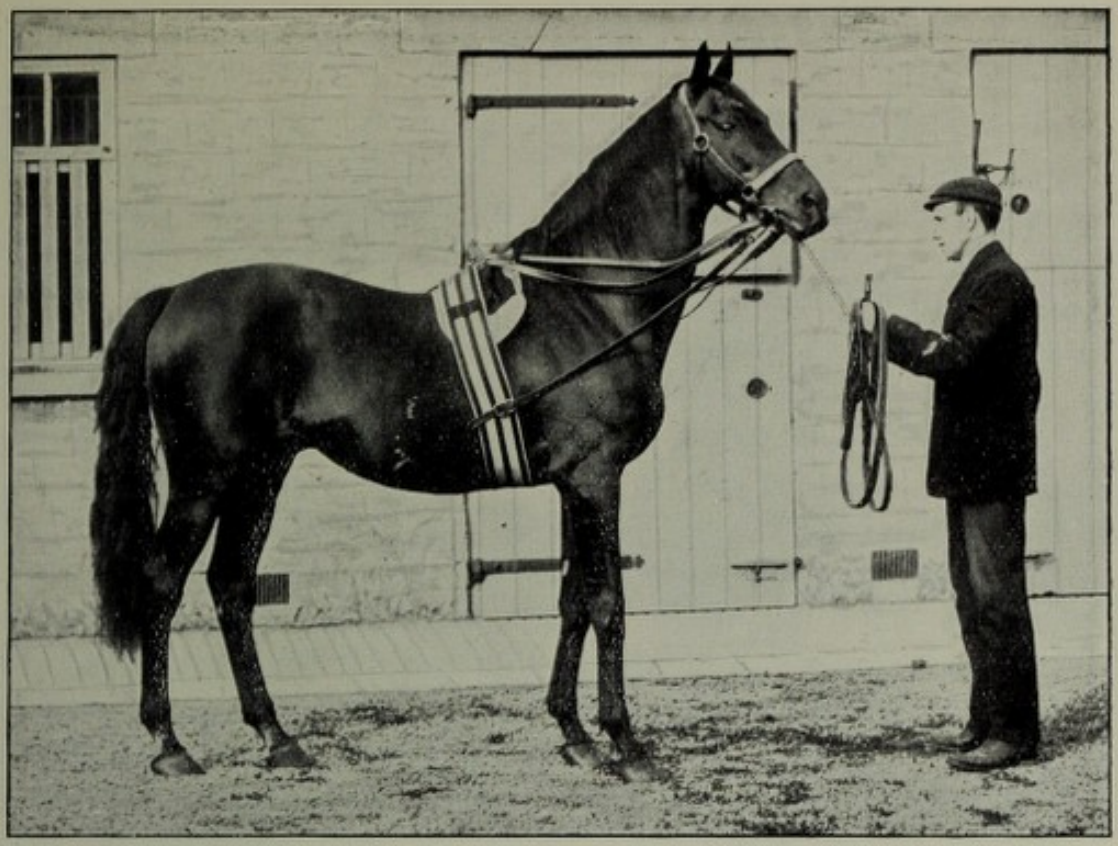
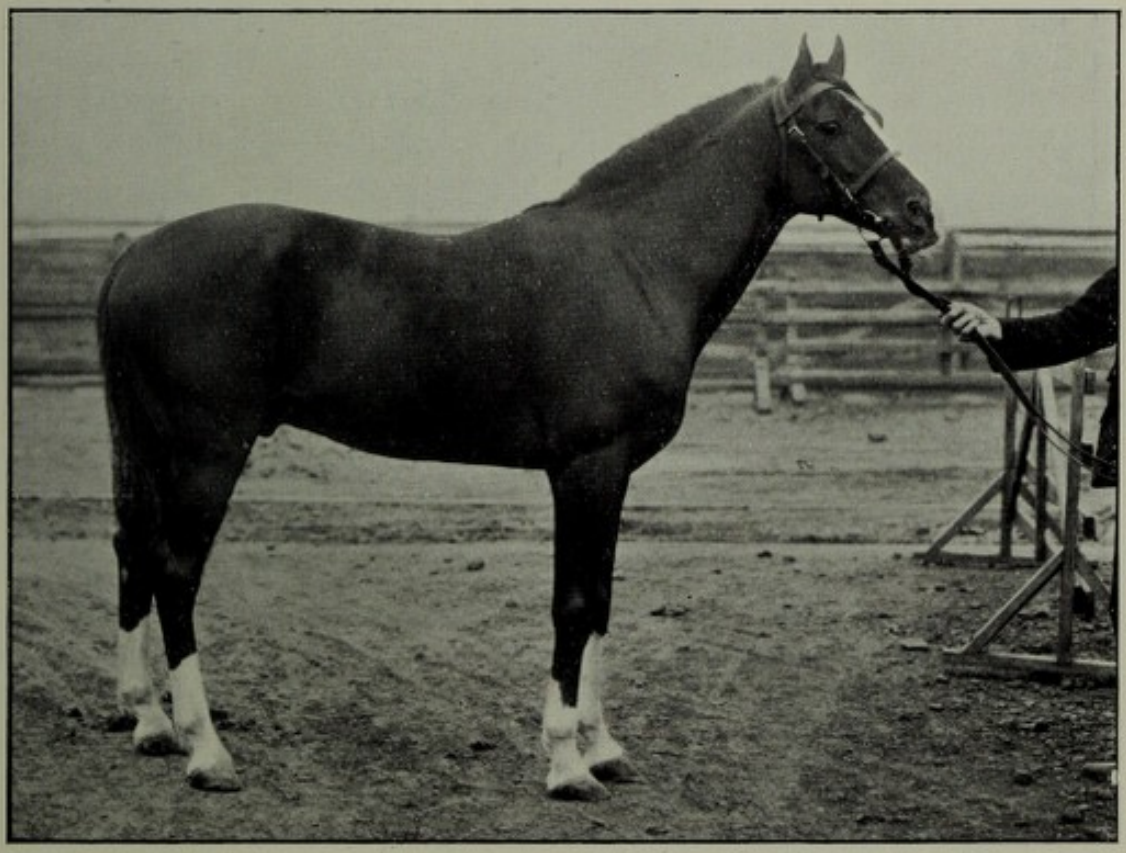


A. Thoroughbred Stallion, "St Simon," at 21 Years. Foaled 1883.
By "Galopin St Angela." Owned by His Grace the Duke of Portland.
Unbeaten on the turf; the greatest sire of recent times; his progeny, including two Derby winners, has won over £506,000 in stakes.
[*G. H. Parsons, Alsager, Cheshire.*



B. High-cast Arab Stallion, "Scorn," 14.1½ h.h.
Winner of many races in India. Taken to N. S. Wales by G. R. Jackson, Temdale, Mohouga.

[*p.* 432

identifies with the Barb, which "may have found its way to the North African shore at a very early date from the neighbouring coasts of Spain, and there, in the special environment of the desert plateaux immediately south of the mountain ranges, have acquired . . . the superficial qualities of thorough breeding, while retaining the convex head, the drooping quarter, and low carriage of the tail which belonged to his European progenitors." The Arabian horse, or *Keheilan*, the origin of which Ridgway attributes to the Nile Valley, with its extremely unlikely conditions for developing a breed of horses, Blunt claims for the Euphrates Valley, and more remotely in time and distance from Southern Asia. Whatever may have been its origin, Ridgway has established the existence of a Libyan horse of superior quality, highly specialised by its peculiar environment, which he asserts was bay in colour with a white stain on the forehead; also, that the swiftest horse in Homer's time was of this colour, and that the "dark horses of Libya" were the swiftest in the classical times of Greece as well as "in the Roman circus in the first century of our era." He says further, on the authority of tomb-paintings, that "horses of a bay or brown colour existed in Egypt fifteen hundred years before the Arabs possessed a horse." The drooping tail of "Spiermint," the Derby winner of 1906, and of many of the best modern Thoroughbreds, is, if Blunt be right, additional evidence of their Libyan connection, which Ridgway advances on the plea of colour—there being no dun Thoroughbreds and a greatly preponderating and increasing proportion of bay horses among the best horses which have run in the Derby, the Oaks, and the St Leger from 1870 to 1899. Chestnut comes next to bay as a good second, but blacks and browns are not much in evidence, and grey is never now seen to win a good race.

The Arab Horse

The Arab or Kohl breed of horses is the Thoroughbred of the East and of Africa, as the English Thoroughbred is that of the West. It has been in times past responsible for the *quality* that has appeared among horses of mixed blood in Eastern countries. Whatever may have been the original habitat in which this peculiarly beautiful section of the great family of *Equidæ* became developed and specialised, there is

no historical record or reliable evidence of any kind that the Arab tribes possessed horses until after the beginning of the Christian era. Arabia contained wild asses and wild camels, but no horses were numbered among the flocks and herds mentioned in history. Camels were, before horses, the Arab's stand-by. He ate their flesh and drank their milk, and they carried him into battle. It was not till Arabs became expert horsemen that they attained distinction as warriors. In Eastern countries, as in Western and Southern Europe, the horse was first used to draw chariots, and never to carry mounted men, probably owing to the smaller size of the early representatives of domesticated horses.

The name "Kohl" and its derivatives, *Keheilan* horse and *Keheilet* mare, originated in kohl, a powder of antimony used by Eastern women to darken the skin round their eyes. The eyes, especially of grey and white Arabs, show dark peripheral rings; but, correlated with the unfailing darkness of the uncovered skin near the eyes and muzzle, is a blue-black skin beneath the hair of the body and limbs, except under a white snip, a blaze, or stockings of varying dimensions.

The true Arabian horse belongs to one or more of the strains of blood known as Al Khamseh, **The Five,**[1] viz., (1) Keheilan, (2) Seglawi, (3) Abeyan, (4) Hamdaire, (5) Hadban. There are some sixteen other less-noted strains, with numerous sub-strains. Contrary to the general opinion held in this country, probably over 85 per cent. of Arab horses are dark in colour. The preponderating colour, as in the English Thoroughbred, is bay, and it is on good authority admitted that, with some conspicuous exceptions in favour of white or grey, the best Arabs are bays, usually with black points, although Major-General W. Tweedie[2] says the true nutmeg-roan or nut-meg-grey runs the bay colour close for the place of excellence in the Arab breed. Chestnuts of different shades are numerous, though some are hot-tempered and even violent. No Arab foal is ever born white, but "always bay, chestnut, or dark brown." Blunt says, "Roans, piebalds, duns, and yellows are not found among the pure-bred Arabs, though the last two

[1] Ridgway gives several traditions which unconvincingly attempt to account for the origin of *The Five*, pp. 165-7. See footnote, p. 388.

[2] *The Arabian Horse, His Country and People*, published by William Blackwood & Sons, 1894.

are occasionally among Barbs." Ridgway says—"In Syria there are more grey and far fewer bay horses, and occasionally black; in Turkish Arabia grey practically becomes the universal colour, and sooty black is common in the Kurdish horses; whilst the Shammar horses [belonging to tribes in the region between the Euphrates and Tigris, north of Erack in Turkish Arabia] seen by Upton were white, grey, and reddish-grey." This divergence from the normal Arab colour he attributes to crossing with "the Upper Asiatic horse [of the type of the pure Mongolian pony], which forms the substratum of all the horses of Syria, Turkish Arabia, Armenia, and Persia." The cross-bred descendants acquire greater size than either original pure-bred parents—the Turcoman or Persian horse being 15.2 hands, while the best Arabs average about 14.3 hands. In Arabia, where the total number of pure Arabs is not now great, the best horses are in the possession of the Anazah tribes of the deserts of the central plateau, 4000 feet above sea-level. Blunt specially names the Gomoussa as having "really fine mares." "Arabs trace the pedigree of their horses through the dams, and not through the stallions as with us," which accounts for the difficulty of procuring mares for export.

Points of the Anazah Arab Horses.[1]—In the general form there is a beautiful balance of power and symmetry, and for racing, to which it has been dedicated, the great general length gives it a long reach or stride. The head is not proportionately small, but beautifully formed. It is large and broad above the eyes (which are full and prominent), short, and tapering from the eyes to the muzzle, with a depression or hollow in the face. The unusually long, wide nostrils, capable of being greatly dilated, open upwards and outwards with accelerated breathing, due to violent exercise. Some tribes of Arabs remove the point of a gristle which supports the lower lip of each nostril, to permit of greater expansion. The ears are not long, but pointed, beautifully shaped, and characteristically placed, thus indicating purity of breed. The light but strong and muscular neck is of moderate length, and forms a graceful arch from the poll to the withers. The withers are high, fully developed, and run well back, but they are not too narrow or thin. The back is

[1] With acknowledgments to Upton.

short, the loins powerful and well coupled, the croup high, the haunch very fine, the tail set on high, and the dock short. The quarters are long and deep; the gaskins full and muscular without being heavy or unshapely; the thighs well let down; the hocks clean, large, well formed and well placed. The shoulders are long, powerful, and well developed, but light at the points. The arms are long, lean, and muscular, and deep at the well-developed elbow. The knees are large, square, and deep, and the pisiform bones behind very prominent. The legs are short, deep, and have fair-sized bone, with the tendons and ligaments large and well strung. The fetlock joints are large and bold; the pasterns long, large, sloping, very elastic and strong. The feet are wide, and open at the heels, rather deep, and slightly elongated.

The hardiness of a high-bred Arab is well illustrated by the following **brief history of "Mahmud,"** whose photos in summer and winter coat formed the originals of Plate CVI., taken when he was eleven and twelve years old respectively. He was bought in Cairo by Lord Tullibardine for £18, when "rising four," out of a drove of young horses from Damascus, and taken to a racing stable to be trained; "but whenever he found himself collared, he used to turn and savage the horse that was bothering him, so was of no use for racing." He carried Lord Tullibardine through the Egyptian campaign, and was present at Atbara and at Omdurman, where he was wounded. He was then brought to this country, but being too hot for polo, was regularly ridden by his owner as a hack. He went through the whole of the South African campaign without being sick or sorry, except for a slight sprain of a fetlock, which occurred on stony ground, near the end of the war. His lordship never spared him, but used him for all the long treks and hard work he had to do. While two Blues' chargers died, he survived the deadly time of horse-sickness experienced after the relief of Ladysmith; but for this he is probably indebted to the personal care of his master, who saw that a few drops of eucalyptus oil were regularly put in his nose-bag before it was placed in position for the night, and that all ticks were removed as soon as they showed up, and the place of attachment to the skin sterilised. He was returned to this country



A. Arab Horse, "Lord Tullybardin."



B. Arab Horse, "Lord Tullybardin," in a Long Coat.

[*Both by A. F. Mackenzie, Birnam, N.B.*

[*p.* 436

in September 1902, and passed to the stud after being shown a few times. The best foal which "Mahmud" sired up till 1906 was out of a Transvaal mare.

The Royal Commission on Horse-breeding.[1]—In the year 1888, certain money, which was formerly given in Queen's plates for racing, was first diverted by the Royal Commission on Horse-breeding to the encouragement of horse-breeding in Great Britain. The selection of the best horses entered for the various districts was at first annually made in March at a show of thoroughbred stallions suitable for getting half-bred horses, at the Royal Agricultural Hall, Islington, in connection with the Royal Agricultural Society of England and the Hunters' Improvement and Hackney Horse Societies. In 1892, twenty-two "Queen's Premiums" of £200 each were offered for stallions of four years old and upwards, and these were distributed in six districts in England—three in each; and four districts in Scotland—one in each. The Royal Agricultural Society of England provided three additional stallions for another district of England, making, with the six districts already referred to, the seven produce districts into which the country has been divided in connection with the annual agricultural returns. In 1892 this Society withdrew its financial assistance. For eight years (1894-1901) twenty-nine **stallions** annually received premiums (now reduced to £150), but since that time the number selected has been fixed at twenty-eight. Until 1903, the judges selecting the horses were given no information beyond a record of the age and height of each animal. Now merit in performance in racing or steeplechasing has with much benefit been taken into account. All stallions are rejected if not found on inspection to be free from roaring or whistling, ring-bone, unsound feet, navicular disease, spavin and cataract. **Roaring** is frequently associated with a wasted appearance of the tissues which cover the larynx, and "is caused by paralysis of one or both of the muscles which open the larynx." Each stallion is expected (if required) to serve the minimum number of fifty mares in the season, at a fee of £2 for each mare and 2s. 6d. to the groom. The average percentage of foals left is a little under sixty. The total number of mares served in the season fell from 1916 in

[1] Secretary—J. Herbert Taylor, 12 Hanover Square, London, W.

1888 to 1271 in 1895, but the figure in recent years has usually been from 100 to 300 higher. The success of the work is better gauged by the honours awarded to the produce of premium stallions, and these for seven consecutive years (1898 to 1904) numbered 283, 357, 425, 406, 355, 404, and 455. At the spring show of the Hunters' Improvement Society in 1905, the prizes for the best group of three young hunters by the same sire were awarded to the produce of one of the King's premium stallions, "Wales." The number of **stallions rejected** for unsoundness has recently diminished much; out of ninety exhibited each year, only five failed to pass veterinary examination in 1905 against seventeen rejected in 1889.

"**A record** has been kept **of all breeders** who have had mares served by the premium stallions since 1888, for the benefit of the War Office and the Remount Department."

It was a judicious act to discontinue the payment for racing purposes of the sum of £3360, which was formerly given from Her Majesty's Privy Purse for Queen's plates, as the sum was much too small to encourage first-class racing. It is questionable, to say the least of it, whether it was right to give for the encouragement of horse-breeding such a paltry sum, even when increased as it was by a Parliamentary vote of £1740 per annum. If it be a wise policy to encourage horse-breeding by State aid, the money thus devoted to it is altogether inadequate. If a larger sum is ultimately provided, the Commission will naturally be requested to take a more comprehensive view of the situation, and to extend encouragement to other breeds than the Thoroughbred. A Parliamentary Blue-book of 138 pages, containing the **minutes of evidence** taken before the Royal Commission on Horse-breeding, was published in 1890, and the Tenth Progress Report was issued in 1905,[1] signed by Portland (*President*), Coventry, Ribblesdale, Middleton, Henry Chaplin, Jacob Wilson, John Gilmour, and J. Bowen Jones.

The efforts to improve the breed of light-legged horses are not confined to Great Britain. The **Royal Dublin Society** issued in 1892 the first volume of its *Register of Thoroughbred Stallions* for service under the horse-breeding scheme of 1892. The conditions were that the stallion should be entered in Weatherby's Stud Book, should be over three

[1] To be had from Wyman & Sons, Limited, London.

and not over eighteen years of age, should by the Society's veterinary surgeons be declared free from all hereditary diseases, and should in other respects be considered suitable for the objects of the horse-breeding scheme. They alone could be selected for mares receiving nomination the property of farmers whose holdings were less than £150 a year tenement valuation, two-thirds of the fee of £3 being paid by Government. A thoroughly **revised scheme** for the encouragement of horse-breeding in Ireland was issued by the Board of Agriculture and Technical Instruction for 1905, and it was reprinted in the *Hunters' Stud Book*, vol. ii., page 248.

The Hunters' Improvement Society[1] entered its twenty-first year in 1905. Its objects, stated in vol. ii. of the Stud Book, 1906 (eleventh volume of the series), are:—

1. To improve the breed and promote the breeding of hunters and other horses used for riding or driving, and for military purposes.

2. To give premiums at spring shows, and obtain for breeders the use of sound stud-horses at moderate service fees.

3. To publish Stud Books—the first nine volumes were *Records*—of hunter stallions and mares, and use means to induce the various Agricultural Societies to offer prizes at their shows for mares and young stock.

4. To attract public attention to a subject so important to the nation, and to spread knowledge of the principles upon which a better class of horse may be bred.

The membership in 1905 numbered 1695, as compared with 1112 in 1896. The income for the year 1904, viz., £3861, included a sum of £479 received from the Royal Commission on Horse-breeding. Gold medals are offered annually by the Society at its own show and at the shows of the three National Agricultural Societies; and there are over 100 Associated Societies which may secure gold, silver, and bronze medals if they offer prizes for hunter classes on published conditions which are calculated to encourage the breeding of good, sound animals. A list of stallions registered for service is annually added.

On 30th May 1904, the Council of the Hunters' Improve-

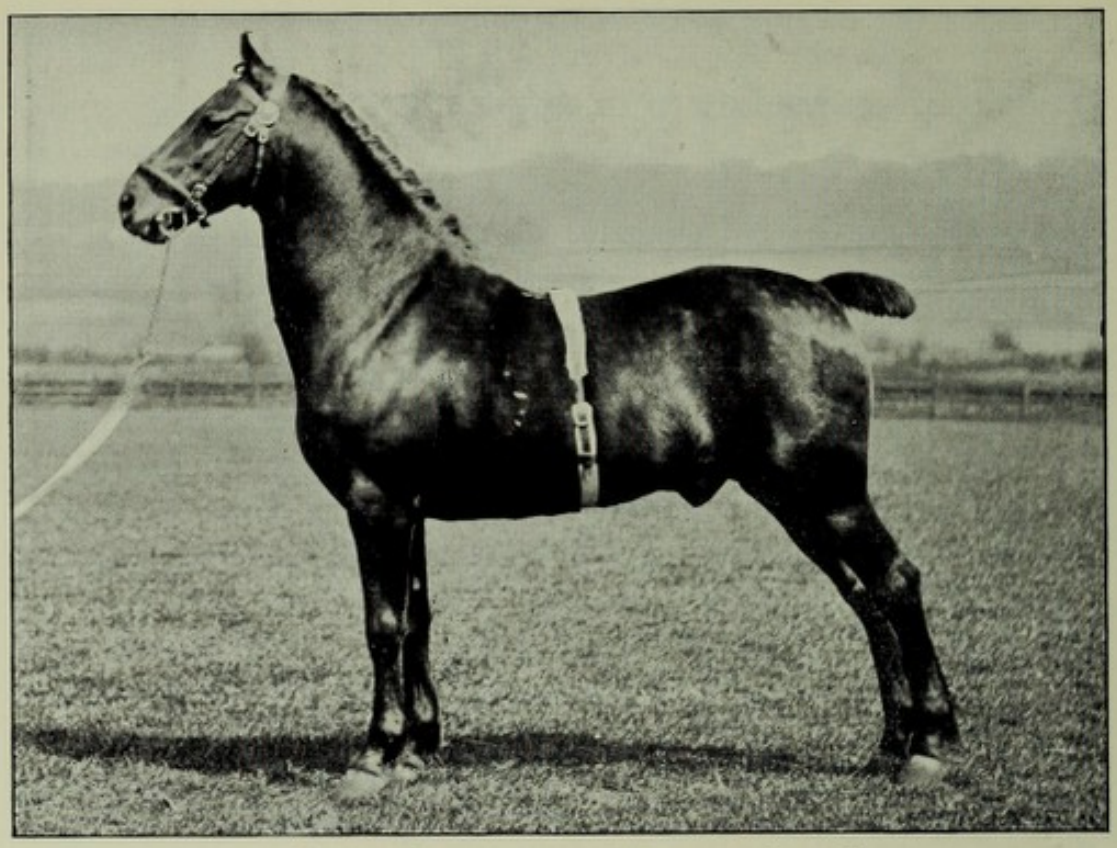
[1] A. B. Charlton, Secretary, 12 Hanover Square, London.

ment Society appointed a **special committee** to "ascertain whether the present system of light horse breeding in the United Kingdom could be made more remunerative." Some special effort was felt to be necessary, owing to "the large increases in the importation of horses from foreign countries, and the danger lest the breeding of light horses should in consequence become neglected." It was elicited at the next meeting on 8th June that "there is a great deal of improvement going on" among a restricted number of high-priced animals, but "a greater amount of deterioration of the brood mares in the breeding districts, the retaining principle being entirely ignored in the whole system of horse improvement throughout the country." It was agreed that "the retaining of the brood mares in the breeding districts is the turning point" of success. With the object of securing "the best practical and professional opinion on this national matter, ten questions were drafted and sent to (1) The Royal Commission on Horse-breeding; (2) The Council of the Hunters' Improvement Society; (3) The Masters of Hounds and Secretaries of Hunts; (4) The owners and certain breeders of hunter stallions and mares; (5) The Secretaries of the Associated Shows; and (6) Selected Veterinary Surgeons. The replies returned numbered 466, covering a total of 4660 responses."

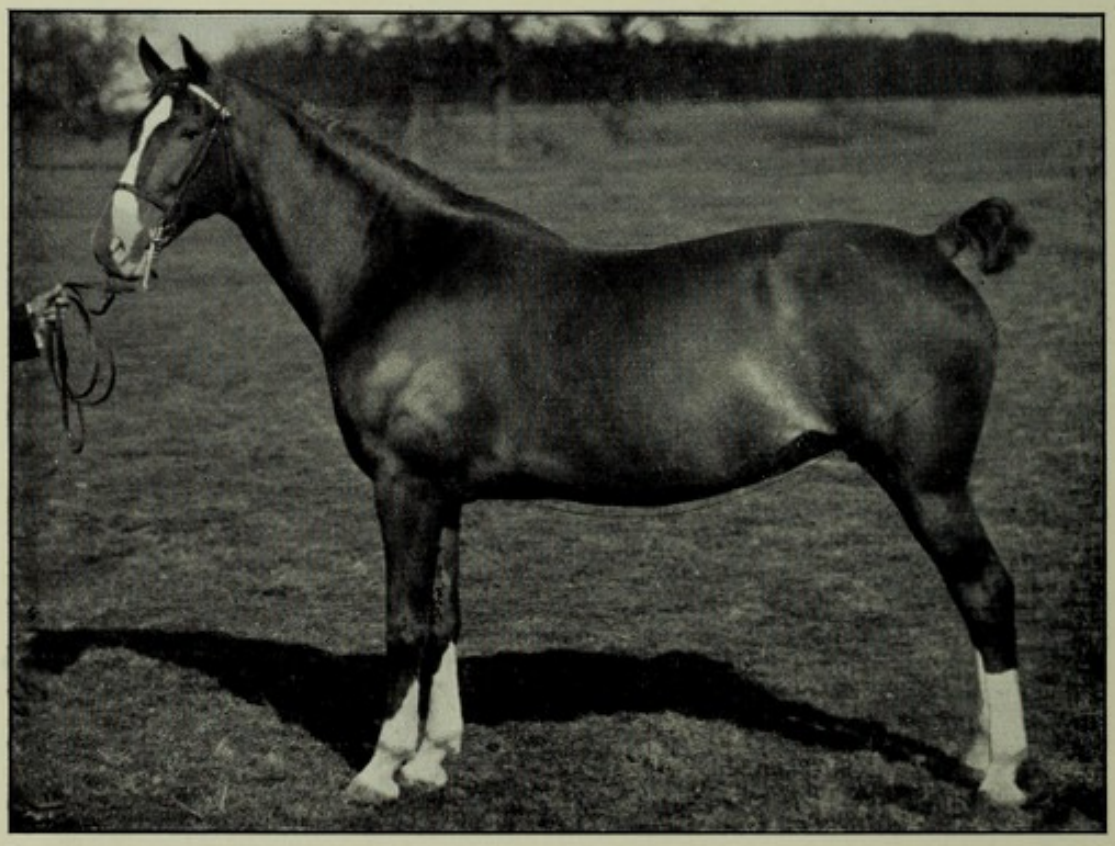
The Committee's Report to the Council of the Society indicated that there is "an almost entire want of system and scientific treatment in the production of light horses of the hunter type," but "a considerable desire in certain favourable localities to have the opportunity of producing suitable brood mares, and also stallions of the registered hunter type"—no less than 256 correspondents being in favour of this class of stallion. "In 1904 the Dutch Government took away 350 of the best young Irish mares," while this country pays the foreigner over £2,000,000 a year for horses which the present system of management does not supply at home. The reports expressed high approval of the efforts of the "Brood Mare Society," and recommended financial and other support. The need for "some organised effort to retain the good brood mares that are left" was strongly urged. The present scheme of King's premium sires for encouraging Thoroughbreds of the highest quality was approved by 263 of the



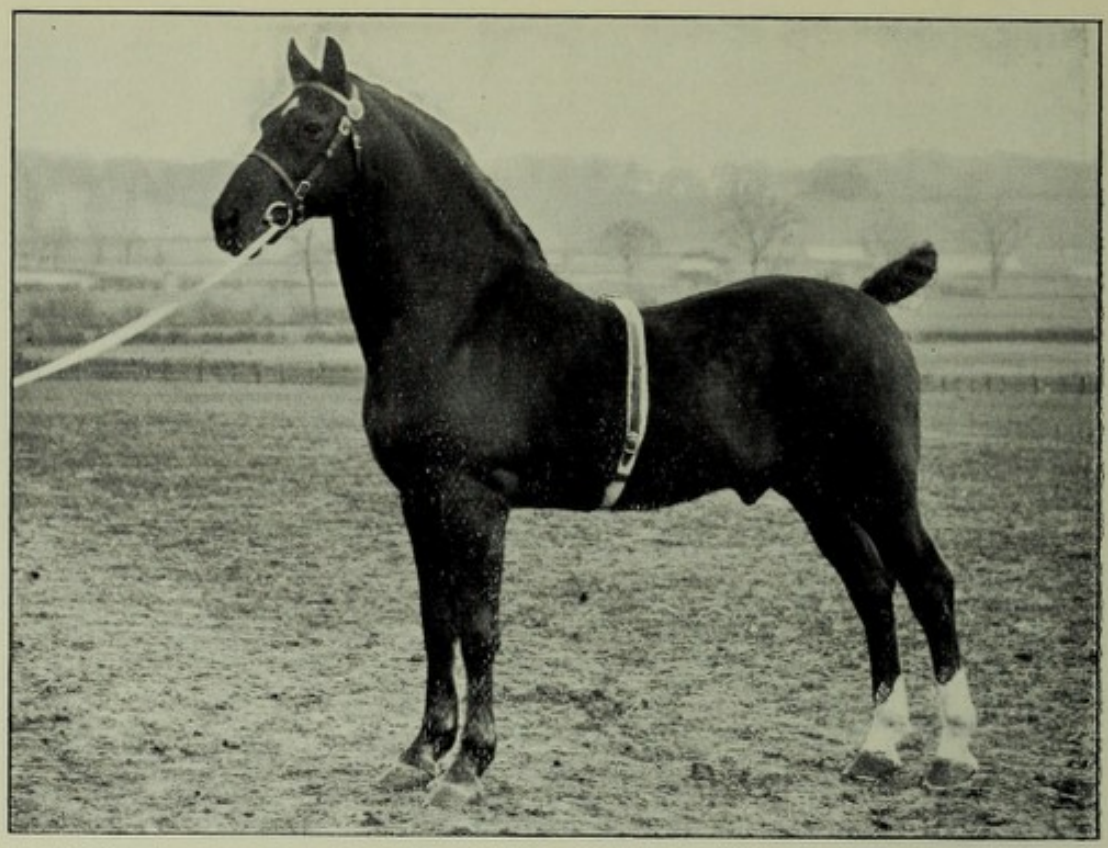




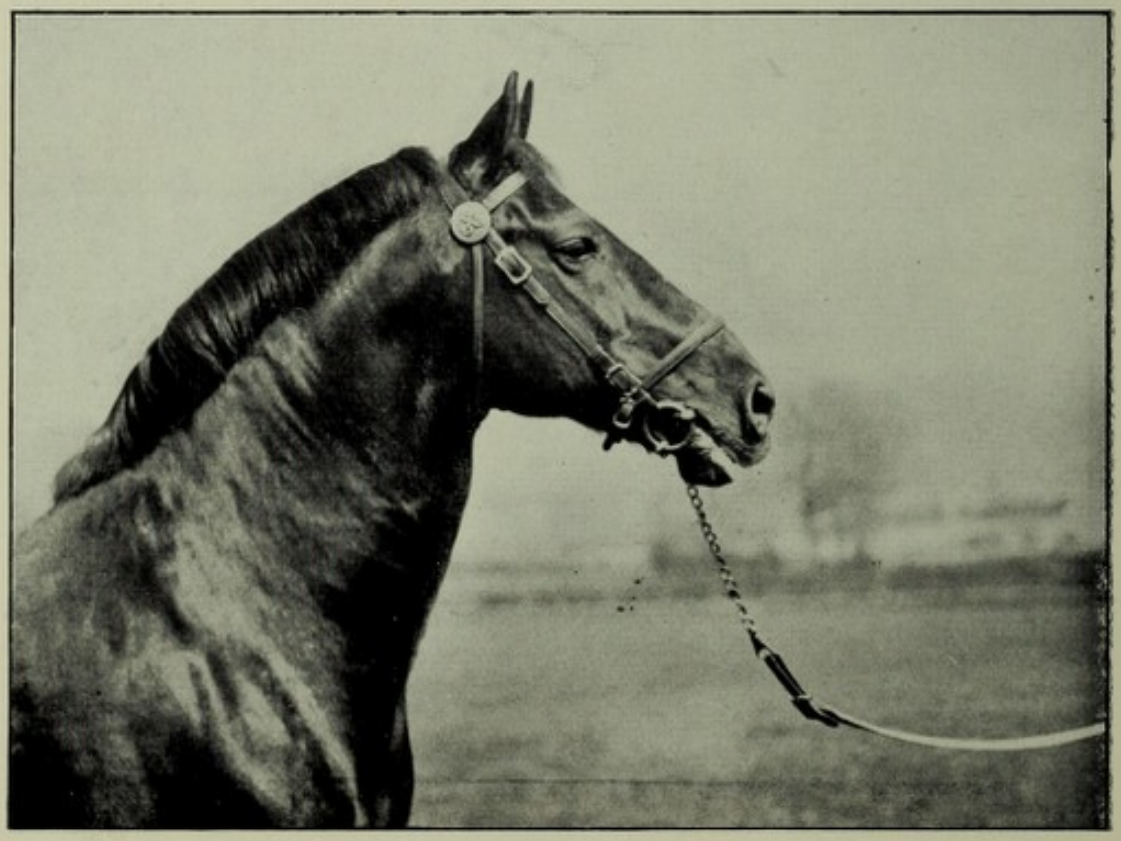
A. Hackney Pony Stallion, "Whitegate Swell."
Won at the Royal at York in 1900. A fine type of pony sire, that can walk six miles an hour.
Owner, John Jones, Whitegate Stud, Wrexham, Wales.
[*G. H. Parsons, Alsager, Cheshire.*



B. Hackney Mare, "Rosadora."
Champion Mare, Hackney Society Show, London, 1900 and 1904; special prize, 1907.
Owned by Chas. Galbraith, Terregles, Dumfries.
[*C. Reid, Wishaw.*

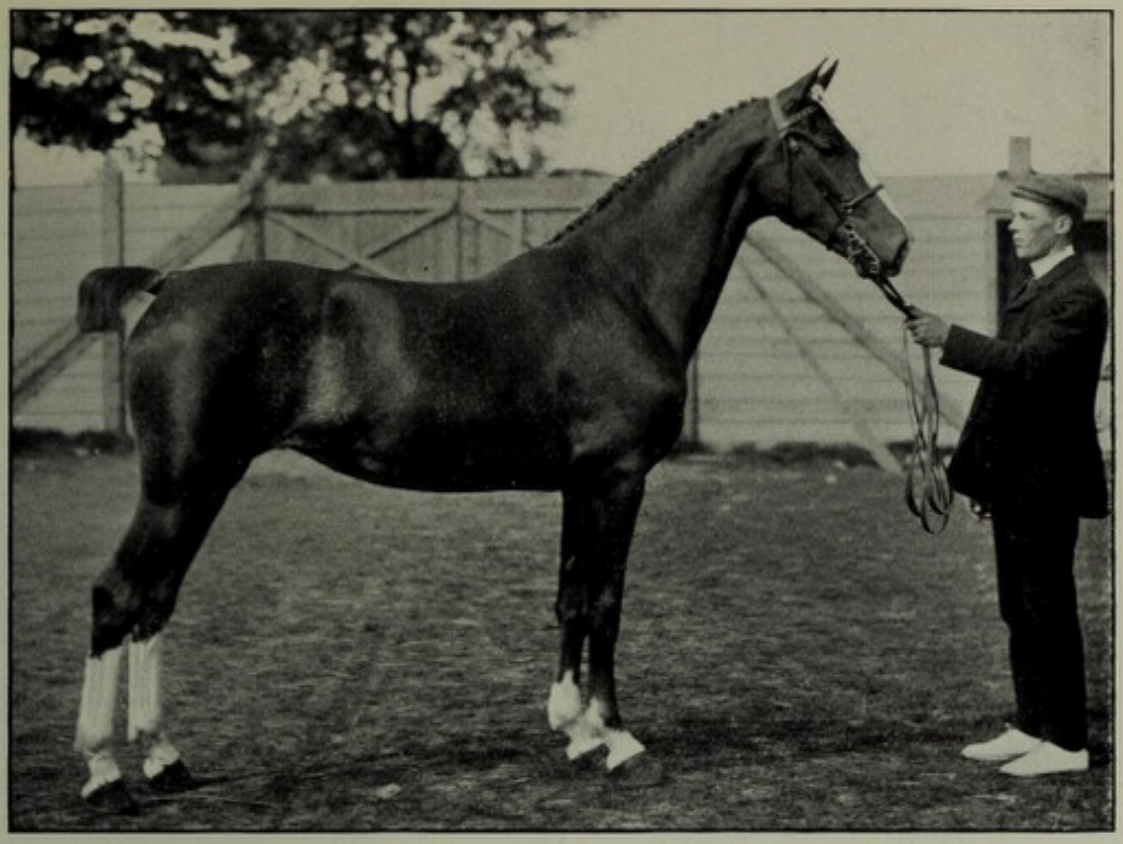


A. Hackney Stallion, "His Majesty," 15.2 h.h.
Aged, chestnut, noted prize-winner. His progeny include, "Forest King" (champion Harness Horse of the world, sold for £4200), "Diplomatist," "Knowle Belinda," "Aytoun Sweet Nancy," etc.
Owned by John Jones, Whitegate Stud, Wrexham, N. Wales.

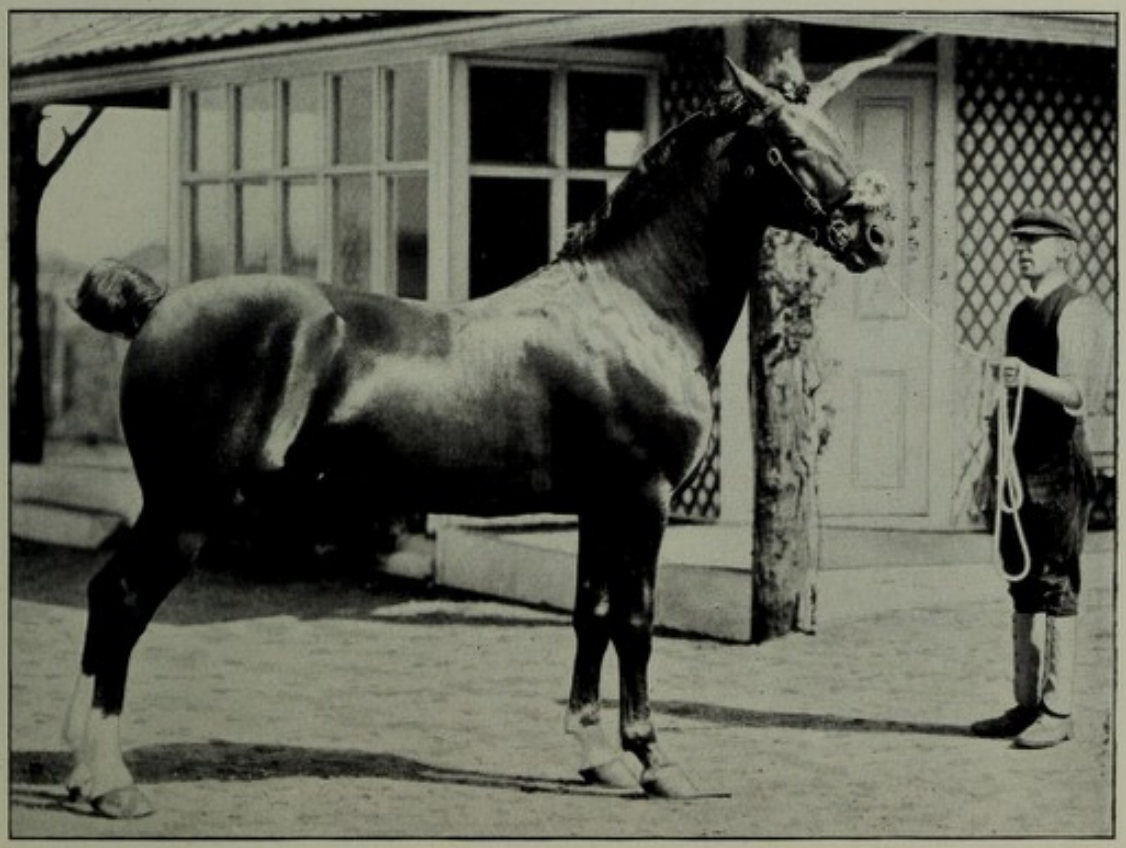


B. Head of "His Majesty," described above.

[*Both photos by G. H. Parsons, Alsager, Cheshire.*



A. Hackney Mare "Gallant Girl" (Chestnut roan).
Winner of many prizes.
The property of Sir Walter Gilbey, Bart.



B. Hackney Stallion, "Royal Danegelt."
Winner of many prizes, including a Champion Cup at the London Hackney Show, 1902.
The property of Sir Walter Gilbey, Bart.

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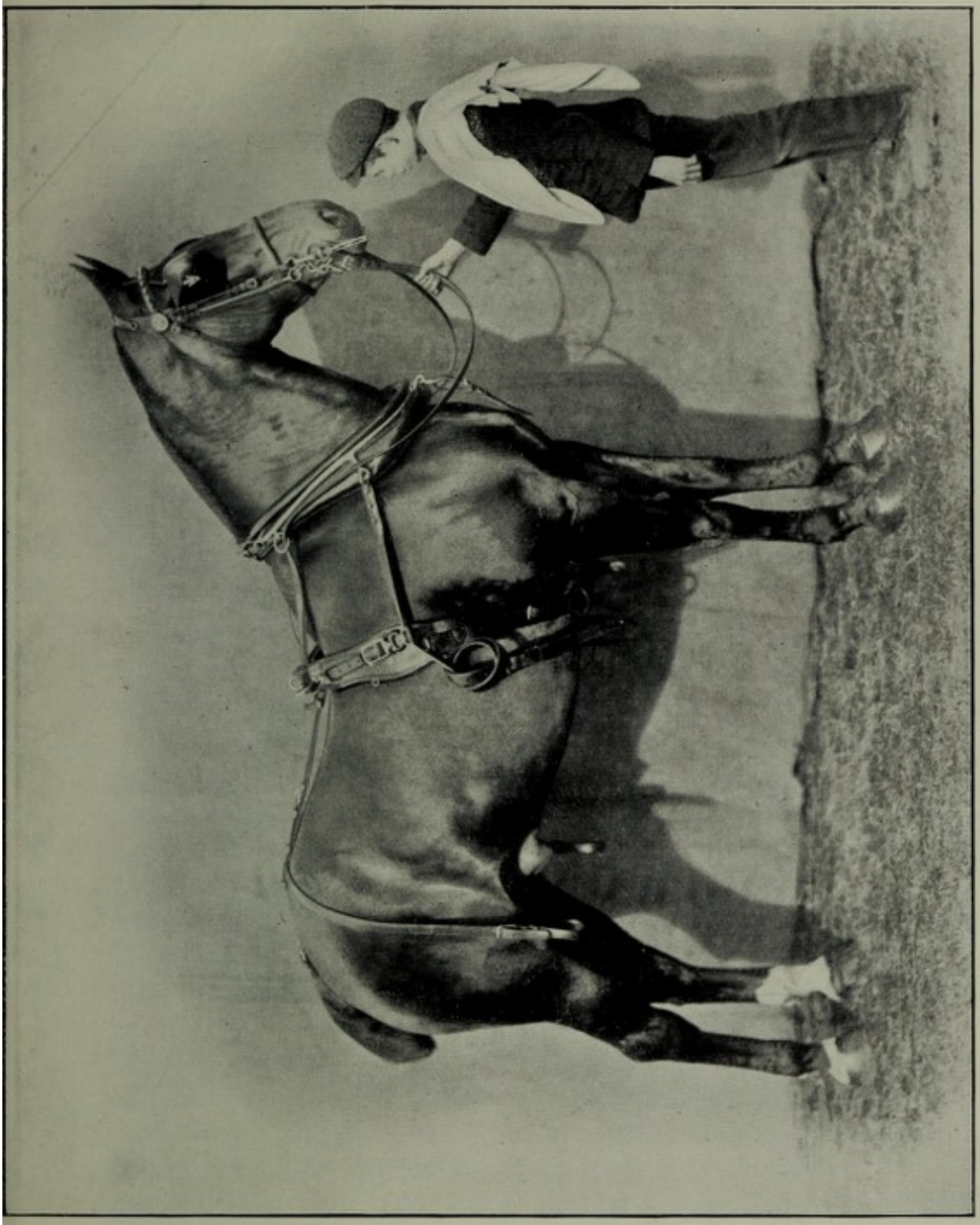


HACKNEY CARRIAGE HORSE, "BESTMAN," 17.1 h.h.
Bred and owned by Sir Walter Gilbey, Bart., Elsenham Hall, Essex.

[*pp* 440 *and* 441

answers, but "an important minority voiced several desirable changes in the selection and type of these stallions," and the admission to the schemes of stallions registered in the *Hunters' Stud Book.* The Committee recommended: "(1) That a serious and sustained effort should be made to organise the hunter-breeding industry . . . and advised methods of rendering assistance in breaking and in selling horses, and co-operation among the producers themselves; (2) that the Hunters' Improvement Society should appoint a **Permanent Committee,** with power to add to their number, with consent of the Society, to consist of its own representatives and nominees appointed by The Royal Commission on Horse-breeding, The Brood Mare Society, The Board of Agriculture, The War Office, and The Department of Agriculture and Technical Instruction for Ireland."

The type of registered hunter sires to be created was to be "bred with a special view to bone, substance, constitution, shape, and endurance, and in these respects their manner of production would differ from that of the Thoroughbred, which is bred mainly for speed." To make the industry remunerative and to supply the home demand, it was necessary "to raise the standard of excellence, diminish the proportion of misfits or failures, and cheapen the cost of production."

The following suggestions appeared in the minutes of evidence taken by the Special Committee: "(1) That the King's premium horses in the United Kingdom should be considerably increased under the auspices of the Royal Commission on Horse-breeding, if the Commission see their way to recommend the same. (2) The Government should distribute among suitable farmers of the United Kingdom the cast mares from artillery and cavalry, free from hereditary diseases, and suitable for breeding purposes, to be used quietly on the farms. (3) The mares, the property of the Government, being lent to farmers for breeding purposes, to be returned to the Government should they not breed. (4) The Government to pay the service fee to a premium or registered sire, and to have the refusal of the produce at three-years-old-off, the same to pass the veterinary surgeon, and to be taken at the fixed minimum price of £35 on 1st September, if bred as stated. (5) That small prizes of £5, £4, £3, or £2, according to the number of

entries, should be given at country shows for the best and most suitable animals, undocked, when the Government inspector might claim all shown in these classes at £35 each, if suitable. (6) On 1st September the selected animals would become the property of the Government at the prices agreed upon, and the sum be paid at once to the owner, he in turn agreeing to keep the animal in healthy condition for one year more or less, at the rate of 4s. per week; should the horse not remain in good condition, the Government reserve the right of reducing the amount to be paid for keep. (7) The purchased animals to be branded or marked in some way to identify them whilst in the farmers' possession, and a local person living in each district appointed to look after the mares lent and the produce, who shall report in the first place to the Secretary of the Hunters' Improvement Society, who will then communicate with the War Office."

After a full discussion, recorded in vol. vii. of the *Hunters' Stud Book*, 1898, whether or not only Thoroughbred stallions should be admitted to the register of hunter sires, it was decided, under necessary safeguards, that a sire need not be a registered Thoroughbred if the foreign strain were of a quality which had won races under Jockey Club or National Hunt rules. **A supplement** to the Stud Book has been opened for mares and fillies without registered numbers—the test being inspection under the Council's regulations, or prize-winning at recognised shows. The supplement is intended to be a feeder to the Stud Book.

The Brood Mare Society was established in 1903, "for the purpose of obtaining (free from hereditary disease *strong* hunter-bred) mares by gift or purchase, and lending them to farmers and others on certain conditions, the object being to keep good brood mares in the country, and restrict their wholesale exportation and the consequent deterioration in the breed of horses in the United Kingdom."

The President in 1906 was The Earl of Donoughmore, The Earl of Rothes being past-President. The Central Committee in London consisted of: Algernon Turnor (*Chairman*), Col. T. Deane (*Vice-Chairman*); W. Phillpotts Williams, (*Hon. Manager*), 7 Carwinion Terrace, Liskeard; E. W. Tilling, Captain Phipps Hornby, Charles Armstrong, Leopold

de Rothschild, Sir Merrik Burrell, Bart., Eustace Barlow, T. Wickham Boynton, J. L. Nickisson, Viscount Emlyn; and Gerald B. Manley (*Hon. Secretary and Treasurer*), 23 Bucklersbury, E.C.

The second Report, issued in 1906, announced that "twenty-nine mares had been presented by the public to the Society," and that one of these was a young mare from the War Department, which had met with an accident. The Society then possessed a stud of 50 mares, distributed mostly among farmers and others practically interested in the breeding of hunters. Local committees are elected to do the work of the Society under rules and conditions laid down by the Society. The "custodian" becomes a member of the Society by paying £2 a year for each mare lent to him by the Society. He may use her at suitable work, but if entered at any horse show it must be as the property of the Society, while the fees are paid by the custodian and the prizes gained belong to him. The mare must be served by "a sire selected and approved by the local committee," but the custodian pays the fee and the foal belongs absolutely to him, with the proviso that the first and second fillies foaled of any mare shall on or before 30th October in the year in which they respectively attain three and a half years of age be offered to the local committee," with the option to purchase until 31st December, "at such prices, not exceeding £35, as may be agreed upon."

Special terms are often obtained from stallion owners for the Society's mares.

The concerted action taken by the **three powerful Societies,** The Royal Commission on Horse-breeding, The Hunters' Improvement Society, and the Brood Mare Society, to introduce a national system of horse-breeding, deserves every possible support as an earnest and well-considered effort to guard against the recurrence of the dangers, the difficulties, and the embarrassments which were evident during the course of the Boer War (1899-1902).

Algernon Turnor, Godby Hall, Melton Mowbray, has specially prepared the following historical notes for insertion in these pages:—

"It is only in time of peace and by the exercise of foresight many years in advance, that adequate provision can be made

to supply sufficient military horses even for the commencement of some future war. This object can only be attained by improving the quality, increasing the value of the article produced, and making the industry remunerative. It has been the endeavour of the above-named Societies not only to keep this end in view, but also to organise such a system of national horse-breeding as may be handed down to future generations. It is therefore interesting to trace the steps by which the system is being constructed.

"A motion, brought forward early in 1903 in the Council of the Hunters' Improvement Society, to try the experiment of acquiring and placing out in selected districts a number of suitable brood mares, though rejected at the time, led to the formation towards the close of that year of the Brood Mare Society, which was instrumental in calling together an influential meeting at Bridgewater House in 1905 under the Presidency of the Earl of Minto, and which collected by voluntary effort sufficient funds to inaugurate its system and try its machinery.

"On 16th July 1906 the Earl of Donoughmore, President of the Brood Mare Society, brought forward a motion in the House of Lords, urging His Majesty's Government to give effect to the recommendations of the Royal Commissioners on Horse-breeding, as set forth in their Tenth Report to Parliament, especially with reference to the provision of mares. The resolution was accepted by the Government, and, on 31st October 1906, the President of the Board of Agriculture summoned a Conference at Whitehall, which was numerously attended by members of the Royal Commission, of the Hunters' Improvement Society, of the Brood Mare Society, of the Royal Agricultural and of many other Societies, all of which are interested in this important question.

"An interesting and instructive discussion, initiated by the Rt. Hon. Henry Chaplin, ensued, which resulted in an important memorandum being prepared, setting forth the conclusions arrived at by certain representatives, who took part in the Conference. The proposals in that memorandum are, briefly, that the Government should set aside some £25,000 a year in addition to present expenditure, and lay it out under the following heads:—(1) A portion to be spent on purchasing suitable mares, and placing them out with the

help of the Brood Mare Society; (2) a portion to be used in advancing loans to individuals or Societies to purchase suitable sires, or expended by the Government in purchasing them and letting them out; (3) a portion to be spent in giving additional prizes in cases where the Government regulations are carried out; (4) a portion to be devoted to expenses; (5) a competent committee to be appointed to assist in giving effect to the above. These suggestions have already received the unanimous support of the Council of the Hunters' Improvement Society and of the Brood Mare Society, and have been submitted to the President of the Board of Agriculture, carrying the full weight and authority of the various bodies which have had them under examination.

"Should these proposals meet with the approbation of Lord Carrington, he will be in a strong position to lay them before His Majesty's Treasury, and the position which this question has now attained justifies the hope that action may be taken to place an industry, so important to agriculturalists, and so vital to our military necessities, on a satisfactory and enduring basis."

Army Remounts

The **class of horses required** for the army may be generally described as follows (*Army Regulations*, edited):—

War Office, London, S.W., *November* 1904.

Ages.—For peace, 4-off to 6 years; for war, 6 to 10 years.

Heights.—*Household Cavalry* (black).—At 4 years, 15.3; at 5 years, 16 hands. *Cavalry.*—At 4 years, 15.0½ to 15.2½ hands; at 5 years, 15.1 to 15.3 hands. *Royal Artillery.*—15.3 hands. *Mounted Infantry.*—14.3 to 15.0½ hands (5 years and over only). *Colours.*—Whites and greys are only required for special purposes, and are always specially ordered. Other very light or washy coloured horses are not accepted.

Entire, unmanageable or vicious horses, crib-biters, wind-suckers, parrot-mouthed, or undershot-jawed horses, or those with capped elbows, damaged knees, or with injured or deficient teeth, are not admissible animals. Horses with short docks will not be accepted. Soundness in eyes, wind, and limb are essential; no stale, upright, or overshot joints, and no curby hocks will be passed. The class required is a deep, short-legged, short-backed, good barrelled horse, of the

hunter stamp, with substance and quality, and true action, and going quite clear of the joints. The same description generally applies to cobs. Artillery, Engineers, and Army Service Corps should be good-quality draught horses. The Inspecting Officer of the Remount Staff is the final authority to decide on the purchase or rejection of any animal. The number required annually in normal times of peace is approximately 2500, as under:—Cavalry, 1000; R.A., R.E., and A.S.C., 1360; Mounted Infantry, 140. In normal times of peace there are no specified dates for the assembly and inspecting of horses. Farmers having horses for sale should apply to the Assistant Director of Remounts, War Office, forwarding a description of their horses. Forms to fill in the description of horses for sale and any other details will be furnished on application.

As the British Government can secure from abroad the class of horse wanted for £30 to £35, it is argued that they are not in a position to offer terms to encourage horse-breeding to any appreciable extent in this country. The proper course for the farmer to follow under the circumstances is—aim at breeding first-class hunters and harness horses, and the misfits, if sound, become army remounts.

The Hackney or "Norfolk Trotter" Breed

Is said by Lawrence to have sprung on one side of its ancestral descent from the Norwegian horse. It is consequently found in Norfolk and Yorkshire, where the Norse invaders had their principal strongholds in this country. The peculiarity of its action, as indicated by its name, is the most important difference between the Hackney of the present day and the Thoroughbred. The breeds have both been freely crossed by imported horses from the same foreign stocks. The form, however, has also differentiated with difference in surroundings, and the difference in the objects for which they have been bred. It is to the original native mares in each case that the trotting habit of the one and the galloping habit of the other are due.

The modern Norfolk Trotter was remodelled from the earlier trotter of Norfolk and the Fen country about the end of last century, by the use of Shale's or Shield's horse, or

"Scott Shales" (692), which infused much of the Thoroughbred Arab and Barb blood, and gave fine bones, pace, and staying power to the heavy, round-boned, and more or less cart-horse-shaped trotter of the beginning and middle of the century. The **original Trotter** varied in size from the farmer's market cob to the regular cart-horse of the country, to which the Suffolk Punch is no doubt directly related. There are no reasonable grounds to doubt that the free action of many of our cart-horses and the action of the hackney had a common origin in an early British horse.

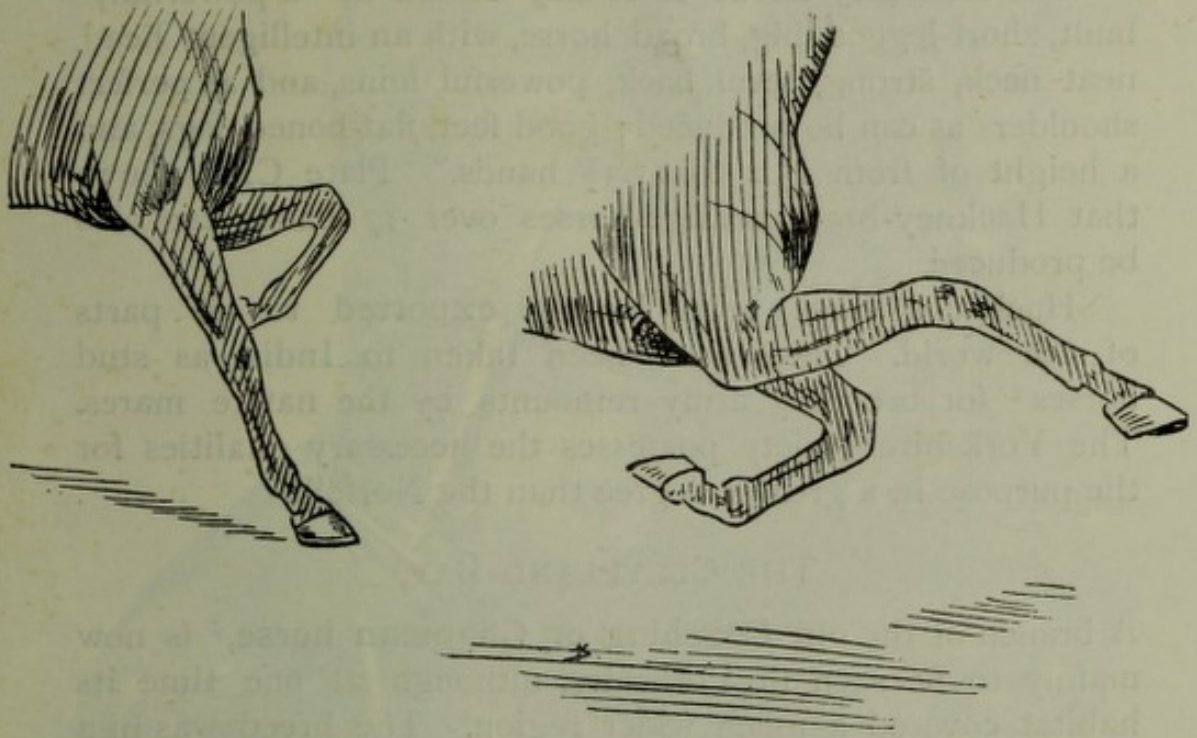


FIG. 27.—FAULTY TROTTING ACTION. FIG. 28.—PERFECT ACTION AND FORMATION.

From Galvayne's *Twentieth Century Book on the Horse.*

It was formerly a custom in Norfolk to trot the cart-horses when returning with the empty cart or waggon—a fact which indicates that they were at one time lighter and more active than those of the present day. Their increase in weight can, however, be accounted for by the crossing which took place between the original breed (described as "small, brown-muzzled, and light-boned") and Lincolnshire and Leicestershire Black Horses.

Among the **Yorkshire Trotters** the same process of improvement was carried out about the same period. Thoroughbred Arabian blood was largely used through the

employment of a good horse named "Sportsman" and his descendants. It is owing to the presence of an abundance of Arab blood in the Hackneys of Yorkshire and of Norfolk that it is now possible to cross the two varieties with satisfactory results, and to maintain them as they now exist in the same Stud Book. At an earlier date, but so late as 1775, crossing in this way was not advisable, as it is recorded[1] in reference to Norfolk horses, that "not a single horse of any repute has been produced from these half-bred horses brought from Yorkshire or elsewhere."

The **Hackney horse of to-day** should be "a powerfully-built, short-legged, big, broad horse, with an intelligent head, neat neck, strong, level back, powerful loins, and as perfect shoulders as can be produced; good feet, flat-boned legs, and a height of from 15.2 to 15.3½ hands." Plate CXI. shows that Hackney-bred carriage-horses over 17 hands can also be produced.

Hackneys have been largely **exported** to all parts of the world. They have been taken to India as stud horses[2] for breeding army remounts by the native mares. The Yorkshire variety possesses the necessary qualities for the purpose in a greater degree than the Norfolk.

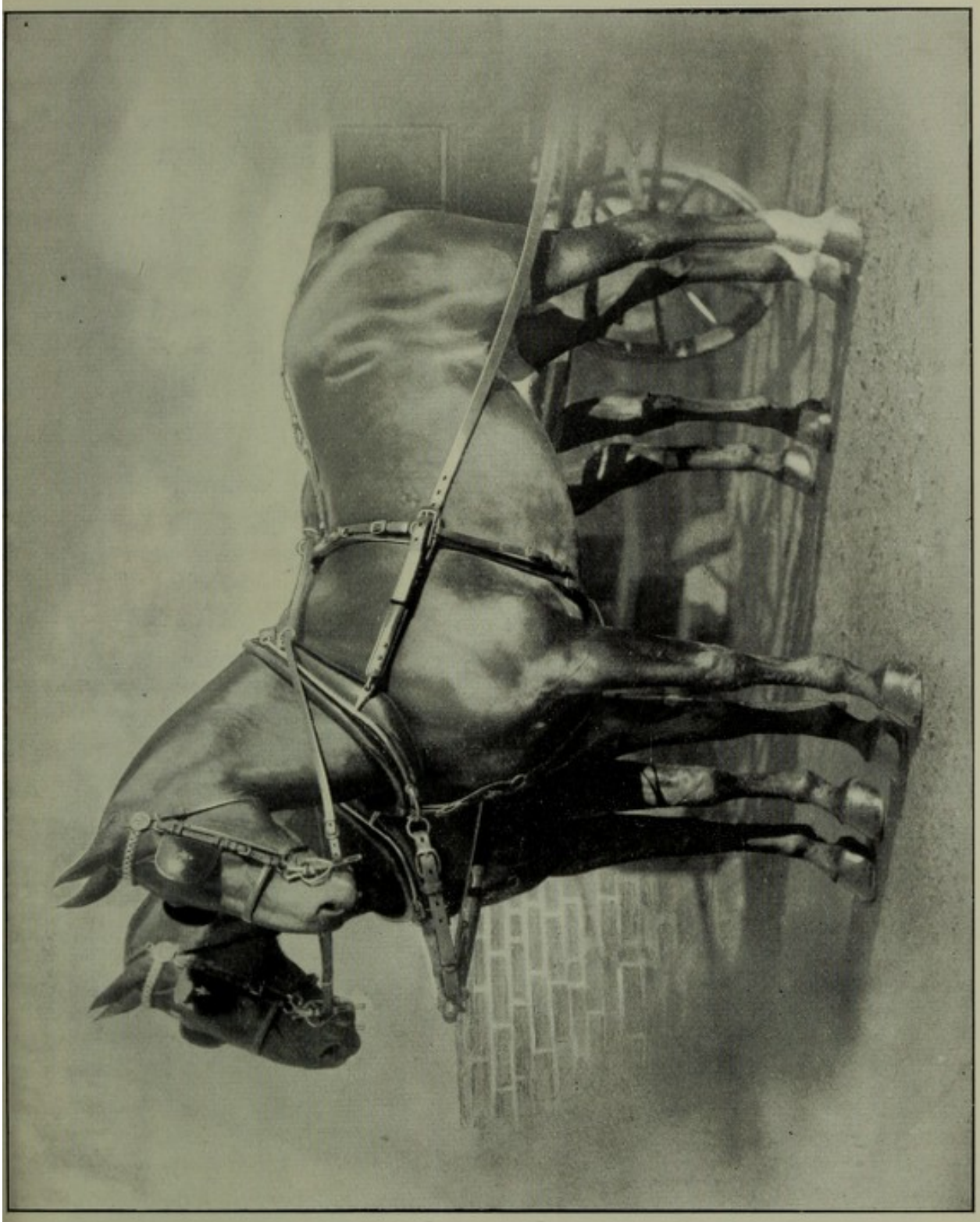
The Cleveland Bay,

A branch of the **old Coaching or Chapman horse,**[3] is now mainly to be seen in Yorkshire, although at one time its habitat covered a much wider region. The breed was in a most flourishing condition for about two decades subsequent to the middle of the eighteenth century, after which period it declined. It, however, sustained its worst blow at the time when the advent of railways led to the reduction of the demand for stage-coach horses, and when it became fashionable to breed carriage-horses and other light-legged horses by mating a Thoroughbred horse with a light farm mare. By

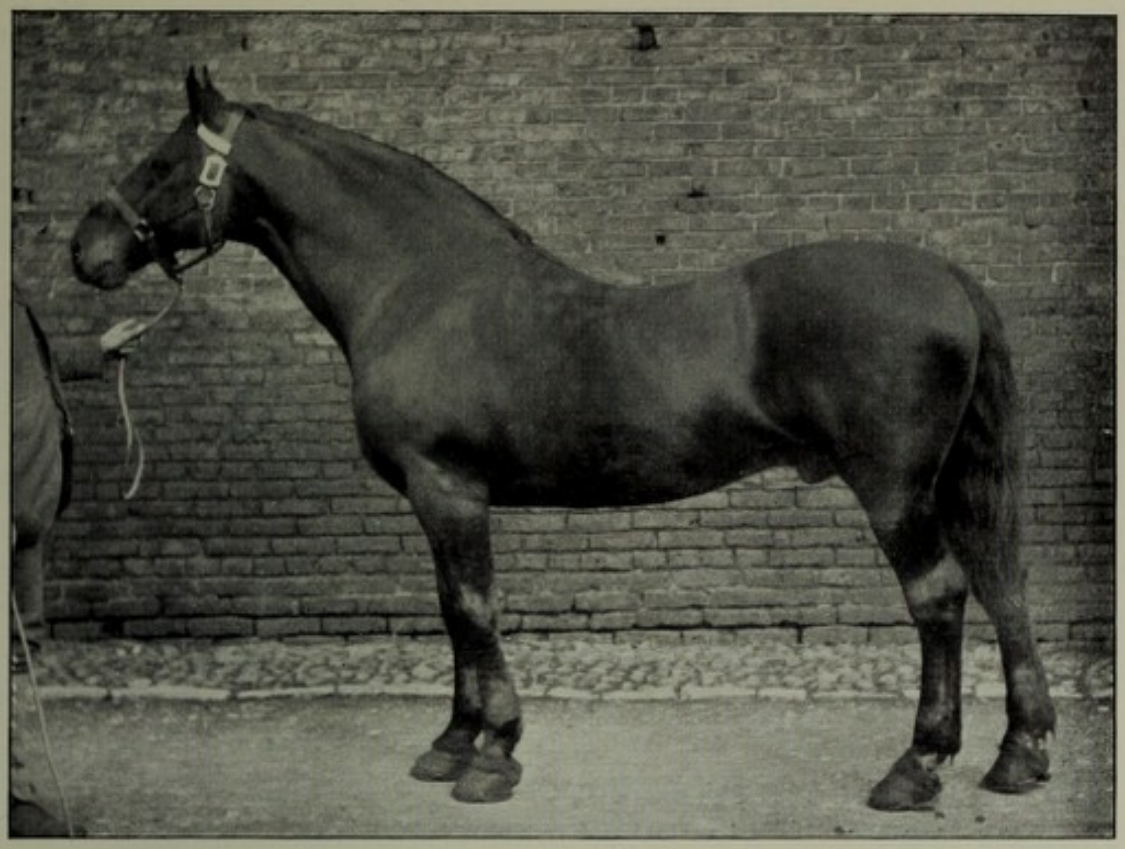
[1] In the first volume of the *Hackney Stud Book*, 1884, to which the Author is indebted for many details of the early history.

[2] The Report (1892) announcing the transference of the management of horse-breeding operations from the military to the civil authorities, says:—"The stallions at the end of the year numbered 367, Norfolk trotters being most numerous, and most popular with native breeders. An improvement in horse-breeding is noticed."

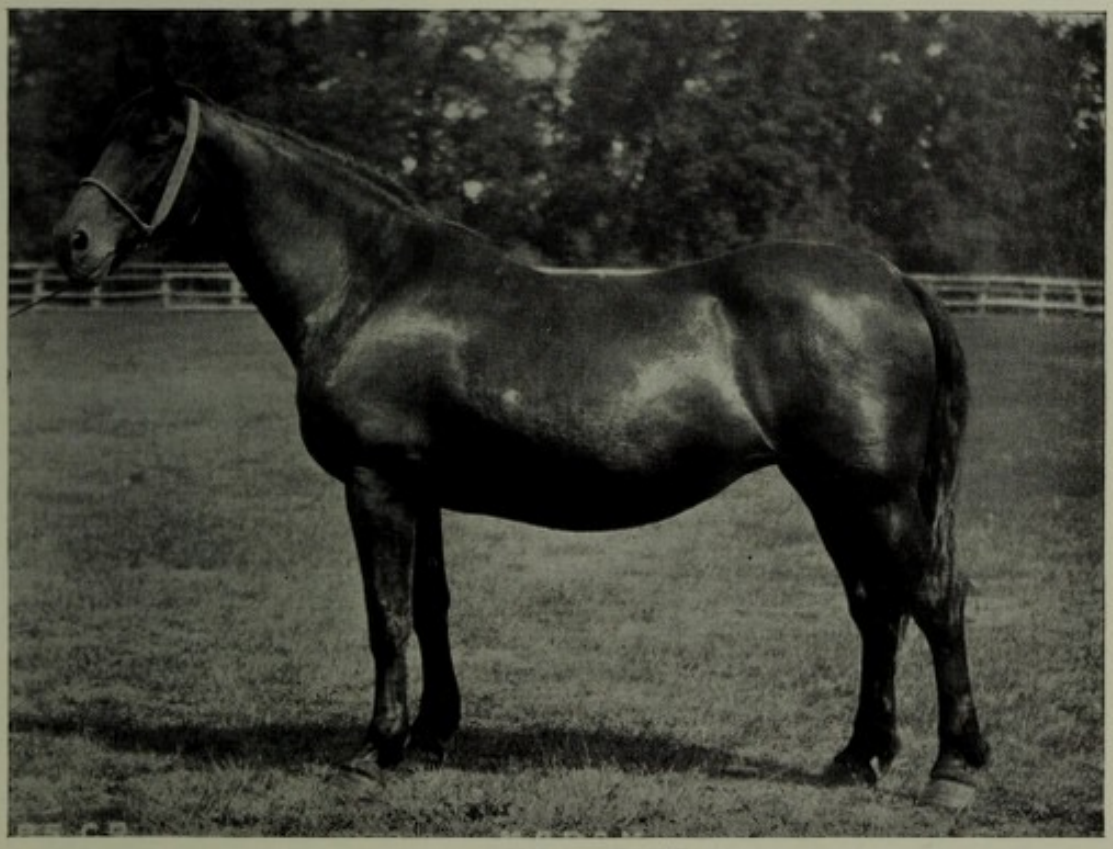
[3] See Appendix O.



HACKNEY CARRIAGE HORSES, "SMART MEMBER" AND "BESTMAN," over 16.3 h.h.
Bred and owned by Sir Walter Gilbey, Bart., Elsenham Hall, Essex.



A. Cleveland Bay Stallion, "Fidius Dius." Foaled 1871.
An excellent type of the old Chapman horse.
Owned by H. V. Webster, Northallerton.



B. Cleveland Bay Mare, "Madam."
Owned by H. C. Stephens, Cholderton, Salisbury.

[*C. Reid, Wishaw.*

this means also the Cleveland became stained to some extent by the introduction of foreign blood. Within recent years much greater attention has been paid to the preservation and improvement of the breed. The *Stud Book*—the first volume of which was published in 1884—has proved a distinct source of interest, and a means by which the best qualities of the original breed may yet be brought prominently forward. There is a tendency—due, it is said, to in-breeding, but no doubt also to the Thoroughbred cross—to a lighter condition of bone than that natural to the old Cleveland horse.

The Farmer's Magazine for 1826 says:—"Probably the best horse for working the lighter class of soils is the Cleveland Bay, an original breed of the country, 'neither blood nor black,' that is, a distinct race from the English Blood-horse, and equally distinct from the Black or Cart breed of the country. It was the basis of the breed of the old London coach-horse, when heavy cattle were used for these conveyances; and, after it became the fashion to adopt a lighter horse for carriages, this valuable breed was allowed almost to become extinct, till their excellence for agricultural purposes was noticed by some practical farmers in the North of England, who for several years have been exerting themselves to revive the breed."

Vol. i. of the *Royal Agricultural Society's Journal* gives the dimensions of a Cleveland stallion introduced by J. B. Lloyd into Gloucestershire about 1827, to cross with the local breed of cart-horses, in order to gain more activity with little or no diminution of strength, as follows:—"When 'Old Cleveland' was at his full size, in good condition but not full of flesh, he measured 16 hands 1½ inches high, 9⅜ inches round the pastern, 10 inches round below the knee, 21 inches round the arm, 15⅝ inches round the knee, and 6 feet 10 inches round the girth. His legs were as clean as a race-horse."

These quotations tend to confirm the view that at one time the Cleveland was a heavier horse than he is now.

Hayes traces the **origin of the Cleveland Bay** to a cross between Yorkshire cart mares, the direct descendants of the old Great Horse of the country, and a Barb which introduced the bay colour and the dark dorsal stripe characteristic of

the breed. Descent is claimed for it from the war-horse of the ancient Britons, and Cæsar's account of their use of chariots in war is quoted as referring to it, although at that time the size must have been much smaller than at present. Horses, it is now thought, were employed in the war-chariot, the world over, long before they were large enough to carry a rider into battle. The Greeks, Romans, and Egyptians all had war-chariots, and likewise the Aryans from Central Asia when they invaded India 1400 years B.C.

The **mode of chariot warfare** of the ancient Britons was as follows:—"First they ride about in all directions and hurl their darts, and by very terror of their horses and clashing of the wheels they frequently throw the ranks into disorder; and when they have penetrated between the divisions of the cavalry, they leap down from the chariots and fight on foot. The charioteers, in the meanwhile, edge out of the battle by degrees, and so dispose of the chariots that if they are pressed by large numbers of the enemy they have a ready means of retreat to their own men. Thus they possess the rapidity of cavalry and the stability of infantry in battle, and by daily use and practice they become so proficient that in steep and precipitous places they are accustomed to maintain their horses at full speed and in a moment to check and turn them, and to run along the pole and to stand upon the yoke, and from thence to dart back into the chariots as quickly as possible."—CÆSAR.

"The war-chariot comes on like the flame of death, the rapid chariot of Cuthullin, the noble son of Semo. It curves behind like a wave near the shore, like the sun-streaked mist of the heath. Its beam is of polished yew, its seat of the smoothest bone, its sides are replenished with spears, the bottom is the footstool of heroes."—OSSIAN.

Those who are interested in the Shire horse are equally certain that the passage from Cæsar refers to that breed. The probability is that both claims are equally well founded, and that the differences which now exist, admitting that they are great, have been produced since Cæsar's time by "crossing" in different directions and with different objects in views.

Lloyd's description of the Cleveland horse, quoted from the *Cleveland Stud Book*, says:—"From 16 hands 1 in.

to 16 hands 2½ inches in height, he should be possessed of good, sloping shoulders, a short back, powerful loins, and long quarters. His head is rather plain than otherwise, and on the large side, but it is well carried, and his general appearance denotes activity and strength combined in a manner not seen in any other breed. His action is not remarkably high, but it is the kind of action for getting over the ground. In colour he is bay—either light or dark—with black legs, clear of hair; and black zebra-like stripes on the arm and above the hock are sometimes seen. These are known as the black points, and are supposed to denote special purity of breeding. White, save a small star or a few white hairs in the heel, is not admissible, a blaze or a white foot proclaiming at once the admixture of foreign blood."

The *Stud Book* points out that nearly every horse of note belongs to one or other of three great families—the descendants of "Dart" (83), "Barley Harvest" (447), and "The Hob Horse" (316). Those who have carefully followed the previously detailed histories of many other breeds of live stock will remember that this is in no way an unusual circumstance, but is, on the contrary, one of frequent occurrence.

The Yorkshire Coach-Horse,

From the North and East Ridings of Yorkshire, is a breed of more recent formation than the Cleveland. The following quotation from the preface of the *Yorkshire Coach-Horse Stud Book*, 1887, indicates in a few words its recent origin and general characteristics:—

"It cannot be claimed for the Yorkshire coach-horse that he is a pure-bred animal, but that on the contrary, by the judicious crossing of large-sized good-coloured mares with stallions altogether or nearly thoroughbred, a class of horses has been produced suited to the wants and circumstances of the times. By universal consent the colour should be bay or brown, with black eyes, mane and tail abundant but not curly, the height from 16 hands to 16 hands 2 inches, with fine head, sloping shoulders, strong loins, and lengthy quarters, high-stepping action, good sound feet, flat legs, and abundance of bone and muscle."

The coach-horse has rightly or wrongly been described as an improved Cleveland. Springing from the same county, there are good grounds for believing that the two breeds are related through some of their progenitors. The high action of the coach-horse would indicate that it may in the same way claim kindred with the breed of trotting horses which has aided in making Yorkshire famous as a horse-breeding county. It is an established fact that much of the "quality" of the coach-horse has been derived from the fountain-head of "quality," the English "Thoroughbred," and from the breeds from which the Thoroughbred was formed. On this point the preface already quoted says:—"Amongst the oldest noted sires of celebrated coach-horses is 'Dunsley's Dart,' descended on his sire's side from 'Darley's Arabian.' 'Dunsley's Dart' was the grandsire of 'Agar's Dart,' the sire of 'Rainbow,' afterwards called 'King George IV.,' sold to Robert Thomas, of Eryholme, Darlington, when seventeen years old, for £300." "'Harpham Twak,' said to be a small horse not more than 15.1, was a full-blood horse, his dam's sire going back to the 'Darley Arabian.'" "'Sawden's Active' was by 'Jalap,' by 'Regulus,' the winner of seven Royal plates in one year; whilst 'Lamplough's Victory,' from whom a host claim descent, appears by conclusive evidence to have been sired by 'Trotting Jalap,' a son of 'Old Jalap,' which horse is recorded in the Racing Stud Book as foaled in 1758. The dam of 'King William' (245), a horse which was in service in 1840, was by 'Brutandorf,' and grandam by 'Old Sandbeck,' were both recorded as full-blood horses, 'Sandbeck' being the sire of 'Barbell,' the dam of 'Flying Dutchman.'"

The performances of the breed in the old coaching-days are also worthy of notice:—"Of the speed, power, and endurance of these horses, we have recorded that 'Dreadnought,' by 'Old Clothier,' won a trotting match for £100, carrying 16 stones 16 miles within the hour; 'Wonderful,' a horse that obtained a high premium at Ripon Show in 1819, had a brother, 'Peirson's Plato,' that trotted 18 miles within the hour, carrying 18 stones; and Bevas Pullen's 'King William' trotted a mile in three minutes at Selby, carrying 14 stones."

Like all breeds into which foreign blood has recently

been introduced, the coaching-horse cannot always be relied upon to breed true to type: but the large proportion of "blood" present in the best specimens minimises this drawback, and time, with the careful breeding now being followed, will efface it entirely.

In meeting driven horses, the following lines indicate the **British rule to be observed in passing**:—

"The rule of the road is as plain as my hand,
To explain it I need not be long:
If you keep to the left, you are sure to be right,
If you keep to the right, you are wrong."

In France and in America, driven horses on meeting pass on the opposite or right side, so that the drivers have a full view of the wheel of their own and of the passing carriage. In this country, a vehicle being overtaken, or a led horse, is passed on the right side.

The **Horse's Prayer** also appears in verse:—

"Up hill drive me not,
Down hill press me not,
On the level road spare me not,
And in the stable forget me not."

The American Trotter[1]

In view of the facts that the greatest progenitors of the breed were of British descent, and that trotting horses are rapidly becoming fashionable not only in this country but on the continent of Europe, no apology is necessary for introducing a brief account of the "National Horse of America" in a book relating to British Live Stock.

Public interest is divided among the three most noted breeds of trotters—our own Hackney or Norfolk trotter, the American trotter, and the Russian trotter Orlov or Orloff. Of these the American horse is considerably the fastest. The Orlov, founded at Khrenovoya, to the south of Moscow,

[1] See an article on "The National Horse of America," in the 1887 Report of the U.S. Department of Agriculture, by Leslie E. Macleod, Associate Editor of *Wallace's Monthly*. To this article, and to his friend Henry Wallace, of Des Moines, Iowa, the Author acknowledges indebtedness.

by Count Alexis Orlov-Tchestmensky, is a multiple cross derived from many breeds—English, Arabian, European, and Persian. The first great sire was an Arab imported from Greece in 1775. By a Danish cart mare he sired "Polkan," who, mated with a strong-built Dutch mare, produced "Barss." "All the Orlov trotters are descended from the three sons of 'Barss'—'Lubeznoy,' 'Dabroy,' and 'Lebed.' They are of no distinct type, but divided into heavy and light trotters. The majority of them indicate their vulgar relationships by their large and hairy fetlocks, fiddle heads, and goose rumps. As usual, the cart-horse strain comes out in the head, legs, and setting-on of the tail; and the Eastern blood in the body." The best records of the Orlov do not come within the 2.30 record, while the Hackney has been bred more for showy action than for pace. It has been well remarked, in considering the different objects for which trotters are bred, that the aim of the American horse is to create interest by getting as quickly out of sight as possible, while the Hackney strives to attain the same object by keeping within view, and covering as little ground as possible.

John Henry Wallace, founder and compiler of the *American Trotting Register*, which was begun about 1865, and the first volume of which, published in 1868, contained 3000 entries, may be said to have laid the foundations from which the **"Standard Trotter"** has been evolved. Wallace laid down the principle that "speed will most probably breed speed," and thus made the test of actual performance the basis upon which animals were admitted to registration in the *American Trotting Register*,[1] which remained his own property till it was sold to a syndicate, along with the *Year Book* and *Wallace's Monthly*, for $130,000. Since Wallace took the matter of registration in hand, the record (per mile in minutes and seconds) has been reduced from 2.40 to 1.58½ in 1903, realising what had for years been confidently expected, *i.e.*, that America would produce a horse that would trot a mile in less than two minutes, or at the rate of over thirty miles an hour. The employment of "pace-makers" and the use of "dirt shields" makes it possible to argue that the unaided horse has not yet reduced the record below two minutes to the mile.

[1] In 1892 it embraced ten volumes, and registered 60,000 animals.

The following is a list of the American **trotting record times,** in minutes and seconds, for one mile:—

1806	Yankee	2.59	1878	Rarus	2.13¼
1810	Boston Pony	2.48½	1879	St Julien	2.12¾
1826	Trouble	2.43½	1884	Jay Eye See	2.10
1834	Sally Miller	2.37	1885	Maud S.	2.08¾
1845	Lady Suffolk	2.29½	1891	Sunol	2.08¼
1849	Pelham	2.28	1892	Nancy Hanks	2.04
1853	Highland Maid	2.27	1895	Alix	2.03¾
1859	Flora Temple	2.19¾	1900	The Abbot	2.03¼
1867	Dexter	2.17¼	1901	Crescens	2.02¼
1874	Goldsmith Maid	2.14	1903	Louis Dillon	1.58¼

Long distance records, in hours, minutes, and seconds:—

10 miles	Pascal (1893)	0.26.15
20 miles	Captain M'Gown (1865)	0.58.25
50 miles	Ariel (1846)	3.55.4½
100 miles	Conqueror (1853)	8.56.01

The modern improvements in the racing sulky have made the lowering of records in recent times more apparent than real. The "bike" sulky has 4 seconds in the mile to its credit.

The following **rules,** which came into force on 8th April 1893, explain the meaning of the term "standard trotter":—

1. Any stallion that has a record of 2.30 or better, provided two of his get have records of 2.20 or better, and provided his sire or dam is already a standard animal.

2. Any mare or gelding that has a record of 2.25 or better.

3. Any mare that has a record of 2.30, provided her sire is standard and her dam is by a standard horse.

4. Any stallion that is the sire of four animals with records of 2.30 or better, or the sire of three with records of 2.25 or better, or two with records of 2.20 or better.

5. Any mare that has produced an animal with a record of 2.25, or two with records of 2.30 or better.

6. The progeny of a standard horse when out of a standard mare.

7. Any mare whose sire is standard, and whose first and second dams are by standard horses.

The rack or pacing action,[1] which involves the lifting of the hind and the fore foot on the same side at the same

[1] See Appendix D for illustrations by Eadweard Muybridge on animal locomotion.

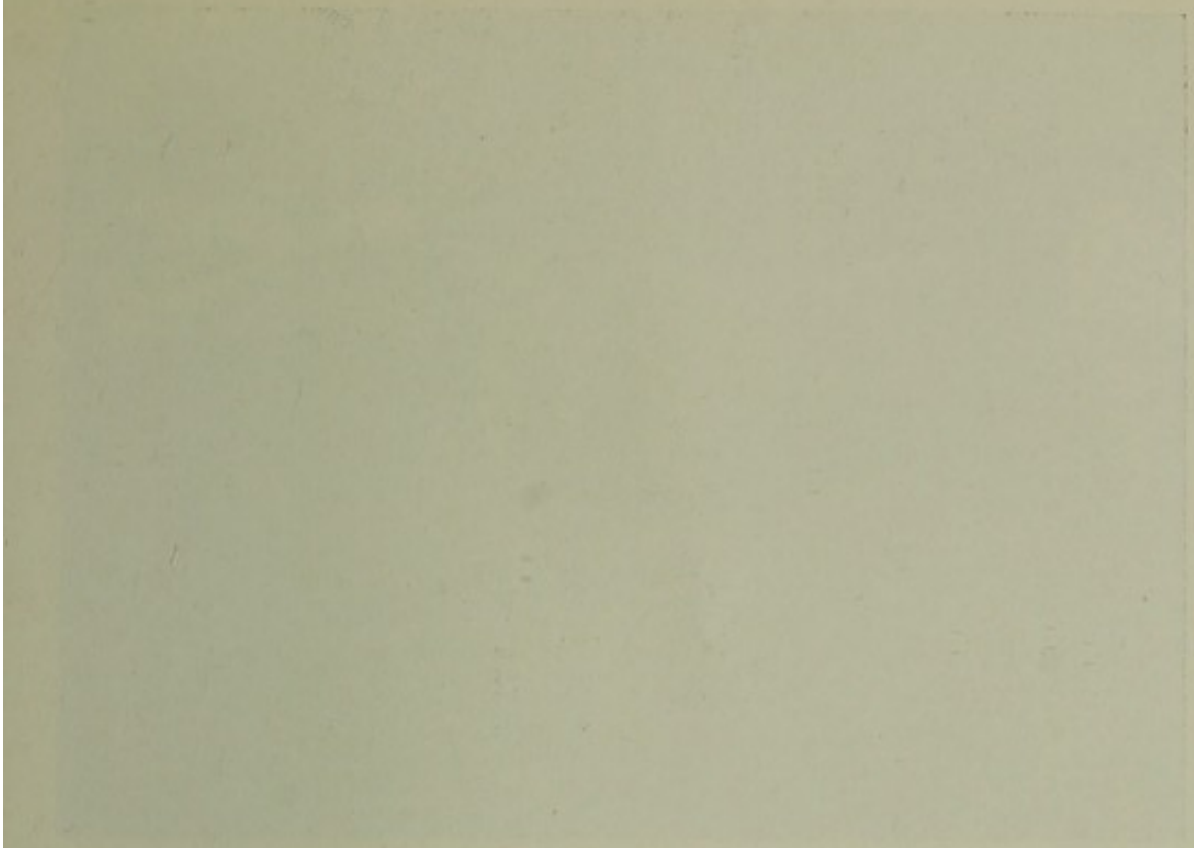
time (giving origin to the name "side-wheeler"), in place of the fore and the hind foot on opposite sides as in trotting, is a natural movement which may appear in the progeny of a noted trotting family in the same way that a famous pacing sire or dam may produce a horse which assumes the trotting rather than the pacing gait. "Probably three-quarters of the pacers are trotting bred."

The pacing standard is the same as the trotting standard detailed above, but pacing horses are entered in a separate section of the "Record." Pacing is kindred to and intermediate between trotting and galloping. The best pacing records are on the whole slightly in advance of the corresponding trotting records, probably because a pacer gets his four feet more nearly in a straight line than a trotter. The pacing movement is increasing in public favour with the great increase of pacing stock.

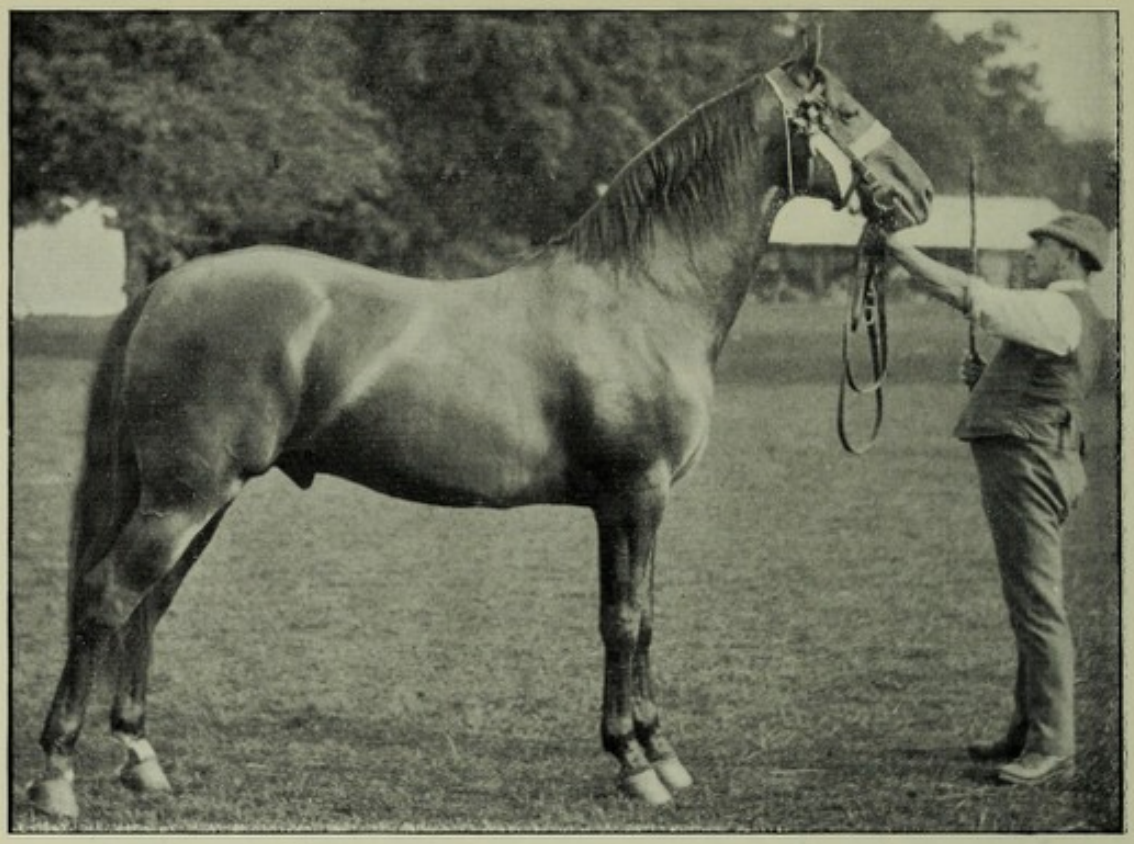
Important lessons to British breeders are to be learned by studying the early history of the American trotter, which in a word may be said to be descended from the best "clean-bred" English "running" or "race-horse"—the so-called "Thoroughbred,"—with a happy combination of other blood—notably of the old English Trotting horse, the ancestor of the Hackney of the present day. We have the authority of John H. Wallace[1] that two English Thoroughbreds, "Messenger" and "Shark," exported in 1786, laid the foundation of the best blood stock in America. Macleod says:—"The foreign horse that played the most important part in originating the American trotting breed, and that which conspicuously figures in the ancestry of our greatest sires and performers, was 'Imported Messenger.' 'Messenger' was a grey horse, foaled in 1780, bred by John Pratt, of New Market, England, and, according to the English Stud Book, was got by 'Mambrino' out of a daughter of 'Turf.' 'Mambrino' was by 'Engineer,' son of 'Sampson,' by 'Blaze,' by 'Childers' ('Flying Childers'), son of the 'Darley Arabian,' a horse imported to England from the Levant in the reign of Queen Anne. 'Turf,' the reputed sire of the dam of 'Messenger,' was by 'Matchem,' son of 'Cade,' by the 'Godolphin Arabian.'"

It is believed that "Messenger" was not a pure Thoroughbred, because his grandsire, "Engineer," sire of "Mambrino,"

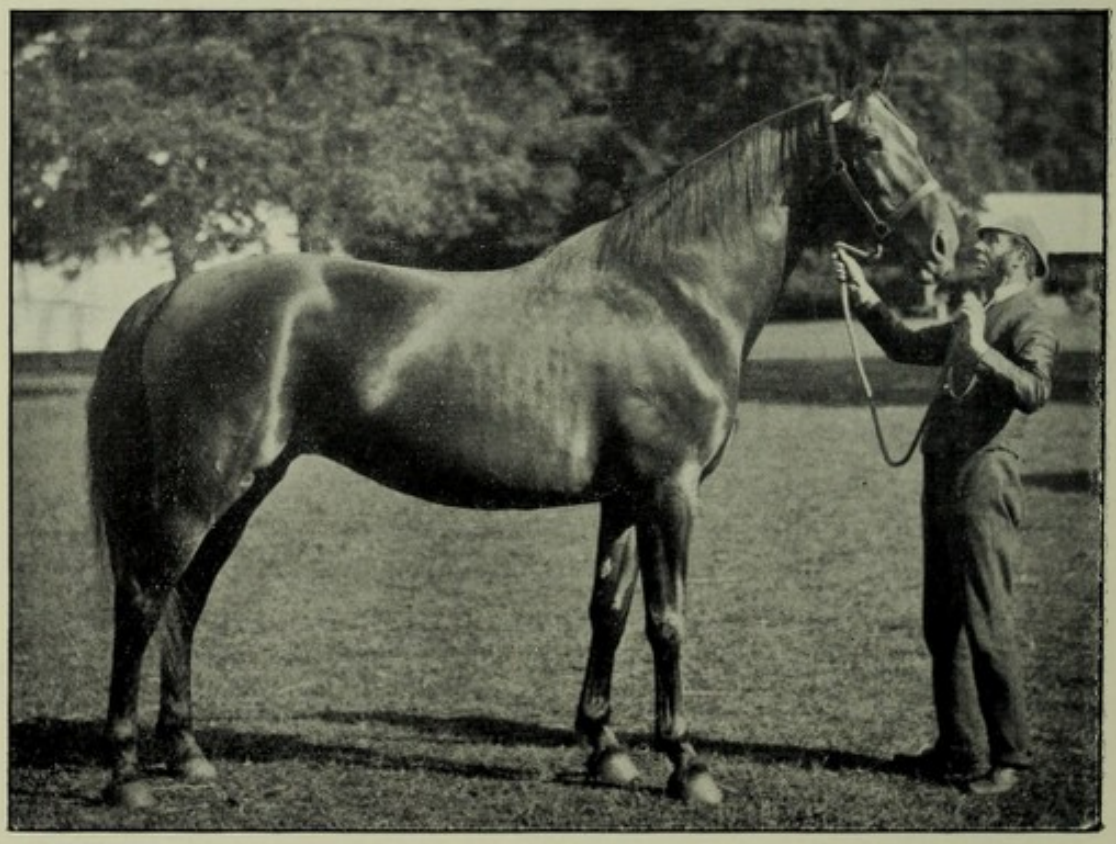
[1] In *The Horse of America* (1897), pp. 222-31 and 303, *q.v.*





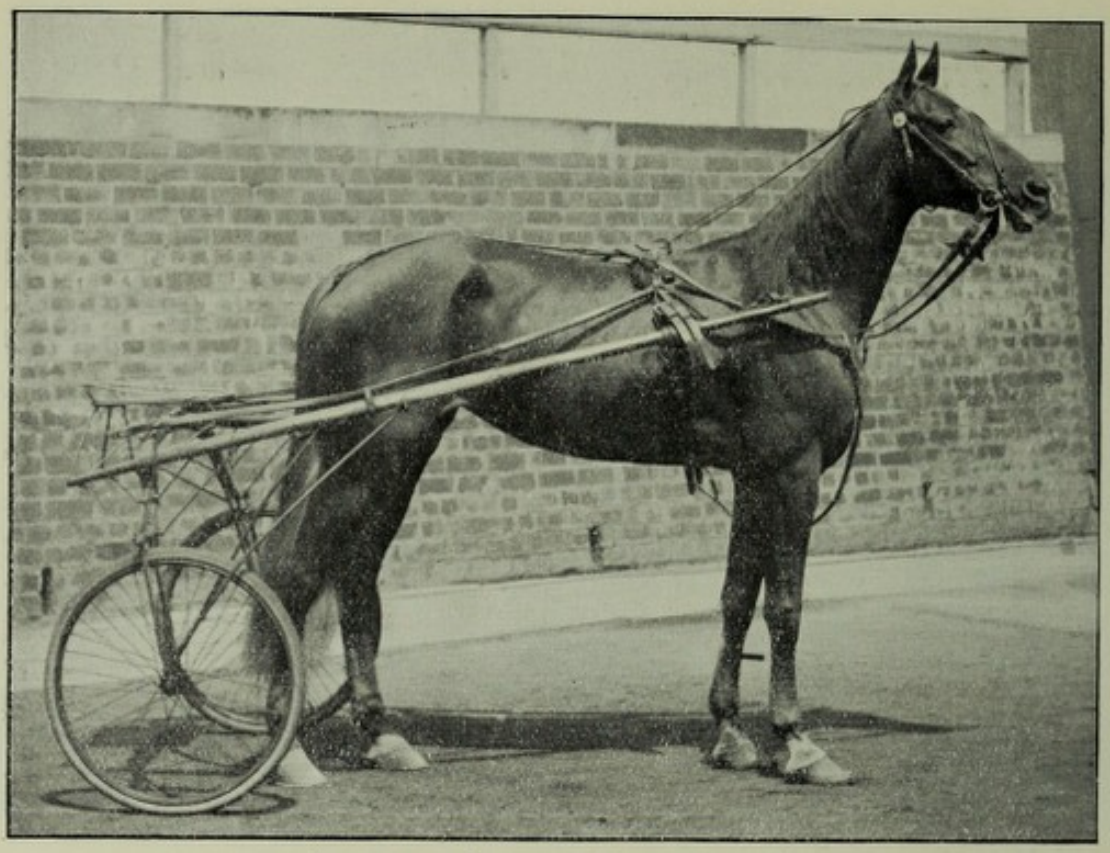


A. Yorkshire Coaching Stallion, "Salisbury" (1888).
First prize, Royal Agric. Soc. Show, Warwick, 1892.



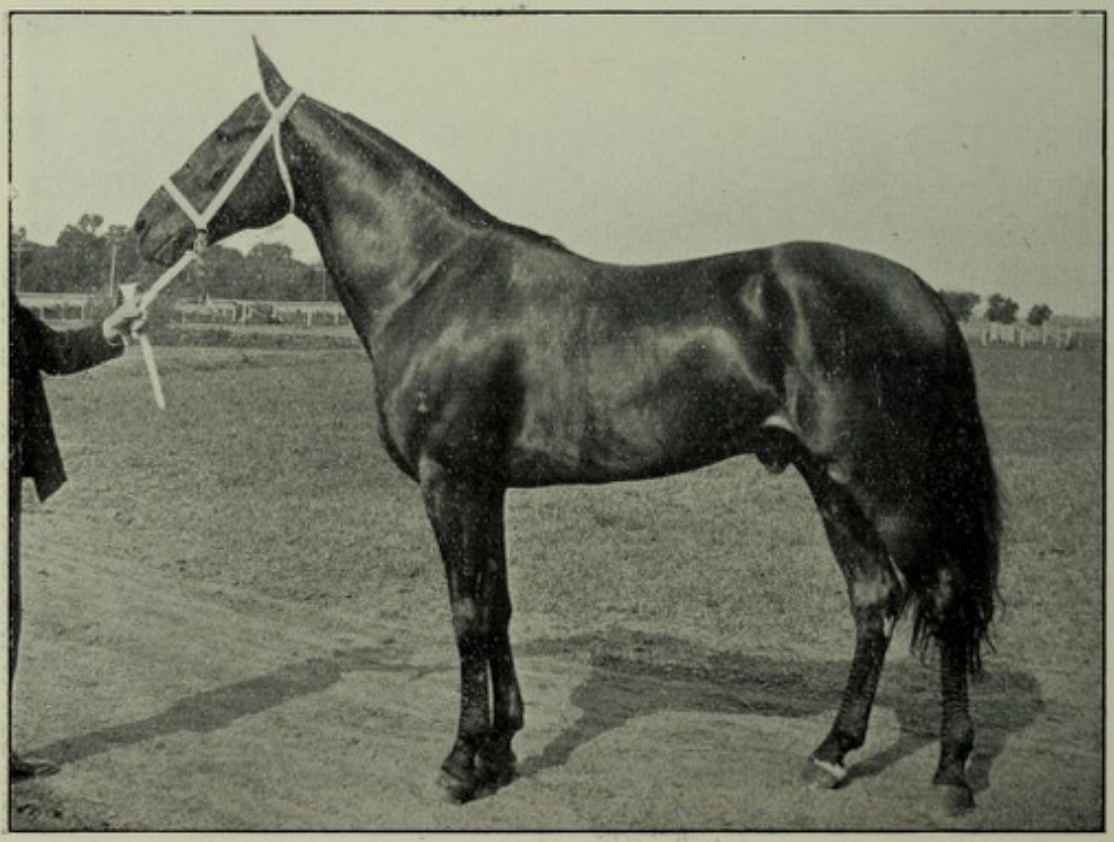
B. Yorkshire Coaching Mare, "Wath Belle" (338).
First prize, Royal Agric. Soc. Show, Warwick, 1892.
Both the property of Thos. Carr, Kirksmeaton, Pontefract.

[*Both photos by C. Reid, Wishaw.*

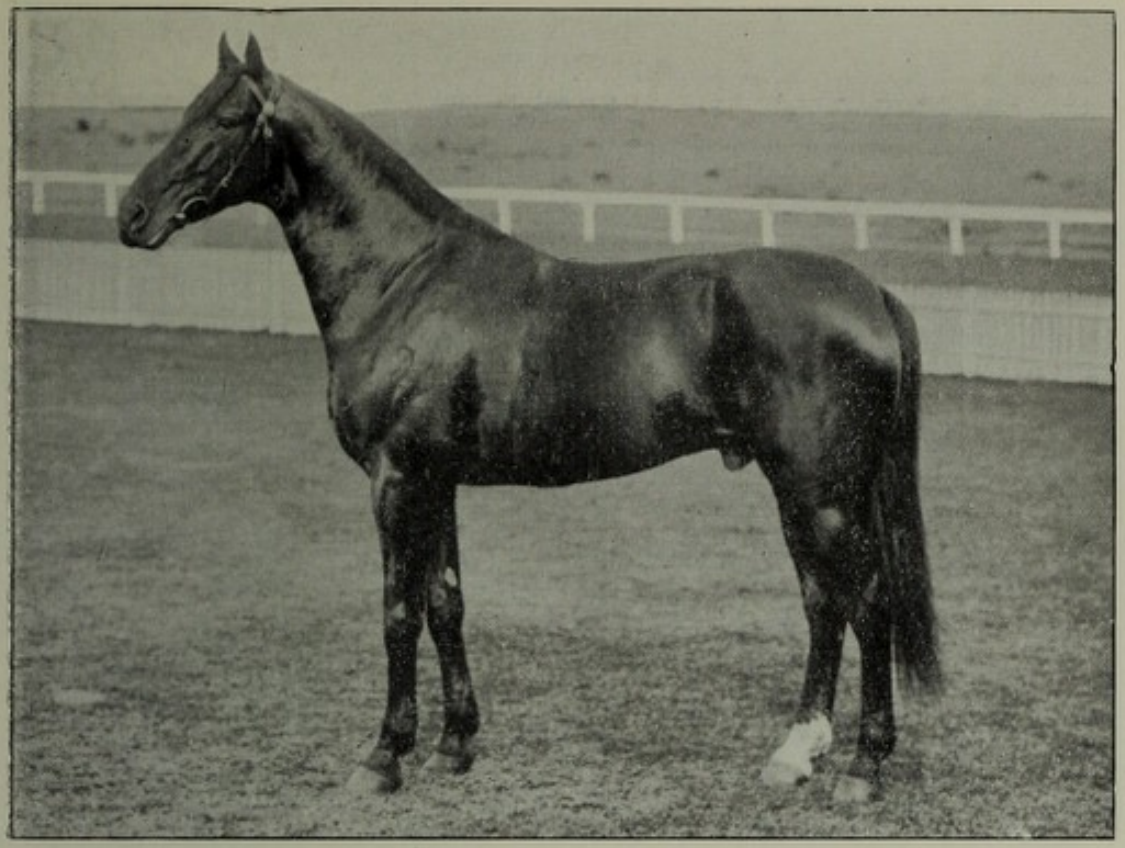


A. American Trotter, "Rustic Beauty."
Record, 10 miles in 27 mins. 52½ secs. in 1900.
Owned by T. Smallwood, of Manchester.

[*G. H. Parsons, Alsager, Cheshire.*



B. American Pacing Stallion, "Dan Patch," 1.56.
"Champion Harness Horse of the World."
Owned by M. W. Savage, International Stock Food Company, Minneapolis, Minn., U.S.A.



A. Trotting Stallion, "Almont."
First and Champion, Royal Agric. Society of Victoria, 1904.
Holder of the world's record, 3 miles, 6 mins. 50 secs., made at Ascot, Victoria, 1903.
Owner, A. J. B. Sharp, Hartlands Stud Farm, near Melbourne.



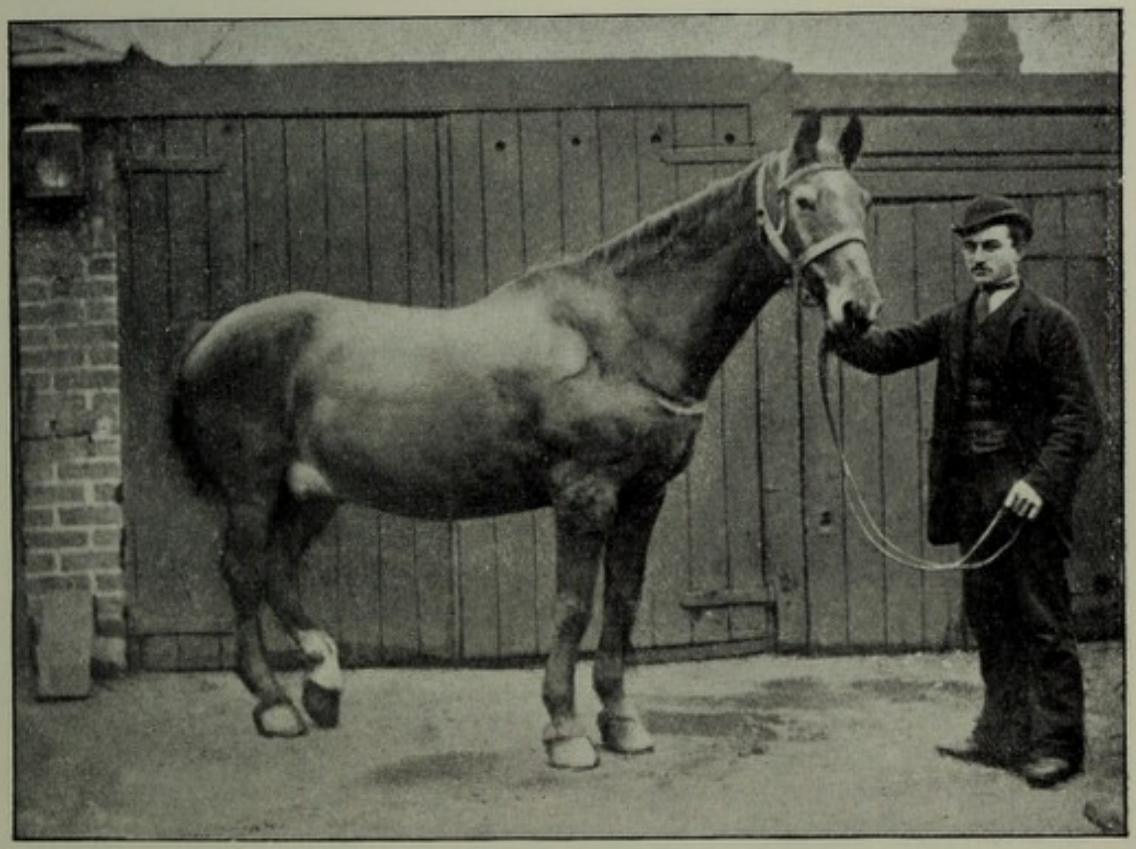
B. American Trotter Mare, "Sunol," 2.8½.
The property of Robt. Bonner, 8 West 56th Street, New York.

[*Schreber & Sons, Philadelphia.*

[*pp.* 456 *and* 457



A. Cross-Bred Harness Horse.
By a Yorkshire Coach Horse on a Clydesdale Mare. Bred by S. W. Wallace, Ford, Thornhill, N.B.
[*Photo by the Author.*



B. Gelding, more than Half-Bred, 15.2 h.h.
Reputed to be 61 years at death in 1888, with evidence of his being at least 48.
Described by Sir John M'Fadyean in *The Veterinary Journal* at the time.
Skeleton in the Royal Dick Veterinary College, Edinburgh. Owned by F. S. Petrie, Leith.

[*pp.* 456 *and* 457

had not a complete pedigree record. There was in this circumstance an opportunity afforded for the introduction of trotting qualities and tendencies from the English Trotter of the day, while at the same time the preponderating share of blood was derived from the Thoroughbred connection.

It is acknowledged by all the best authorities that great uncertainty exists as to the ancestry of many of the **founders of the trotting breed,** but well-authenticated instances of the introduction of Norfolk Trotter blood nevertheless exist. "Imported Bellfounder," the sire of the dam of **Rysdyk's "Hambeltonian,"** generally conceded to be "the greatest of all American trotting progenitors," is believed to have been of Norfolk blood. "Hambeltonian" was foaled in Orange County, N.Y., in 1849, "and began his career as an obscure cross-roads stud horse," standing at a fee of $35. He and his dam were bought for $125 by Wm. M. Rysdyk, a farm labourer, from his master, Jonas Seeloy, the old Bull's Head cattle drover who hired him. As the horse's own record was probably not more than 3.15, it was not till he was thirteen years of age in 1862 that he began to be noticed as a progenitor of first-class trotters. His stud fee then jumped to $75, $100, $300, and $500 in successive seasons. He ultimately earned $288,000 at the stud. At twenty-five years old he measured 15.0¼ hands at the withers and 15.2¼ at the croup. "He was a long horse, but all his fastest progeny were short in the body." His get was extremely irregular in size, and "unstable in conformation." Many of the best trotters have been about this height—15 to 15.2 hands.

The *New York Herald* recorded that "'Hambeltonian' died in 1876, having begotten about 1333 foals. Forty of them gained trotting records of 2.30 or better; one hundred and fifty of his sons got 1478 trotters of standard speed, and eighty of his daughters produced 110 trotters in the 2.30 list. In the succeeding generations, the achievements of the family are still more remarkable, and it is estimated that nearly, if not quite, 15,000 of the 17,625 trotters in the 2.30 list are descended from the 'old hero of Chester,' through either sire or dam, or both. Since 'Dexter's' day, every trotter save one that has lowered the world's record has carried the blood of 'Hambeltonian.' The exception is

'Harus,' 2.13½, whose sire was of unknown breeding. At the close of the campaign of 1901, 138 trotters had earned records of 2.10 or better. Of this number, no less than 135 were traced to 'Hambeltonian.' . . . The most successful horsemen have doubled and redoubled in their studs the blood of the world's famous trotting progenitor, and the greatest of trotters have resulted from this course. 'Crescens' (2.02¼), traces to him through both sire and dam, as did 'Alix' (2.03¾), and 'Nancy Hanks' (2.04)." The course followed was that of "line-breeding," and the wide area of country over which the various members of the great trotting family spread, no doubt tended to minimise any injurious tendencies from consanguineous breeding by change of environment. As his progeny of to-day have not deteriorated in constitution, they have gained immensely in speed. The two stallions mentioned below, "Axtell" and "Allerton," also belong to this line of descent. "Messenger," mainly through "Mambrino," his most famous son, was the fountainhead of the four chief trotting families of the day—(1) the Hambeltonians, (2) the Mambrino Chiefs, (3) the Clays, and (4) the Black Hawks or Morgans. The latter belong to the oldest family of trotters, springing from a horse, "Justin Morgan," foaled in Vermont in 1793. The Morgans produce useful and profitable roadsters, but they are undersized (14.2 to 15 hands), and consequently do not bring the highest prices.

"Nancy Hanks" (6), a brown mare bred in 1886 by H. Boswell, Lexington, Ky., first beat record on a regulation or round track with 2.07¼, or 2.05¼ on a kite-shaped track, which is considered to be two seconds faster than the other; but as a six-year-old, in the autumn of 1892, she lowered her record to 2.04 on a round track, and established her reputation as a "lightning striker." Prior to "Nancy Hanks" **the three most famous trotters** of the day, called the "Trinity of flyers," were "Axtell (3)" 2.12, "Allerton (5)" 2.09¼, and "Sunol" 2.08¼. "Axtell" and "Allerton" were bred by C. W. Williams, Independence, Iowa. Though "Axtell' possessed the greatest popular reputation, "Allerton" is believed by experts to have been the better horse. "Axtell" was sold to a syndicate in 1889 for $105,000, then the highest price paid for a horse in America. He was retired to the stud, where he was highly successful, and his service fee fixed at the

enormous sum of $1000. The mare "Sunol," the property of Robert Bonner, of New York, was bred in California, and sold at three years old for $41,000. **"Dan Patch,"** (Plate CXIV.), a pacing stallion, 1.59¼ at six years old, is, with 1.56 as his later record, the unbeaten champion harness horse of the world. He bred by "Kausar," "Joe Patch," 2.01¼, the "iron racehorse." "Dan Patch" was sold privately in December 1902 for $60,000. Plates CXIV. and CXV. show that trotting power, in either male or female, is not incompatible with elegance and beauty of symmetry. They also show that in trotting performances of a high order, "blood," or breeding, is sure to come to the front. "Since 1895, the trotting breed of American carriage-horses has, in competition with the Hackney, dominated the show ring and the sale mart. Every champion high stepper of the national shows since that date has been the offspring of a trotting sire, except in two instances, where the blood of the winners was unknown."

Though the fastest trotters show **breeding** in an unmistakable manner, there are certain peculiarities of form which have become developed in a conspicuous degree—for instance, a massiveness or heaviness about the shoulder, especially round the point, not present in a horse with a running gait. As compared with the running Thoroughbred, the shoulders of the American Standard Match Trotters are more upright, and the width between the forearms greater, giving the appearance of more width of chest. But extra width depends largely on the extra development of the pectoral muscles which lie between the humerus and chest. To compensate for this peculiarity the fore feet come very closely together through the fore legs being inclined inwards, both at rest and in motion, and thus increasing the liability to "hit" or "interfere" while trotting. Boots for the protection of the joints liable to be struck while trotting have to be fixed on the limbs. This danger is aggravated by a comparatively modern development seen in about nine-tenths of the Standard Trotters. Unlike "Hambeltonian," who had straight action, they have their toes turned out. This is supposed to give some advantage while moving at top speed: it seems to be a utility development. The hereditary qualities of persistency at the trot and speed at the trot are well-marked acquired characteristics of the "Standard Trotter." Mares are not usually so well

ribbed-up as horses, but the Trotter which requires staying power is generally round in the barrel and as well ribbed-up as the chaser. Although "the vast majority of fine hunters and good chasers are considerably higher at the withers than over the croup," the American Trotter is generally lower in front than behind. There is in the Trotters a great length of hind quarter from the hock upwards, and the pelvis generally droops posteriorly. As a rule he is good-natured, tractable, and easily trained. His step generally is long and low, qualities which admit of speed, but which do not attract public interest as readily as the high and showy action of the Hackney.

Although it was later than the middle of last century that match trotting really became fashionable in America, the breeding of trotting horses is now one of the greatest live stock industries in the United States. Trotting does not, however, monopolise the racing interest in America. In New York, flat races are much more numerous than trotting races, and absorb by far the greatest share of the attention of sporting men. Towards the West the interest in trotting increases, and in Kentucky, for example, it is all-absorbing.

N.B.—For further information, see *The Trotting and the Pacing Horse in America*, by Hamilton Busbey. London: Macmillan & Co., 1904. Price 8s. 6d. net.

CHAPTER XXII

HORSES (*continued*)

Irish Horses—The Connemara Pony—Irish Hunters—The Polo Pony Society—The Polo Pony Stud Book—Inclusion of Indigenous **Mountain Ponies**—Methods of Improvement—North Wales Breed—South Wales Breed—New Forest Ponies—Dartmoor Breed—The Highland Ponies of Scotland—Western Islands Riding Ponies—The Highland Garrons—The Shetland Pony—**The Ass**—**The Mule** and **the Zebrule.**

IRISH HORSES

IN 1888 the Imperial Government began to make a grant of £5000 a year for the improvement of Irish Live Stock, and put the administration in the control of the Royal Dublin Society, who allocated £3200 to horse-breeding in the form of premiums for Thoroughbred stallions, which were distributed according to local requirements. This went on till 1902, "when the payment of premiums was discontinued, and the money devoted to the provision of free, or assisted, nominations for mares," which in turn continued till 1900. The numbers of horses in the following table were provided and maintained chiefly by private enterprise:—

Year	1892	1893	1894	1895	1896	1897	1898	1899	1900
Horses	101	119	105	219	239	212	217	206	201

In 1900 the Irish Board of Agriculture, with more ample funds, took over the work, and they now carry it on on a larger scale, guided by experts forming the "Horse-breeding Committee," representing the various breeding interests. Suggestions have also been invited annually from County Councils. The Department has found it necessary to introduce stallions, and to sell them on easy terms to suitable purchasers. Clydesdale and Shire horses were admitted at first, but they have not been received with favour, and their use was restricted in 1903. The total

number of sires stationed in Ireland when the Board took the matter in hand was 2424. Of these, 1724 were estimated to be "half-bred," having been bred without system and as a matter of chance. On inspection, only 12 meritorious animals could be found, "the others being unsuitable for the production of hunters, harness horses, or Irish farm horses," largely due to the introduction of English and Scotch Cart-horses, Clevelands, and Hackneys, during the previous thirty years.

In an article on "The Horse in Ireland," in the *The Journal of the Board of Agriculture and Technical Instruction for Ireland* (October 1904), it is pointed out that "some particular type of horse is found in each district," and the ponies of Cushendall and Connemara are instanced to illustrate how "horses become modified through adapting themselves to their surroundings." **A typical horse**—descended from animals bred in Ireland during a long period, and noted for their high courage—is of good size, his bone is specially well developed, his legs are clean, flat, and hard, without spongy softness of bone or ligament. The hair is fine and sparse all over the trunk, although somewhat coarser on the back of the fetlocks.

The Live Stock Journal says: "Nothing struck the early invaders of Ireland more than the contrast between their great heavy horses—probably Flemish—and the smaller and more 'classy' steeds of the natives that in all probability owed their origin to the constant traffic between Galway, Limerick, and other parts, with the Gironde and Spain, the countries of the Barb. Giraldus Cambrensis extolled the 'hobbies.' Stanyhurst said: 'The nag or the hackine is very good for travelling, albeit others report to the contrary, and if he be broken accordinglie you shall have a little Tit that will travell a whole daie with anie bait.' Theiner, reporting to the Pope, said: 'The land produces absolutely nothing but oats, and most excellent victorious horses, more swift than the English horses.' Arabian and Turkish horses were imported in the time of the Stuarts; some of them found their way into Ireland. But the half-bred or seven-eighths hunter is the specialty of Ireland, and has been for many years a valuable export; and Ireland still remains the best mart of the world for war horses and hunters."[1]

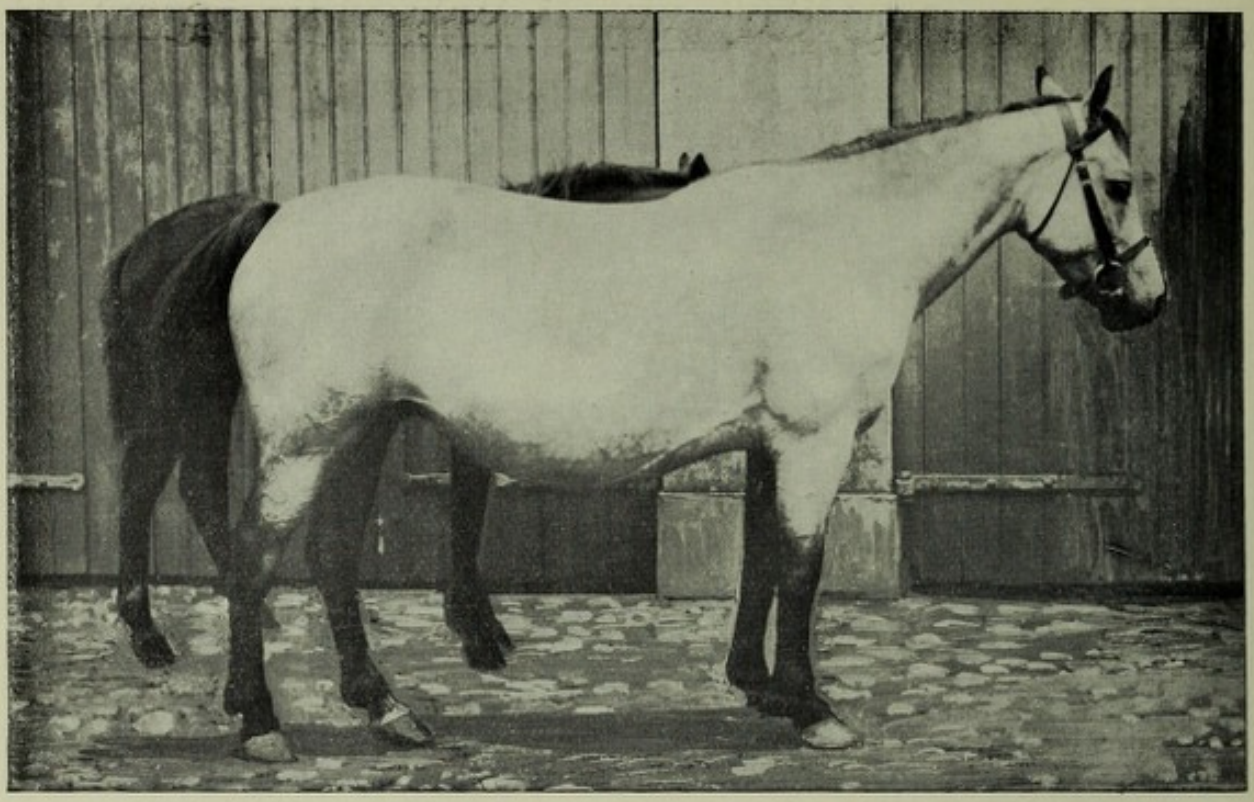
[1] The following is a quaint though instructive description of a **Medieval Irish Horse** and his rider:—"The blue-eyed hero [Murough] dressed himself in his armour and arms of valour, his broad full-form mail

The Connemara pony—a direct and till recent years an unpolluted descendant of the horse which inhabited Ireland from time immemorial—though dwarfed by the climatic conditions of an exposed sea-board, as well as by the meagre fare, still retains the high courage and stamina of his ancestors, and, though somewhat modified in shape, possesses the strength and bone so characteristic of the Irish horse. Roscommon is so famous for the production of big-boned animals—cattle, sheep, and horses—that no sire is too small to get sizable hunters in Roscommon. The natural characteristics of the typical Irish horse are more prominently developed in the Thoroughbred and the Irish Draught-Horse than in any other of all the breeds in the country. Owing to the close relations which existed from early times between Spain and Ireland, there were constant importations of Spanish horses. The **Hobby** (or **Hobbie**) **breed of horses,** famous on the Continent and in England, must be regarded as a purely Irish product, evolved—partly from Spanish blood—by the influence of the Irish soil and climate in

coat, his long venom-edged blade, his champion's helmet full of starry carbuncle stones, his two thick-hafted battle-javelins in his firm unloosable hands, his empurpled brown-red shield upon the arched expanse of his back, a sharp knife dagger on his left side, and three letters of golden letters, written on the shield and the knife, setting forth that it was he himself who used to lop the heroes in the battle. Then there was found for him a smooth, high-spirited, very-fast, clear-leaping steed, with four shoes of fine white silver beneath him and a golden-bitted bridle, which [steed] had in itself twelve accomplishments of excellence : first, three excellences of a woman—a narrow waist, a full hip, and a proud spirit; three excellences from a bull—a stout eye, a thick neck, and a broad face ; three excellences from a fox—a bounding gait, a pointed ear, and a bushy tail ; three excellences from a hare—a high leap, a rapid turning, and a run uphill. Then he got on the back of his blue, sweeping, very knowing, lively, expert steed so that they went in no other fashion than as a *lon* going before the wind, or a seamew off a bald mountain head, or a wheel down a great incline, or a sound going through the valleys, or Ceadach, the son of the King of Sorcha, going to dispute with the king-son Caoilte mac Ronain in the desert places of Airreacht O'Conor, on the near confines of Erin and Alba ; so that such was the career of travel and constant going which the hero made at that time, that he would rout badger out of woods, geilts of glens, wolves under heights, and put foxes a wandering ever, until he came to the brink of Loch Derg."—*The Land of the Ferule*, with translation, notes, and glossary by Douglas Hyde (London : Irish Text Society, 1899), pp. 31-32.

conjunction with the necessities of the time—in other words, by artificial selection. The Hobbie began to lose ground about the beginning of the seventeenth century, and about the end of the eighteenth a number of stallions of Eastern blood were introduced from England. These, crossed with the native mares, formed the **parent stock of the Irish Thoroughbred,** which may be said to date from that time, and to be based, like the English Thoroughbred, mainly upon the three great sires—"Herod," "Eclipse," and "Matchem." About the middle of the eighteenth century, upwards of a hundred imported stallions were standing in Ireland. From this time the history of the Thoroughbred horse in England and Ireland is practically the same.

The Irish Draught-Horse is not authentically recorded before the close of the eighteenth century, when the requirements resulting from a great increase of the tilled area produced a demand for a bigger and stronger horse for tillage. Imported English draught-horses having failed, the breed was built up by selections from the heavier of the native horses suitable for farm work. The animals were too coarse for hunting, although they jumped well; but the mares were admirable for mating with the Thoroughbred stallions, and to this cross we owe the Irish Hunter which has established for Ireland a world-wide reputation. The low price of agricultural produce has led during the last 50 years of the nineteenth century, but particularly since 1879, to the "steady decrease in numbers and quality" of the draught-horse, which passed first from the large farmers into the hands of small men who were compelled to meet urgent calls by parting with their good colts and fillies. "Consequently, after a drain of 25 years, we have left only some very old and degenerate specimens of a very valuable breed, which must be regarded as a national loss." The loss of this breed has reflected injuriously upon what formerly was the comparatively safe industry of breeding Hunters, increasing its uncertainty in proportion to the additional amount of Thoroughbred blood it is now necessary to employ. In the interests alike of the agriculturist and the breeder of Irish Hunters, the restoration of the Irish Draught-Horse is a necessity. He was formed by selections from the remains



A. Connemara Pony and Foal.
Owned by W. A. Byrne, V S., Castlestrange, Co. Roscommon.



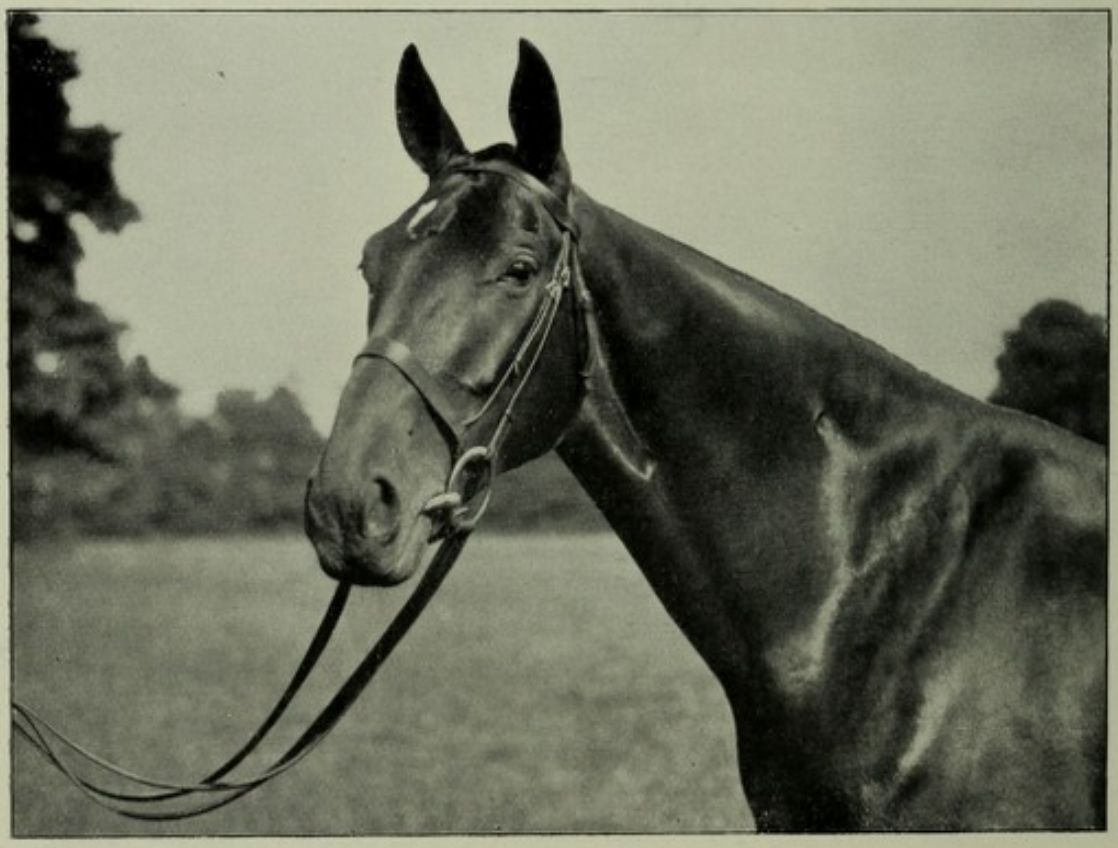
B. Irish Draught Stallion, "Prince Henry."
Owned by M. J. Cleary, Bishopstown Moate, Co. West Meath.

[*From "The Journal of the Board of Agriculture and Fisheries for Ireland," Oct.* 1904.

[*p.* 464



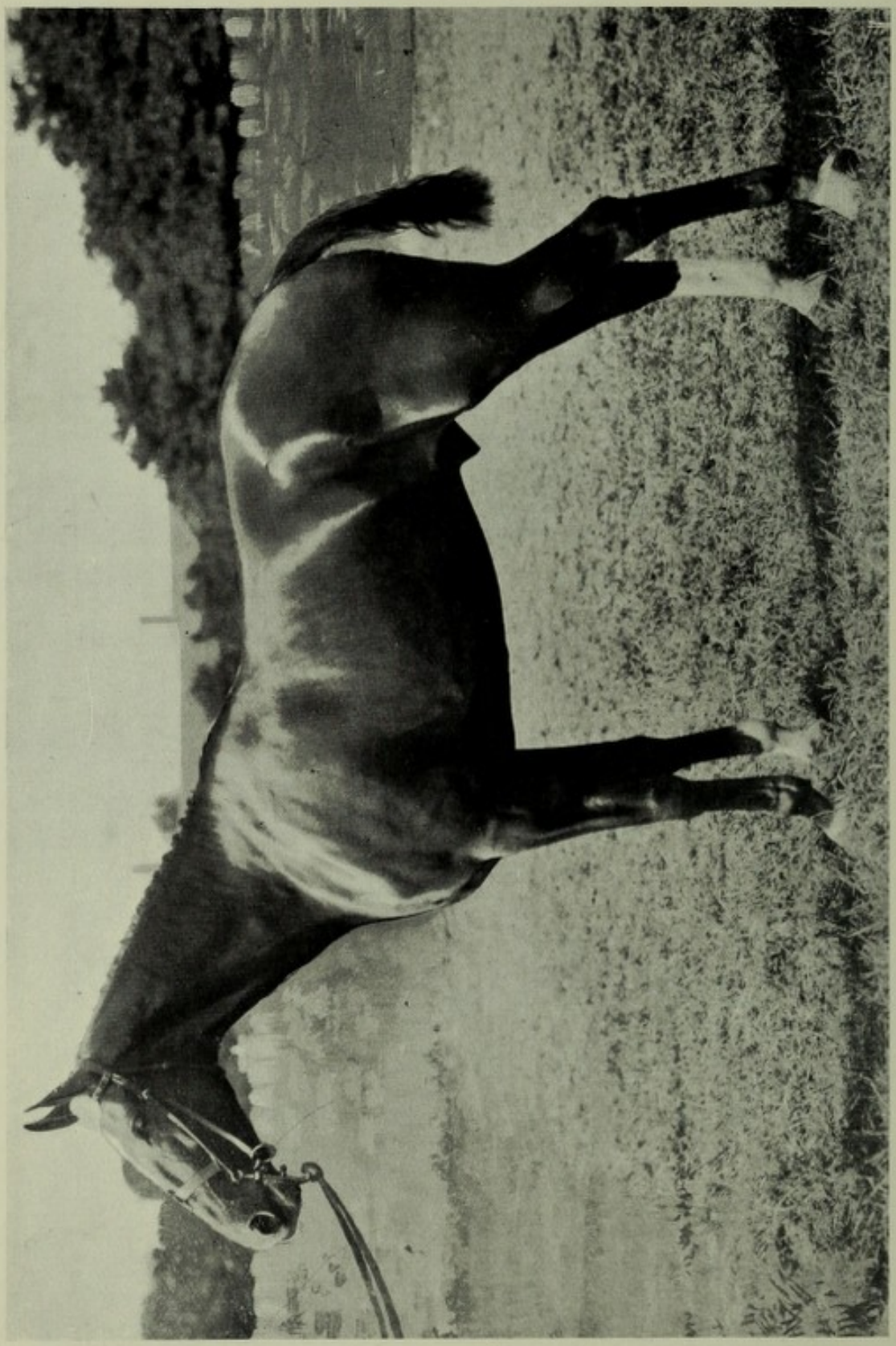
A. Milk-White Hunter Mare, 9 Years Old, by "Bonaparte."
Bred in Yorkshire; sold by J. H. Stokes, Leicestershire, to J. B. Thorneycroft, Netherplace, Mauchline, to breed hunters. The foal born March 1904; by "The Rush," a dark chestnut, by "Barcaldine," out of "Whirlpool."



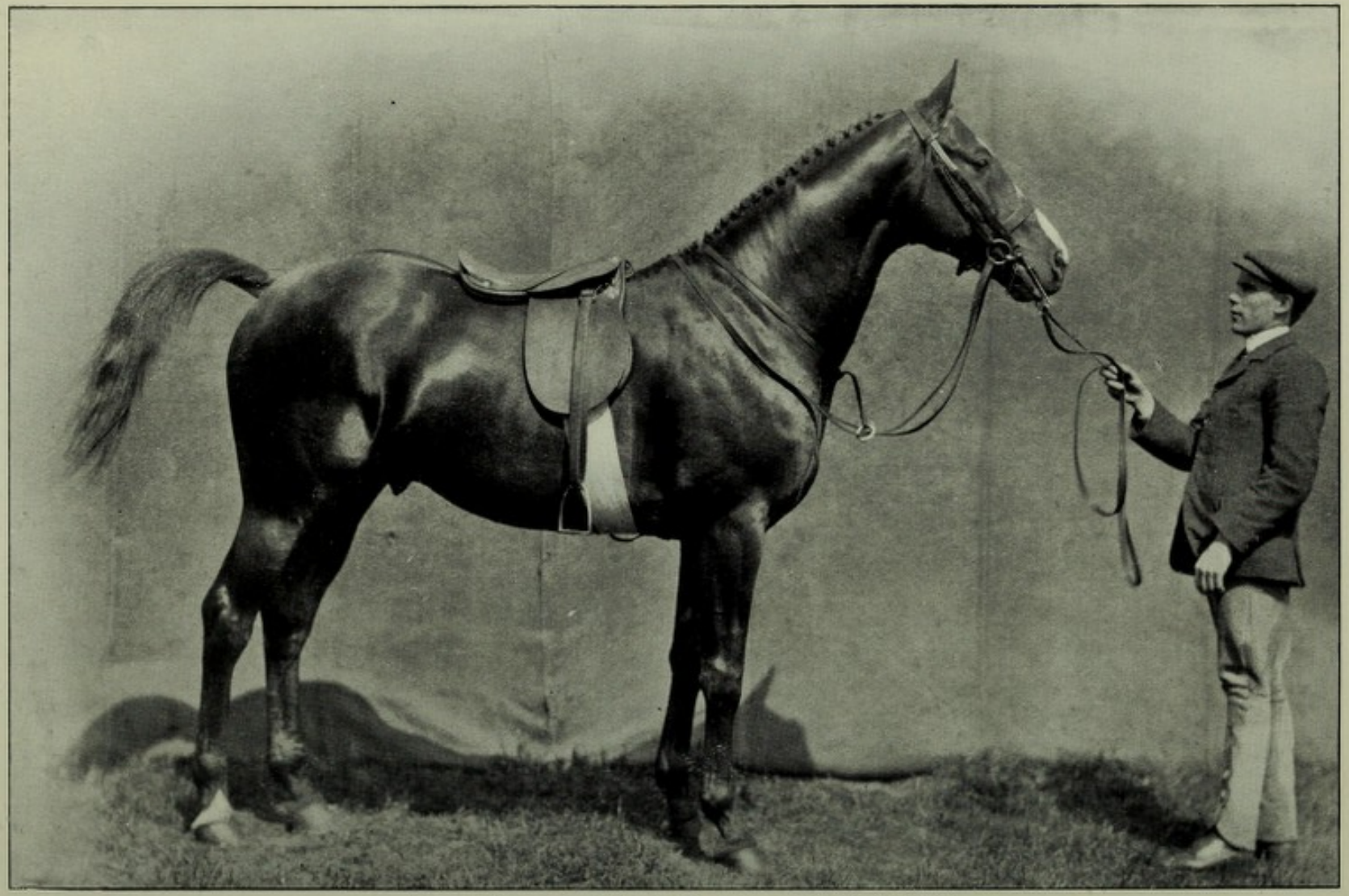
B A Typical Hunter's Head.

[*G. H. Parsons, Alsager, Cheshire.*

[*p.* 464



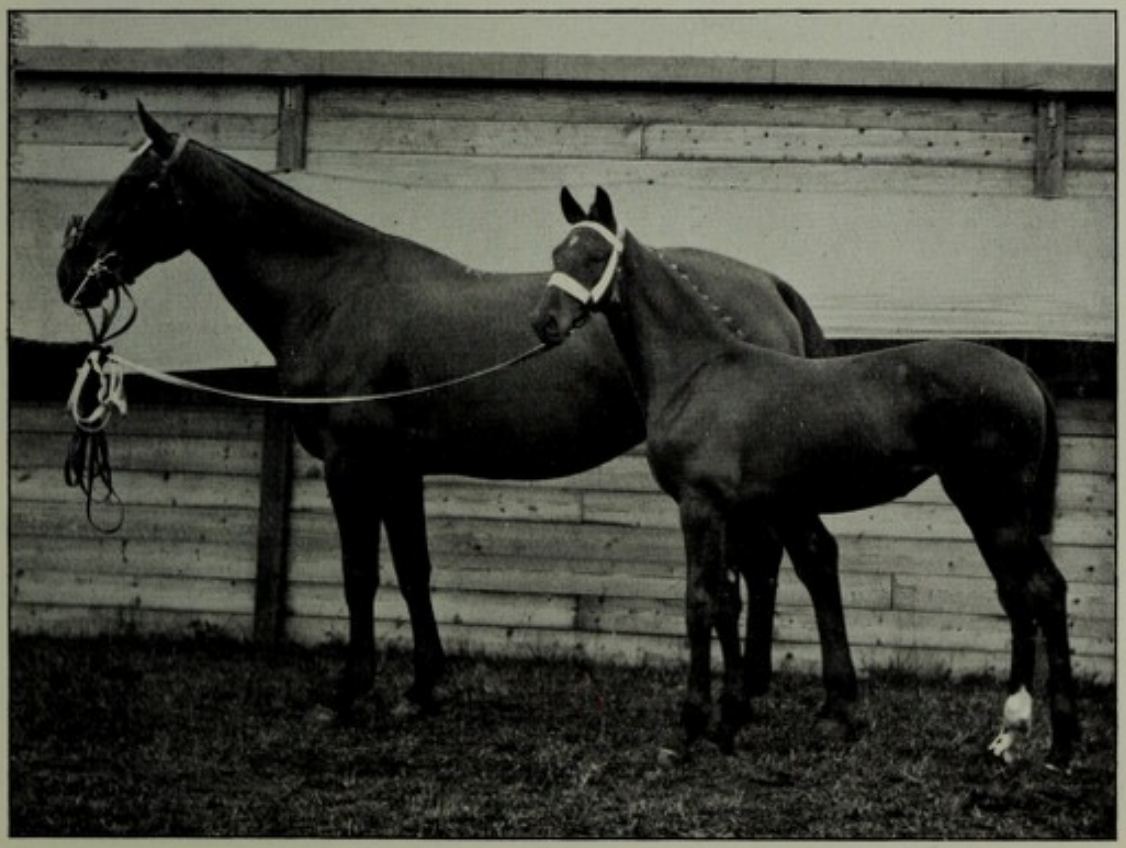
IRISH HUNTER GELDING, "MOYGLASS."
Owned by John Doyle, Philisborough, Co. Dublin.
[*From the "Irish Board of Agric. Journal" for October* 1904.



HUNTER STALLION, "MERRY MATCHMAKER." Foaled 1899.
Many prizes, including First, Hunters' Improvement Society, London Show, 1902; and Gold Medal, Royal Lancashire, 1904.
Bred by Donald Fraser, Tickford Park, Newport Pagnell.



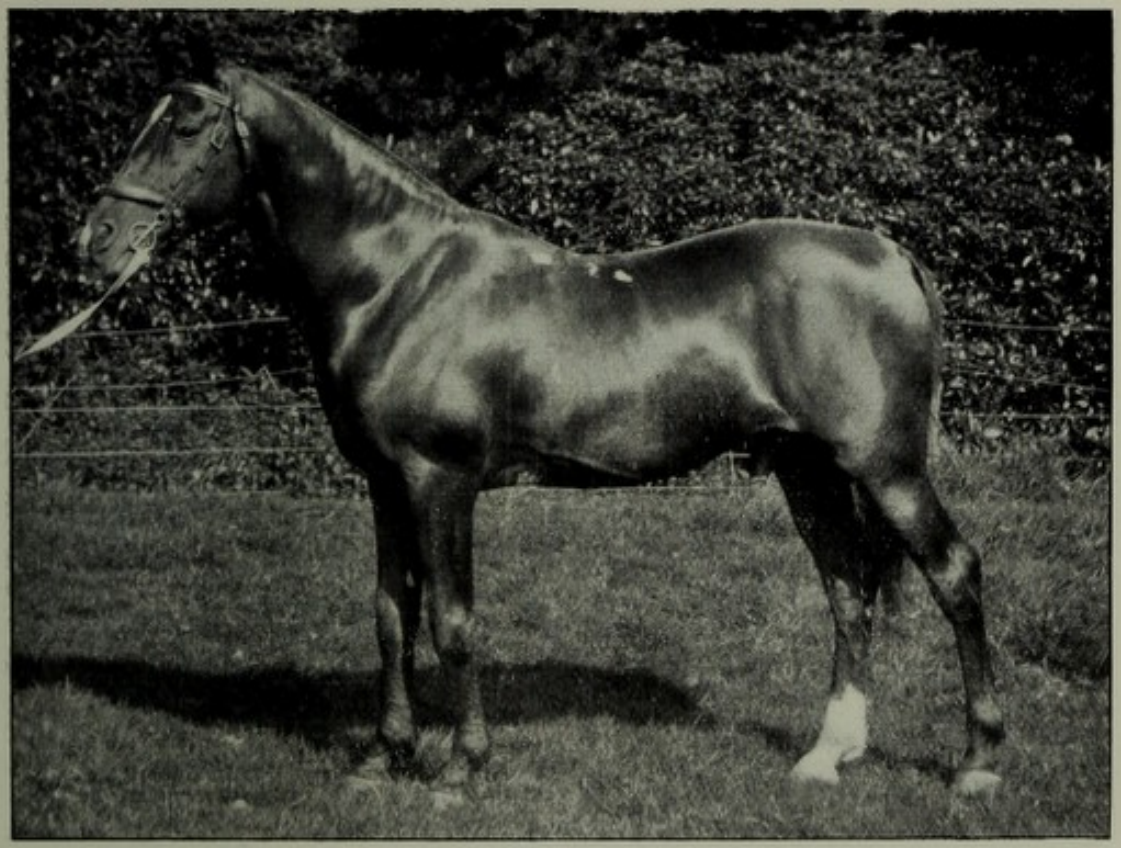
A. Heavy-weight Hunter, "Orator" (Chestnut, 6 Years Old).
s. "Oriflambe"; won First at Newark, Peterboro, Essex, and Leicester, and the Fifty-Guinea Champion Cup at the Royal Lancashire, etc.
Owned by J. H. Stokes, Nether House, Great Bowden, Market Harborough.



B. Hunter Brood Mare, "Speculation," and Foal, "Spendthrift."
First, Tunbridge Wells, and £50 Cup, Royal Lancashire, 1905.
[*Photos by G. H. Parsons, Alsager, Cheshire.*



A. Polo Pony Mare, "The Pheasant," and Foal by "Rupert."
Winner of Gold Medal at B. and W. Show, 1905. Owned by the late Miss Standish, Marwell Manor, Eastleigh, Hants.



B. Polo Pony Sire (bred in Arab), "The Bey," 14.1 h.h., and 8 ins. of bone below the knee. Many first prizes, including the One Mile Steeplechase, Woolwich, 1892; First, Foreign Ponies, Hurlingham, 1894; First, Polo Pony Show, London, 1902; and First, Royal Lancashire, 1903. Owner, G. Norris Midwood, The Grange, North Rode, nr. Congleton.
[*Photos by G. H. Parsons, Alsager, Cheshire.*

[*p.* 464



A. Welsh Mountain Pony Mare and Filly.
Owned by W. Y. Craig, Milton House, Alsager.
[*G. H. Parsons, Alsager, Cheshire.*

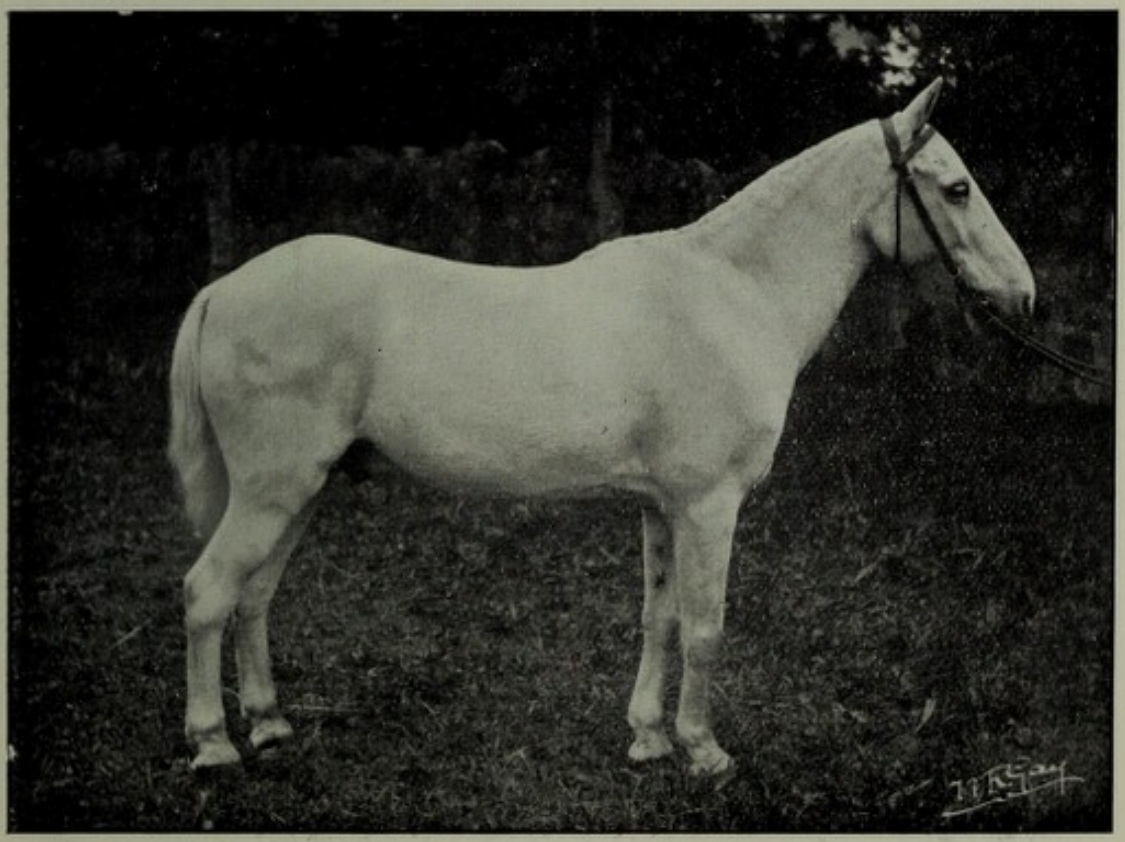


B. Welsh Pony, "Searchlight."
Owned by D. Price, Queen's Square, Llangadock, Carmarthenshire.

[*p.* 464

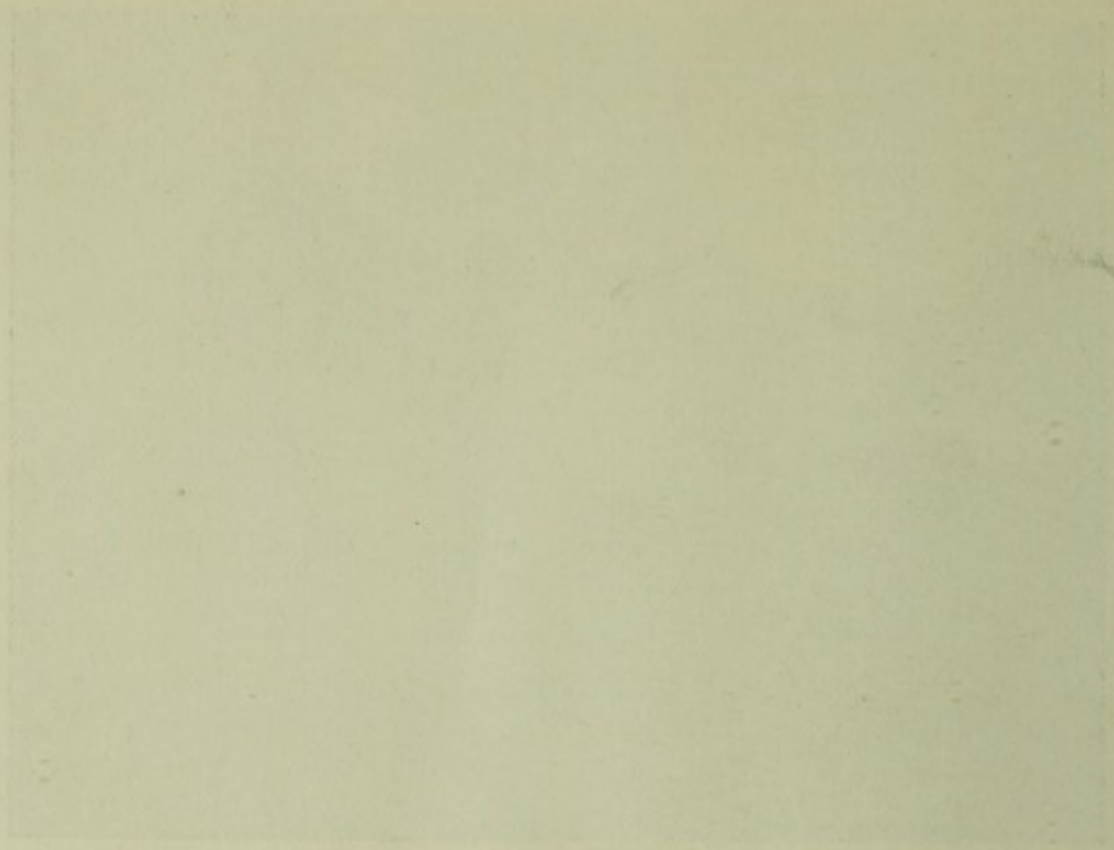


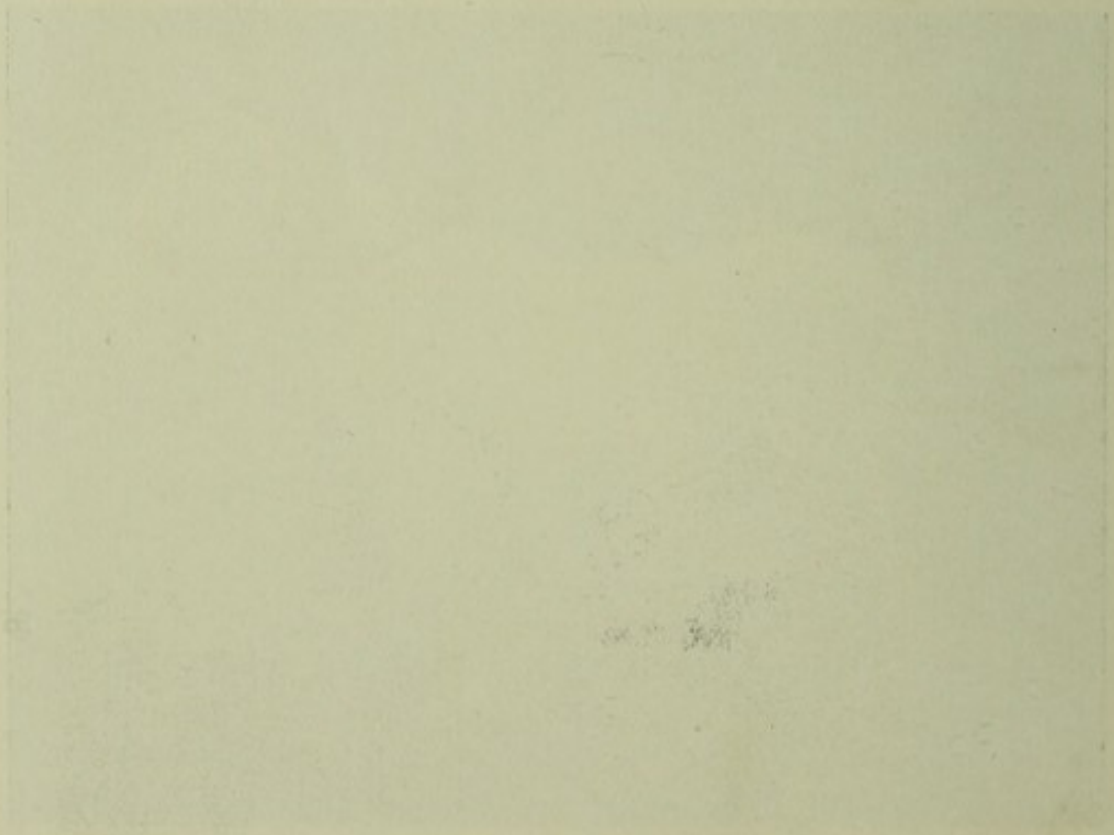
A. Welsh Pony, "Old Stager" (362), in Winter Coat. Foaled in 1865.
Produced thirty-five living foals, the last in 1904. Lived in the mountains till spring 1905.



B. Dartmoor Stallion, "Tommy," at 32 Years, 11 h.h.
Owned and photographed by N. R. Gay, Moorland Park, South Brent, Devon.

[*p.* 464





of the Hobbies, which were descended from native horses crossed with Eastern blood. The process of selection is ripe to be repeated from the material available.

The **Polo Pony Society** was initiated under the presidency of the Earl of Harrington, at the Chester Royal Show in June 1893, when the rules for its formation were framed. The *Polo Pony Stud Book*, "for the improvement and encouragement of the breeding of high-class Riding Ponies," is the chief instrument through which the Society exercises its useful influence. It also stimulates breeding by offering prizes at shows.

The **members of Council** were:—E. M. Archdale, Crock-na-crieve, Ballinamallard; Sir Douglas Brooke, Bart., Colebrook, Brookboro'; Captain Moray Brown, 36 Woodstock Road, Bedford Park, London; Lord Arthur Cecil, Orchardmains, Tonbridge, Kent; W. Scarth Dixon, 56B Micklegate, York; Stuart Forster, Postlip Hall, Winchcombe, Gloucestershire; A. E. Gerard, Hopesay, Ashton-on-Clun, Salop; the Earl of Harrington, Elvaston Castle, near Derby; Captain Herbert, 57A Pall Mall, London; John Hill, Felhampton Court, Church Stretton; Lt.-Col. C. Campbell Hyslop, Stretton House, Church Stretton; E. Langford, Chirbury Hall, Chirbury, Salop; Marquis of Londonderry, Londonderry House, Park Lane, London; J. W. Macfie, Rowton Hall, Chester; F. B. Mildmay, M.P., Flete, Ivybridge, S. Devon; W. L. Pilkington, Huyton Grange, Liverpool; Sir Walter Smythe, Hurlingham Club, Fulham, S.W.; Sir Humphrey de Trafford, Bart., Trafford Park, Lancashire; the Rev. F. F. Vidal, Arab Stud Farm, Needham Market; J. R. Walker, The Knowl, Burton-under-Needwood; John Williams, Bala, North Wales; Owen Williams, Cefn, St Asaph; C. Woosnam, Cefnllysgwynne, Builth; Frederick Wrench (*Vice-President*), Irish Land Commission, Dublin.

The Council was elected with powers to add other men of experience to act with them as judges of the eligibility of ponies for entry. In 1889 the judges on this Board of Inspection numbered 100. Its members lived widely apart in England, Wales, and Ireland, but not in Scotland. The limit of height of foundation mares and stallions was fixed at 14.2 hands, and

no such animals could be entered without certificates signed by judges, unless they were certified leading prize-winners. The certificates include freedom from hereditary disease.

The late **Captain Moray-Brown's description of a Polo Pony** is taken as a *standard* to aim at in the shape and quality *of a high-class riding pony.* "He or she should have a clean, well-bred head, a broad forehead and intelligent eye, a well set-on neck, strong, flat legs, and good sound feet. The nearer perfection you can get shoulders the better, for, though sloping shoulders are not absolutely necessary for turning quickly or for speed, yet good shoulders will often enable your pony to recover himself if he makes a mistake or gets knocked out of his stride. The pony's back should be short and muscular; the ribs well arched, and the loins strong; the quarters should be long, strong, and muscular, with length from hip to hock, and the second thighs well developed. Do not despise a pony with a tendency to sickle hocks or with a slight goose-rump. These points may offend the eye as far as symmetry is concerned, but an animal thus made, though he may lose speed from the conformation, can invariably turn quickly. Let your pony show as much substance as a weight-carrying hunter, the quality of a racehorse, and measure from 14 to 14 hands 2 in." To stand with the hind legs well under the body like a zebra enables a polo pony to turn more cleverly in the game than when the legs are placed perpendicularly, as they ought to be in the case of other horses.

The *Polo Pony Stud Book* differs from other British Stud Books in admitting specimens of any breed that do not exceed 14.2 hands, and that pass the rigid inspection of the judges. Small-sized Thoroughbreds, such as "Rosewater," who gained first in a strong polo class at Hurlingham; "Dancing Girl" by "Starlight" out of "Pretty Dance"; and "Tessie"—a Newmarket as well as a pony race winner—are eligible, and supply an important element in the foundation being laid of the riding pony of the future. No distinct type of riding pony exists, and the individual specimens of "weight-carrying" ponies are rare and valuable, and much in demand. Although many are admitted to the Register, "the weight-carrying blood polo pony is the type which the Society considers is the one to be aimed at."

Ponies are more and more wanted as hacks, apart from the insatiable demand for high-class polo types. Built on proper lines, a riding pony should trot, canter, or gallop, but the high-trotting harness action is an objection, as it implies discomfort to the rider and an unnecessary test of endurance on the animal's fore feet. Welsh ponies in some districts have been spoiled for the saddle by crossing with the Hackney to gain size, but the *pure-bred Welsh pony* is regarded, in relation to the objects of the Polo Pony Society, as one of the safest and most appropriate foundation breeds to incorporate. "The indomitable pluck, endurance, and good temper of the Welsh pony, together with his substance and dash, will be found an invaluable cross for the Thoroughbred and Eastern bred ponies."

A great difficulty in breeding polo ponies is to keep the height within the limit, and small, pure pony blood as female foundation stock becomes invaluable. With the Welsh should be mentioned the Dartmoor, Exmoor, New Forest, Church Stretton Hills, and West Highland ponies, the characteristic features of which are discussed later. The general run of these animals have been so left to Nature and neglected that they would not pass the entry inspection, but their hardiness of constitution and other qualities cannot be ignored; and by allowing only the best stallions selected at the annual "round ups" to breed, the herds running wild may be improved so as to produce many useful breeding mares to be taken into the *Stud Book*.

Vol. V. contains the following defence of the inclusion of the word "Polo" in the name of the Society—**Polo** being only one of the many uses to which a riding pony under 14.2 hands can be put. "The pony suitable for polo must be the highest type of a riding pony, with well-laid, powerful riding shoulders and good forehand generally, while the necessary power across the loins and muscular hind quarters, with clean strong hocks, will not be forgotten. They have to carry at top speed weights which are generally considered ample for hunters of 15.2 and upwards, and are therefore *a first-class pony* for riding purposes."

The **admission** of the various indigenous **mountain breeds** for registration in the *Polo Pony Stud Book*, each in its own division, was announced in the same volume with the stated

object that "by registering such of them as are likely to breed riding ponies, and by periodically going back to this fountainhead of all ponies, we may be able to regulate the size of our high-class riding ponies to the desired limit, while at the same time we shall infuse into their blood the hardiness of constitution and endurance, combined with a fiery yet even temper, so pre-eminently characteristic of the British native breeds."

Lord Arthur Cecil, who wrote the introductory statement to the 1899 volume, says: "Personally I am of opinion that the one great recommendation should be the power of the animal to live and thrive in the winter time without any adventitious sustenance, while there are many characteristics which all these possess in common, notably the clean-cut head, small ears, bright, full eye, and well-curved nostrils, together with a strong predisposition to the brown colour, with light tan or mealy points, which we see running through them as a common attribute of them all."

In addition to giving a preference to the best stallions within each breed by castrating inferior ones, **two methods of improvement** are suggested. One is "a free interchange of stallions, of any of these breeds."

With that method we heartily agree, if an exception be made of the Highland Garron, which is unlike the others; but with the suggested introduction of Arab or English Thoroughbreds into the herds of mountain ponies, where they have "to live and thrive in the winter-time without any adventitious sustenance," we cannot concur, because it can only end in disaster and tend to the depletion, not to the strengthening, of that "fountainhead of all ponies," which is a product of Nature's inexorable law of the survival of the fittest. If the riding pony of civilisation is, as is asserted, going to gain hardiness and constitution by the introduction of blood from the mountain "fountainhead," so as surely will the Highland shelty lose that hardiness and constitution which is essential for its very existence by the introduction of such alien blood. No better animal than a properly selected Thoroughbred could be found to introduce quality into a breed of ponies that are independent of the climate and of Nature's scanty rations; and for certain purposes the Arab may be included. The reports that Arab blood was

introduced into the Connemara breed, and into that of the West Coast of Scotland, by "shipwrecked remnants of the cavalry" from the Spanish Armada, are vague traditions. If the tales were true, there is a strong presumption that the imported horse of these early days would be a hardier animal than his modern prototype.

The following **characteristics of the various mountain and moorland ponies** are mainly extracted from the authoritative statements in Vol. V., and should be read along with the general descriptions already given at page 466:—

North Wales Breed.—"The height should not exceed 12.2 hands. Bay or brown is preferred; grey or black allowed; but dun, chestnut, or broken colour is objectionable. The action should be that of a hunter; low [action], 'daisy-cutting' to be avoided. A pony should move quickly and actively, stepping out well from the shoulder, at the same time flexing the hocks, and bringing the hind legs well under the body when going. It should show good 'pony' character, and evidence of robust constitution, with *unmistakable evidence* of the hardiness peculiar to mountain ponies, and at the same time have a lively appearance. The shoulder should be well laid back and sloping, but not too fine at the withers, nor loaded at the points."

South Wales Breed.—"The South Wales hill pony seldom exceeds 13 hands, and in a pure state is about 12 hands. His attributes are a quick, straight action and sure-footedness; he is low in the withers, short in his forehand, and with faulty hind quarters, as far as appearance goes, his tail being set-on low and his hocks sickled; but his fore legs and feet are good. His head and eye show breed, courage, and sense, and his constitution is strong, or he could not live where he does. Of late years he has been crossed with the Cardiganshire cob to some extent; and half-bred two-year-old Shire colts have been allowed access to the hills in the summer in some places, much to the detriment of the breed. In colour, bays and browns prevail."

New Forest Breed.—"For the New Forest pony it is difficult to give any exact description, but the best class of

them are from 12.2 to 13.2 high, according to the portion of the Forest in which they are reared. If taken off the Forest when they are weaned, and well kept during the first two winters, they are said very often to attain the size of 14.1. There is sometimes an apparent deficiency of bone, but what there is should be of the very best quality. The feet are wide and well formed. They are often considered goose-rumped, but their hocks should be all that could be desired. In colour they may be said to range through every variety, though there are not many duns, and few, if any, piebalds left. The flea-bitten greys, which are still very common in the Forest, show strong traces of an Arab cross. The shoulders, though not always what might be desired in point of depth, are almost invariably fine and well laid. It is a great characteristic of the New Forest pony to be always gay and alert, and, though they are extremely good-tempered and docile when fairly broken, they are quite indomitable until they are completely cornered. The true Forester is never sulky."

Dartmoor Breed.—The height does not exceed 14 hands for stallions and 13.2 for mares. Pure specimens free from Hackney blood are not over 13 hands, and are rarely over 12.2. Black, brown, or bay is preferred; roan and dun are very rare; grey and chestnut result from crossing. The head should be small, well set-on, and blood-like; the ears small and sharp at the points, and the neck strong but not too heavy, graceful, and of good length; the chest well let down, and the fore legs short with a good amount of extremely hard bone of the finest quality.

"The feet are almost invariably excellent, but, owing to many ponies never being shod till they are four or five years old, the walls of the hoofs sometimes break away when the shoes are first put on. The backs of the stallions are rather shorter than those of the mares, but the loins are powerful and the middle well ribbed up. As in the case of most horses and ponies which have been bred out in the open for generations, there is an unfortunate tendency towards a droop of the quarters. It must be further admitted that some are more or less cow-hocked. In all probability both these defects are due to the life of hardship the ponies lead on the

moor, as in heavy weather they huddle together and turn their hind quarters to the bitter winds, thereby affecting, in the course of time, the carriage of their hocks and hind quarters. Yet it is not every Dartmoor pony that is goose-rumped or cow-hocked, and even when he is so afflicted, he still remains one of the very best ponies for work, and absolutely the hardiest constitutioned horse in the world. That the tendency towards plainness is capable of modification there can be no doubt, and probably the best of all bloods to introduce for the purpose is that of the Exmoor, provided that the stallion selected for the purpose is a pure-bred moor pony, and not the result of some fantastic cross, of which there have been far too many in North Devon as in South. The wild Dartmoor hills would lose a great deal of their charm were they not dotted with stray studs of these pretty little creatures, which in summer lead an ideal life of pleasure and freedom. Even in winter, when the mountains are enveloped in snow they appear to enjoy life thoroughly. Often may one observe a sturdy old mare go to a furze-bush covered with snow, beat it with her foot, and after bruising the bush, eat with apparently as much relish as she would a bundle of the best upland hay. A great place for the sale of the Dartmoor pony is Brent Fair, held at a convenient spot on the southern edge of Dartmoor."—J. B. T. KINGWELL.

Exmoor Breed.—"The Exmoor pony should average 12 hands, and never be above 13 hands; moorland bred; generally dark, bay, or brown, with black points; wide forehead and nostrils; mealy nose; sharp ears; good shoulders and back; short legs, with good bone and fair action."

Fell and Highland Breeds.—The North of England and Highland ponies are a stronger and more powerful breed than any, but though they make admirable riding ponies in precipitous or soft ground, they are themselves hardly as suitable for galloping as any of the other breeds.

W. W. Wingate-Saul says of the Fell pony: "A very powerful and compact cobby build, the majority having a strong middle piece with deep chest and strong loin characteristics, which, combined with deep sloping shoulders and fine withers, make them essentially weight-carrying

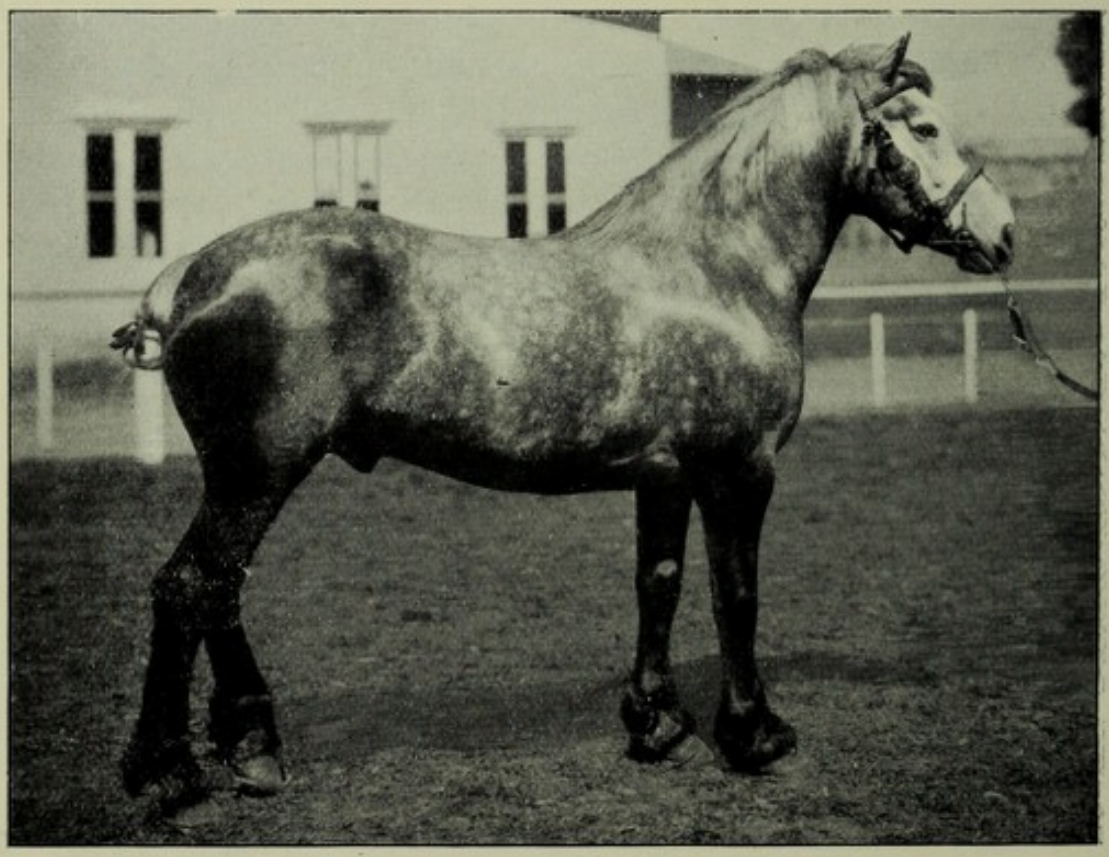
riding ponies. The prevailing—indeed the only—colours are black, brown, bay, and quite occasionally grey. I do not remember ever having seen a chestnut, and if I found one I should think it due to the introduction of other blood. The four colours prevail in the order named, the best animals often being jet black, and usually without white markings unless it be a small white star. The head is pony-like and intelligent, with large bright eyes and well-placed ears; the neck in the best examples being long enough to give a good rein to the rider. The hind quarters are square and strong, with a well set-on tail. The legs have more bone than those of any of our indigenous breeds, ponies under 14 hands often measuring 8½ inches below the knee. Their muscularity of arm, thigh, and second thigh is marvellous. Their *habitat* (having been bred for centuries on the cold inhospitable Fells, where they are still to be found) has caused a wonderful growth of hair, the winter coat being heavy, and the legs growing a good deal of fine hair, all of which, excepting some at the point of the heel, being cast in summer. Constitutionally they are hard as iron, with good all-round action, and are very fast and enduring."

The Highland Ponies of Scotland were admitted as a separate breed in Vol. VII. of the *Stud Book*, 1903. J. H. Munro Mackenzie, Calgary, Isle of Mull, divides the breed into three classes: (1) The *representative of the original Highland Pony* (12.2 to 13.2) of *Barra and the outer Islands*. "They have good hard legs and feet, head rather large and plain, and shoulders a bit straight, but they are hardy, useful little animals, well suited to stand exposure and poor feeding, and when brought on to good keep it is wonderful how they grow and improve. Colours: black, bay, and brown, with a few duns and greys."

(2) *The High-Class Riding Pony of the West Highlands and Islands*, running from 13.2 to 14.2. "But few remain. They belong to Mull, Tiree, Skye, and Uist, and parts of the Western mainland, and show a very strong cross of Arab blood, which is believed to have come by Spanish Armada horses or Arab chargers brought home by Highland officers. The ponies have beautiful heads and good shoulders: are good all over; famous for staying through long journeys under



A. The Celtic Pony.
With three kinds of hair on the tail, and no callosities on the hind legs.
Recognised as a distinct type of horse by Professor Cossar Ewart, Edinburgh University.
[*C. Reid, Wishaw.*



B. Percheron Stallion.
To illustrate the French breed from which, on one side, the Garrons no doubt sprang.
[*From the Author's "Argentine Shows and Live Stock,"* 1904.



A. Dartmoor Ponies in their Home Quarters.



B. Exmoor Ponies brought down from the Mountains.

[*Photos by C. Reid, Wishaw.*



A. New Forest Ponies.

[*C. Reid, Wishaw.*



B. West Highland Ponies in 1848.

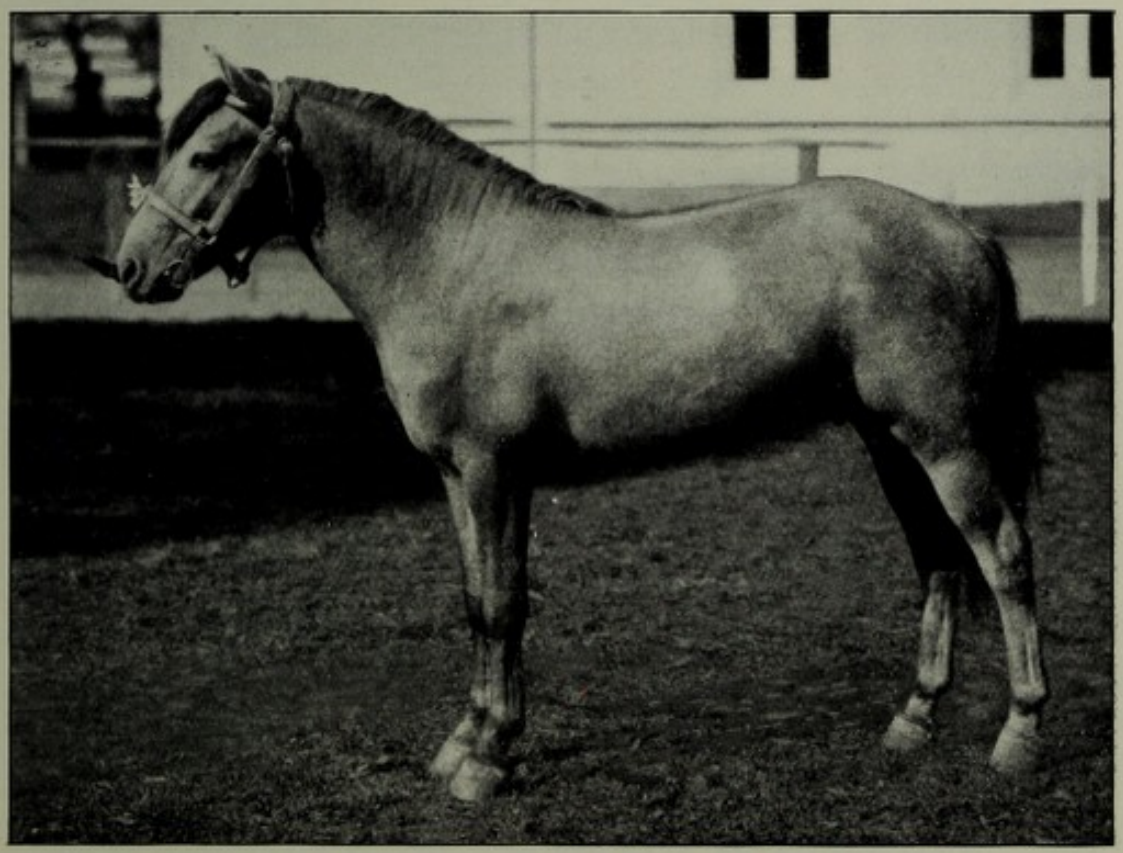
A grey gelding from Mull; a bay mare from Barra (5 years old); and a dun mare, 7 years old, from Uist.

[*From Low's Collection of Paintings in Edinburgh University.*

[*pp.* 472 *and* 473



A. Percheron Mare with a Black Foal,
which, like the black foal of the Garron, becomes white with years.



B. Percheron-Shetland First Cross at 2 Years Old.

[*From the Author's "Argentine Shows and Live Stock,"* 1904.

[*pp.* 472 *and* 473

heavy weights and on poor keep. Colours: black, brown, dun, and grey, with a few bays; the duns and greys generally show most Arab blood, in which no Arab cross can be traced for generations."

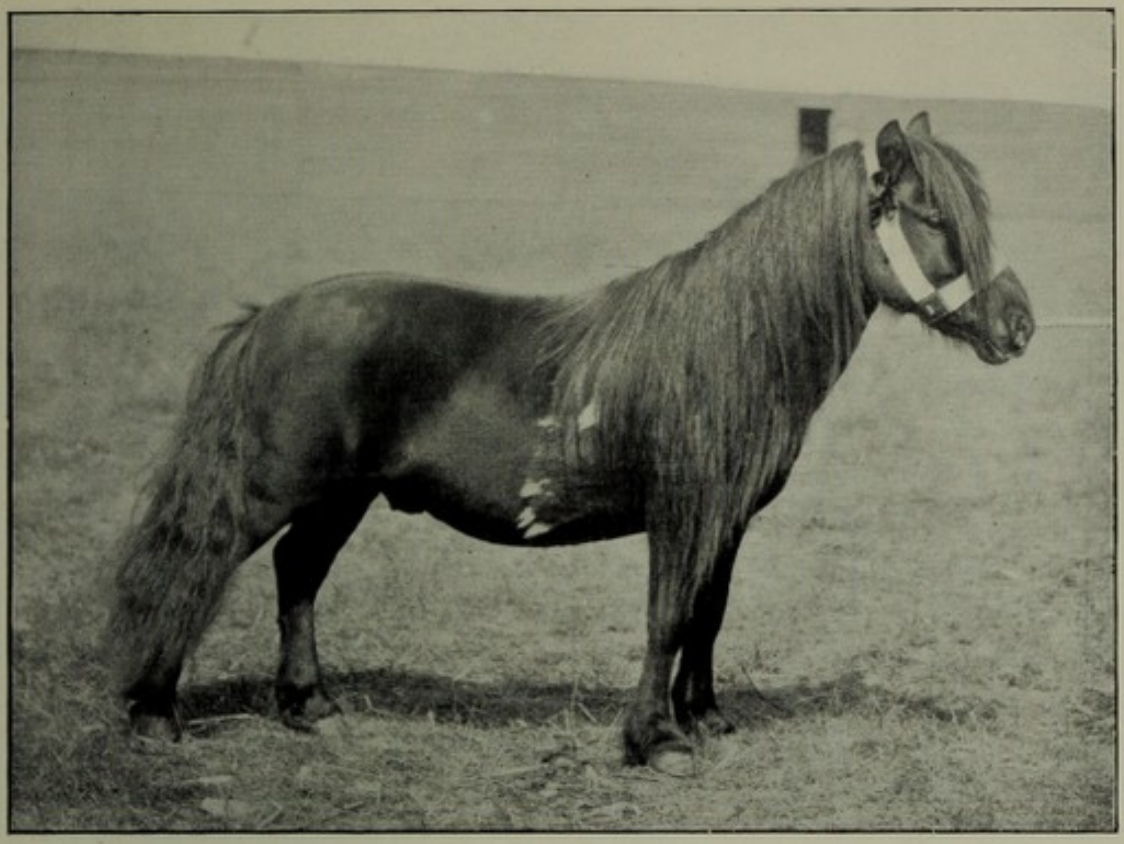
(3) *The Highland Garron* is a good deal bigger than the others, up to 13 hands. The centre and fountainhead of this breed is the Duke of Atholl's stud at Blair Atholl. The breed belongs chiefly to Perthshire and the Central Highlands, and is limited in numbers. The colours are black, brown, dun (with or without a stripe covering the backbone, bars on the fore legs, and dark points), piebald, black or brown and white, bay, and a few greys. Tufts of white hair appear at times on any part of the body. Dappling is quite common, and dappled cream becomes white with age like grey. Munro Mackenzie describes them as having "good game heads, bold eyes, shoulders a bit straight and back long, with the best of legs and feet, a good tuft of hair on the heels, and often a very well set-on tail," and as "originally bred from small ponies crossed with large horses." They are short and stumpy, but strong in the pastern, with a very short distance between the knee and the fetlock. They have short ears, good-sized, sagacious-looking heads, with great strength of jaw, and big, wide-open, clean-cut nostrils. They show no trace of Arab type or origin. They run up to 15 hands (the mares at Atholl are 14 hands and the young stallions 14 hands), and are undoubtedly the biggest and most substantially built pure-bred ponies in this country—the majority of them strong enough to haul with ease a ton-load on a macadamised road. They are unequalled hill ponies for staying power at slow speed, sure-footedness, and for carrying heavy loads of deer or smaller game on rough hillsides and mountainous places, and bearing the sportsman to the shooting ground. They possess the strength of the cart-horse, with the nuggety build, steep, powerful shoulders, and low withers of the best normal type of mountain pony. Many are weak in the muscular development of the second thigh. The grey mares (which, curiously enough, are often a degree heavier than the others) produce black or dark dun-brown foals, with a silver hair through the foal coat which, like that of the Percheron, is replaced by a grey coat. This very striking similarity, the weakness of the second thigh,

and the strong resemblance in general appearance to the Percheron breed, affords strong presumptive evidence that the "large horses," which were crossed many years ago to form the Garron breed, were Percherons. That a breed of Garrons could now be produced by a similar combination, even if the real type of Highland pony could be found, is highly improbable, as the existing breed has been subjected to a long period of acclimatising and to the natural selection of the survival of the fittest. They are not usually housed in winter, with the exception, as at Blair Atholl, of a shelter shed to which they have access at will; but formerly, when the numbers were greater, no shed was provided for the young unbroken stock, and no food supplied but a short allowance of straw while snow covered the ground, or frost remained unusually long. They became very lean in spring, but picked up rapidly when grass came. This seems to be a breed which a unique combination of circumstances has admirably formed in shape, size, and constitution, for a special purpose, and any attempt to "improve it," as it is called, by crossing, is practically certain to ruin it in one or other of its essential characteristics.

The Atholl stud is said to be probably the most typically pure strain. Wm. Dalziel Mackenzie, of Farr and Newbie, Daviot, Inverness, has another pure stud, but not of the Atholl blood. The stud of Donald Stewart, Drumchorry, Pitlochry, has been bred on the male side from "Herd Laddie" (Plate CXXX.), the famous Atholl sire, to whom and his progeny many mares of a pony type are sent from all parts of the country. Some good mares, but not for breeding, are in the possession of Lord Willoughby de Eresby, near Comrie; and of Edward Ormiston, keeper, Gaick Forest, Kingussie. The value of a good Garron is from £40 to £45. They are said to be able to do well on one-third less food than a Clydesdale. The Clydesdale-Garron cross is quite a success. The Garron gives the form and the Clydesdale greater size. The polo pony cross is far from satisfactory.

The **Shetland Pony** or "Sheltie"[1] is one of the oldest

[1] From "Hjaltland," the original form of Shetland. See the Introduction in Vol. I. of *The Shetland Pony Stud Book*, 1891, to which indebtedness is acknowledged.



A. Shetland Pony Stallion, "Laird of Noss" (20).
First at the Highland Show at Inverness, 1892.
Then the property of the Marquis of Londonderry, Seaham Hall, Seaham Harbour.



B. Shetland Pony Stallion, "Good Friday" (3636), 9 h.h.
Winner of many First prizes since 1888.
The property of Sir Walter Gilbey, Bart., Elsenham Hall, Essex.

[*Both by C. Reid, Wishaw.*

[*p.* 474

breeds of ponies in existence, and one of the most symmetrically shaped and active, as well as the most useful and hardy. The discovery in 1864 of the Bressay stone, on which a horse is sculptured in relief, furnishes evidence that ponies may have been in the Islands as early as the sixth century, A.D. The ancient Norse name of the mainland of Orkney, "Hrossey" or Horse Island, probably indicated the presence of horses not far from Shetland as early as the Norwegian invasion. The diminutive size and hardy constitution are the product of the law of the "survival of the fittest" from extremely trying conditions, especially during winter, when, forced by starvation, they subsist on seaweed picked up on the shore. The trying climate and scanty food are the safeguards of the purity of the breed, which has frequently in ignorance been crossed with imported blood. The mongrel progeny tend to die out in the course of time. Shetland ponies live till they are thirty or forty years and more old, and they are said to be "foaled in the field, live in the field, and die in the field." A pony mare rarely produces more than one foal every second year. Until foals are two years old "their covering is wool rather than hair." The natural coat in winter is long and shaggy, while the new hair in summer is short and sleek. The form resembles that of a well-shaped Clydesdale, with good, characteristic action. The smallest recorded specimen is said to have been only 26 inches high. The average height is 40 inches, and no pony of more than 32 inches can be entered in the *Stud Book*, with the object of keeping down the size, because large specimens sell at bad prices. Any pony over four years old is capable of carrying a man, and often his wife behind him, at a rapid pace. Although blacks, bays, and browns, are favoured, mouse colours are said to be most prevalent; but grey, cream, chestnut, and piebald are also represented. There are about 5000 horses, including ponies, in the Islands, or only half the recorded numbers in 1822. There is a excellent market in America and Canada for registered Shetlands, and a good demand in Great Britain for well-shaped specimens that move well in saddle or harness. The inferior varieties, which fetch comparatively very small prices, are put, in decreasing numbers, to work in coal mines. Their low but powerfully built frames enable them to go where taller ponies could not enter, and there do the work of

any other breed of pony measuring a hand higher. Their docile temperament and tractable disposition, which are quite remarkable in comparison with ponies of any other British breed, adapt them admirably for either purpose. Their sure-footedness, intelligence, and good-nature, make them ideal companions and pets of children.

The Domesticated Ass,[1]

Equus asinus, differs from the horse mainly in the absence of wartlike processes (chestnuts) on the hind legs; in the croup being higher than the withers; in having contracted upright hoofs, long ears, and a short erect mane; in the hock being longer, thinner, and weaker than that of the horse; in the long hair of the tail being confined to a tuft near its extremity; and in the sound of its voice or call. The difference between the bray of the ass and the neigh of the horse needs merely to be mentioned, not described. The voice of the mule has a sound intermediate between the two. Three black stripes, one down each shoulder, and the third along the line of the back-bone—said traditionally to represent the results of the three strokes given by Balaam to his refractory ass—though regarded as typical characteristics of the ordinary Brown or Mouse-coloured Donkey, are not always present. In relation to other dark markings, Darwin's *Animals and Plants under Domestication* says: "With the Common Ass, as the legs of the wild progenitor are almost always striped, we may feel assured that the occasional appearance of such stripes in the domestic animal is a case of simple reversion."

The large white-haired, though black-skinned, Syrian Donkey, popular in Egypt with European visitors, has no dark hair on any part of its coat. A small star is the only white marking seen on a dark haired donkey, and that rarely. "The ass is never of a bright bay, chestnut, red, or blue-roan or nutmeg-grey." The best colour is black with a mealy ring round the muzzle.

The domesticated species is generally supposed to be most nearly related to the wild ass of Abyssinia (*E. tæniopus*). The wild ass of Central Asia (*E. onager*), which is noted for

[1] Refer also to *Horses, Asses, Zebras, Mules and Mule Breeding*, by Tegetmeier and Sutherland, *Field* Office, London, 1895.

its swiftness, and for more slender build than that of those already mentioned, also differs in having shorter and less sharply pointed ears. The diminutive size of the common British and Irish donkey is due to two main causes: (*a*) the want of attention in breeding, and (*b*) the coldness of the climate, which, through generations of neglect, has been permitted to exercise its full influence.

In countries where the ass is held in high favour—for example, in Syria, Arabia, Upper Egypt, Spain, and in the United States—where it was introduced by General Washington—it is represented by animals of special excellence and value. In America there is a great impetus given to breeding donkeys, by the trying nature of the climate for horses. In Kentucky, Missouri, and New Orleans, where great attention is paid to the breed, not purely on account of its own value as such, but for the rearing of mules, the size of animals bred from the best imported stock frequently reaches 15.2 and 16 hands.

Of all the imported varieties (say Tegetmeier and Sutherland), "the **Catalonian** is the finest type of animal, being a good black, with white or mealy points, of fine style and action, and from 14½ to 15 hands high, rarely 16 hands, with a clean bone. It was from this breed the Kentucky Jackass sprang early last century. The **Andalusian** is about the same type, having a little more weight and bone, but they are all off-colours. The **Maltese** is smaller than the Catalonian, rarely being over 14½ hands high, but nice and smooth, refined and thoroughbred in appearance. The **Majorcan** is the largest of the imported jacks, the heaviest in weight, bone, head, and ears, with the exception of the French Poitou, frequently growing to 16 hands, but lacking in style, finish, and action. The **Italian** is the smallest of all, being usually from 13 to 14 hands, with good feet, bone, and weight." The **Poitou,** a brown ass, the last imported into the States, is said to have sprung from Spanish stock, although the difference in structure and character is now great; even the loud and sonorous voice is quite different from that of the other breeds. The Poitou Ass corresponds to the heaviest of our heavy breeds of cart-horses. His limbs are very large and massive, but the bones usually good and flat, measuring from 8½ to 9 inches below the

knee-joint, which is very large. His feet are much bigger and less narrow at the heels than the feet of other donkeys, and his pasterns short. The body is heavy, the chest broad, the shoulders upright, the back straight, the neck of medium length, broad, thick, and strong, the lips pendulous and the ears enormous, so that in some animals they bend over and hang forward like the lop ears of certain breeds of swine. The whole body is covered with long and shaggy hair, including frequently a long mane and forelock. A large head and ears, and an unkempt coat, are points of excellence among home breeders. The females are 13 to 14 hands, and the males run up to 15 hands. The Poitou Jack (Plate CXXXIII.) mated with mares of our three heavy working breeds of horses, would produce the finest draught animals in the world, and for many descriptions of work might with great advantage be bred and used in this country. The 1st prize jack of this breed at the Paris Exhibition in 1906 sold for over £500. Mule breeding is one of the most remunerative of local industries in France.

The mule, properly so named, is the produce of a cross between a jack-donkey and a mare, while the animal produced by a stallion and female ass is a **"hinny."** The latter is rarely seen, and is inferior in value and usually in size to the mule, which is a most valuable beast of burden in hilly regions or in hot countries, being more sure-footed and possessing greater powers of endurance than the horse, more especially when both have to live on poor food. In external form the mule most strongly resembles the ass; but when bred from a heavy draught mare, it combines with this something of the superior stature and massiveness of the mother.

The mule has not been much used in this country, except for a time in tramway cars in London, Glasgow, and a few other populous centres, subsequent to the sale of pack mules which occurred after the close of the last Egyptian campaign. The Secretary and Manager of the Glasgow Tramway and Omnibus Company wrote, in September 1892,—"We have now no mules, having allowed them to run out"; no doubt because there exists no means of procuring them in the open market in this country. Mules have some advantage over horses in tramway work: (1) they are not particular as to the quality of their food, and they consume less by about

7 lbs. per day; (2) being very sure-footed they are not nearly so liable to fall; (3) they are durable, and fully four miles per day more can be taken out of them than out of horses. They are not only hardier and less liable to become lame, but, in competition with horses of their own weight, they have more pluck and perseverance in overcoming difficulties, they walk faster with a load, pull more steadily, and are more powerful. Consequently, where mules are understood and appreciated, the price of a work mule is relatively higher than that of a horse. They are easily broken to work at two years old, but they require to be treated with patience and kindness combined with firmness.

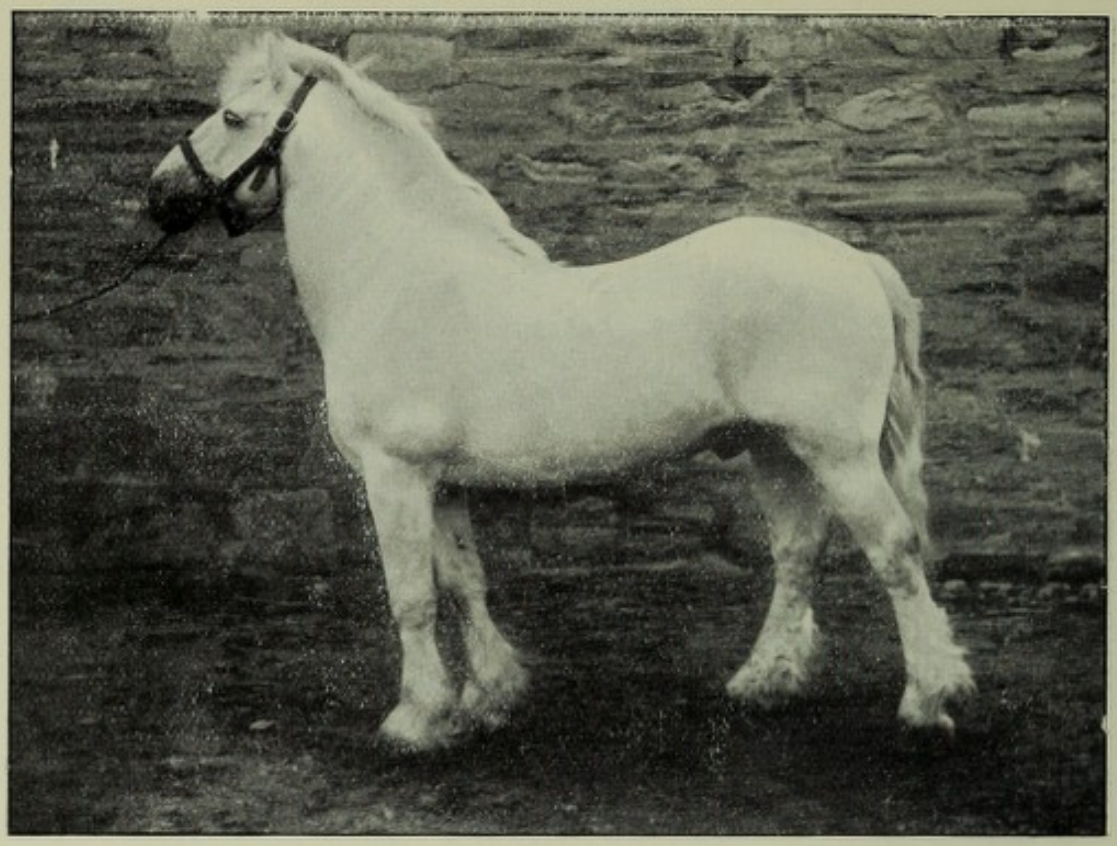
The good qualities of the mule in the performance of farm work in England have been demonstrated by Edward Pease, of Darlington, and by C. L. Sutherland of Down Hill, Down, Kent, who at Coombe, Croydon, a farm of 300 acres (90 being arable) did all the work by mules that consumed a bushel of oats each per week with green clover in summer, and one and a half bushels of oats each per week with hay during winter. W. S. Ferguson, Pixton Hill, Perthshire, Scotland, has bred splendid mules for agricultural purposes by a Spanish Jack on pedigree Clydesdale mares. After ten years' experience he pronounced a pair of them to be equal to the two best horses in his stable, ready and able for every description of farm work, which they did on less food, without ever having required the attendance of a veterinary surgeon.

In America they are extensively employed. The U.S. Agricultural Returns for 1892 show the existence of 2,314,699 mules in the United States, which take their share in the work of the country with the 15,498,140 horses which appear in the same table. The 16-17 hand mules of Missouri, Kansas, and some of the Eastern States are for weight and substance unequalled in any part of the world. During the Boer war in South Africa, 124,729 mules were purchased for service in the British army—73,000 of these being supplied by the United States, and C. L. Sutherland says: "It was considered by many competent authorities on the spot, that but for the North American mule the war would never have been finished." In spite of this national experience of the inestimable value of mules for any purposes, mule-breeding is not making much progress in this country.

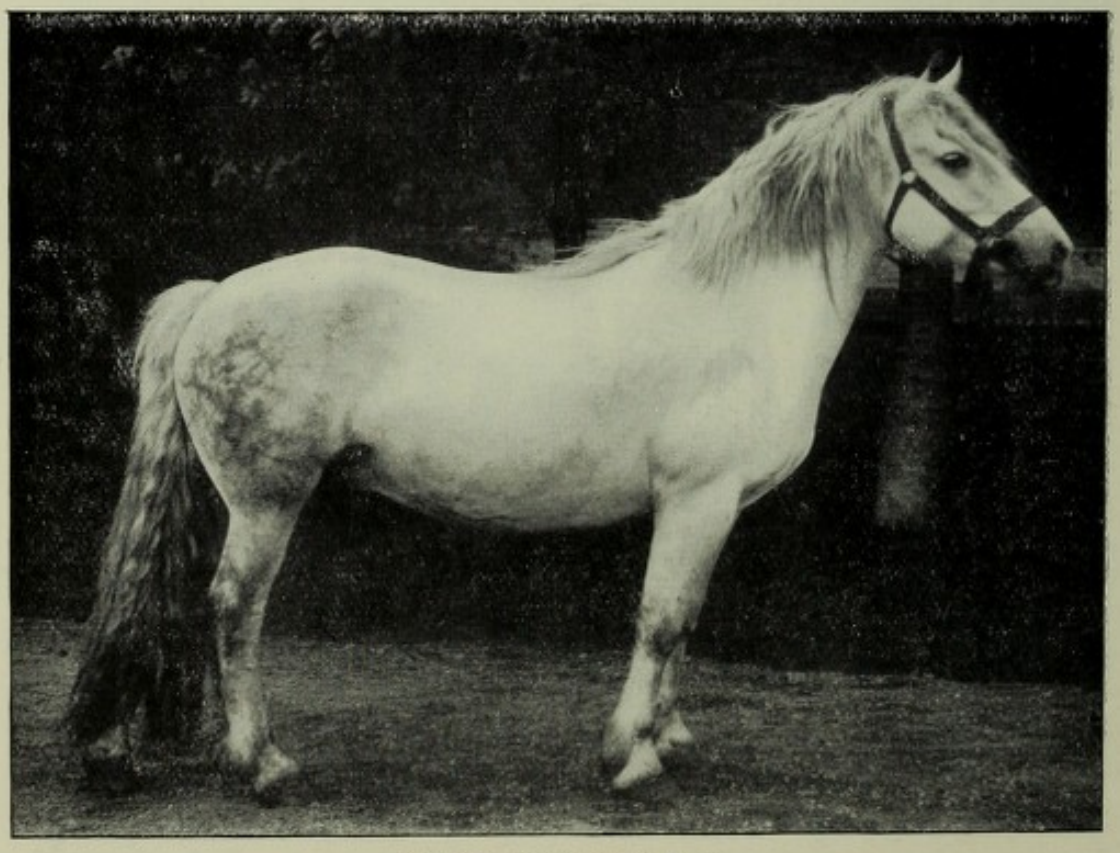
The mule is barren, although mating of both sexes is not uncommon. In recognition of this well-authenticated fact the Arabs have a saying that "when the mule breeds, men will become women and women men." Many authentic cases are on record of female mules giving a copious supply of milk to foals that have adopted them as foster mothers.

It is a mistaken belief that the mule is more feeble as a young foal than the pure-blooded foal of the mare or of the she-ass, unless it be deprived of mother's first milk, as among the ignorant peasantry of Poitou, who mistakingly consider it to be poisonous. On the contrary, it is specially energetic and active immediately after birth, rising and sucking without aid within a very few minutes. It is, however, longer in reaching maturity, but it lives longer, and may be worked for a longer period, than the horse. The female mule meets a more ready sale than the male, and she comes more quickly to maturity. A mare carries a mule foal for 333 days, and the height of the mule usually follows that of the mother, and not infrequently exceeds it. There is frequently much difficulty in getting both mares and jacks to mate, and when mated they do not breed so certainly as animals belonging to one species. These are discouragements to mule-breeding being introduced in this country. The want of the technical knowledge necessary to the successful management of the enterprise, as well as its being contrary to the sentiment of the country, also militates against it.

Zebrules or **Zebroids** have in recent years excited much public interest, on account of the success of the extensive experiments conducted between 1896 and 1904 by Professor Cossar Ewart at Penicuik, Midlothian, about 15 miles from Edinburgh. There "Matopa," 12.2 hands, a Burchell zebra stallion, variety Chapmane, from the Transvaal border, by a great variety of ponies and a few larger mares, bred some sixteen zebra mules (Plates CXXXVI. and CXXXVII.). They proved to be very hardy, resisting the winter cold at an elevation of 800 feet above the sea. They had double the number of stripes common to the zebra, and were without exception bright, intelligent, and handsome in appearance, had excellent feet and clean limbs, with wonderful bone when the



A. Highland Garron, "Herd Laddie."
The sire of many champions.
The property of His Grace the Duke of Atholl, Blair Atholl.
[*Swan Watson, Edinburgh.*



B. Highland Garron Mare.

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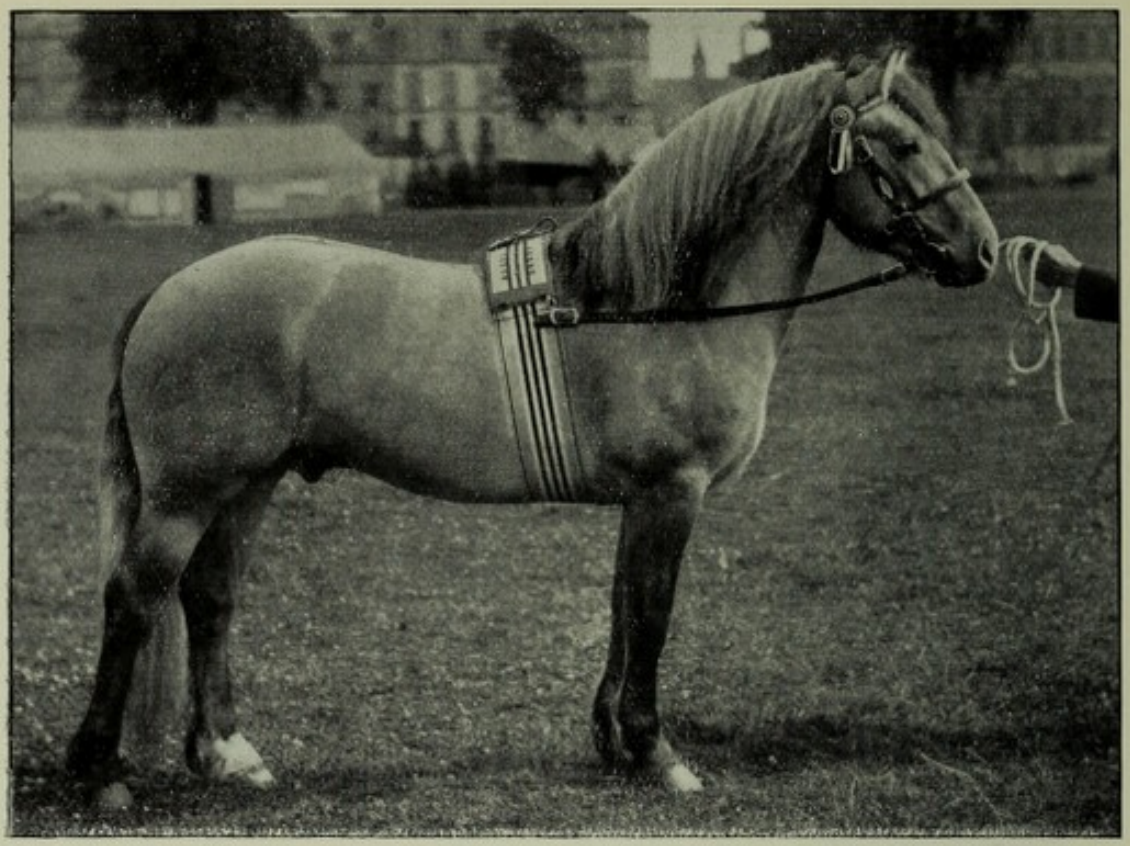
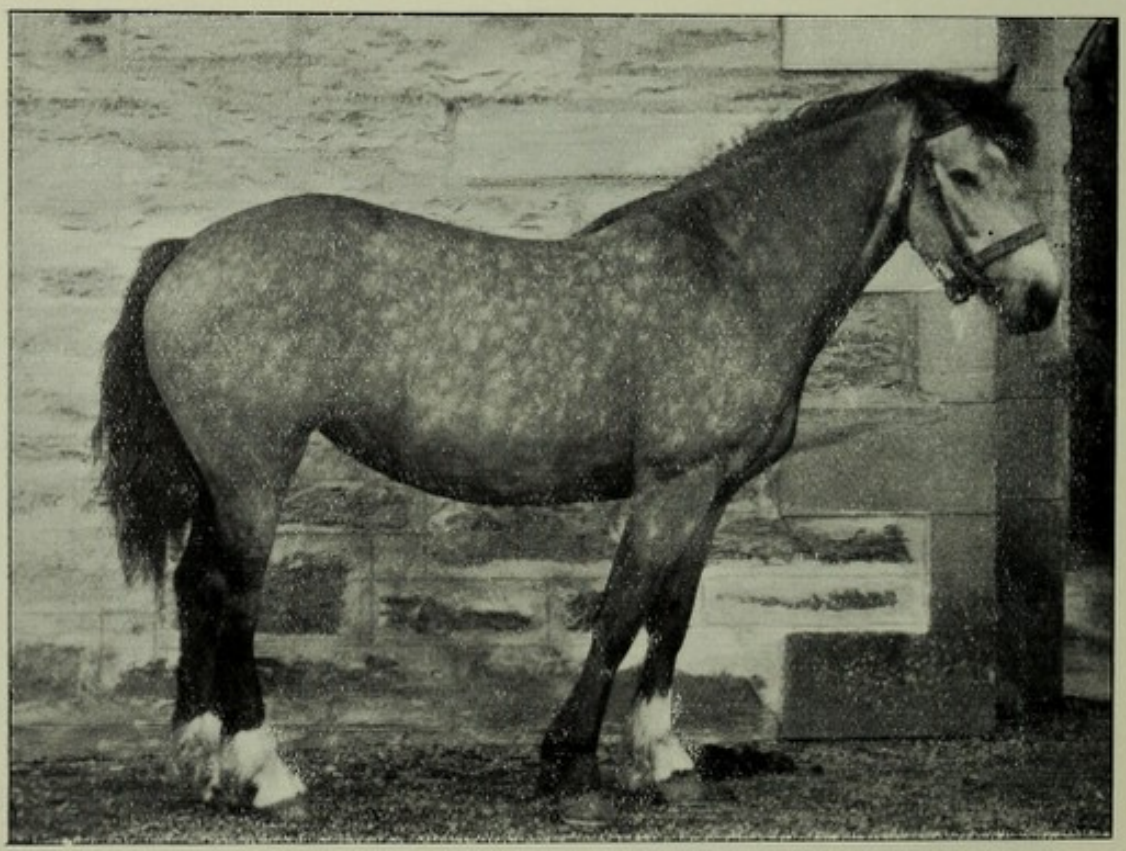


A. Highland Garron Stallion, "Bonnie Laddie."
Breed Champion at Perth Highland Show, 1904; and Special Prize, Polo Pony Society, for Best Male; also the President's Medal for Best Male, Glasgow, 1905.

[*C. Reid, Wishaw.*

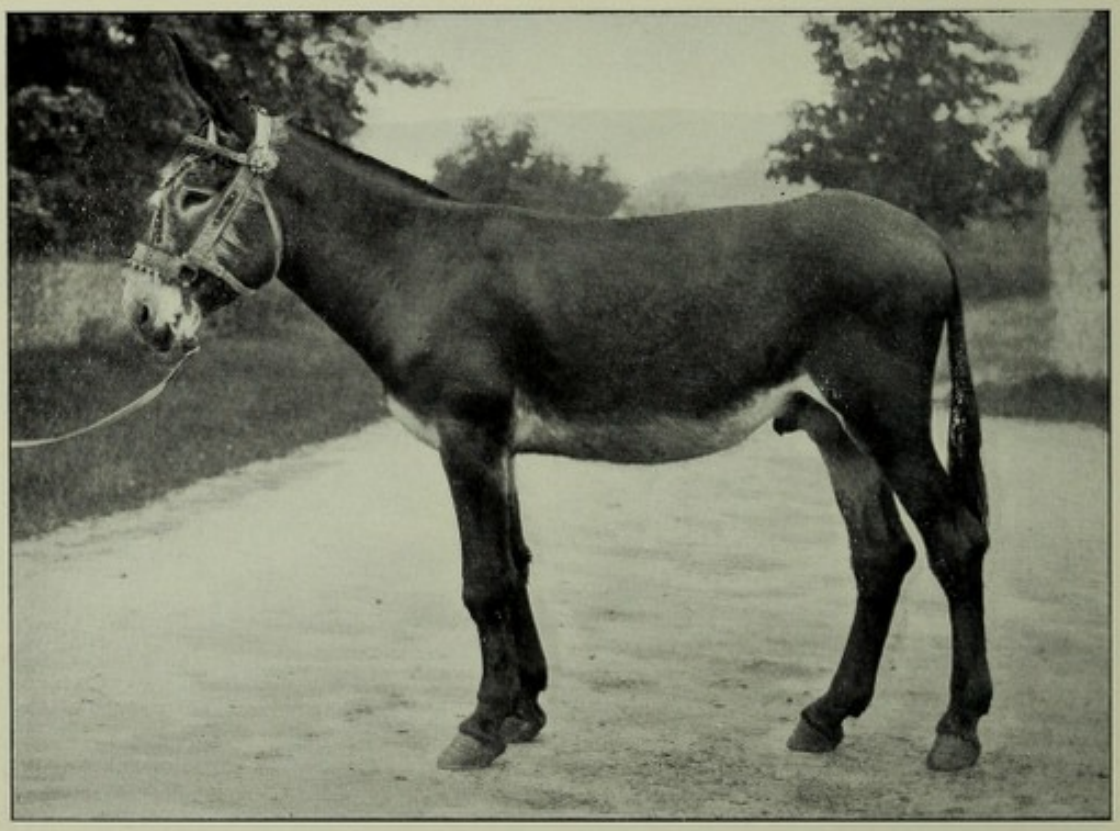


B. Highland Garron Mare.
Both the property of His Grace the Duke of Atholl, Blair Atholl.

[*Swan Watson, Edinburgh.*



A. Catalan Jack, 15 h.h.
The property of C. L. Sutherland, Downe Hall, Downe, Kent.



B. Catalan Jack.
First prize at the Royal Show in 1906.
The property of Harold Sessions, Wootton Manor, Henley-on-Thames.

[*E. G. Ballard, Chepstow.*

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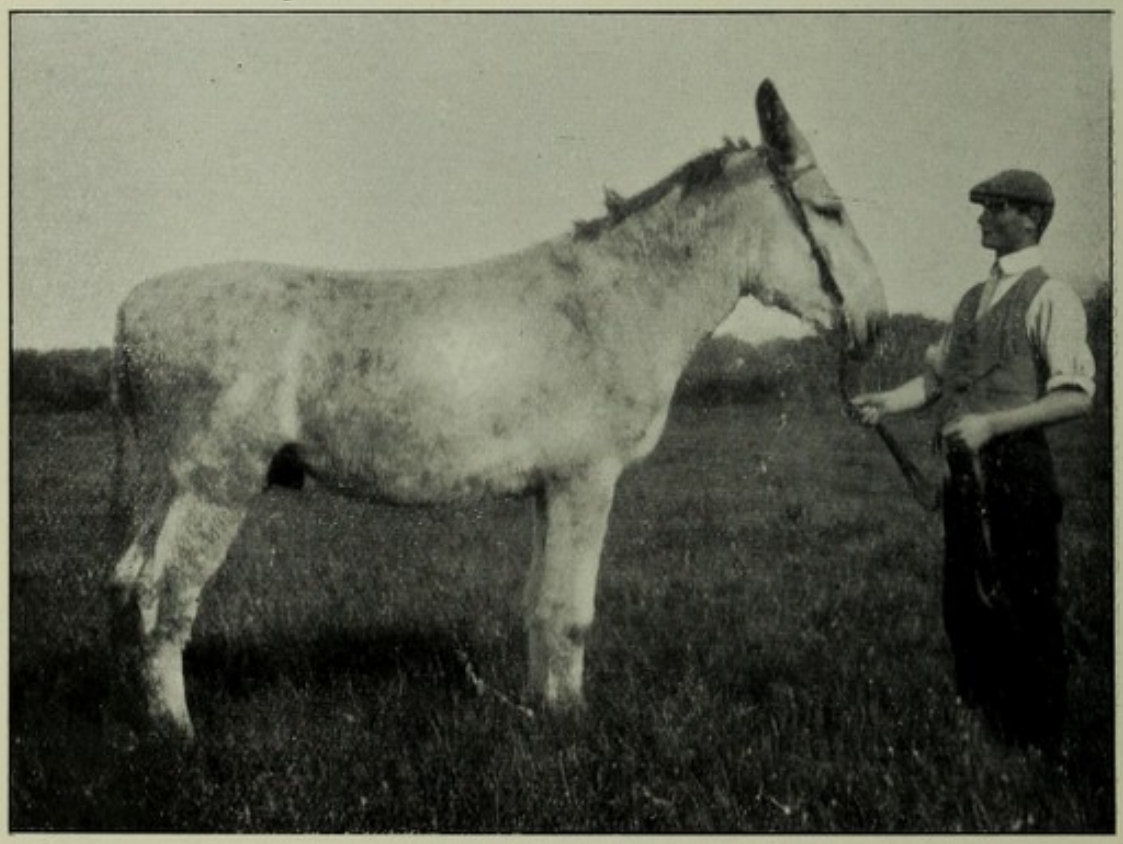
A. Poitau Jack, 14.2½ h.h. Worth £320.



B. Andalusian Jack, 15 h.h. Aged 6 years.
The property of Harold Sessions, Wootton Manor, Henley-on-Thames.

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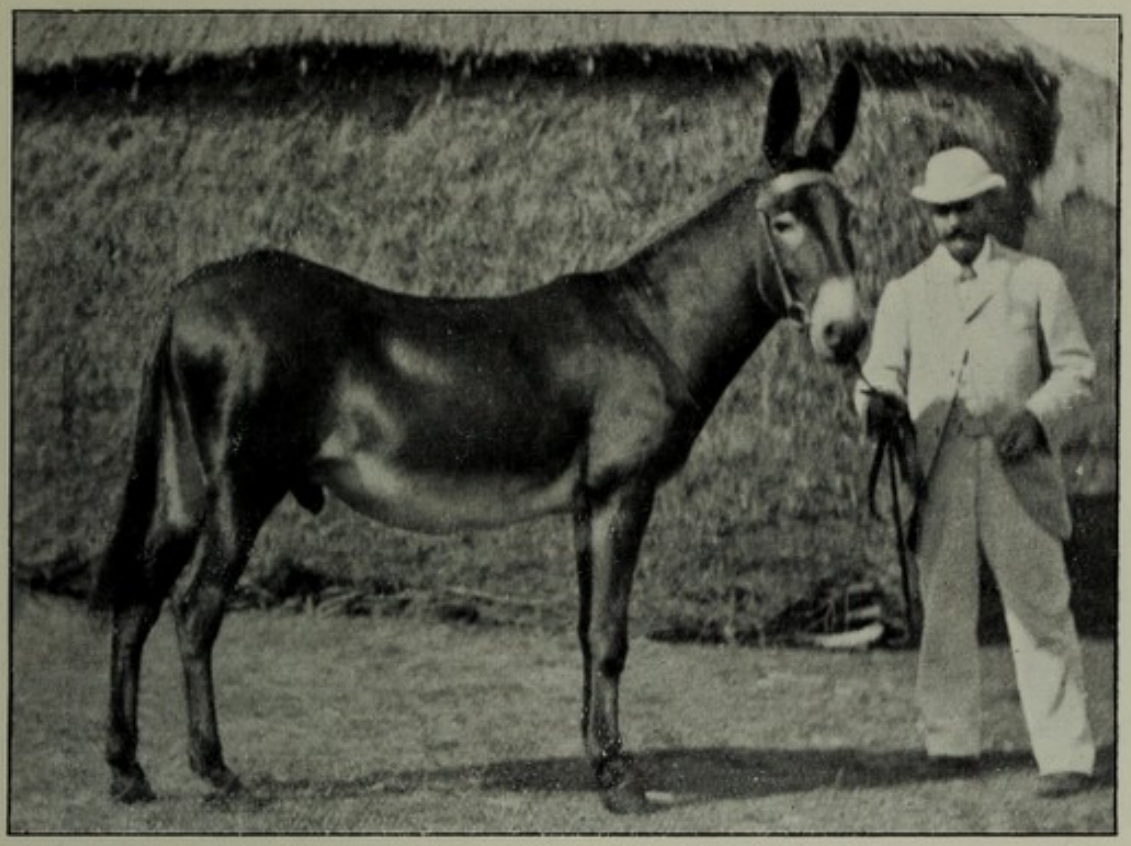
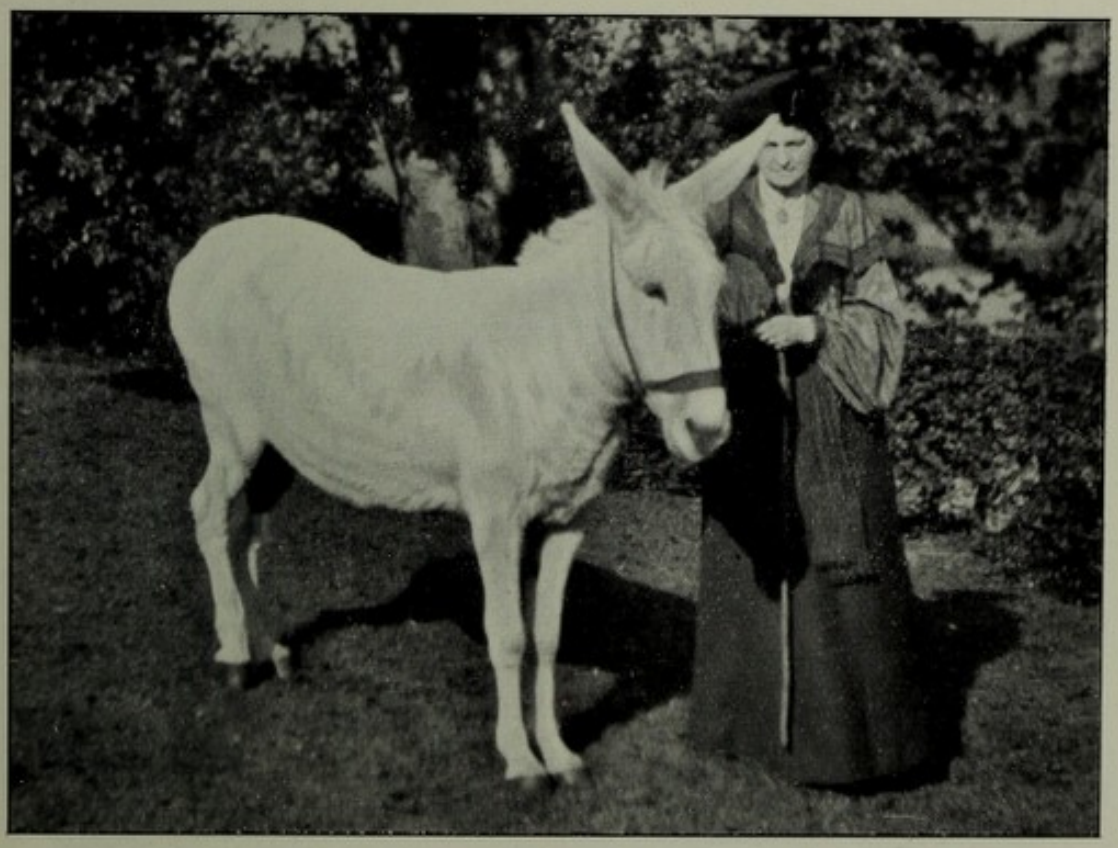


A. Maltese Jack, 14.1 h.h

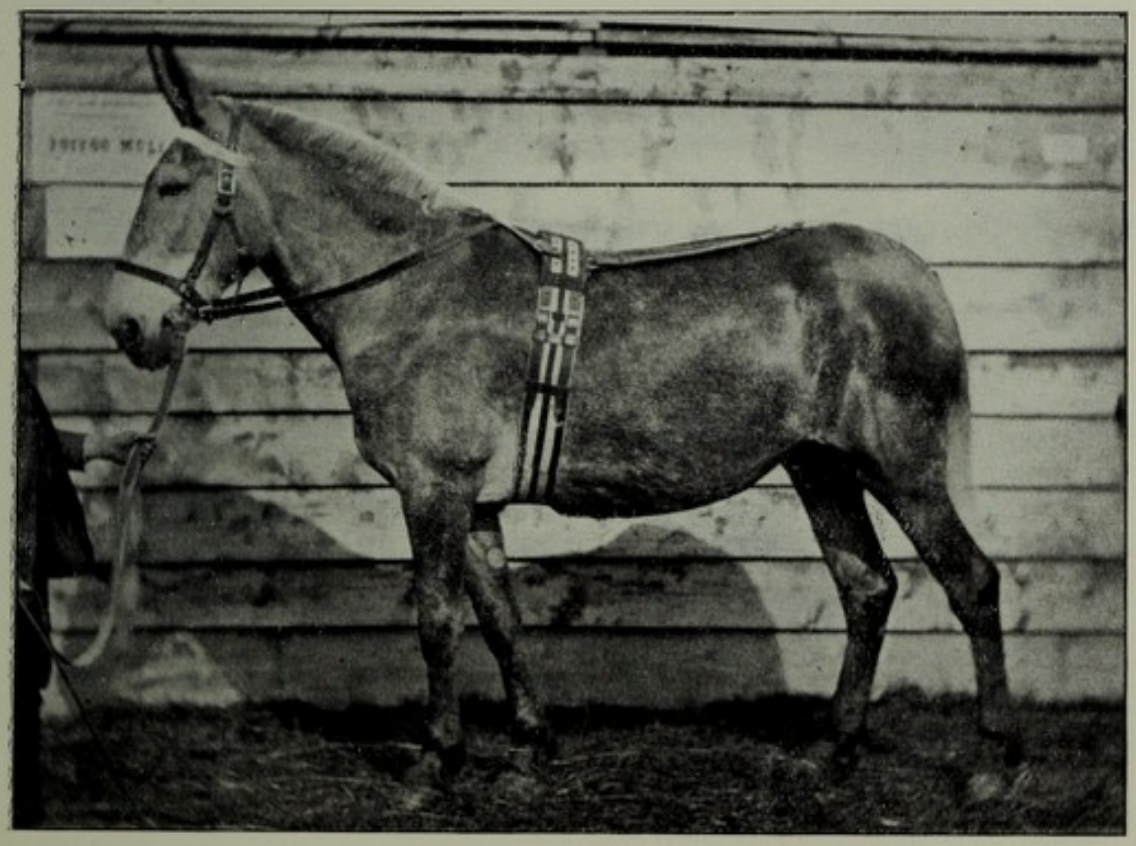


B. White Arabian She Ass, "Nephthus." Imported from Egypt.
The property of Lady Dunbar, of Mochrum, Kirkcudbright.

[*Photo by Sir Wm. C. Dunbar, Bart.*



A. Irish Jennet, 13 h.h. (23 years old).
The property of C. L. Sutherland, Downe Hall, Downe, Kent.



B. Poitau Mule.

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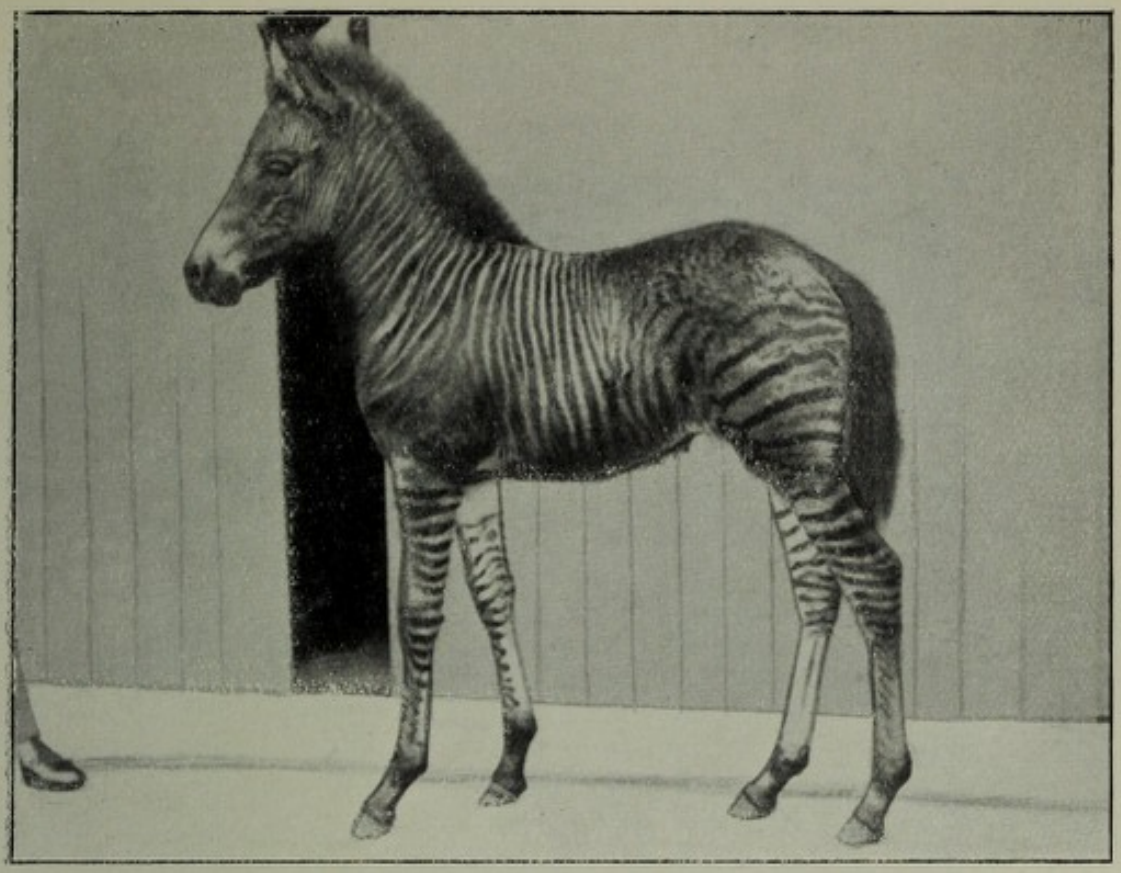
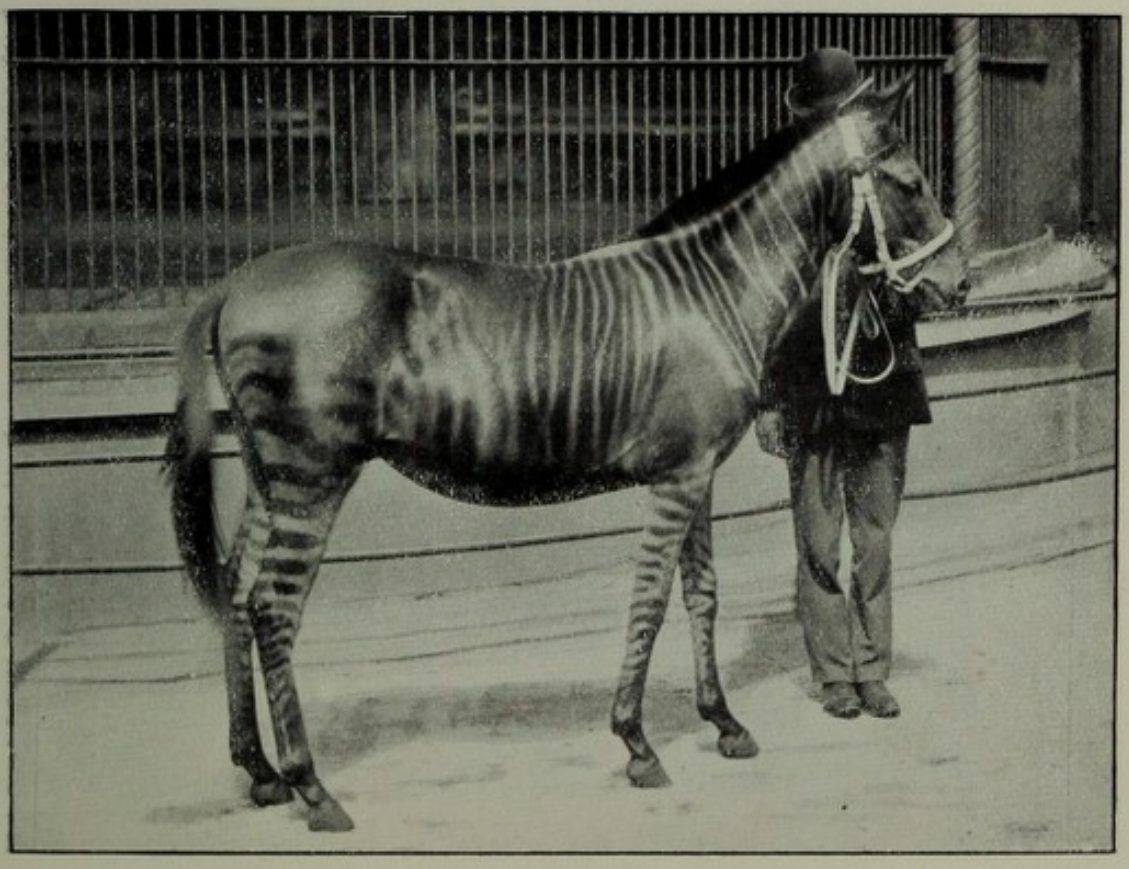


A. Zebrul, "Romulus," as a Foal.
S. "Metopo," a Burchell zebra; d. "Mulatto," a black West Highland pony, 13 h.h.



B. Zebrul, "Remus."
S. "Metopo"; d. "Biddy," threequarter-bred Irish bay mare, 14 h.h.
Both bred by Prof. Cossar Ewart at Penicuik, near Edinburgh.

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1. 2. 3. 4.

ZEBRA HYBRIDS BY "METOPO."

(1) "St John," d. a skewbald Iceland pony; (2) "Valdas" (twin), d. a thoroughbred chestnut polo pony; (3) "Remus," d. "Biddy," threequarter-bred Irish bay pony, 14 h.h.; (4) "Lorna," d. Highland pony—forest type.
Bred by Prof. Cossar Ewart at Penicuik, N.B.

[*Carl Hagenbeck, Thierpark, Hamburg.*

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strength of the mothers was considered. They were good-natured and tractable for mules, and were broken to the saddle and to harness. The two tallest specimens, over 14 hands, went to work in a mountain battery in Northern India.

The early official reports of these animals were not entirely satisfactory in relation to the unsuitability of their feet to a hilly country; their need for a larger amount of food than the ordinary mule; and their suffering from fever and catarrh and falling off in condition with hard work. But the trials have not been extensive enough nor carried on long enough to settle the question of the suitability or otherwise of the zebrule for military purposes.

Carl Hagenbeck, of Hamburg, secured eight of the number when the Penicuik experiments came to an end. Six of them were sent to the St Louis Exposition in 1904, and sold, to develop an interest in America in the new cross. The two retained by Hagenbeck, and valued at £200, are regularly driven in his private carriage, and are said to be hard workers, doing quite 50 per cent. more work than any horse. It is generally admitted that zebroids are stronger for their size than common mules, and there can be no difficulty in breeding them up to 16 and 17 hands, by Grevy's Somaliland zebra on mares of any of the heavy cart breeds. The first zebra cross on record appears to have been bred by Lord Clive about the beginning of the last quarter of the eighteenth century, by mating a common jack and a female mountain zebra. Mountain zebra crosses are reported to be more difficult to handle than other zebrules, and those by under-bred mares worse than those showing some quality. Similar crosses were bred in Italy and in Paris early in the nineteenth century. Zebra-ass hybrids were bred at Knowsley and at Windsor Park in the reign of George IV. Zebra crossing in different ways was carried out later in Paris and Melbourne, and several similar crosses were bred by Lady Meux, at Theobald Park, Hertfordshire. Lord Morton's famous Quagga-Arab cross was produced in 1815, and Lord Mostyn bred another of the same. The first genuine mule-zebra by a Burchell sire, and probably the most perfect specimen that has yet been produced, was Ewart's "Romulus" by "Matopa" out of "Mulatto," a West Highland pony, in 1896. Baron de Parana, of Brazil, has since bred a

number of useful animals in a similar way. The zebrule is not proof against the poison of the tsetse fly, *Glossina morsitans*, but this is not to be wondered at, as the zebra bred away from the fly country is not itself immune.[1]

[1] For full particulars, consult *The Penicuik Experiments*, by J. C. Ewart, published by Adam & Charles Black, London, 1899; papers in the *Journal of the Highland Society* for 1902; and, "The Utility of Zebra Hybrids," by Thos. H. Dale, in *The Transvaal Agric. Journal*, 1904.

CHAPTER XXIII

THE HORSE—BREEDING AND BREAKING

Breeding—Selection of the Mare—Shelter Treatment of a Farm Brood Mare—Taking the Horse—Difficulties about Conception—The Foal—Rearing by Hand—Joint-ill or Navel-ill—Haltering and General Treatment—Young Cart-Horses—Young Blood Stock—Food of a Colt—Castration—Strangles—Docking—Breaking—The Age of a Horse from his Teeth—Williams' Horse Measuring Standard.

SOUND, well-built, and compact animals of good blood and good pluck, and free from any vicious tendency of temper, should be selected to breed from.

Three years old used to be considered the proper age to put a mare to the stallion, since with an immature dam, as with one too old for breeding, the foal may be small and weakly. But in these latter days of early maturity and high feeding it is found that the best Shire foals are born to fillies put to the horse at two years old. Young entires begin to serve at the same age, but prize-winning two-year-old fillies are kept back for a time in the interests of their showyard career. May is the best month for foaling, as there is then an abundant supply of green food, and the weather is mild enough for brood mares to lie out in the fields. Where shelter is available, in the form of cosy paddocks, shelter-sheds, or loose-boxes, there is an advantage in the case of animals which are to enter showyard competitions to be born two or three months earlier. Since Stud Books came into existence, ages usually date from the first day of January, and it is difficult for the best young animal to make up age-leeway during the first two years.

Substantial **inexpensive sheds,** sheltered from the cold east and north winds, are made of old railway sleepers, usually 9 feet long by 9 inches wide, placed on end to form the walls, and sunk 2 feet into a dry piece of ground with a good fall for the escape of surface water, with a roof of light scantling covered with corrugated iron, and gutters under the

eaves to carry off the rain water. In a mining country like Lancashire, where iron is destroyed in a year or two by furnace and pit fumes, ⅝ in. white pine boards may be substituted, costing 1d. per square foot, and creosoted or painted with Pilchers' "Stoprot," costing 3s. 6d. per gallon, sufficient to cover 400 superficial feet of new boarding (address, Carlisle). The floor of the shed and an entrance way is formed of a thick layer of gravel, furnace slag, or burnt clay. Such shelters prevent chills till genial weather comes, and are also a valuable protection from flies and a scorching sun in summer. The **period of gestation** is about eleven months. Small but increasing amounts of green food should be given for a few days before the mare goes out to the field, to accustom the digestive system to the change, and thus to prevent colic—a rule to be observed with all classes of animals about to be changed from hard food to grass.

A farm-mare should continue till the day of foaling to do a moderate amount of light work, such as ploughing, but should not be put between shafts for some months before it, as, owing to the enlarged size of the belly as parturition approaches, there is risk of injury from the shafts. The quantity of concentrated or rich food ought to be restricted in the case of a mare in high condition some little while before her time is up. A roomy loose-box is the best place for the mare to occupy, beginning two weeks before foaling. Within twenty-four hours of foaling, and at times earlier, wax-like little scales, becoming at last bright and nearly transparent, are seen on the tips of the teats. These are two in number, laterally flattened, and provided with two openings or milk passages. After the wax appears the mare should be regularly watched day and night by an attendant, who can see without being seen, to prevent her doing injury to the foal at birth by lying down with her tail too close to the wall. In the event of a false presentation or other serious difficulty professional aid is necessary. When natural parturition occurs, the act is more rapid than in the case of horned cattle, or other farm animals, and the danger of strangling the foal during delay greater. After a prolonged delivery the mouth of the exhausted foal should be cleared of slime, and air blown down its throat, to aid the first inflation of the lungs. In nature the tearing of the umbilical

cord as the mare rises prevents after-bleeding, but, when aid is necessary it is usual to tie it in two places and sever it with a knife between the knots rather than to attempt to imitate nature by breaking it. (See p. 489). If the mare be slow to lick the foal, it should be rubbed dry to prevent it growing cold, and, if weak on its legs, it should be supported and held in position to encourage it to suck as soon as possible. If this is unsuccessful, half a teacupful of milk should be drawn by the forefinger and thumb from the mare's teats into a vessel, warmed, if convenient, by dipping into hot water, and poured into the foal's mouth with a table spoon, as a new-born foal cannot long survive without food. If everything has gone well and the foal is strong and warm and only awkward on its legs, some breeders think it best to leave nature to its own course, and the foal by instinct soon finds its way to the teats. Beyond these precautions the mare rarely requires assistance. To see that the anus of the foal is not by chance closed by an adventitious skin or membrane which requires to be broken, and to give the mother frequent small drinks of natural water with a little oatmeal thrown into it, along with a suitable amount of succulent digestible food, is all the further treatment necessary under normal circumstances. A mare should "clean" naturally within an hour or two after foaling, but if the after-birth hangs for eight hours it should then be detached by inserting a well-washed hand and arm, moistened by carbolic oil or carbolic soap and water, and pulled away before it begins to decompose. It differs from that of the cow (see p. 335) in the form of attachment to the uterus, being generally adherent to the internal surface of the womb. The ailment known as "hanging cleansing" is often fatal if not promptly attended to, and may be contagious. To get rid of it, should it become established on a farm, disinfect the houses, lime the pastures, and stop breeding for a time. Succulent food, such as roots that are available at the season, or a mixture of steamed barley, Indian corn, a few beans and bran, given at a temperature not over 60°, encourages the flow of milk before grass comes; and daily exercise and fresh air, avoiding cold and draughts, are essential for the healthy development of the young animal in all its stages. Some breeders relieve the pressure of work on the attendants

in the early spring months by arranging for half their mares to foal in November. The cost may be four or five pounds more, but mares getting a liberal supply of roots or steamed food milk very well, and are ready to take a share in spring work and let the foal be weaned in May. Should the navel of the foal be attacked by flies and become raw, it may be wetted with an infusion of walnut leaves, and dry flowers of sulphur powdered over it, to encourage healing and to ward off flies.

No nursing mare ought to be put to work if it be possible to avoid doing so. This precaution reduces the chances of the development of scouring or of rickets in the foal, which grows up into a fine animal. In any case, she should have a clear month's rest after foaling before going to work, and then only for half a day at a time. After returning from work a little milk should be drawn before the foal is allowed to suck. The milk which collects in the udder while the animal is at work is poorer in fat than milk drawn at frequent intervals, and it also changes in character from natural milk, and may develop poisonous substances injurious to the young.

Mares that are served at the "foal-heat," eleven days after foaling, "hold" most readily. They remain "in use" at this period for three days, but on other later occasions they should come in season every three weeks during the spring and early summer months and remain "on heat" for about a week. A mare that breaks at four in place of three weeks is not likely to conceive. In certain years mares are irregular in coming to foal-heat, and are at times as late as seventeen days. If missed or neglected during the first heat some mares are not easily caught again for a time or two, if at all, until the foal is weaned and they are in any case not so easily "settled." A mare, like a cow, may have conceived at the first covering and yet take the horse three weeks later as if she had not done so, and thus put her attendant out of his reckoning as to the time she should foal.

By the second time a mare is in season there is a large flow of milk, which to some extent reduces the system and renders conception less certain. A mare covered when going out of season is then most likely to "hold" or "stint." One good "jump" or connection is better than several at one time or on one day ; but in the event of a mare being covered soon

after she comes in season, it is an excellent practice to give her a second chance in a day or two, or just before she goes out, and she should be kept quiet and away from other horses for a few days to prevent excitement and the consequent repeated attempts by "showing" to discharge the contents of the uterus and vagina. If this be attended to there is no necessity for douching her with cold water, which is surely an unnatural and unnecessary practice under any circumstances. It also appears to be wrong to put a mare to two horses within two days, though the practice of "crossing" a mare with a second horse, if there be any doubt about the potency or ability of the first stallion, tends to increase the number of successful connections. When a mare fails repeatedly to conceive she should be examined for stricture of the passage into the uterus, and, if necessary, the opening extended by inserting a finger or thumb. If she be in a plethoric condition two or three pints of blood may with advantage be drawn from the jugular vein at the time of service if she has not been breeding for some years.

A stallion can serve eighty mares, the number approved by authority, in the season, and get on an average forty to fifty foals, if he be not made to travel too great distances to find the mares. Some valuable horses, that are such sure foal-getters that mares "settle" after the first connection, may cover a hundred and some even a hundred and thirty. A horse with one stone down can get foals, but he cannot do so if both testicles be carried out of sight. **Cantharides,** or "Spanish fly," is given by ignorant grooms to entire horses under the mistaken impression that, because it increases sexual excitement, it increases sexual power. The other effects of the drug are frequent urination and blood-stained diarrhœa. "*Treatment.*—Give demulcent drinks and small doses of laudanum, but avoid oils."

It is frequently difficult to notice when small pony mares are in season, as they are not so demonstrative at this time as large animals. They should if possible be turned out to graze with a stallion. As a mare approaches twenty years of age, the chances of her conceiving, if she has never bred, or if she has not bred for some years, are not great. When a mare is in the habit of breeding regularly she will sometimes continue to do so till she is very old. "Old Stager" (Plate

CXXIV.) produced thirty-five living foals.[1] Conception is made more likely—when there is any tendency to barrenness—by the use of a cart horse on a Thoroughbred mare, or of a Thoroughbred horse upon a cart mare.[2]

A foal that gallops till it perspires copiously on being put out for an hour or two after it is, say, ten days old, should not be allowed to lie on the cold ground or in a draught, else it is liable to scour and swell at the joints and become worthless.

A foal brought up by hand should be fed with cow's full-milk: "Clyde," *alias* "Glancer" (153), which developed into a grand horse and became a most successful breeder, was reared in this way. It is frequently spoiled in disposition through being petted or played with, so that it becomes too familiar with its attendant, and loses the natural and necessary respect for the authority of its master. An ancient practice in Norfolk after the foal is two weeks old, is to feed it on skim-milk, boiled linseed, and bean-meal, getting gradually up to 2 gallons of milk and 4 lbs. of the mixture per day.

Joint-Ill: Navel-Ill: Specific Arthritis.—This gout-like affection of foals is similar to that seen in calves, and is due to the entrance of an organism by way of the unhealed umbilical cord. The organism produces blood-poisoning and the formation of pus. The joints swell, become hot, and are very painful, and there is high fever and great debility. "*The Treatment* is extremely unsatisfactory, but if begun early, some measure of success may be met with. First give a purgative of castor oil, foment the joints, and use an anodyne application of simple soap liniment (made by boiling one part of common hard soap with 7 pints of water), and laudanum, equal parts of each. When the abscesses come to a head they must be lanced, and an antiseptic (5

[1] At Bosby in 1886 the Author saw a cross-bred mare, belonging to W. Mould of the Harrington Arms, which was breeding at the age of thirty-two, and had bred twenty foals in twenty consecutive years. All were said to have been good, and a number were weight-carrying hunters.

[2] Cowe of Mains, Chirnside, possessed a mare (nearly Thoroughbred), which in 1886, at the age of twenty-three years, "held" to a cart horse after repeated trials extending over several years with Thoroughbreds. In 1887, however, she was successfully served by a Thoroughbred. Had it not been for the breaking of a leg which ended fatally, she might have continued to breed for years.

per cent. carbolic acid) injected into the cavity. Support the strength of the patient with milk, and give iodide of iron and phosphate of iron, 5 grains of each, in milk three or four times a day. *The preventative treatment* is the most important: the boxes in which mares are intended to foal should be whitewashed, and the floors swilled with a disinfectant, and the bedding should be regularly changed. As soon as the foal is dropped, the umbilical cord should be tied with a silk ligature and the part sponged with carbolic lotion, one of the acid to forty of water." The person undertaking the tying should disinfect his hands with carbolic solution before touching the navel; also the silk should be soaked in the solution previous to being used.

A foal is **weaned** when it is five or six months old, say a spring-born foal early in October; then it should be housed at night. But from the time it is a month old, it should be firmly but kindly treated and trained for a short time every few days to be led, by means of a light head-collar, which should remain on permanently, and have a short dependent end left to lay hold of. The operation of haltering, if delayed till weaning time, is attended with danger to the animal, due to the resistance which is usually made, and requires great care. A cattle-shed with bare walls and a few inches of dung under foot is a good place to select. A cart rope should be fastened round the neck of the foal to draw it up to a fixed point—such as a hole in the outer wall through which the rope is passed—so that it is made to know what it is to be held. The struggle at first is often severe, and perspiration flows freely with the excitement and the exertion. After all this is over, the foal must be kept in a warm place till it is thoroughly cooled down. Gentle treatment and constant handling are necessary to give the creature confidence. Leading should from the first be done as frequently by the "off-side" as by the "near," to accustom it to turn as readily to the one side as to the other. The young animal should also be taught to eat a few bruised oats and bran, so that it may be prevented from losing the foal flesh at weaning time. When circumstances permit, and the superior quality of the foal warrants it, this condition is most effectively maintained by allowing it to suck through the winter. The mothers of valuable foals should usually

be provided with a moderate amount of bruised oats. A sufficient allowance for a Shire or Clydesdale foal during the first winter is 2 to 3 lbs. of crushed oats, a ¼ to a ½ lb. of bran, and ¾ lb. of finely-ground linseed cake, given in two feeds in the day, with ½ a peck of roots and chopped sainfoin, lucerne, or clover hay in England, or ryegrass hay in Scotland. As grass comes in spring, the dry food should be gradually reduced, and finally discontinued when good pasture is available.

Young Cart-horses should never be too highly fed, as forcing softens the constitution, and they become too fat and heavy for the strength of their limbs. They should at all times be kept thriving to encourage growth, and to prevent disease and the injury which results from the presence of internal parasites.

Farm horses ought to run out in the fields during the second winter, within reach of good natural or artificial shelter, and be rationally fed. An excessive quantity of dry grain of any sort is liable to heat the blood, and produce skin irritation and incessant rubbing, and sometimes cracked heels. Giving the bulk of the grain (barley or oats) in a boiled or steamed mixture at 60° F., obviates the difficulty; and linseed cake in moderate quantities, not sufficient to cause fatty degeneration of the liver, acts in the same way, especially when supplemented by a daily allowance of roots.

Colts born in November, when about two years old should, if intended to do a full complement of work in spring, receive during the winter a mixture per week of (1) 3 stones of crushed oats and maize meal in equal parts; (2) 1 stone of crushed linseed or finely-ground linseed cake mixed with wheat or barley chaff; (3) ½ cwt. of chopped hay—clover, lucerne, or sainfoin—or an equivalent in strong boned ryegrass hay, with (4) a foddering at night of oat or barley straw to pick over; also (5) about 1 stone of roots in season—swedes, mangels, and carrots—or an equivalent in steamed potatoes. Kept on such food, they will be in condition to do good work in spring. Salt should be within reach of all young stock, which must also be allowed plenty of exercise to develop muscle. In the case of Thoroughbreds, the highest authorities say that they cannot be too liberally fed, provided they have sufficient exercise.

Young Blood stock, in properly fenced, high, wooden-railed paddocks, usually take sufficient exercise by galloping for amusement in rivalry with one another, as young greyhounds do. The ordinary fence of six or eight plain wires is most dangerous for a young horse. While rubbing against it, he is liable to put a fore or a hind leg through it and become entangled in the wires, which cut to the bone as he struggles to get free. A safe and effective guard is found in a single barbed wire stretched on each side about 2 feet from the

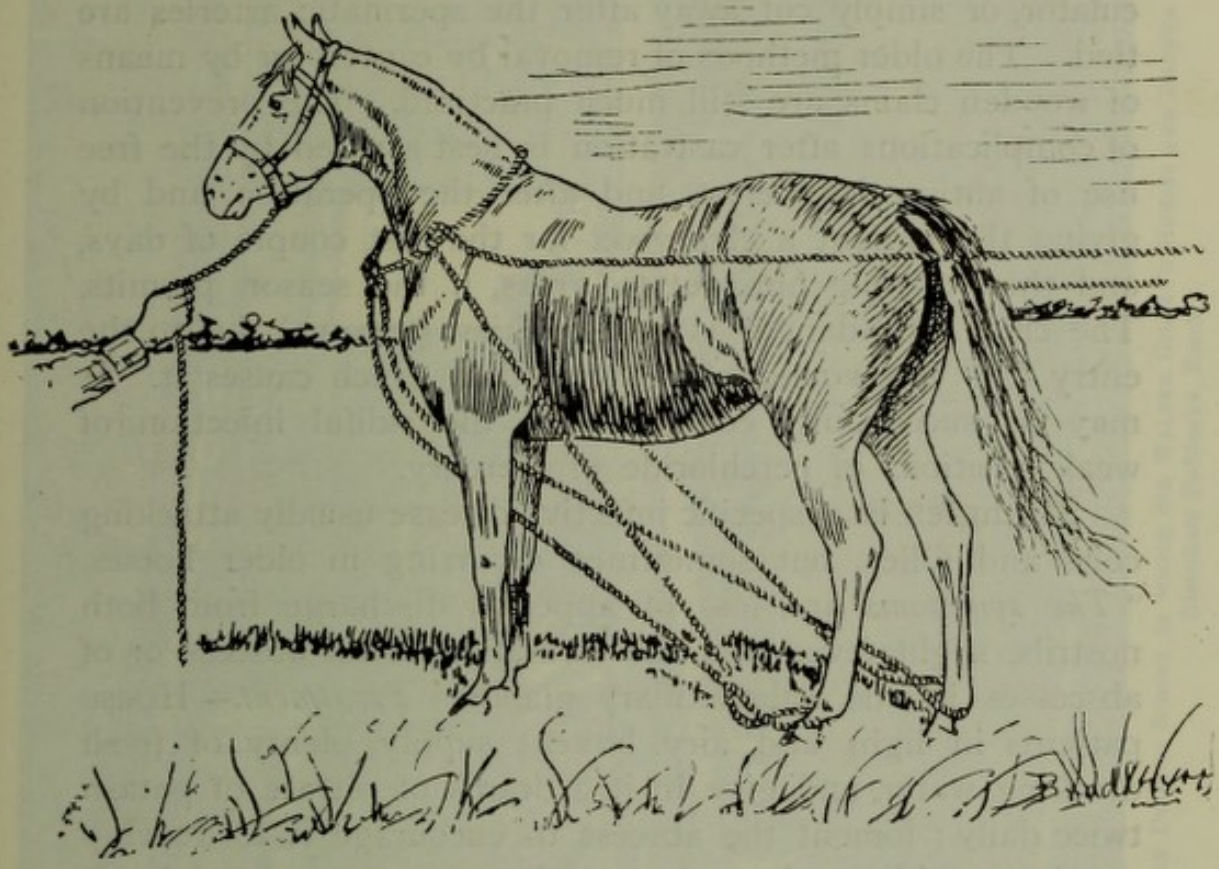


FIG. 29.—COLT PREPARED TO BE THROWN BY SIDE ROPES.
From Galvayne's *Twentieth Century Book on the Horse.*

fence, the height of a horse's breast, and supported by strong 4-feet crossbars, about a rood apart, fastened to the main standards carrying the wires.

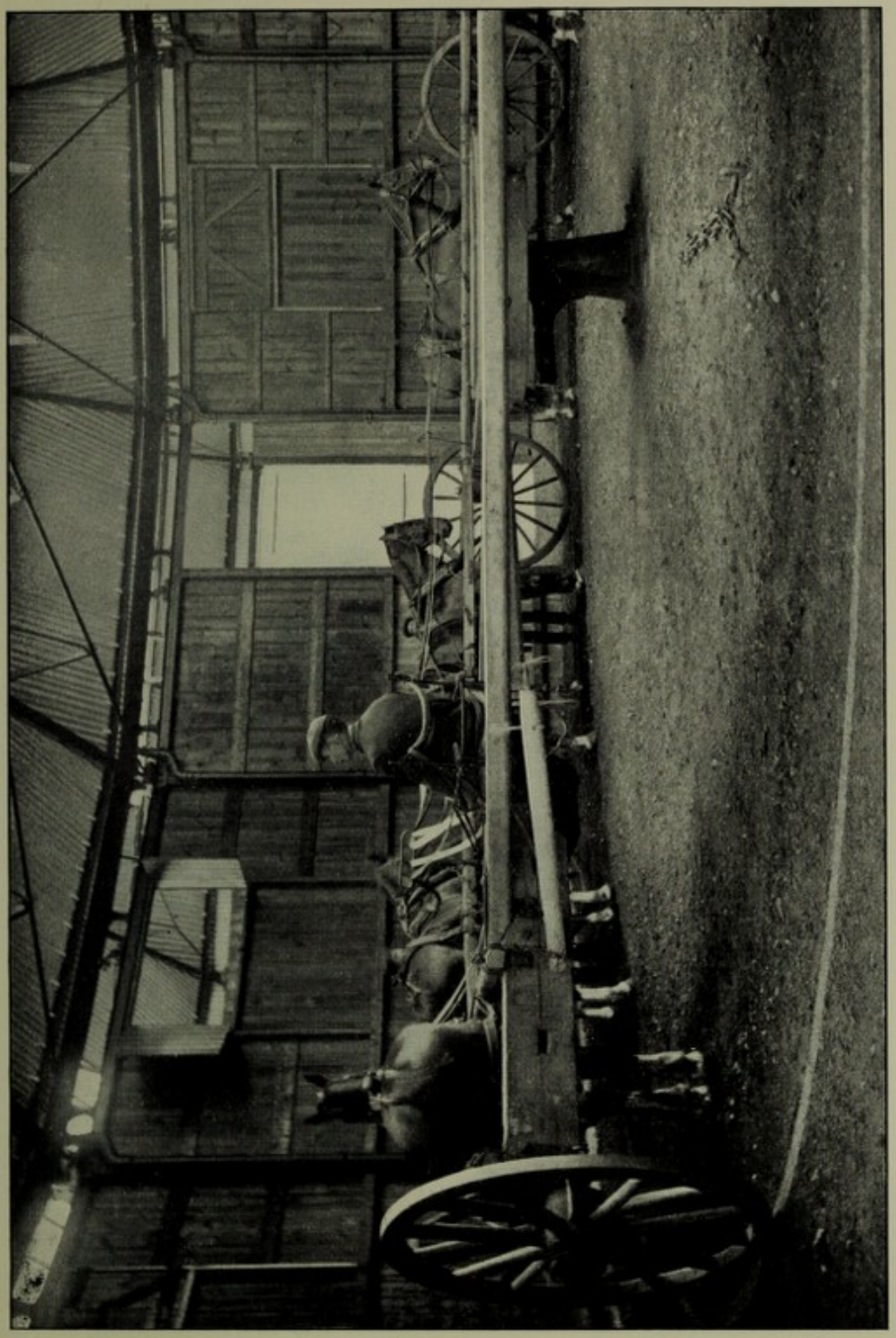
Castration is usually performed when a colt is about one year old, a time when there is little risk; or it may be done at two years, if a well-developed crest and a more masculine appearance is wanted. In some districts of England from four to six weeks old is considered a safer and better time. A horse is rendered hardier by castration for racing and hunting and all classes of fast work. The

operation can be performed by an expert with least risk while the animal stands on his feet, against a wall. The horse may be cast by means of side ropes or by hobbles; but the danger in this is the possibility of injury to the spine, brought about by the animal struggling when down. The danger is increased if an attempt be made to hold the feet so that he cannot move them in struggling. Something must give; and he is liable to slip, or break his back. The testicles are usually removed by the ecraseur or the emasculator, or simply cut away after the spermatic arteries are tied. The older methods of removal by cautery or by means of wooden clams, are still much practised. The prevention of complications after castration is best assured by the free use of antiseptics before and after the operation, and by giving the patient a clean box for the first couple of days, and then turning him out to grass, if the season permits. The chief after-danger is from lockjaw (tetanus), due to the entry into the wound of the organism which causes it. It may be successfully combated by the skilful injection of weak solutions of perchloride of mercury.

Strangles is a specific infective disease usually attacking colts and fillies, but sometimes occurring in older horses. "*The symptoms* are, loss of appetite, discharge from both nostrils, slight fever, and the formation of an abscess or of abscesses in the submaxillary glands. *Treatment.*—House patients in light and airy boxes; supply plenty of fresh drinking water, and give in it 2 drams of nitrate of potash twice daily; foment the abscess to encourage it to develop on the outside, and as soon as it comes to a head let it be lanced. Should the abscess burst inwardly, there is danger of choking and blood-poisoning. When convalescent, the patient must be well fed with nourishing food, and given sulphate of iron and gentian as tonics."

The practice of docking horses, or cutting off a portion of the tail with the object of giving a better view of the hind quarters, is likely to decrease in future. It may linger among Hackney[1] studs, but it has almost been given up among Clydesdale, though not in Shire, horses, and it is decidedly objectionable when adopted in the case of large

[1] Undocked roadsters, when touched suddenly with the whip, are liable to throw the tail over the reins, and, getting alarmed, kick or bolt.



Interior View of the Driving School in which Sir Walter Gilbey's Horses are Broken and Exercised, Elsenham Paddocks, Essex

[p. 492

carriage horses or animals good enough to become officers' chargers. The pain, though severe for a few seconds, is not the ground upon which extremist humanitarians have really most cause to object to the operation. The removal of the most effective portion of the tail—the weapon which nature has supplied as a defence against the attacks of flies when the animal is turned out to pasture—is in reality the only important consideration.

Breaking is attended with danger from rearing, kicking, bolting, or sulking on the part of the horse; and carelessness, drink, or bad temper on the part of the man. Three special requisites in his case are patience, coolness, and determination. Horses are more easily broken while quite young than when a few years older.

The skin should be kept in good order and free from all parasites, and the hair encouraged to grow by occasional washing with a solution of MacDougall's dipping composition. The animals should be taken up for breaking when they are about two and a half years old. Heavy work strains and stiffens a young horse. The backbone often becomes bent, and stands up "roach-backed," if an animal is made to draw loads that are too heavy. Harrowing or light ploughing is a suitable and safe form of work for a young horse; but carting on the hard road is not so till after he is five years old. Horses ought to be broken to every description of farm work before they are three years old, or earlier if practicable, and during the operation their vision should not be contracted by obscuring their eyes with blinders. The use of an open head-collar is the best preventive of bolting should derangement of the headgear occur. The first stage is to accustom the animal to the work horses, by feeding it in the stable with them—the harness also being put on to remain while baiting.

Mouthing or **bitting** is done by tying a horse up at repeated short intervals of half an hour at a time with a stout but not too heavy jointed bar-snaffle and smooth bit, and running side-reins fastened back to a sursingle or jockey, but it is far too little practised among draught-houses. To cut the mouth with a wrongly constructed, sharp, or thin bit so that it bleeds, makes the repeatedly injured parts hard, and the animal ultimately callous, so that he refuses to answer to

the rein. If tied up too tightly, especially with fixed or elastic reins, he is liable to contract the evil habit of "boring"—by thrusting the nose forward and the head down, in an effort to relieve the irritating strain. When the reins are properly adjusted the horse works his head up and down, "bends" to the bit, champs it, and froths at the mouth (both essentials of satisfactory progress), while the natural state of the wicks of the mouth as well as the sensitiveness of the "bars" inside, is preserved in place of being lessened. After bitting has been going on for some days, the reins being gradually tightened and the duration of the lesson extended, the horse should be taken out to an open field, and driven with long reins in front of the breaker. Ropes are then fastened to his collar in the position of draught chains, and pulled by men placed well behind, to accustom the animal to the pressure on the shoulders and the sensation of the chains rubbing against the hind legs, such as occurs while turning in the plough. It should next be yoked to a log with ropes (which are safer than draught chains, should anything go wrong and the legs get entangled), and when accustomed to this treatment, put in double yoke with an old, steady, but active stepping horse.

Breaking to the cart should come afterwards, as it is often a difficult task with nervous animals. The greatest possible care should be taken with all horses, even those reputed to be quiet. A man on each side of the head should hold a long rein to prevent the horse, if startled, from jumping on one or other of them. Two additional men, one on each side, should fasten the attachments, the draught chains being adjusted first. The kicking-strap or a rope substitute should cross over above the root of the tail, each end being made fast to a shaft. This is far more effectual than when the rope is located in the usual place, over the highest point of croup. A fifth man lets down the cart behind when the horse is in position. A long pole placed between the body of the cart and the axle, so that it projects well behind, prevents the animal rearing.

A wild, intractable, or even vicious horse may be subdued by **"Galvayning"**—the Australian method of tying his head with the neck bent round to his tail, and driving him round until he submits to be guided. By adopting this method any horse may be more quickly and safely put through all the

various stages of the operation of breaking, but time must be given in any case to allow a young and inexperienced animal to become accustomed to what is required of him and to practise it.

A young horse should be tired, but never fagged by too much or too heavy work, else he may develop bad temper. In a display of this, an animal which urinates repeatedly is usually difficult to overcome. The mouth should not be subjected to sudden checking or tugging. An animal which

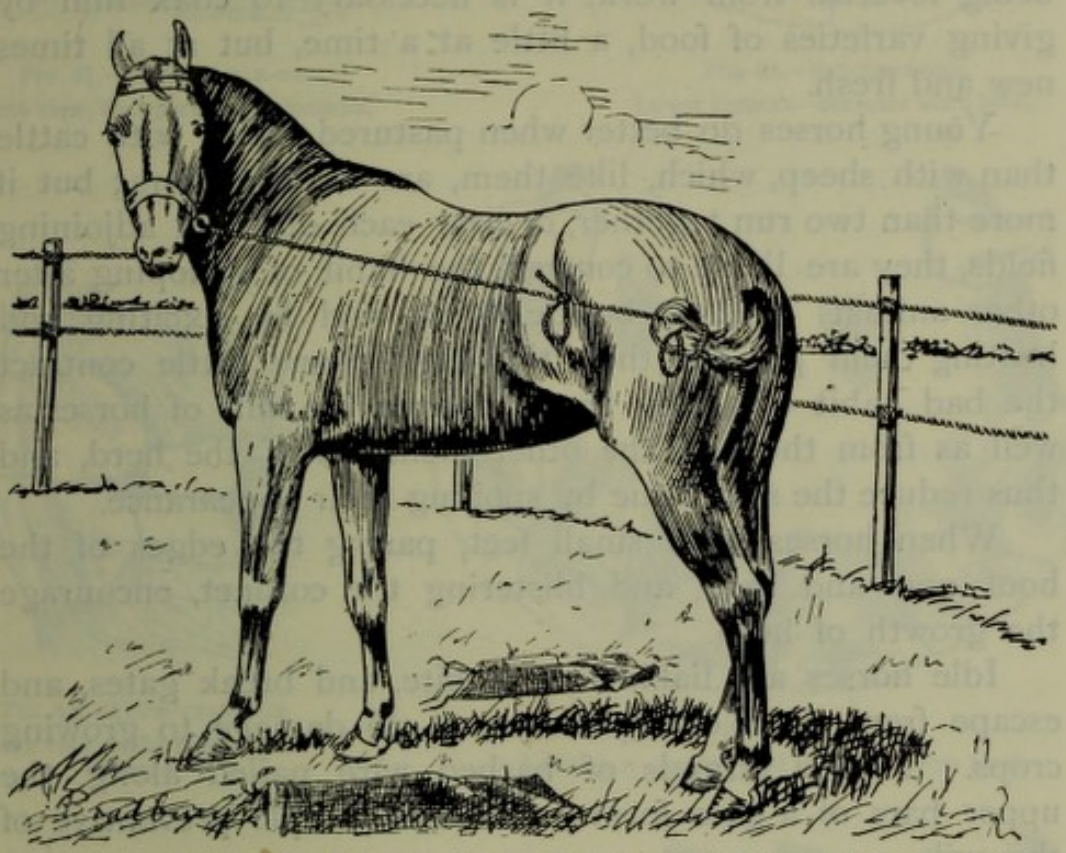


FIG. 30.—A COLT IN THE GALVAYNING POSITION.

From Galvayne's *Twentieth Century Book on the Horse.*

has been thus abused indicates its recollection of it by trying to move away, and by holding up its head, on the approach of a man. The shoulder and back, under the pressure of the collar and saddle, often become "fired," hot, and painful, especially in warm weather. *Remedy.*—Bathe after work is over with tepid water, gently rub the part dry, and soak it with whisky, or white lotion—1 oz. sugar of lead and 1 oz. sulphate of zinc dissolved in a quart bottle of water. This is the best common lotion for broken or irritated skin. To bathe after work with cold salt water is a common means of

hardening the skin of the shoulder to endure the pressure of future work. A paste of fuller's earth plastered over any irritated or superficially injured part acts as a serviceable, stimulating, and healing dressing, provided it be left on till the cure is effected. This debars its use, however, when the injury is the result of the rubbing or pressure of the harness, except when the horse is laid aside from work.

While teething, it is not unusual for a young horse to have a tender mouth and to refuse to eat. If off his food through being feverish from work, it is necessary to coax him by giving varieties of food, a little at a time, but at all times new and fresh.

Young horses do better when pastured along with cattle than with sheep, which, like them, are close grazers; but if more than two run together, or near each other in adjoining fields, they are liable to contract the habit of galloping after other animals grazing beside them, and by exciting and heating them prevent their thriving. Some cattle contract the bad habit of eating the hair from the tails of horses as well as from those of the other members of the herd, and thus reduce the sale value by spoiling their appearance.

When horses have small feet, paring the edges of the hoof now and then, and blistering the coronet, encourage the growth of horn.

Idle horses are liable to rub, bite, and break gates, and escape from their own pastures to do damage to growing crops. A few strands of barbed wire nailed along the upper bars of a gate form a safe and simple preventive of the evil.

The age of horses able to do work may easily be determined by the incisor teeth of the lower jaw, if the animals be not more than eight years old. The molars, except when newly developed, form no guide. A mature horse has forty teeth in equal numbers on each jaw, four being tushes or canines, which are absent in the mare.

"*The Foal* at birth, or within a few days, has the two central temporary incisors, 'milk teeth,' or 'sucking teeth.' In from fourteen to twenty-one days the two middles appear, and about two months after they become level at the crown with the two centrals. At about the age of six months the two corners appear. When first developed they are always

INCISOR TEETH, SHOWING THE AGE OF A HORSE FROM THREE YEARS TO EIGHT YEARS INCLUSIVE.

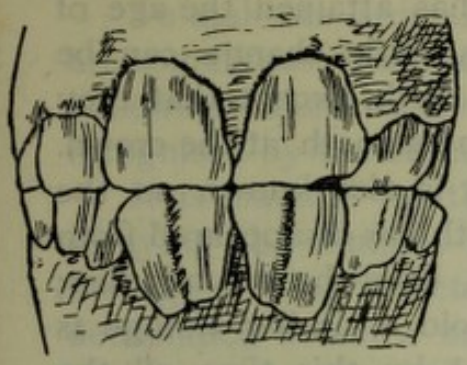


FIG. 31.—THREE-YEAR-OLD.
Front view, four permanent incisors.

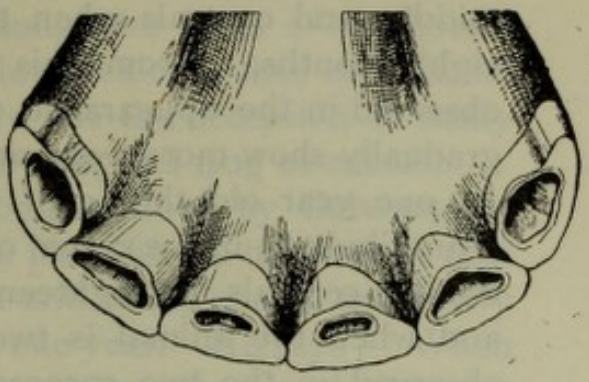


FIG. 34.—SIX-YEAR-OLD.
Lower incisors—centrals worn level.

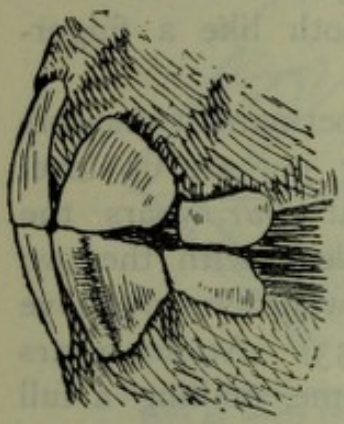


FIG. 32.—FOUR-YEAR-OLD.
Side view, eight permanent incisors.

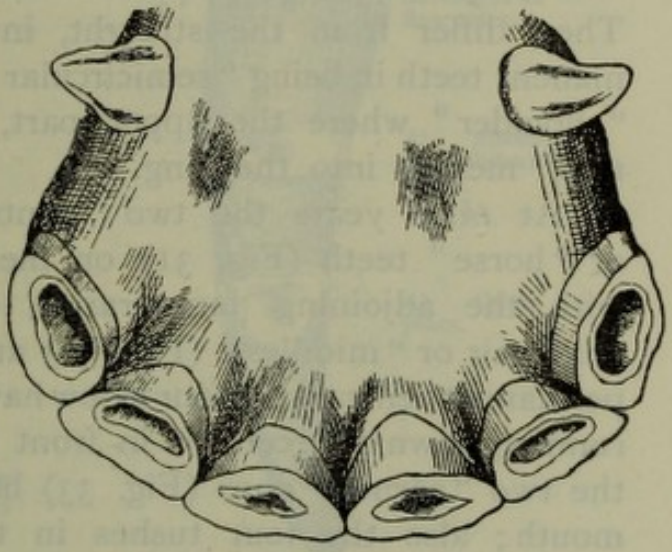


FIG. 35.—SEVEN-YEAR-OLD.
Lower jaw—central and lateral incisors level.

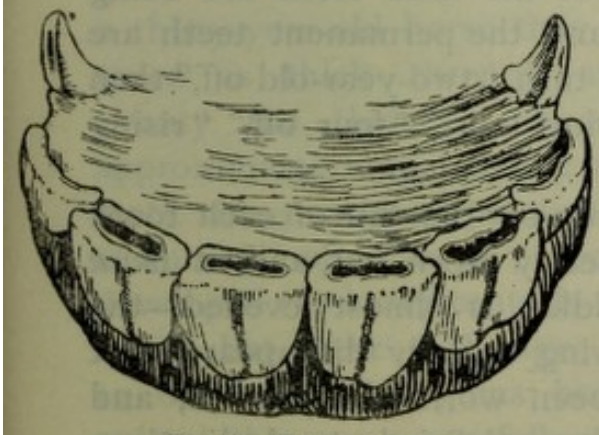


FIG. 33.—FIVE-YEAR-OLD.
A top and front view of a full mouth.

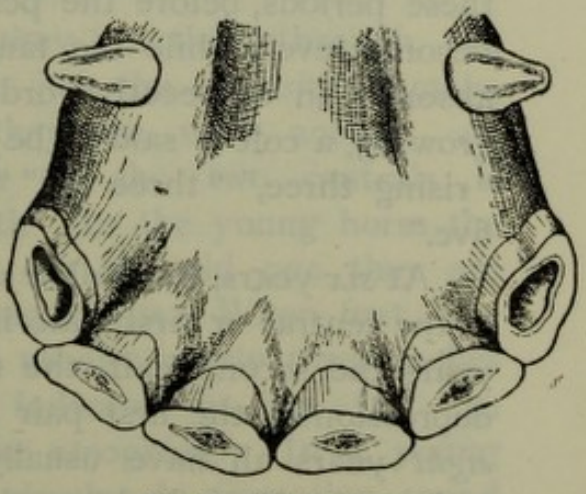


FIG. 36.—EIGHT-YEAR-OLD.
Lower incisors nearly level—laterals slightly cupped.

All reduced from Galvayne's *Twentieth Century Book on the Horse.*

narrower than the centrals and middles. The outside walls of the corner teeth are generally level with those of the middles and centrals when the colt has attained the age of eight months. From this age very little change can be observed in the appearance of these teeth, except that they gradually show more wear, and become smooth at the crown. At one year old the 'cup' (or what is also known as the infundibulum) in the crown of the teeth has disappeared from the two centrals; at eighteen months, from the two middles; and when the animal is two years old a similar change is observed in the two corners, so that by this time all the crowns of the lower incisors have become flat and smooth. The temporary incisors appear simultaneously in both jaws." They differ from the straight, inverted-cone shaped permanent teeth in being "semicircular in shape," with a decided "shoulder" where the upper part, "smooth like a finger-nail," merges into the fang.

At *three* years the two "central" permanent incisors or "horse" teeth (Fig. 31) on the lower jaw are up level with the adjoining temporaries, and at *four* years the next pair or "middles" (Fig. 32) are up level with the two permanent centrals, the four below having a well-defined groove running down the centres in front (Fig. 33). At *five* years the two "corner" ones (Fig. 33) have come, making a full mouth; also the four tushes in the male. "Neither the corner incisors in the lower jaw nor any of the upper incisors have any decided groove when they first appear." Between these periods, before the permanent teeth have successively become level, while the fangs of the milk teeth are being absorbed in consecutive order and the permanent teeth are growing, a colt is said to be in turn "two-year-old off," then "rising three," "three off," "rising four," "four off," "rising five."

At *six* years, the hollow or cup on the top of each tooth of the central or first pair is nearly worn out, and at *seven* years the second pair, the middles, is almost levelled—the depression in the first pair having entirely disappeared; at *eight* years all have usually been worn nearly level, and before *nine* is reached "mark of mouth" is lost. Indications of greater age are grey hairs about the head, deep hollows above the eyes, an angular, aged look about the body,

and a hollow or saddle-back.—From Galvayne's *Twentieth Century Book on the Horse*, with acknowledgments.

To make an animal look young, the teeth of old horses are sometimes "bishoped" by low dealers—that is, artificial hollows are made in their crowns, but the deception is easily recognised by the absence of the marginal ring of enamel.

It is claimed for the method described by Galvayne, of studying the changes that take place as the teeth wear, that the age of a horse between ten and thirty can be accurately determined within a margin of one year. He says: "When the lower permanent incisors are first developed they are

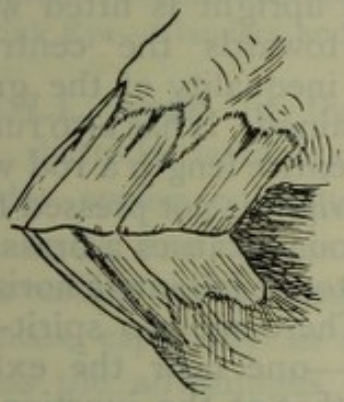


FIG. 37.—Side view of both jaws at nearly twenty years of age.

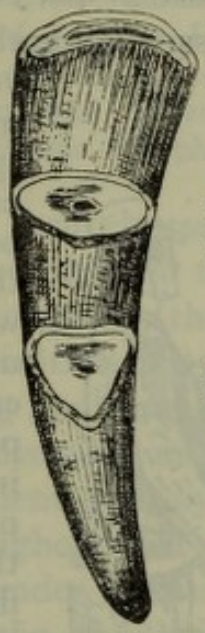


FIG. 38.—Sections of an incisor

Reduced from Galvayne's *Twentieth Century Book on the Horse*.

quite twice as wide across as they are thick through. In a thirty-year-old horse they are just the opposite, namely, twice as thick through as they are wide across. At twenty the thickness through of the two centrals is approximately equal to the width. In the young horse the teeth are nearly perpendicular. In the old one they are at an angle of 30° to 40°, according to age. When first fully developed the lower centrals are usually nearly three inches long," but wear with age, as indicated in Fig. 37. "In an old horse the gums become atrophied. In a young animal the gums are full and circular in formation round the teeth."

A valuable auxiliary to the foregoing indications of age

is a V-shaped central groove, which in highly fed stallions begins to show at about ten years, or nine years and six months, in each of the corner incisors of the upper jaw. When the teeth have grown and been worn down so that the grooves extend the full length of the tooth, the animal is twenty-one years old.[1]

Professor W. Owen Williams' Patent Horse Measuring Standard was awarded a gold medal by the Highland and Agricultural Society, at Kelso, July 1898. It has since been fitted with rack and pinion adjustment. *The Farmer and Stockbreeder* of 4th July 1898 says:—

"It possesses a number of ingenious devices which prevent anything like incorrectness or fraud. The upright is fitted with a spirit-level towards the centre, to enable any inequality of the ground being ascertained. It has also running through its entire length a rod which, when the upright is not pressed firmly upon the ground, causes a brass indicator at the top to fall into a horizontal position. There are two spirit-levels in the arm—one near the extreme point, the other at the junction with the upright. A brass and mirror reflector shading the outside spirit-level enables the operator, standing behind the upright, to see when the level is right, and the other level is immediately under his eyes. These levels indicate respectively any swaying of the arm towards or from the horse, and any movement forwards or backwards. The index on the upright is on the inside facing the horse, so that the operator, who stands behind the upright, cannot possibly read the height indicated by the standard until after he has taken it away from the animal."



FIG. 39.

Maker—J. Nicolson, optician, 17 Haddington Place, Edinburgh. Cash price, 4 guineas.

[1] For fuller details, Galvayne's work must be consulted.

CHAPTER XXIV

THE MANAGEMENT OF FARM HORSES AND TREATMENT OF COMMON AILMENTS

Winter Season—Work—Concentrated Food—Alterative Medicines—Internal Parasites—Water—Fodder—Litter—**Summer Season**—The Soiling and the Grazing Systems of Feeding Horses—**Common Diseases**—Colic—Monday-morning-evil—Cracked Heels—Mud Fever—Founder—Grease—Mallenders and Sallenders—Thrush—Pink Eye—Glanders and Farcy—Epizootic Lymphangitis.

FULL work in the case of farm horses in country districts lasts for eight months in the year, and includes spring cultivation and ploughing, the planting of grain crops, and the preparation of the root land, as well as harvesting and autumn ploughing and cleaning. In many instances, especially in suburban districts and those which possess the advantages of convenient railway communication, the busy season extends throughout the year. This is becoming more and more the case under intensive systems of farming, which, as compared with the practices of our forefathers, have adopted a greater variety of crops in the rotation and an extended use of horse-power machinery, such as numerous recently introduced cultivating implements, and the various forms of haymaking and harvesting machines. On light land two hundred and eighty working days per annum may be taken as a good record in farm work, and with clay-land two hundred and sixty full days' work is satisfactory. The additional time, exclusive of Sundays, may or may not be taken up with the extra work necessarily associated with high farming.

The average cost of feeding a farm horse on an ordinary farm may be estimated at £25 per annum. The cost of upkeep of a man and a pair of horses, taking into account wages and sundry expenses—farrier's and saddler's bills, and interest on capital invested in the horses and the

implements they work—amounts to about £105 to £110 yearly, or a cost of about 8s. 6d. per pair per working day. Little variation has taken place in this total figure during the last half-century, because, although the cost of food has fallen, wages have risen to a corresponding extent. Fourteen to sixteen miles per day is a sufficient distance for a horse to walk on a hard road if the work be regular. An animal will do its work more easily on a road with here and there moderate rises and descents than on one which is level throughout, because the positions assumed are more varied, and additional muscles come into play on going up and on coming down hill, to break the monotony of the constant strain upon those which bear the burden upon a level road.

The food during winter ought to be liberal, and should consist of a mixture made equivalent to three bushels of dressed oats (40 lbs. per bushel) per week, the grain being bruised or broken (not ground), especially for old horses. Unless extremely dry and kept in a dry place, only a little can be prepared at a time, as the ingredients, especially oats, mould and spoil. In addition to oats, which would naturally form the greater part of the mixture, one or more of the varieties of food in the following list, according to what is cheapest in the market, may be included :—Beans, peas, lentils, barley, maize, a little malt or desiccated brewers' grains to assist the digestion, along with bran or linseed cake (restricted to one and a half pound per day), to keep the bowels open. Oats have for some years maintained a relatively higher price, according to feeding value, than barley or wheat, in a great measure owing to the fact that the area in which oats can be successfully grown is more restricted in the hotter grain-producing countries than the areas in which wheat and barley are cultivated. In the warmer climate of the South of Europe, barley takes the place of oats as horse-corn, and there is no sufficient reason why the less expensive varieties of Mediterranean barley, not pure enough for brewing purposes, should not be employed to feed horses in this country. Should the high price of oats be maintained for a few years, the inducement to save expense will lead to the prejudice against barley as food for horses (unfounded as regards the flinty well-matured

barley grown in abundance of sunlight), being given up by British farmers, whose prospects as bread-producers are not too bright.

Dry bran prevents a horse bolting his food too quickly. Though beans when given in large quantities tend to produce costiveness, a small amount added to a food mixture has the opposite tendency. A little fenugreek meal or flour acts as a relish or spice, and is a valuable adjunct.

Indian pulses are now more or less used as ingredients in the mixed **purchased** foods of the various farm animals. It is not safe to include them, as the late Principal Wm. Williams of Edinburgh and Principal M'Call of Glasgow traced a disease to the use of some of them in the food of horses.[1] The seeds of *Lathyrus sativus*, imported from India and Egypt, is especially poisonous to them. They have difficulty in breathing, and fall down as if in a fit if forced to exert themselves, and death is sudden. There is no known cure (p. 327).[2]

As the horse has a small stomach, it should be fed at least three times a day—morning, noon, and night. To prevent costiveness, cold bran mashes are better than boiled food, the latter being apt to cause colic (page 509), although it produces a glossy skin. In addition to restricting the amount of rich food given on Sundays while horses are at rest, saltpetre (2 to 4 drams) is at times added to the usual bran mash on Saturday night, to prevent stocking or "Monday-morning-evil" (page 511), in hard-worked and highly-fed horses. The concentrated food provided during the slack season, whatever be the length of the period, may be averaged at one bushel of oats per week.

Fodder.—A large horse at full work will consume, in addition to short food, 18 to 24 lbs. per day of "seeds," hay, or strong-boned lea hay. If fodder be chaffed, a few lbs. less will suffice. In Midland and Southern England natural or meadow hay is preferred for hunting and carriage horses, whereas in Scotland, pure ryegrass hay of luxuriant growth is

[1] Described in the *Veterinary Journal* for 1885 and 1886 under the title of "Lathyrus Poisoning."

[2] See a paper on "Leguminous Plant Poisoning," by Dr R. S. M'Dougall, in the *Journal of the Botanical Society of Edinburgh* for December 1894.

most appreciated. Timothy-grass hay gives excellent results in either part of the kingdom, but the natural meadow or bog-hay of Scotland is, as a rule, too soft in texture to be suitable for horses doing hard work. Hay is dusty if much heated in the stack, and then it injures a horse's wind. Heated oats are liable to produce a similar result, and concurrently to injure the kidneys, and, moreover, horses do not care for them.

For one horse, when clover hay is given *ad lib.*, 2 to 2½ bushels of oats, or an equivalent of the mixture, is considered to be enough concentrated food per week. The hay of crimson clover, *Trifolium incarnatum*, from which ripe seed has been removed, is dangerous to feed to horses, as it has been known to produce balls in the stomach, as a result of its hairy and indigestible condition, and to cause death from acute peritonitis, resulting from the balls passing into the intestines. New oats are not good for horses, and should not be used as horse-food till after the year expires in which they were grown. A supply of old oats should consequently be preserved until after the New Year. New or green oats make impure blood and induce liability to grease. Straw (usually oat-, but at times wheat- or bean-straw) is often given during winter, and hay in spring when hard work begins; but the best results are obtained by using a chaffed mixture of hay and straw throughout the winter season.

Chaffed straw should be allowed to lie for some time before it is fed to horses, as recently chaffed straw is liable to produce internal irritation, which may result in diarrhœa.

A successful **daily ration** for full-sized Clydesdale or Shire horses at general farmwork is:—12 lbs. oats, 3½ lbs. beans or white peas, 1½ lb. linseed, 12 lbs. chaffed fodder (1 lb. hay to 3 lbs. straw), and 3 lbs. of long hay at night; or a total of 32 lbs. of dry food. The average cost per week may be stated in round figures at 10s., as follows: 84 lbs. oats, 4s.; 24 lbs. beans, 1s. 4d.; 10½ lbs. linseed, 9d.; bruising, 4d.; 84 lbs. chaff, 2s.; 21 lbs. hay, 7d.

Another good weekly allowance for a large horse at full work would be: 3 bushels of oats (40 lbs. to the bushel), 1 pint of linseed ground into meal, 4 bushels of chaff, ½ bushel of bran, 1 truss of straw (36 lbs.), and 2 trusses of hay. A pint of sunflower seeds gives a horse a glossy skin, but at 16s. per

cwt. is too expensive for ordinary feeding. Under pressure of work, a ½ bushel of beans may be added to the mixture. Two oz. of raw linseed oil encourages a horse, if trained to it, to eat his food after a hard day's work. When on light work, a stone of oats and a stone of hay per day is a very common and simple ration for a farm horse. A quart of beer is a good pick-me-up for an exhausted horse, and Major Humfreys has recommended a gallon of warm tea, not strong, but with plenty of milk and sugar, as a good restorative for a tired horse.

A large dose of 2 oz. of carbonate of ammonia, in the form of a ball, for a horse with a stoppage in the bowels, is often a useful stimulant, giving relief by moving the bowels.

The relatively low prices of **wheat** towards the end of the nineteenth century led to its use among farm animals, and it was fully demonstrated that wheat about 26s. per quarter is an excellent food for work horses if the following limitations be observed :—1*st*, that it is given bruised, and not either whole or baked into bread ; 2*nd*, that it is mixed with bran or chopped fodder ; 3*rd*, that the wheat mixture is not the only food given in the day ; and 4*th*, that the other food be not short and dry, like oats, beans, and barley, but grass or silage ; or in the absence of green food, 2 to 3 lbs. of linseed cake or molascuit. **Linseed cake** or **treacle** in moderate quantities acts most beneficially as a food regulator for all classes of animals on the farm, with the possible exception of horses doing fast work : if given at all, the amount should then be little.

It is good practice for the attendant to give, before leaving the stable for the night, a few raw swedes, carrots, or mangels as the last food supplied. **Potatoes** are liable to produce colic, and should never be given raw to horses. Old, sprouted potatoes, even after boiling, have been demonstrated by Principal Sir John Macfadzean, Royal Veterinary College, London, to be deadly poison to horses.[1] **Furze** or whin is sometimes grown as a forage crop to provide green winter food for horses, 30 lbs. being sufficient for each animal per

[1] The case occurred September 1896, when Alfred D. Wells, of Linodun, Willingford, lost eleven horses from eating in most instances small quantities of sprouted "chat" potatoes kept over from 1895, after being three months in bags in a shed, and having there developed a few small new potatoes. Two test horses fed on the potatoes died. An affected animal seems dull, and dies within twelve hours after being first observed, without evincing any sign of pain.

day; but it requires to be chaffed like straw, or thoroughly bruised between rollers.

In the South of England work-horses often go loose in open yards with shelter-sheds during winter. They are thus put in the way of getting gentle exercise and plenty of fresh air to keep them healthy.

Treatment during Summer.—If horses are too highly fed while not doing full work, they are much more difficult to maintain in good working form in winter than when they are kept in an ordinary way. Along with green food in its season, 7 lbs. of oats, in two feeds per day, is generally enough for a horse. When at hard work this amount may be doubled. Some horses do not eat corn freely when on grass; the teeth seem to be "set on edge," like those of a human being by eating unripe apples.

There are two **common systems of feeding** during summer: *First*, "soiling," involving the cutting and carrying of green forage to horses turned loose when not at work in a large open yard with shelter-sheds. Clover, grass, vetches, and cabbages are all useful foods in their season. This is an economical plan if food be not plentiful, but it requires additional labour to that necessary when horses are grazed. *The second* system involves the easier and more common practice of turning horses out to grass over night and at other times while not at work. The disadvantage of this method of treatment consists in horses, especially if young, galloping and cutting up the pasture, casting their shoes, breaking their hoofs, and rubbing down fences and gates; besides the risk of catching cold or contracting founder in the feet if they are carelessly turned out after being heated before they have properly cooled.

Alterative Medicines.—Two drams of desiccated and powdered sulphate of iron, mixed in a full feed of corn once or twice a day, is a good tonic for a horse, and is frequently required along with careful feeding in the "fall," after he goes into the stable. The physical system of the horse seems to go down at this season, probably with the change of coat. It is owing to this peculiar condition that roadsters at this time often become weak, fall on and injure their knees. Tonics are better than physic in the correction of ordinary derangements, unless **parasitic worms** have to be

cleared away. Horses that have grazed during the summer invariably pick up internal parasites, and a course of treatment on going into the stable to dry food is necessary. To destroy round or thread worms in the stomach or intestines, a horse, after fasting for twelve hours, should have a powder containing 1 dram santonine, 2 drams areca nut, and 2 drams nux vomica, to be followed, after preparation for twenty-four hours with cold bran mashes, by an **aloes ball**—for a roadster of 15 h., 6 drams; of 15.2 to 16 h., 7 drams; and for a heavy draught horse, 8 drams. (See p. 518.)

Tapeworm is difficult to dislodge, but it is not the cause of inconvenience to its equine host. If its presence is suspected, it may succumb to a course of daily 1 dram doses of desiccated sulphate of iron powders for a month, given in oats and bran; with once a week 2 oz. of turpentine, and 2 drams of the extract of male fern soaked in dry oatmeal, and administered in a drench of cold water, or in a pint of raw (unboiled) linseed oil. At times the bran preparation alone is sufficient to restore a horse to its natural state of health. One of the safest, most simple, and effective purgative drenches for a horse is 1 or 2 quarts of fresh yeast or barm.

Water which is not very hard should be given in a pure and fresh condition, though not below 55° F., when an animal returns from work. Water taken before feeding encourages eating, and prevents colic, which is brought on by giving it after, and washing the undigested food from the stomach into the bowels. The practice of giving dry food before an animal has quenched its thirst, after exhausting work, is not to be recommended, although the animal system accommodates itself to this unnatural state of things, and the results are not, when it is regularly practised, so bad as might be expected. It is, moreover, safer to give water in moderate quantity to an animal just off a journey, if not over-heated, than after he has been allowed to stand till he is cold and the circulation has become less active. Horses that are at rest in the stable do best if pure water is left within their reach at all times.

The **hygienic stall fittings** illustrated on p. 508, introduced by A. C. Mundt, 102 Fenchurch Street, London, E.C., by which water can be laid on for the free use of horses, cattle, or other animals, are supplied in sections, (1) the water-

channel; (2) pieces of concrete placed on the top of the drinking-channel to form at the same time the front of the manger; (3) the drinking space closed by a swinging flap (on which "patent" is printed); and (4) the galvanised stoneware manger. In a stable the "automatic drinking-channel" is best placed at the back of the manger to prevent the horse putting his foot into the drinking space. A yard in length ready to put together costs 15s. The water is

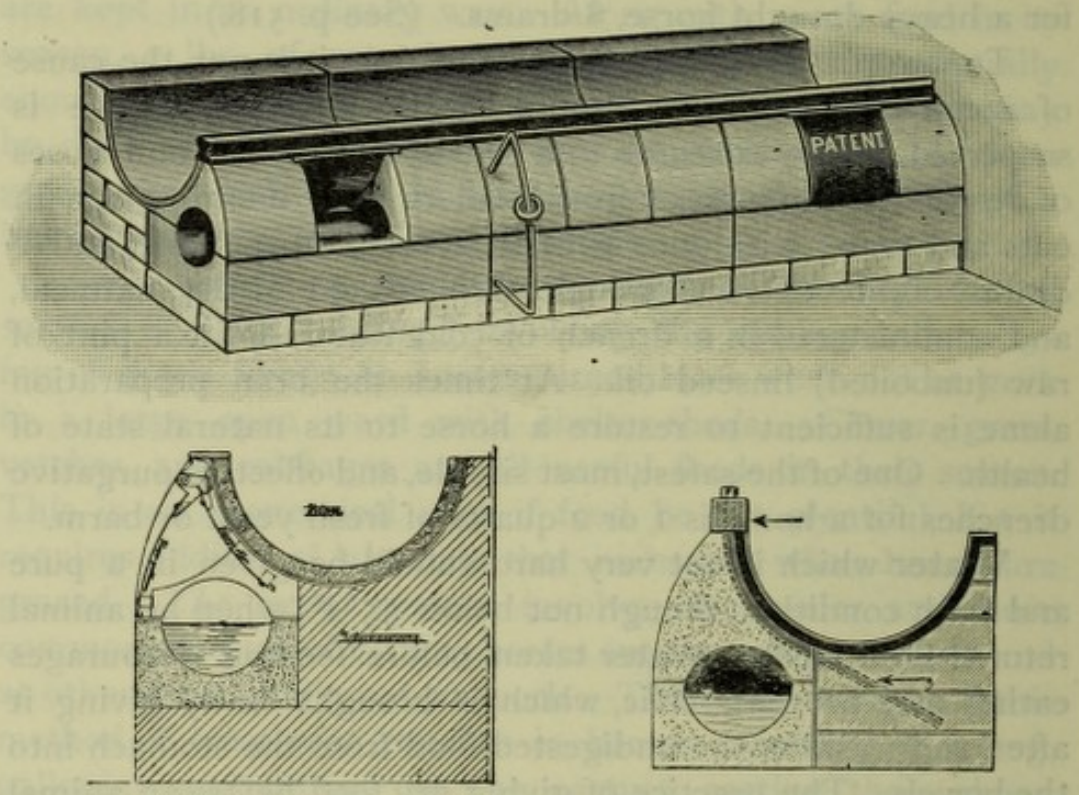


FIG 40.—MUNDT HYGIENIC WATER-SUPPLY FITTINGS.

kept clean and fresh, and an animal readily learns to push back the swinging flap when it wants to drink.

There is danger of inflammation of the intestines if a horse's belly is wetted when he is not used to it.

The thorough grooming of farm horses is too little practised. They should be well rubbed down with dry straw on coming in from work, and groomed when the hair has dried, to get rid of dust which is to a large extent the remains of dried-up sweat. Good grooming is as good as an increase of food to an animal. To make grooming more easily performed, and to add to the horse's comfort, the hair on the under part of the body and the limbs above the knees and

hocks may be removed with advantage. The extremities, which require protection to a greater degree than other parts of the body, should retain their natural covering. Horses thrive best when thus relieved of the surplus coat of hair. It is no uncommon sight to see an unclipped horse, which had been heated in the yoke, still wet on the following morning. This is an unnatural and unhealthy state of matters.

Litter.—Barley straw, on account of the awns irritating the tender parts of a horse's skin, is objectionable as litter: 12 to 14 lbs. per day of wheat or oat straw is much better. Bedding should never be stored during the day under the manger. When a good market for straw is available, moss litter may be substituted. It costs about 25s. per ton, in 4-ton lots, carriage paid; or about 4d. each horse per week, as 1 cwt. is sufficient per horse per month during the winter season. If moss litter is allowed to become too wet before it is removed, there is a danger of injury to the horse's hind feet owing to the ammonia produced from the urine acting upon the weaker parts of the horn, with the result that sores break out about the heels.

Should a horse **sprain a limb** and become lame, he must not go to work, as he will certainly become worse. Rest, and the application of cold-water bandages to reduce inflammation, followed by firing and blistering to give strength, are the usual methods of treatment.

A winter out at grass without his shoes, and letting him meanwhile get down, but not too far, in condition, renovates in a marvellous way an old or any horse that has been overworked. He takes sufficient exercise, and he goes so quietly about, that a weak part is allowed to strengthen. It is thought that frost also aids in the recovery of unsound limbs. A horse that has been highly fed during summer will become much poorer when turned out in winter than if he had been moderately kept.

Some Common Ailments

Colic is more prevalent among horses than in the other domestic animals, and is probably due to the comparatively small size (a capacity of three gallons) and the peculiar structure of the horse's stomach.

"Amongst the commonest causes are—(1) Faulty feeding; (2) sudden change of food; (3) long fasts followed by heavy meals; (4) long draughts of cold water when overheated, especially after beginning to cool down; (5) excessive amounts of green food, especially when first given in spring following the hard keep of the winter months; (6) constipation; (7) internal parasites; (8) twisted or invaginated gut; (9) calculi; and (10) tumours. The first seven causes produce either simple or flatulent colic. Attacks due to the latter three are beyond the treatment of the stock-owner. *The symptoms* of **simple spasmodic colic** are extremely sudden in their onset: the animal may be at work, when he will stop without warning, paw the ground, shake himself, and try to lie down; or, in the stable, he may be quietly eating, when he suddenly stops, paws the ground, whisks his tail, and looks round towards the abdomen. These signs increase in proportion to the pain, which may become so acute that he throws himself down, groans, rolls on his back, jumps up and stands quietly for a few moments, and then rolls again. The symptoms may keep recurring at longer or shorter intervals. An attack may pass off in fifteen minutes, or last as many hours. If it lasts longer than this, there is reason to fear the more serious causes of colic. The animal sweats profusely, the pulse is full and hard, the temperature is raised slightly, and the distribution of the body temperature is uneven.

"**Curable colic** may be confounded with the more serious ailment of **Enteritis** (inflammation of the intestines); although in colic the animal generally throws himself violently about, while in enteritis he lies carefully down; in the former the pain is intermittent, the eye bright and natural, and the temperature only raised one or two degrees; in the latter the pain is continuous, the eye dull and anxious, the temperature raised at least 3° or 4°; and pressure on the abdomen gives relief in colic, but in enteritis it causes pain. The *treatment* must be prompt to relieve the pain, and the best way is by subcutaneous injection of morphia, 5 to 8 grains of the hydrochlorate in an 8 per cent. solution, administered by a veterinary surgeon; but, failing this, give a draught of linseed oil and turpentine; or chlorodyne 1 oz., and sweet nitre 2 oz., in warm water, followed by a pint of linseed oil. Repeat the draught in two hours if the pain is not relieved. If fæces are

not passed, the rectum should be manually explored and back-raked, and an enema of tepid water given to promote the action of the bowels. The belly, ears, and legs should be well and continuously rubbed," the animal being sheeted and allowed to lie down.

Flatulent Colic is due to the fermentation of food and consequent generation of gases in the stomach and intestines, often the result of drinking water after a feed of green clover, vetches, or sainfoin. This is a more serious condition than simple colic, owing to the danger of rupture of the distended parts or of suffocation by pressure on the diaphragm, preventing the proper functioning of the heart and lungs. *Symptoms.*—"The abdomen is blown out (hoven), particularly in the right flank, the pain is continuous, and the breathing rapid—the nostrils being greatly dilated; the animal lies down gently, gas passes by the rectum, and the body is covered by cold sweats, the extremities are cold, and there are signs of great distress. *Treatment.*—Promote the free escape of gas by using enemas, and give a draught of linseed oil, 1 pint, and 2 oz. of turpentine. If this fails to counteract the formation of gases and so give relief, the abdomen must be punctured, preferably in the right flank (to get into the cæcum or great colon), at a point equidistant from the point of the haunch, the edge of the last rib, and the ends of the lumbar processes. The hair should be first clipped and the part washed with a disinfectant (as Jeyes' fluid), then an incision made through the skin with a sharp knife or lance, and lastly, the puncture, in a downward and forward direction, with a special trocar and cannula previously disinfected, and the gas allowed to escape *slowly*. When the cannula is removed the wound should be closed with some form of plaster."

Lymphangitis, Weed, or Monday-morning-evil is an inflammation affecting the lymphatic glands and vessels of a limb, usually one of the hind limbs. Coarse, round-boned, underbred, heavy horses are much more liable to attack than the light-legged breeds. The commonest cause of weed is the keeping in the stable, without exercise, of highly fed animals which have been accustomed to regular work, and continuing to feed them as if they were working. With cessation of work the corn should be reduced, and a bran

mash with 2 drams of nitrate of potash given. When horses are first turned out to grass in spring, "weed" may show itself. "*The symptoms* are rigors, trembling, quick breathing, rise in temperature, and great lameness; the leg is swollen, may be held off the ground, and is tender to the touch, particularly marked at the seat of the lymphatic glands inside the thigh in the hind limb and inside the arm in the fore extremity, the horse walking with a stringhalty action. *Treatment.*—Give a moderate dose of physic (aloes), and an anodyne draught of 2 oz. of laudanum and 2 oz. of sweet spirits of nitre. Foment the leg with hot water to relieve the pain, but, to avoid the formation of an abscess in the groin, do not continue to foment, and dress the leg with an anodyne embrocation—soap liniment 2 oz., laudanum 2 oz., and water 1 pint."

Cracked Heels is primarily an inflammation of the superficial layers of the delicate skin in the hollow of the heels. It extends to the deeper structures, and produces lameness. White heels are more liable to suffer than black ones. The causes are too frequent washing of horses' legs, especially in cold weather, standing in damp and filthy stables, and high feeding. *Treatment.*—"Give a dose of physic, and dress the heels with zinc ointment to which iodoform has been added in the proportion of 1 to 8; or Goulard's solution 1 part, and glycerine 4 parts."

Mud Fever is a more aggravated condition akin to that of cracked heels, and arises from the same causes; but generally from the lazy groom's habit of washing the legs in place of permitting them to dry, and then cleaning them by brushing. If this be practised, the legs should be thoroughly dried, or the animal made to walk a mile or two before going into the stable, to quicken the circulation and prevent the chilling of the skin through the rapid evaporation of water. "The cutaneous inflammation then extends up the legs on the inside of the hocks and thighs and on to the body, and the skin is red and covered with small pimples. This condition is at times the result of the irritating effects of certain soils. In some parts of Great Britain it is common; in others it is almost unknown." If neglected, the irritation, which begins usually about the heels, may spread and make it necessary to throw the animal out of work for weeks. Some horses suffer

seriously from the disease and fall away in condition, while others seem little affected. The *treatment* is the same as that given above for cracked heels, but the lotion is preferable to the ointment. One of the best preventives is to leave the hair of the limbs as a protection to the extremities, which are most liable to suffer from cold.

Fever in the Feet, Founder, or Laminitis, is an inflammation of the sensitive laminæ and all the vascular structures of the feet. In nine cases out of ten it is primarily due to disordered internal organs—bowels or womb. Horses with heavy bodies and small legs and feet, those with flat, open feet, and others with a hereditary tendency, are predisposed to the disease.

The *inciting causes* are—(1) overfeeding with a stimulating diet while giving insufficient exercise; (2) driving a horse a long journey on hard roads after prolonged rest in the stable; (3) exposing a horse to cold, or giving him flour and water or meal and water without the starch having been burst by boiling, or, when overheated, an excessive draught of cold water; (4) animals obtaining by accident, or by being carelessly fed, an excess of such foods as wheat, Indian corn (by far the worst), green oats, or green oat-straw. "Laminitis is sometimes a sequel to parturition. Travelling stallions are particularly subject to the disease. They are made sleek and often too fat, to catch the public eye, and they have to walk long distances on hard roads, or stand in horse-boxes during long railway journeys. *Symptoms.*—The first indications are those of a chill, shivering, and slight rise of temperature, then apparent stiffness of the loins; the surface of the body cold; temperature up to 104° or 105°; the horse refuses to back, or does so gingerly; and the feet are hot. The fore feet are the most commonly affected, and the horse stands with the hind feet well underneath him, in order to relieve the fore feet from his weight. If all four feet are affected, he stands with them gathered together and the back roached. The appetite is usually totally lost. Some animals persistently stand, others equally persistently lie, to their undoubted relief. The disease runs its course in about a week. *Treatment.*—Remove the shoes and poultice the feet with bran poultices; give 2 drams of nitrate of potash in the drinking water. Of febrifuges, the best in this disease is the tincture

of aconite (Fleming's, in 5 to 10-drop doses), or, even more reliable, P. B. tincture of aconite in 20 to 30-drop doses. Failing the aconite, laudanum as an anodyne may be used in 2-oz. doses, at intervals of four hours. A dose of physic (5 or 6 drams of aloes, or 20 to 30 oz. of raw linseed oil) should be given, at the onset of the malady, provided there are no signs of diarrhœa—in that case a purgative increases the irritation and aggravates the attack. The poultices should be frequently changed, and, if the animal does not lie down, he should be put down, to relieve the pressure on the feet." In a few days the patient must be exercised on soft ground, and a pair of thin-heeled box shoes should be put on, and exercise repeated twice a day.

Grease is an inflammation of the skin of the heel, with an increased discharge from the local glands of sebaceous or fatty matter, and hence the name. Underbred, heavy horses (especially those with hard, curly hair on their legs) are more liable to it than light ones, and the hind legs are more commonly affected than the fore.

"*The essential cause* is an unhealthy condition of the blood, due to overfeeding with corn, and insufficient exercise. Predisposition to the disease is distinctly hereditary, and it is undoubtedly a mistake to breed from animals that have suffered from this affection. It is a frequent subject of remark among breeders that certain families of cart-horses are liable to develop grease. Cracked heels that have been neglected are liable to degenerate into this more intractable disease. In chronic and aggravated cases, the papillæ of the skin increase, forming large wart-like growths, termed 'grapes.' *Treatment.*—Give a dose of physic, and lower the diet. Clip the hair from the heels, and foment two or three times daily, and, when the inflammation has subsided, apply astringent lotions, as chloride of zinc 40 grs. to 1 pint of water, Goulard's solution, 1 oz. to 4 oz. of glycerine, 1 oz. of sulphate of copper to 4 of boiling water, after being allowed to cool. A frequent change of dressings in skin diseases will often effect a cure when any one of them would fail. When **grapes** are present they must be removed by the hot iron, carefully protecting the healthy portion of the heel by a cold iron while the hot one is being used. A run out at grass purifies the blood and aids in the cure of grease."

Mallenders and **Sallenders** are forms of eczema involving the deep layers of the skin in the flexures of the hock and knee joints, most common in heavy horses, and particularly in heavy stallions. "The first signs are roughness of the hair and scurfiness of the skin; then deep cracks appear right through the skin. This condition, if not taken early, is difficult to cure. The diet should be lowered, a dose of physic given, the part well washed with soap and water, and iodine ointment or oleate of mercury ointment applied."

Thrush is a diseased condition of the frog, characterised by a fetid discharge, and is aggravated by horses standing in damp and ill-kept stables, and also by the practice of stopping horses' feet with cow dung. It produces tenderness in the feet, and at times short action and lameness. *Treatment.*—"Remove the shoe, and pare all loose and diseased horn from the frog; thoroughly irrigate the cleft with 'Jeyes' fluid'; poultice for a couple of days in bad cases, then dust into the cleft calomel, and push in a pledget of tow and tar, or dress daily a few times with blue mercurial ointment."

Canker is a condition of the foot that may arise *de novo*, or may be a sequel to neglected thrush. "The horn-secreting structures of the frog and sole are chronically inflamed, and produce, instead of horn, an abundance of soft cells which readily degenerate into an extremely fetid semifluid material under-running the horn, and causing its separation. *Treatment.*—Give always a *dry* standing. Apply strong astringent lotions like those suggested for grease. Chloride of zinc, sulphate of zinc, sulphate of copper, and sulphate of iron in strong solution, with dark common carbolic acid added, is frequently used. The disease is, however, of an extremely intractable nature, and may defy all treatment. Sometimes all four feet are affected, indicating that there is an affection of the body generally, as well as the local malady."

Pink Eye is a specific infectious disease like influenza, spreading from horse to horse, but not to other animals. It varies much in its acuteness. Horses of all ages are attacked, but those badly housed and badly fed suffer most. "*The common symptoms* are—extreme prostration and muscular debility, accompanied with high fever and irregularity of external temperature; and usually there is a dry, hard cough. The mucous membrane of the eye has a yellowish-red colour,

hence the name, pink eye; the legs sometimes swell, and pit on pressure; and the temperature rises to 103° to 105°, rarely higher. In complicated cases, the liver and chest may be involved. *Treatment.*—This ailment is one that has to run its course, and careful nursing and good hygienic surroundings are the main factors that bring about a successful termination. Place the patient in a light, airy loose-box, clothe and bandage; frequently remove the bandages, and hand-rub the legs to improve the circulation. Encourage the animal to drink, and in the drinking water give 2 teaspoonfuls of potassium chlorate twice daily, also 2 oz. of epsom salts twice daily, in the water, to keep the bowels in proper order; a purgative must on no account be used. As a febrifuge, acetate of ammonia and sweet nitre, 2 oz. of each, in water, may be given three or four times in twenty-four hours. If the appetite be lost for some time, milk mixed with an equal volume of water will keep the strength up. During convalescence give tonics, sulphate of iron, and powdered gentian—a teaspoonful of each in manger food."

Glanders is an incurable disease of the horse due to the *Bacillus mallei.* There are two forms—acute and chronic—the latter being the one usually seen.

Symptoms.—" In the early stages of chronic glanders there may be only an unthrifty appearance, which is followed by poor and emaciated condition, and a scanty nasal discharge, usually unilateral or from one nostril, of a watery fluid which afterwards becomes like the white of an egg, viscid and sticky. On the mucous membrane of the nostrils typical ulcers form, with hollow centre and raised edges, and the submaxillary glands swell, adhere to the inside of the jaw on the affected side, and become hard as the disease advances. The varying temperature is slightly above normal, which is 100.5° F. The disease can be transmitted to mice and rats by inoculation, and to feline animals, as lions and tigers, by feeding them on the flesh of glandered horses. It is fatal to man. Grooms who sleep in stable lofts may contract it by infection; or they may be inoculated by the nasal discharge getting into abrasions of the skin or on to the mucous membrane. An affected horse coughing or sneezing in a man's face is most dangerous. Cattle are immune, and sheep and pigs are

practically safe. The chronic form of glanders may exist in a horse for years, and as 'occult glanders' be communicated to his stable companions although he is apparently healthy. The **acute form,** the only one known in the donkey, is quickly fatal in the horse. Its period of incubation is from three to seven days, and it runs its course in a very short time. All animals affected with this form of glanders should be immediately destroyed." In the days of stage-coaches the disease was very generally distributed over the United Kingdom. Now, it is chiefly confined to the cities of London, Liverpool, and Glasgow, and, although scheduled under the Diseases of Animals Act, it increased in recent years, owing to the inadequate means adopted for its repression. In 1895 there were 487 reported outbreaks. Within ten years the number rose to 2304, but fell in 1906 to 1066. Predisposing causes to infection are the poor condition induced in a horse by over-working and under-feeding, and keeping in dark, badly-ventilated or under-ground ill-drained stables. The *mallein test* is a sure means of diagnosis, even more generally reliable than the tuberculine test in cattle; but it is unfortunately used by unscrupulous owners of large studs to identify affected horses, that are then passed on to unsuspecting purchasers and so carry the disease to new centres. By order of the Board of Agriculture, veterinary surgeons must report all outbreaks of glanders.

Farcy, the cutaneous form of the disease, also occurs in an acute as well as in a chronic form. "Small, hard, painful tumours break out on the surface of the body, usually on the insides of the thighs and forearms, or on the neck. In the acute form there is fever and swelling of the affected limbs." When the swellings or buds point and break, discharging purulent matter, they form ulcers and do not tend to heal.

Epizootic Lymphangitis is included in the diseases scheduled under the Diseases of Animals Act. It was imported into this country in 1902, at the close of the war in South Africa, where, as in India and Italy, it was formerly known. "It closely resembles farcy in its clinical symptoms, swelling of the legs and formation of abscesses along the course of the lymphatics, but it can be distinguished from farcy by the discharges containing not a bacillus, but a

cryptococcus that can be seen under the microscope without employing a staining material." The mallein test is not applicable to the disease, which is curable if treated early, and is thus unlike all forms of glanders. The *treatment* is to scrape out the abscesses, and to touch the spots with a hot iron, and, in accordance with the discovery of Dr Tinjard in India, where conditions make it possible, send the patient to an altitude of 7500 feet above the sea.

Worms in Horses

"*Ascaris megalocephalus.* — The commonest nematode worm of the horse, length 6 to 15 inches. The intestine is their natural habitat, and in great numbers they are a common cause of colic, but occasionally they make their way to the stomach and then may cause mad staggers.

"*Treatment.*—A dose of aloes or a pint of linseed oil with 2 to 3 oz. of turpentine will remove them."

"**Bots** are the larval form of the fly, *Gastrophilus equi.* The flies lay their eggs on the hair of the mane, neck, shoulders, and the fore legs; the eggs hatch in about a week. The horses lick themselves or their companions, and in this way the larvæ find their way into the stomach of the horse, where they usually attach themselves to the cuticular portion, there to remain during the autumn and winter, and pass out with the fæces in spring. On the cuticle they do little harm, but occasionally they extend to the villus portion, and, interfering with digestion, cause colic and loss of condition, and they have been known to perforate the wall of the stomach and cause death. Bots are difficult to dislodge, as they bury their mouths in the coat of the stomach.

"*Treatment.*—Carbolic acid 1 dram, glycerine ½ oz., in a pint of warm water, followed shortly by a pint of linseed oil and 2 oz. of turpentine, may be successful. The solution of iodine is sometimes effective.

"*Preventive measures* are to smear horses turned to grass in the summer months from July to September with a dressing similar to that recommended to protect cattle from the warble fly, viz., 1 gallon train oil, 1 pint spirits of tar, and 1 lb. flowers of sulphur."

Oxyurus curvula, see Appendix Q, p. 739.

Strongylus tetracanthus, see Appendix Q, p. 740.

CHAPTER XXV

ISLAND, MOUNTAIN, AND MOORLAND BREEDS OF SHEEP

Remnants of Ancient Breeds of **Island Sheep**—The Four-horned—The Shetland—The Faröe Islands' Sheep—**Mountain and Moorland Breeds**—The Cheviot—Scotch Blackface Highland—The Shepherds' Calendar—Habits of Mountain Sheep—Shepherding—Shelter—The Lonk—The Rough Sheep—The Swaledale—The Gritstone—The Limestone—The Penistone—The Old Norfolk Horned Sheep—The Herdwick—The Welsh Mountain—The Kerry Hill—The Radnor or Tanface—The Clun Forest—The Exmoor—The Dartmoor.

SHEEP belong to the genus *Ovis*. They have been subjected to domestication as far back as records go. They are classified in various ways in this country: horned and hornless, blackfaced and whitefaced, mountain and lowland, long-wools and short-wools, long-tailed and short-tailed. Iceland sheep possess remarkably small and insignificant tails. In the East there are sheep with rudimentary tails and large masses of fat on the rump; while others, again, have the fatty development in the tail itself. Two is the usual number of horns, but in the Western Islands of Scotland remnants of the ancient polycerate sheep exhibit four horns, or at times even a greater number. A general characteristic of the sheep is the presence of only one pair of teats from which milk can be drawn, though a second rudimental pair is not infrequently seen in British breeds.

Fecundity, or the state of being prolific, differs much in different breeds of sheep, and in different specimens of the same breed. Some bear single lambs, some twins, and some triplets, while four and even five have been known to be brought forth at one birth. Although the local surroundings, including the kind, quality, and quantity of food, have much to do in determining the issue, yet there is unquestionably an inherent propensity in certain ewes to follow regular habits in the matter of producing certain numbers of off-

spring. The tendency may have been induced by local conditions favourable to a particular object being continued through generations, and thus made accumulative. If sheep are well fed (but not too fat), and only the young of those bearing twins bred from, the flock after a time becomes distinctly more prolific.

Points applicable to most British Breeds of Sheep

(*Exceptions in various breeds will be named when they occur*)

1. A graceful *carriage* and springy style of walking:

2. A characteristic *head* with good depth and strength of *jaw*, and breadth across the bridge of the *nose*, and full bright *eyes*, indicating both docility and courage:

3. The *neck* thick towards the trunk, tapering to the head, arching slightly, and not too short:

4. The *chest* broad, deep, and projecting well over the fore legs, and descending from the neck in a perpendicular line:

5. The *back* level and broad behind and before (except in the Cheviots and the Lonks, which have sharp shoulder-tops or withers), with a uniform covering of *flesh*, not boggy, but to the touch firm and muscular; *under-* and *upper-lines* straight:

6. The *ribs* well sprung, rounded and deep:

7. The *shoulders* well laid and covered with firm flesh. The regions immediately behind the shoulders filled up:

8. The *thighs* and *gigots* and also the *arms* and the *fore flanks* fleshed well down:

9. The *rump* or part near the dock well developed, though not too large, as is sometimes the case in Cotswolds, Border Leicesters, and other heavy-fleshed breeds:

10. The *quarters* long and not drooping behind, and the spaces between them and the last ribs short:

11. The *legs* straight and set well apart, not too long; the *bone* clean and fine, and neither coarse nor deficient: the *hocks* are much better slightly out than at all in or "cow-hocked":

12. The characteristic *wool* of the special breed covering well the *body*, and particularly the belly; also the scrotum of the ram.



MANX FOUR-HORNED AND SCOTCH BLACKFACE CROSS RAM HEADS.

Got by one pure and three cross rams on blackface ewes.

1. First cross, brown, like a pure four-horned ram. 2. Second cross, white, with grey-dun face.
3. Third cross, white, with speckled face. 4. Fourth cross, a blackfaced sheep but for the horns.

Bred and owned by J. Greenshiels, Westtown, N.B.

[*Brown & Co., Lanark.*



A. Four-Horned Sheep, originally from the Western Islands of Scotland.
Now more or less mixed with other blood. Kept in parks and policy grounds of country-seats throughout England and Scotland.

[*C. Reid, Wishaw.*



B. Manx Four-Horned and Scotch Blackface Cross Ram.
Fifth generation of Cross rams on pure Blackface ewes.
Bred and owned by James Greenshiels, Westtown, Lanarkshire.

[*Brown & Co., Lanark.*



A. "Polycerate Breed of the Hebrides," of Scandinavian Origin.
[*From Low's Collection of Paintings in Edinburgh University* (1848.)



B. "Welsh Breed of the Higher Mountains." Glamorganshire.
No longer pure. The ram and lower ewes improved types.
[*From Low's Collection of Paintings in Edinburgh University* (1848).

[pp. 520 and 521



A. Faröe Islands Sheep, of Scandinavian Origin.
In a "raett," or fold, in which the wool is removed by pulling.



B. Faröe Islands Ram.

[*Photos lent by Miss Taylor.*

[*pp.* 520 *and* 521

Remnants of Ancient Breeds

Four-horned sheep. — The diminutive **Four-horned Western Islands sheep**—of which a remnant still exists in ornamental flocks in the parks and domains of the aristocracy, and, in a more or less mixed condition, in some of the Western Islands—divides with the extinct Tanface breed the distinction of having been aboriginal to Scotland. From the accompanying plates (CXXXIX. to CXLI.), and from the subjoined specific information relating to two branches of their progeny, a good idea may be formed of the character of the breed. It was small, hardy, and like (probably) all the aboriginal sheep of the British Isles, covered with a small fleece of very fine wool. James Greenshields, Westown, Lanarkshire, had a few years ago a small **flock in the Isle of Man.** The wool was of many colours—white, brown, black, and black and white—of very fine quality, but only about 1½ lb. per sheep. The animals weighed only 5 lbs. or 6 lbs. per quarter, and they proved to be such indifferent nurses that they were eventually put away, after producing, by Border Leicester rams, lambs that ranked only as shots. One of the brown Four-horned Manx rams was put among Scotch Blackface Mountain ewes on Westown after the Leicester tups were brought in to pick up ewes that had not settled, and among the resulting lambs was a brown tup lamb with four horns like his sire. The half-bred Manxman was again put with the pure Blackface ewes under similar circumstances. His produce were all white, even the faces, although the mothers were mostly black in the face, but about one-half had four horns. The practice of putting out a four-horned ram each year with less and less Manx blood has been continued until the last (which had, to begin with, five horns, though one was broken off at an early stage) was practically and to appearance, except for the horns, pure Blackface, having had five Blackface crosses. Nevertheless, the persistency of the old breed is so remarkable that half of the lambs still have four horns. All the successive ram heads have been mounted, and form an interesting and unique collection (Plate CXXXIX.). The second crosses from the original Four-horned tup proved to be quite as good milkers as the pure Blackfaces, and some were fine large ewes, especially those that took after the mothers in

having but two horns. The ram to which the most recent head belonged, weighed 20 lbs. per quarter, and his sire (which had the finest head of all) was a larger sheep.

In St Kilda, on the authority of the Rev. J. B. Mackenzie of Kenmore, Aberfeldy, from the notes of his late father, who ministered in the islands, the two small islands Soay and Dun, in the hands of the proprietor, possess some 400 and 80 respectively of the old Four-horned breed. Probably the only cross took place many years ago with the old Tanfaced aboriginal sheep of the Scottish Mainland mountains. The colours are white, black, and yellowish-brown, or these colours mixed in patches. The prevailing colour is light brown, called "lachan." Till recently, it was very common to see some sheep with five horns. They are prolific, having generally twin lambs. Their mutton is very sweet when fresh; but as they are seldom fat, it does not salt well. The old Scotch practice of salting mutton has almost died out on the mainland, in presence of the ever-increasing enormous supply of fresh meat pouring into the country, and to the increase in the consumption of pork.

On the other islands—where ten sheep go with each allotment, and one shilling of rent is paid for each additional one kept—the sheep are larger, fatter, and longer in the wool, the result of crossing with Blackface Highland rams, which were first imported about 1840. As another consequence of crossing, more of the sheep are white. Wethers from these sheep in St Kilda proper have made 10 lbs. up to 14 lbs. of tallow. The total number of sheep in the islands is about 2000. The short fine wool has more coarse hair (kemp) mingled with it than that of any of the modern improved breeds.

The original Shetland Islands sheep was, according to Youatt, of Danish origin, and was celebrated for the unrivalled fineness of its fleece; and for its diminutive size, its extraordinary hardiness, and the superior quality of its mutton. He says in the case of the pure-bred ram, "his skin when the hair is parted, his palate, the bridge of his nose, his horns and his hoofs, should be white. The hornless breed is the best. The body should be long, the legs short, the hoofs broad, the head narrow; the wool fine on almost every part, and weighing from 1½ to 2 lbs., and worth on an average from 3s. to 4s.

per lb. By the cross with the Dutch, which used to be the prevailing one, the carcase is heavier, the wool coarser, the fleece weighing 4 lbs. or more, but not worth one-fourth so much per lb. The tail is about 6 ins. long, and shaped like a flounder, whence arose their name, the 'flounder-tailed' sheep. [Although many different alien crosses have been made, the wild habits of the sheep and the soft nature of the foreign blood have probably prevented much outside blood from establishing itself in the so-called improved variety.] In both breeds the wool is mixed with hairs resembling those of the ruminants of almost every cold climate. The process of shedding the coat is not uncommon in all other animals in cold countries. The wool begins to loosen at the roots towards the close of the winter, and gradually rises through and separates from the hair, and would be eventually detached and lost; but, towards the end of March or the beginning of April, the Shetlander collects all his sheep in 'punds' and 'crues,' in order to pull the wool, which is done with little inconvenience, and no pain to the sheep. The common operation of shearing is out of the question. The wool contains many hairs which require to be dressed out. The animal is still covered by a thick coat of hair, which forms a sufficient defence against the cold of the early spring months. When the wool has attained the length of 3 ins., the hair in turn drops off; but this is a slower process, regulated by the growth of the new hair. On the approach of winter a perfect double coat of wool and of hair is again formed."

This relationship of wool and hair in the most perfect coat for resisting the inclemency of the weather, is a key to the appearance of "kemp" or dead hairs in the coats more particularly of mountain sheep.

Darwin, quoting from *The Quadrupeds of N. America*, refers to it in the case of the wild mountain sheep, *O. montana*, thus: "The wool begins to drop out in the early spring, leaving in its place a coat of hair resembling that of the elk."

The late **Z. M. Hamilton** wrote, in October 1905:— "Youatt's description does not quite hold good for the Shetland sheep of the present day, as the only two islands on which they are really pure are Foula and Papa Stour.

Certainly they are celebrated for fineness of wool, diminutive size, and excellence of mutton, as also for hardiness where they have access to the seashore and can get a supply of seaweed; but if confined on hill ground, I do not think they are hardier than the Blackface sheep. The average weight of a Shetland sheep's fleece is about 2¼ lbs.; price at the present time varies from 2s. 6d. for best *murret* (light brown) wool to 10d. for the coarser qualities of black and white. The weight of a ewe off the hill is about 32 lbs., and that of a three- or four-year-old wether 38 lbs., but if fed on good green ground the latter will reach 42 lbs. The tail is slightly like a flounder, thick or flat at the root, and coming to a sharp point, and rarely exceeds 4 ins. long. On some, but by no means on all sheep, there are coarse hairs. Many of these hairs come off along with the wool in the end of May or June. A number, however, often remain fixed to the skin. If it is wished to retain the fine nature of the wool, it must be 'roved' or pulled off. It rises from the skin if the fleece is ripe and the roving does not cause pain to the sheep. If a Shetland sheep is once clipped it seldom can be 'roved' again, but must be again clipped. The clipping makes the wool much coarser, and in the clipped fleece there is of course a quantity of new wool, useless for 'hosiery' purposes, with the old. When the wool is being hand-carded and spun, all the new wool is forced off and thrown away; consequently a clipped fleece is of much less value to the crofter's wife or daughter who manufactures the fleece into hosiery. It is no uncommon thing for a Shetland woman to get from 18s. to 25s. for the proceeds of one Shetland fleece after it is spun and knitted.

"The native sheep are driven into 'crues' or 'punds' almost every week from about the 15th of May till the end of June, because there is such a difference in the time between sheep being ready for 'roving.' It may be a week or more from the time that the *sides* of a sheep are roved till its *back* is ready. Shetland sheep, although miles out of sight of the sea, know when the tide begins to go back, and all make for the shore. The Shetland crofters believed —and some of the older people still believe—that there is a worm in a sheep's foot that moves when the tide begins to go back."

The Faröe Islands[1] **sheep** (Plate CXLII.) are a small short-tailed breed, supposed to have been formed probably two hundred and fifty years ago after a severe storm had killed out most of the aboriginal breed. This was accomplished by blending the short-tailed Iceland sheep with a Norwegian breed, and no doubt a remnant of the native breed, a small, brown, fine-woolled sheep resembling the Four-horned breed of the Western Islands. It ran wild on one of the islands till a few years ago, when the last specimens were killed to make room for the common domesticated sheep. A few Blackface Scotch mountain sheep were also taken to the Southern Islands. Cheviots have from time to time been introduced into the Islands, but little trace of them is seen, as, if their cross-descendants survive, they soon lose their characteristic features. A pure Cheviot, or one with a slight admixture of native blood, is not suited to the climate, as the wool becomes saturated with the constant rains and cannot dry as quickly as that of the native sheep, and the animal gets chilled.

This domesticated breed, especially of the northern fjelds, is very hardy and of many colours, both of wool and hair (for example: white all over; steel grey; jet black; dark murret or brown—like the majority of the so-called black sheep of our British flocks; light murret, a rose or reddish-dun resembling that of the extinct Tanfaced sheep), with black fore-shoulders, neck and face, and with a white ring round the muzzle and eyes, and a white spot on the forehead. Some white sheep have a ring of black round the muzzle and on the tips of the ears, and others grey spots on the face and legs. Like Herdwick sheep the rams have heavy horns, while the ewes are hornless, and all tend to become lighter in colour as they advance in age. The wool is not shorn but pulled about midsummer, the sheep being collected in a "raett" or fold and tied by the legs (Plate CXLII.). The fleece shows a perfect combination of the double coat so characteristic of the Shetland breed—long straight hair being seen on the surface, and short, downy, soft wool arranged like a bed of the finest moss underneath, through which the long hair grows and projects, so that it overlaps and thatches

[1] Faröe signifies the sheep islands, and they possess over 100,000 sheep. There are seventeen inhabited islands, out of a group of twenty-two belonging to Denmark, lying between Shetland and Iceland.

effectively the undercoat, and wards off the wet and the snows of winter. Sports now and then appear, having reverted to some ancestral type with a more fawn-like appearance, altogether on finer lines, and with rather longer and more slender legs, and a longer tail, dun or light brown all over, but for white under the tail and a dark brown line along the back to the ears.[1] (See Appendix R.)

Mountain Breeds

The Cheviot is named from the range of rounded or cone-shaped green hills, growing a superior quality of pasture, on the Scotch and English Border. "Cheviots are now mostly bred in Roxburgh, Dumfriesshire, Peebles, Sutherland, and Northumberland." The low price of wool and the rage for young mutton greatly reduced the number of Cheviot wethers, at one time kept till they were three or even four years old. The lambs are now sold to low-country graziers, and mostly fed-off within a year at weights not far short of the hill-fed wethers of the past. The ewes are kept on the lower and less exposed green hills. Cheviot wethers and Blackface Highland ewes go to greater heights, or occupy positions on the black or more heathery land at lower elevations. The great fairs or marts where the surplus of draft stock is sold are held at Inverness in July; at Rothbury, Hawick, and Lockerbie, in August, for lambs; and in October for ewes and wethers, of which a great number are also sold at Carlisle and Perth. The principal sale of tups is held at Hawick towards the end of September, but there are also sales at Edinburgh, Muir of Ord, Lockerbie, etc.

The Cheviot breed has been for many years a successful medium for the improvement of the Welsh mountain sheep, and it maintains an excellent reputation in England, where large numbers of cast ewes are taken annually to cross with the various Down and Long-wool rams, to produce feeding hoggets, which are in high favour in the fat market. No sheep thrives better on the plains of the Canadian North-West, and, being hardier than any of our low country Long-wool or Down breeds, it has a hopeful future in other foreign parts, when quality versus quantity of mutton, and the cost of

[1] Indebtedness is acknowledged to Miss Elizabeth Taylor for the foregoing information and for lending the Plate originals.

producing wool per pound, and not the amount per sheep, become more important factors than they are at present. The breed, which usually produces mutton of the finest quality, has one defect as a butcher's sheep, in the occurrence of more than a usual number of yellow carcases which do not fetch top prices.

With a view to the development of the foreign trade the **Cheviot Sheep Society**, formed in 1891, established a *Flock Book*, vols. I. and II. of which were issued in one cover in 1893. It makes the important announcement that: "it is only compulsory for the sire of tup lambs to be entered in the *Flock Book;* though every tup used in the flock must, by being the son of a registered sire, and descended from a ewe from a flock in which only pure-bred or eligible tups are used, be himself eligible for entry in the *Flock Book*. This rule will insure purity of breeding, and keep the size of the *Flock Book* within moderate bounds."

The following **description of the Cheviot sheep** is condensed from the *Flock Book*:—

"*The Cheviot tup* at maturity weighs, when fat, at least 200 lbs. live-weight. He should have a lively carriage, bright eyes, and plenty of action. His head should be medium in length, broad between the eyes, well covered with short, fine, white hair; his ears nicely rounded and not too long [well up from the eye], and rising erect from the head [drooping or low-set ears or narrow ones, 'hare-lugged,' are decidedly faulty]; nose arched and broad, and nostrils black, full, and wide open; neck strong, but not too long; breast broad and open; ribs well sprung and carried well back towards the hook bones —(a long weak back being about the worst possible fault); back broad and well covered with mutton; hind quarters full, straight, and square; the tail well hung and nicely fringed with wool; legs set well apart standing squarely (hocks either out or in, the latter especially, are looked upon as defective); the bone broad and flat, covered with short, hard, white hair; the fleece weighing 10 lbs. to 12 lbs. of fairly fine, densely grown wool of equal quality, meeting the hair at the ears and cheeks in a decided ruffle. Bareness there, at the throat or near the forearms, near the hocks, or below the body, or coarseness about the breeches, is a decided blemish. A hill flock of *ewes* should clip, on an average, $4\frac{1}{2}$ lbs. each of fine

(washed) wool, stiff, straight, dense, and not too short. Hard feeding makes it stronger. The Cheviot should live and thrive well on the poorest keep, and when taken to the lower ground grow larger, and in time become fat."

Horns in the ram (Plate CL.), though not always present, are not objected to, being considered a sign of hardiness. They are "clean," not thick and ringed or rough like those of the Blackface breed.

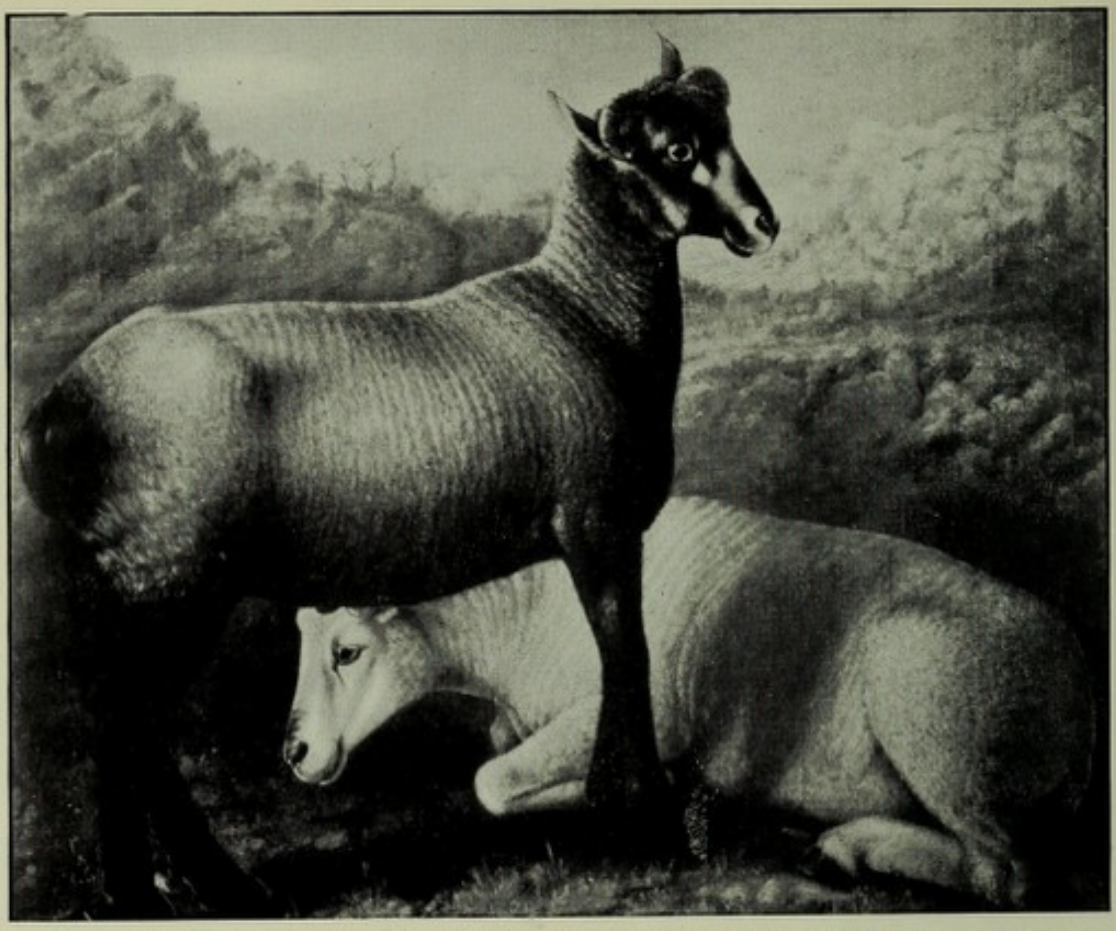
The tail is long, and it is usually cut so that the point reaches the hock,[1] but closer docking may become necessary with changes which are progressing in the systems of management.

The shoulders are high, and sharp at the withers, but not too sharp—else the sheep is liable to be slack behind the shoulders. They must rise, however, to get style.

The **fashionable form** of Cheviot is now shorter, smaller, and more compact, and the wool closer and thicker set than formerly, since a series of bad seasons, down to 1879, showed that the larger, longer varieties with loose open fleeces were not so hardy.

For several decades before that time, beginning about the middle of the century, the so-called "improved Cheviots" were all the rage. They were developed by **James Brydon**, who died in 1887 (designated by himself "a man among sheep, but a sheep among men"), on the farms of Moodlaw, Eskdalemuir (till 1869), and Appin, Tynron, Dumfriesshire, Kinnelhead, and the Holm of Dalquhairn, given up in 1887. At his bi-annual sale in September at Beattock, which was discontinued about 1880, highly fed and excellently dressed rams, numbering 150 to 180, with beautiful form and stylish gait, were sold at high prices, averaging £15 to £17, and there remained hardly a stock in the country that was not impregnated with the blood. A few trying years of bad weather sufficed to show that in attaining size and beauty, Brydon had got on the wrong tack, and had sacrificed hardihood

[1] The tails of mountain sheep are usually left long to protect the udders in cold weather, and because, on natural food, they are not so liable to scour and become dirty behind as sheep on turnips and luxuriant green forage. Shetland and Iceland sheep have not tails long enough to act as a protection, but there is an unusual amount of wool on the inner part of the thighs, which serves the purpose equally well.

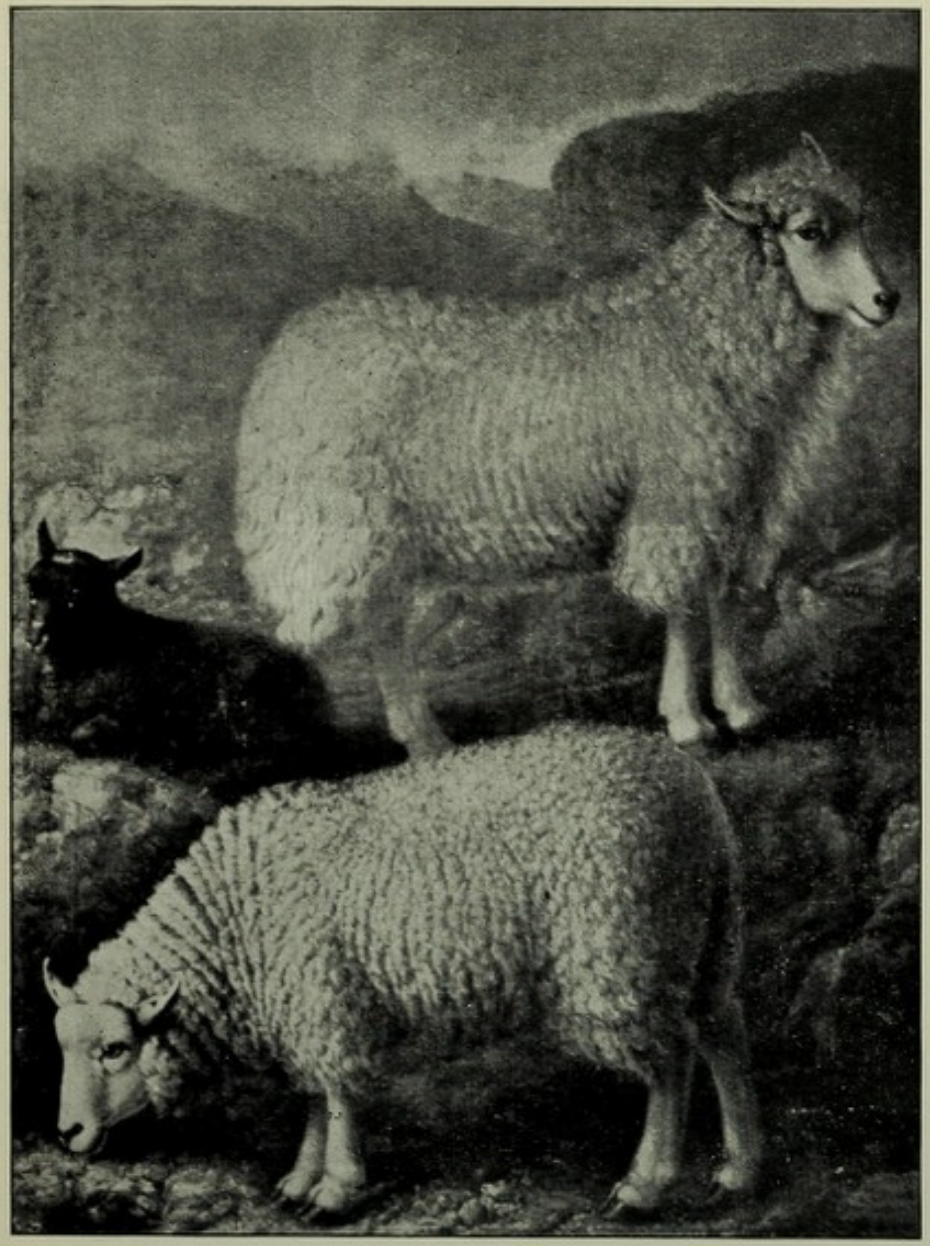


A. Kerry Wethers. A wild mountain breed resembling other mountain sheep in the West of Ireland (extinct).
[*From the Low Collection of Paintings in Edinburgh University* (1884).

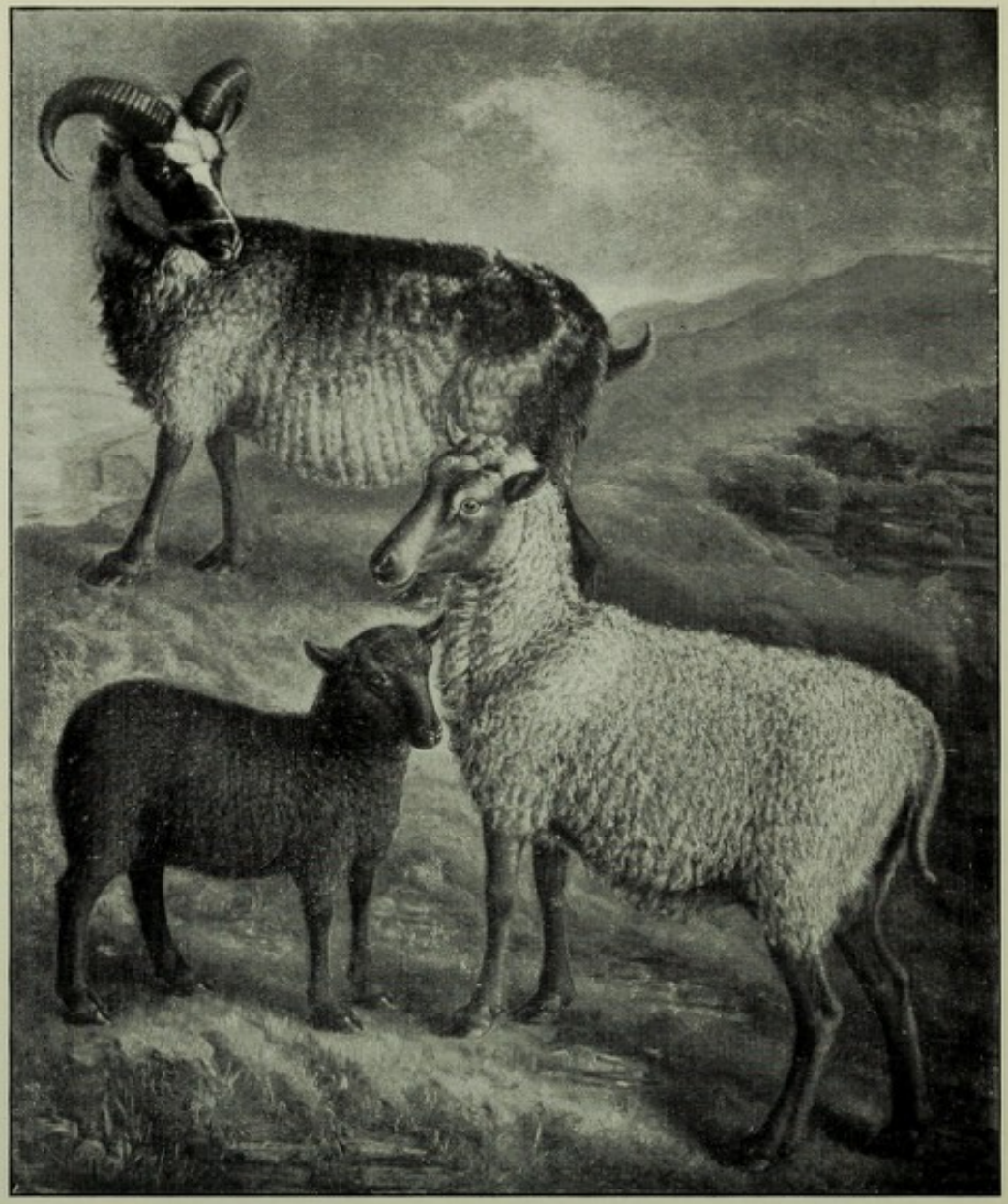


B. Shetland Ram. A remnant of a breed being improved out of existence by crossing.

[*p.* 528



A. Wicklow Mountain Ram and Ewe,
which resembled Welsh sheep.
Supplanted by crossing it with Scotch mountain sheep.



B. Orkney Breed,
allied to the shortailed sheep of Northern Europe, Zetland, and the Farōe Isles ;
growing a short soft wool, mixed with hair (lamb a Cheviot cross).

[*From the Low Collection of Paintings in Edinburgh University* (1848).

[p. 638



A. Cheviot Ewe of the West Country Type.
Many prizes, Highland Society, etc., including a Champion Cup at Moffat, 1886.
Bred by J. A. Johnstone, Archbank, Moffat.



B. Cheviot Ram.
Bred by J. R. C. Smith, Mowhaugh, Kelso, N.B.
[*W. H. Stimpson, Kelso.*

[*p.* 528



A. Cheviot Two-Year-Old Rams, Sons of "Sandy Walker."
First and Second at Hawick about 1899. Bred by Miss Grieve, Skelfhill, Hawick.



B. Cheviot Ewes.
Bred by J. R. C. Smith, Mowhaugh, Kelso, N.B.

[*W. H. Stimpson, Kelso.*

[*p.* 528



A. Cheviot Ram Heads, to illustrate Types.



B. Cheviot Shearling Wethers.
(Combined weight at 20 months, 855 lbs.)
Champion, Scottish National Fat Stock Show, and the Cheviot Breed Cup at Smithfield in 1905.

[*p*. 528.



SCOTCH BLACKFACE MOUNTAIN RAM, "MORNING SUN OF GLENBUCK."
First prize Shearling at Dumfries H. & A. Show, 1903.
Bred by Charles Howatson, of Glenbuck, and used as Champion Stud Ram, seasons 1903-1904.

[*Brown & Co., Lanark.*

[p. 538

and utility—the two essentials in a mountain sheep for selering appearance. Border Leicester blood was erroneously said to have been introduced by him, as the pedigrees of the prominent sires bred to his Cheviot ewes could be traced all the time, beginning in 1851 from "Old Pollie," the first of the leading strain of Brydon's fashionable sheep. "Craigphadrig," who realised £194 in 1867, was a magnificent sheep; but his wool and that of his grandson "The Duke" were like that of a Border Leicester, and, curiously enough, "The Earl," son of the former and sire of the latter (both Highland winners) had a good typical Cheviot coat. The appearance of Border Leicester character no doubt lent colour to the belief that a cross of that breed had been introduced, and the occurrence was probably due to reversion to a much earlier cross, as **Patrick Sellar,** one of the first sheep farmers in Sutherland, says in the *Farmers' Magazine* (1820), "The Cheviot breed has been much improved within the last fifty years by crossing with sheep recommended to the Border farmers by Bakewell. In some cases (perhaps too many), it has got a little dash of the Leicester blood in it." The Leicester of that day would no doubt be a hardier animal than that of the present time, a cross of which would now destroy the hardiness of any mountain breed. The mistaken practices of intense in-and-in breeding and overfeeding of mountain sheep were quite sufficient of themselves to accomplish the wreck which entailed a widespread and heavy loss on the Cheviot sheep-breeders of the South of Scotland, and from which it is questioned if the breed has ever completely recovered. Brydon began before 1860 the practice of housing the ram lambs during winter. The old rams went into the house when they came from the ewes. At first a good many of his best sheep had a yellow tinge on the legs and faces, but latterly this peculiarity was greatly reduced.

The sheep bred from Brydon's rams grew long and lanky, and the coats were open and watery; and worst of all, the ewes became very lean in winter, developed into bad milkers, and in consequence deserted their offspring, which, being naturally soft, made a very short struggle for existence. With all their bad qualities they were very prolific, as many as from one-half to two-thirds of the ewes on good "hefts" (see p. 546) producing twins, half of which had to be killed in bad seasons.

The original unimproved Cheviot was a very close-coated, short-woolled, and remarkably hardy sheep — even more hardy, it is recorded, than the Scotch Blackface. The ewes of the present day are good milkers, if not starved, as they frequently are in bad seasons, when the natural food on which they subsist is late in springing. They are all the hardier and better doers under stress of weather if they do not show too much high breeding, and have a slight yellow tinge on the hair of the head and legs, after the colouring of the old Tanfaced breed of the country. Any redness about the eyes and ears or whiteness on the muzzle is indication of softness.

Cast, draught, or cull ewes, at five years old, go from the hills into the low country and better food, to be "milled" or crossed with Wensleydale, Border Leicester, or Lincoln rams. The produce is called "half-bred," or "Leicester-Cheviot," and those half-breds kept for ewes produce by a Leicester or Lincoln ram "three-part-bred" lambs. Half-breds, when fat at twelve to thirteen months old, weigh 16 to 18 lbs. per quarter, and the flesh is leaner and of better quality than that of the pure Leicester or Lincoln.

In the early records of Cheviot sheep Varney's evidence before the House of Lords in 1828 states that "Cheviot wool is deteriorated very much in point of hair, and will not make fine cloths now, as it once would. It is coarser and longer, a state attributable to the Cheviot having a partial cross of the Leicester."

Sir John Sinclair refers to the Cheviot in 1792, before the Leicester blood was introduced. "Their limbs are of a length to fit them for travelling, and enable them to pass over the bogs and snows which a shorter legged animal could not penetrate. They have a shorter, closer fleece, more portable over mountainous pastures than the Tweeddale and Leicester breeds, which keeps them warmer in cold weather, and prevents either rain or snow from incommoding them. They procure their food by scraping the snow off the ground with their feet. Their weight, when fat, is from 17 lbs. to 20 lbs. per quarter; and, when fed on heath and kept to a proper age, their meat is fully equal in flavour to any that the Highlands can produce."

Youatt, discussing the respective merits of the Cheviot

and the Highland Blackface, says: "The Cheviot is by far the more contented of the two on whatever kind of pasture he may be put. It comes to maturity a twelvemonth at least sooner, and will ever leave the Blackface far behind. A very great proportion of Scotland is now exclusively employed in the rearing of sheep; and there are very few parts of the South Highlands at least in which the Cheviot has not superseded, or is not rapidly superseding, the native Blackface sheep. The Cheviot, however, did not always weather the inclemency of a Highland winter; and the loss of the ewes and lambs almost—and in some cases more than—balanced the advantage of finer wool and early maturity. In the power of endurance there is no doubt the Blackface sheep claimed a decisive victory, and on the wildest of the Grampian pastures no other stock can exist but the Blackface. Lord Napier testified before the House of Lords that the Blackface sheep had been driven out of the whole of Selkirkshire, including Ettrick Forest, and substituted by the Cheviots. Patrick Sellar further records that after their introduction into the more northern Highland counties about 1790, first by Sir John Sinclair, and then by Lord Hopetoun and others, a very rapid increase of Cheviot sheep took place in Sutherland, between 1805 (when they numbered a few hundreds) and 1820, 'which resulted in the annual extraction from the Alpine plants of 20,000 carcases of mutton and 100,000 fleeces of wool.' They replaced the Highland 'kyloes.' Numerous evictions of the small farmers and crofters were necessary to make room for them. Many sheep were stolen and destroyed by the people, who naturally had much antipathy to the land being so occupied.

"About this time on the more sheltered grazings of the Grampians, Cheviot sheep were tried and did well, because they were found to pay better than the native sheep when the land was adapted for them. The Blackfaces maintained their ground in the West of Scotland and the Isles, and in parts of the Southern mountains, and they were numerous in the North." In 1812 a correspondent writes of the Tweeddale district: "The rage for introducing the Cheviot breed of sheep, and of course the taking of sheep farms, has greatly subsided, partly from the low price of that kind of wool, and partly from the great losses sustained by a number of sheep

farmers in changing their stock to that breed, and from great risk in bad lambing seasons. The spring of 1812 was a bad one, and with some Cheviots there was a loss of 40 to 50 per cent. of lambs, and the difference against the Cheviot as compared with the Blackface is put down at 15 to 20 per cent. of less lambs."

Lowe's graphic description of the **home of the Highland Blackface sheep,** under the name of the "Blackfaced Heath Breed," is worthy of reproduction and close study. He says:—"From the high lands of Derbyshire on the south, to the confines of Scotland on the north, extends a chain of rugged heathy mountains, whose summit ridge separates the waters of the Tyne, the Tees, the Swale, the Wharfe, and other rivers which flow to the eastward, from those of the Ribble, the Lowther, the Lune, and others which flow westward. The elevation of the tract is from 1200 to 3000 feet, the highest summits being Cross Fell, near the sources of the South Tyne and Tees, on the eastern part of Cumberland; Skinner Fell, on the confines of Yorkshire and Westmorland; Wharnside and others in the westerly part of Yorkshire. This central chain is separated from the yet higher mountains of Cumberland and Westmorland on the west, by the beautiful vales of Kendal and Eden. The tract is destitute of boldness and grandeur, and, towards the east, passes into the tame moors of Northumberland, Durham, and Yorkshire. This dreary tract is generally covered with coarse heaths, mixed with sedges, rushes, and the less nutritious grasses,[1] and, from being exposed to the winds of both the eastern and western seas, possesses a cold climate. It has given rise to a race of sheep now very widely diffused. This race has been termed the Blackface Heath breed, a name which, though it does not distinguish it from some of the Forest breeds, may be retained, as indicating its peculiar habitat in a country of heaths. It is chiefly found in the more northerly division of the chain of mountains referred to, beginning in the heathy lands of Yorkshire and Lancashire. It extends across the vales of

[1] See an article on "The Natural and Artificial Food of Scotch Hill Sheep," by the Author and Professor Kinch, in the *Highland Society's Transactions*, vol. xvi.



BLACKFACE SHEEP FROM DERRY, LOCHEARNHEAD.
[*From a Photograph taken at Allt-an-fhionn, St Fillans, by P.J.S.B.*

[p. 592

Kendal and Eden to the higher mountains of Cumberland and Westmorland on the west, and by the Carter Fell into Scotland, where it occupies the great range of greywacke hills stretching from St Abb's Head on the east to the Irish Channel on the west. It stretches through the upper part of Lanarkshire into Argyllshire, and all through the Highlands of Scotland, from the Grampians to the Pentland Firth. It has spread to all the Hebrides, and even to the islands of Orkney and Shetland."

The **sheep described by Lowe** in 1842 and **Youatt** in 1837 is now represented by at least seven very distinct sections which might rank as separate breeds. They have been modified by local surroundings and different methods of treatment, and no doubt to some extent by crossing with other breeds. These are :—

(1) The Scotch Blackface Highland ;

(2) The Lonk ;

(3) The "Rough" sheep, a mountain breed.

(4) The Dales breeds, represented by the Swaledale, probably the purest and most important of them ;

(5) The Derbyshire Gridstone ;

(6) The Penistone breed ; and

(7) The Limestone breed.

The two last have undergone the most striking change from the black or mottled face and legs, to white. The rest, with one exception, are very similar to each other in the colour of the hair on their faces and limbs. Youatt says, "the moorland sheep are horned and have black or mottled faces and legs. Their horns spread wide, and they bear much resemblance to the Norfolks. The covering of their buttocks is mere hair, resembling the shag of the goat more than the wool of a sheep ; but this is considered to be a mark of hardiness."

Culley, one of the oldest and most reliable authorities, refers to the dun or **Tan-faced sheep** as the early occupants of the high mountain ranges of the North of England and parts of Scotland, which were in his day the territory of the Heath breed. "Their faces (and legs) were of a dun or tawny colour ; the wool fine and mixed and streaked with different colours. They were hardy and required little trouble, polled, small in size—weighing, at four or five years old, not more

than 7 lbs. or 8 lbs. per quarter, but in every essential quality, except the fineness of the wool, they were far inferior to the Blackface."

The exceptional fineness of the wool, which weighed less than 2 lbs. each, was recorded as far back as 1460, when, or soon after, the breed "prevailed in Annandale, Nithsdale, and Galloway. It lingered longest in some of the mountainous parts of Aberdeen," and was known in Fifeshire into the nineteenth century.

Youatt suggests, in accordance with tradition, that the Blackface breed is of foreign origin, and that it was taken to a Royal farm in the forest of Ettrick by one of the Scottish kings (James IV., who married the daughter of Henry VII. of England); but **Lowe** (edited) favoured the more probable view that it "found its way into Scotland from the mountains of the North of England. It has been, for an unknown period, in all the high lands of the counties of Dumfries, Berwick, Roxburgh, Selkirk, Peebles, Lanark, and adjoining districts. Its introduction into Argyllshire and the Central and Northern Highlands, has been of very recent origin, or about the middle of the eighteenth century, when sheep began to supersede the herds of black cattle, and by degrees it also displaced the aboriginal Tanfaced and the Four-horned breeds of the Western Islands. [Coleman says it did so in a great measure by absorbing them through crossing, and that the hardiness and extraordinary activity of the Blackface ewe from the North of Scotland was largely due to the presence of the Tanface breed.] It resembles the **Persian** sheep in some respects, but the essential characteristics are no doubt the result of natural development under the conditions of soil and climate in which it has existed for hundreds of years. Horns are occasionally absent in the females." [A peculiarity which the Author remembers having seen on the farm of Blair, Ayrshire, soon after 1870, and which probably originated from the hornless Tanfaced connection.] "The fur is shaggy and the wool coarse, in which respect it differs from that of all the other mountain breeds of the country. It is of medium length, and weighs about 3 lbs. the fleece, when washed. Although wild and independent in its habits, it is not so restless as the mountain sheep of Wales. The weight of the four-year-old wether is 60 lbs. The mutton

is more juicy and more venison-flavoured than that of Welsh sheep or Southdown. It finds subsistence beyond the ordinary range of other sheep. It is not so nice in the choice of herbage as most others, and feeds much on the shoots of heather. The breed, extending over a great variety of situations and soils, from the moist moors of Yorkshire and other parts to the rocky mountains of the North of Scotland, presents a great diversity of size and aspect. The best are found in Tweeddale in Scotland [a distinction which was later transferred to Lanarkshire, and finally shared by other districts]. The sheep on the hills of Cumberland, Westmorland, Yorkshire, and Lancashire are much inferior to those of the border counties of Scotland. The only food supplied is what the animals can collect on their natural pastures, including a little coarse hay during deep snows. No permanent improvement for their home conditions has been successful by crossing with other races of sheep." Nevertheless the changing of a Blackface into a Cheviot stock by the constant use of Cheviot tups, and *vice versa*, was a common and successful practice during the early period of competition between the two breeds.

Aiton (1824) says: "This breed of sheep is the boldest, the hardiest, and the most active and industrious of all the sheep species. They are so round of their bodies, so compact in their figure and short coupled, that they are often denominated the 'Short' sheep."

According to Sir G. Mackenzie's **Survey of Ross** (1810), the Blackface breed was first introduced into the mountains of Ross-shire by Sir John L. Ross of Balnagown about the year 1775. They were first bought at Linton in Peeblesshire, and were for a time called the Linton breed, but came later from Perthshire. It was several years before they were really established, owing to the hostility of the people who, with their Black cattle, were removed to make room for the sheep. One Geddes from Perthshire took the farm from Sir John about 1782, and was believed to be the first sheep farmer who settled in the North.

Sheep Stock Valuations.—The proprietors of the North and West of Scotland found sheep pay much better than any other stock, and encouraged sheep farmers to lease and to stock the land; and the system soon spread. Owing to

the large proportion of young sheep which died when brought on (as compared with sheep bred on the ground) to the hill land in Argyllshire and many other districts of the West Highlands and other places, it became an almost universal custom in letting a farm to tie the sheep to it in the contract made by lease—the stock to be taken over from the tenant at the termination of a lease at a valuation made by a representative nominated by each of the two individuals concerned, and an oversman. The prices paid were at first reasonable, and in accordance with the advantages gained by the sheep being kept on the land; but all the area to which valuations applied, especially in the Southern Highlands of Scotland, was not deathly country like the West Highlands, and still the prices all went up in the prosperous times for sheep farmers, until in many places in the seventies from 10s. to 20s. per head more was paid for sheep at valuation than they were worth in the market. These proportions did not adjust themselves as market prices of sheep produce fell, and farmers' outlays for wintering increased, till at the present day the extra sum the proprietor has ultimately to pay for the stock does not fall far short of the reduced capital value of the land. The removal of the sheep from the land turned into deer forest about the end of the nineteenth century was in a great measure due to the fact that, on much of the mountain land where the death-rate of sheep was high, sheep would no longer pay the farmer to keep, even if he had no rent to pay (see the Welsh custom, p. 560).

The **Scotch Blackface Highland Breed** is smaller and hardier than the Cheviot, and it thrives better on coarse pasture, such as black, heathery, and moory land.

Points.—The face and legs are black or mottled ("brocket") (but the colours should be distinct, clear, and free from dun or brown), smooth and glossy. Black on the face is in favour with those who breed cross-lambs to make the lambs dark, as they sell better in consequence, although ewes with black faces are often hard and slower feeders than those with mottled ones. No wool should appear among the hair, although the remains of a tassel on the forehead and of fringes on the cheeks and legs have often to be dressed off well-bred sheep in preparing for exhibition. Such sheep



A. Scotch Blackface Ram, "Old Glenglas," at 17 Years Old, and Ewe at 14 Years, with her Lamb by him.
Bred by John Craig, Burnfoot, Sanquhar.
[*Andrew Miller, Cumnock.*



B. Scotch Blackface Ram, "Old Glenglas," at 17 Years Old.
Bred by Daniel Craig on Glenglas, Sanquhar, and drowned in 1901, when 20 years and 3 months old.
He was wintered out till 16 years old, and he was s. of four lambs at 19.



A. Scotch Blackface Ewes for Ram Breeding.
Bred by John Craig, Innergeldie, Comrie, N.B.
[*J. Trotter, Crieff.*



B. Scotch Blackface Ewe and Lamb.
S. a £50 Cadzow ram, and d. a Glenbuck ewe.
Several first prizes at Moffat.
Bred, owned, and photographed by the late D. A. Macarthur, Nunnerie, Abingdon, N.B.



A. Scotch Blackface Ram, "Sandy Hole."
Bred by James Craig, of Craigdarroch, and photographed at 3 years old, when his fleece weighed 15½ lbs.

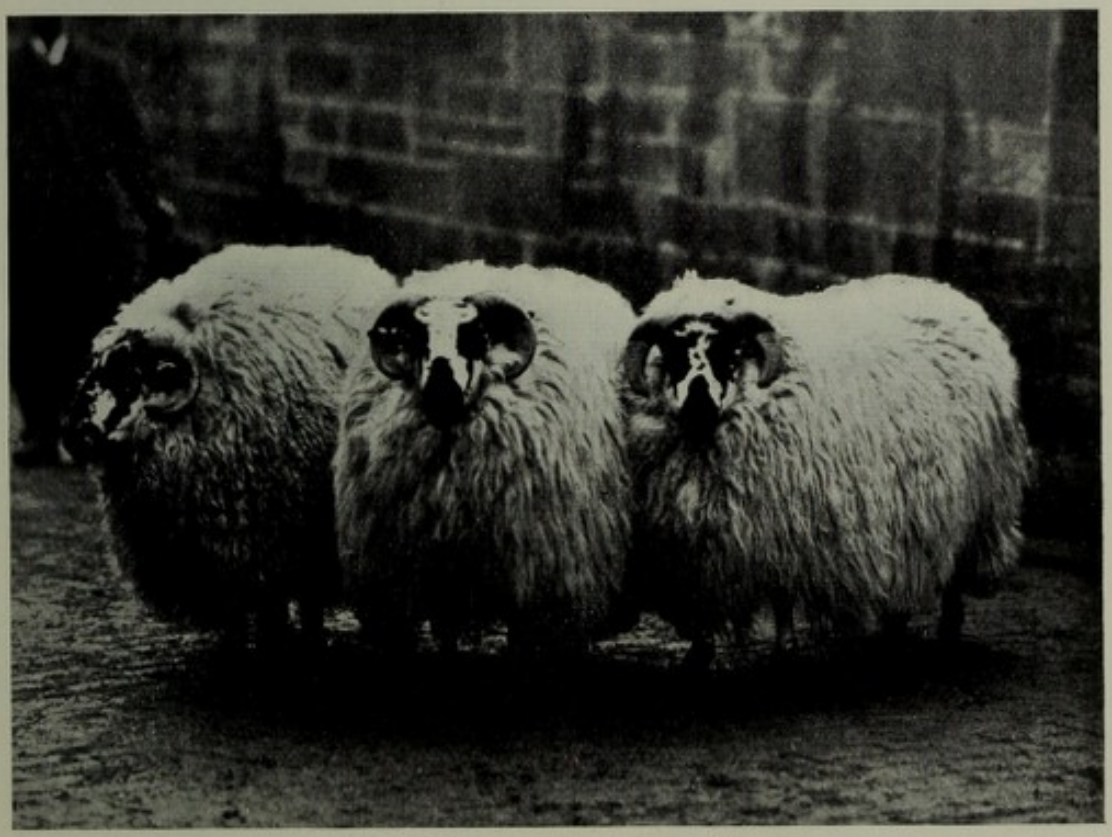


B. Scotch Blackface Ram of Benhar Strain.
Winner, as a 3-shear aged tup, of the President's Medal, Highland Show, Perth, 1904.
[*Brown & Co., Lanark.*

pp. 536 *and* 537



A. Blackface Ewes and Lambs from Milton, Callander.
[*P. J. Stirling Boyd.*



B. Scotch Blackface Shearling Wethers.
Weight, 5 cwts. 3 qrs. 14 lbs. Champion Cup for the best pen, Scottish National Show, and the "John Clay" Challenge Cup at Smithfield, 1904. From Inverquharity ewes by a Glenbuck ram. Fed by John M'Dowall, Girstingwood, Kirkcudbright, N.B.
[*Brown & Co., Lanark.*

[*pp.* 536 *and* 537.

are liable to be soft in constitution and they travel badly in snow. The nose is strong (broad) and prominent, and the nostrils are wide and black. The horns of the ram are large, coming out level from the crown of the head, and not rising above it or joining together at the base, but taking one or more spiral turns according to age. The corkscrew-like curl of the horn is in a forward direction, and should so incline that room is left between the horns for the face. The points, sometimes extending to half of the horns, have to be cut off old rams to let them reach the ground to feed, to free the jaw from pressure when horns grow too close and cut into the face, or to lighten them before going to work on the hill. Three inches were sawn off the horns of "Old Glenglas" (Plate CL.) to let him eat grass. In the ewe the horns, which also spring horizontally, are small, thin, flattened, and curved, but not spirally twisted.

The ears are short and small, but hidden by the horns in the ram, and not much looked to in judging. The back is broad all the way along, and the shoulders formed for freedom of action, like those of the trotting horse. The tail is naturally short, not often hanging lower than the hock, and it is not usual to dock it. But fashion is changing, as no tail is necessary on modern sheep, which are so rough below; moreover it grows inferior and often dark wool. The late James Craig of Craigdarroch had a strain of Blackface sheep with tails so short that they were often rejected for breeding in consequence. Had the short disposition been encouraged, the tail might have been still further reduced, and in time probably got rid of. The mutton is of the finest quality, especially that of three-year-old wethers, or young and tender lambs. A fat wether from the hill at three years off should weigh 15 to 16 lbs. per quarter.

The Blackface sheep is wild and active, and, when thriving best on pasture, must travel about a great deal, a habit which suits it to its native pastures better than to a low country district, where it is liable to be affected with foot-rot. Nevertheless, no breed settles better under cover for house-feeding than the Blackface, whether it be represented by ram lambs for breeding or "milled" ewes for feeding.

The wool is wavy, loose, and shaggy, hanging down nearly to the ground, stronger and more hair-like and kempy

than Cheviot wool. It is specially valuable in the manufacture of coarse articles, such as carpets; and, as it is less subjected to foreign competition than other wools, it fluctuates less in price. The former ratio in price, *i.e.*, half the value of Cheviot wool, has in recent years been altered by Blackface wool selling at a relatively higher figure. The fleece averages 3½ to 4½ lbs. from ewes, up to 5 lbs. for the best hill "running-flocks" (ewe and hogg), and up to 7 lbs. for two-year-old and three-year-old wethers. It is usually clipped unwashed. Much is exported to America when the price does not exceed 6d. per lb., as then it can be imported under a much smaller duty than higher-priced wools. Black or blue spots on the neck, tail, or other parts of the wool-producing portion of the skin of a Blackface sheep are objectionable.

Within the last quarter of last century a very **strong woolled variety of the breed** was developed by Charles Howatson of Glenbuck, and other breeders who followed similar lines. Immense fleeces are produced on sheep receiving abundance of food, as shown in Plate CXLVIII.; and this strain does not fatten so readily as one with a fine, close, short fleece. For a time the strong-coated sheep held the field, practically undisputed, against the older, shorter fleeced, and more woolly variety; but, by the end of the century, a division of opinion had arisen, and many thought the length and strength of the wool had been carried too far, and that the long wool especially associated with short legs of the fashionable showyard sheep was a serious disadvantage in snow, and a danger which met the first lambs of young ewes—many of which, born away from assistance, died without finding the mother's teats. Rough-bellied sheep are also declared by many to be, as a class, inferior milkers. These authorities further insist that the coat of the hardiest sheep is one with good soft wool, short and thick, with a bit of kemp showing on the back, nature's ideal covering—a combination of hair and wool, seen to perfection in the Shetland and the Faröe Islands breeds, and also in the coats of Herdwick and Four-horned St Kilda sheep.

The **advocates of strong coats** of wool are:—Charles Howatson, of Glenbuck; Matthew G. Hamilton, Woolfords; Charles Cadzow, Borland, and James Cadzow, Stonehill (Cadzow Brothers, Borland and Stonehill); James Hamilton,

Nether Wellwood; James Clark, Crossflatt; T. Scott, Bogside; T. Hope, West Brownhill; A. Cowan, Spittalhill, Fintray; A. McDougall, Claggan; Robert Lees, Lagg, Ayr; Robert Cadzow, Weston, Dunsyre. **Those** who go in **for all-wool coats** are:—John Archibald, Overshiels; T. Bryden, Burncastle; W. Whyte, Spott; A. Whyte, Glenmoy; J. A. Gordon, Arabella; Peter McIntyre, Tighnablair; J. Craig, Innergeldie; James Greenshields, Westown, Lesmahagow; and W. A. McTurk, Barlae. Such woolly fleeces cannot be shorn in early spring to come out satisfactorily at the September ram sales, as they "batten" together. This encourages ram breeders to incline to an open, strong coat.

The advocates of fine wool *versus* strong wool do not want a short coat like that of a Cheviot sheep, but a thickset mellow wool of good length, and as uniform as possible all over the body. John Craig, of Innergeldie, Perthshire, and the Archibalds, of Overshiels, Stow, have many so-called "all-wool" sheep of this kind in their flocks, and some have in recent years been gaining prizes at the leading shows.

"Sandy Hole" (Plate CLII.), bred by the late James Craig, of Craigdarroch, was a good example of this class of sheep. He was photographed at Polqueys, at four years old, in June 1869. The fleece, shorn immediately after, weighed 15¾ lbs. He took 1st prize at the Highland Society Show in Aberdeen in 1868, in the hands of the Archibalds, of Overshiels, who had him for three years.

An important feature of the best of this variety is that they continue to yield heavy fleeces when they are old—a quality which should take a first place in those to be considered in selecting rams to rear for breeding.

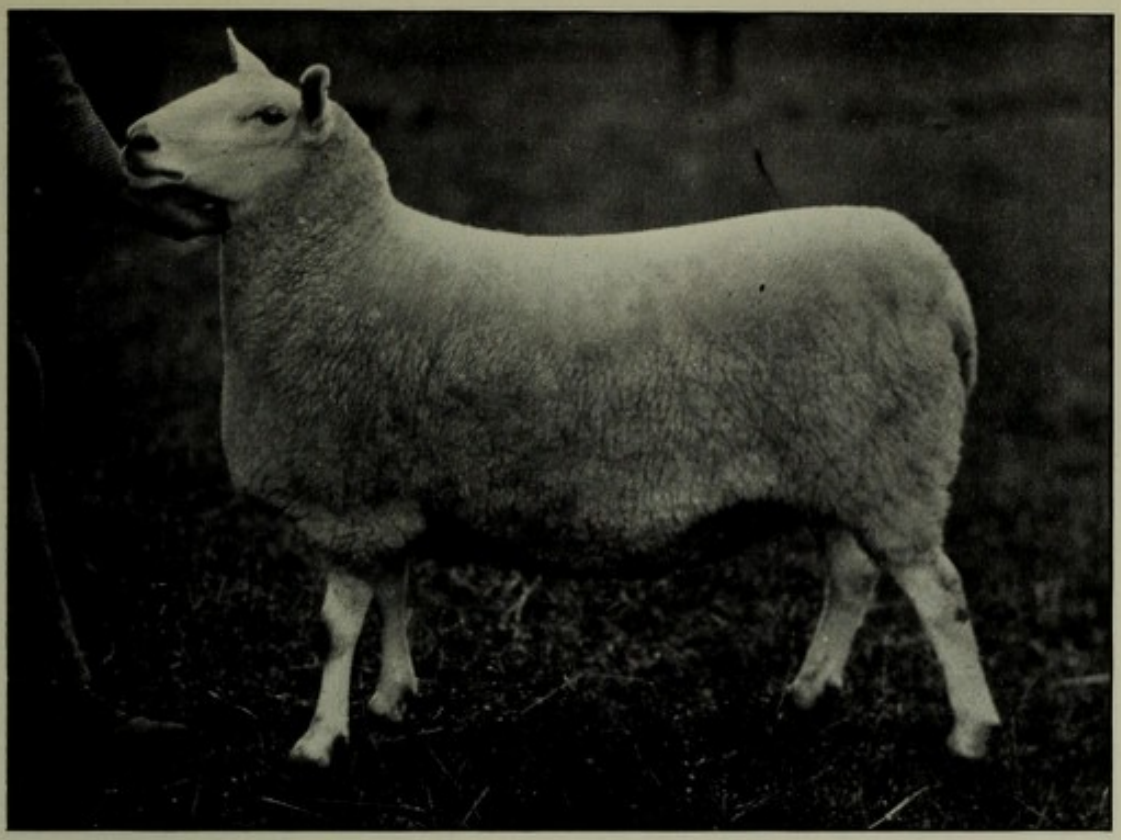
The housing of Blackface ram lambs in winter was originated by James Greenshields, Westown, Lanarkshire. He once wintered about 160 tup hoggs in the fields without turnips, giving a moderate allowance of artificial food. About forty of them picked at their food, and refused to eat enough to produce a rise of new wool sufficient to admit of clipping in the end of April—at that time thought to be early. As an experiment the shy feeders were put in a large well-ventilated shed, and they took to their food immediately, and in a week or two throve so rapidly that they began to spring in the horn, and, on the same amount

of food, speedily overtook their neighbours in the field. From this time onward each season's lot of lambs has been housed in the last week of November with most satisfactory results. There have been fewer casualties, and bent or rickety legs; and no rheumatism, which was not uncommon among those wintered out. There was then no cramming such as is now too frequently practised, on about 1 lb. each of mixed maize and cotton-cake, new milk, cod-liver oil, and as much chaffed rye-grass hay as they can eat. **Overfeeding** is a recent development in a very wrong direction. It began with the ram lambs during the winter months, and has extended to the even more injurious custom of housing and forcing the sucking lambs in the summer with cabbages and grain. Everyone concerned knows this will end in disaster, and that it is rapidly ruining the hardiest mountain breed of Scotland; but it will probably go on increasing till one of the great snowstorms which are recorded in the history of this country as occurring on an average once in two generations (every sixty years) comes to teach the wholesome lesson necessary to save the breed from destruction. A ram which has been forced in feeding while young, not only begets softer offspring, but he is always more difficult to keep in condition on grass in summer and harder to winter. Another disadvantage of forced feeding is that it produces coarse and unshapely animals out of what are naturally the best sheep, and buyers are induced to select rams which have developed from small or badly-nursed lambs that do not so readily show in their external form the injurious influence of having been forced. This is largely accountable for the recent decrease in the size of the breed.

McKersie, of Glenbuck, and Foyers, of Knowehead, Campsie, were the two most **prominent ram breeders** of the third quarter of last century.

With the low price of wool which ruled for nearly twenty years towards the end of the century, and the **preference for young mutton and for beef,** the keeping of Blackface wethers became unremunerative, and this of course encouraged the natural tendency to throw the higher and more exposed hill ranges into deer forests.

In country towns in Scotland at the beginning of the last quarter of the nineteenth century, more than double



A. Half-bred (Leicester-Cheviot) Ewe (3-shear).
President's Medal for best H.B. Sheep, Dumfries Highland Society Show, 1903.
Bred and shown by J. A. W. Mein, Hunthill, Jedburgh.



B. Half-bred Shearling Ram.
Champion at the Highland Show, and many other prizes.
Owned by A. & J. K. Smith, Leaston, Upper Keith, E. Lothian.

[*Photos by Brown & Co., Lanark.*

[*p.* 540

the **amount of mutton was consumed than beef.** The beef supply was confined to the early part of the working days of the week, and nothing but mutton or lamb could be got towards the end of it. Beef was usually a year (or it might be two or three years) older, more mature, and consequently better flavoured, at least when produced from slow-maturity cattle like the West Highland, Ayrshire, or Galloway; but it had to hang for at least six to eight days to mellow before cooking, and it could not be eaten as young meat now is, cut up immediately after cooling. In similar places the position is now reversed: twice as much beef as mutton is wanted, and it is to be had at any period of the week. Boiling in the old days was a much more frequent, as it is a more economical, method of cooking, than the present practice of roasting, stewing, grilling, or brandering.

Market changes have brought corresponding changes in management where sheep are still retained. The demand for mature mutton having decreased, ewes are now largely taking the place of wethers where altitude admits. Top wether lambs bring an enhanced price for fattening, and are in a few cases sold and the seconds kept for wethers. These being generally young lambs, grow on good farms, with a little extra expenditure on wintering, into as good sheep at three years as the tops, and as they are in lower condition as lambs the death-rate from braxy is not so heavy during the first year. In some cases these second lambs are kept till four, and they go to the butcher fat from the mountain pasture, from August onwards, at probably 35s. each, having lost practically nothing by death in the last two years, and having meanwhile yielded 6½ lbs. to 7 lbs. of wool during each of the two years. The top lambs are kept—on all but the best land liable to braxy—as they grow into the best wethers.

The best top Blackface wether lambs, put direct from their mothers for ten or twelve weeks on to clover followed by rape sown with a little rye grass, should increase in value about 1s. a week, and weigh, dressed, generally for the London market, up to 32 to 33 lbs. So superior is rape for the purpose, that, if put on turnips or any other green food, even supplemented with cake, they do not improve for a time. Hoggs wintering at a distance in the low country

from October 10th till April 4th, cost 6s. 6d. to 8s. each, and one to the score, or 5 per cent., is an ordinary death-rate during that period.

N. MacMillan, The Knowe, Kirkconnell, Dumfriesshire, has for more than a decade fed Blackface wether lambs with experience similar to that stated above, but also the following:—Highland bred lambs bare of wool make good feeders and yield good results—bought at 11s. and finished weighing 27 lbs., at 20s. on 10th November. Good sorts of Blackface wether lambs in fleshy condition to be finished in December or early in January on turnips are put, at weaning, in lots of 280 to 300 on to foggage not too rank, but clean and fresh, and frequently changed so that they may improve every day. In the first week of October they go on to half an acre of soft, growing, but ripe turnips adjoining an acre or two of bare ground from which the roots have been removed to make room for the feeding troughs. Dry food, 2 oz. to each, is begun at once and fed once a day. The amount is gradually increased to 6 oz., but never more, and is ultimately fed at twice. The best results are got from a mixture such as equal parts of dried grains, sound maize (crushed), undecorticated cotton-cake, and oats, with a half amount of locust beans. Turnip cutting begins when the first break of standing turnips is about two-thirds eaten, so that no check in the supply of food occurs. Yellows follow soft turnips. On swedes Blackface lambs lose their bellies, get less bulky, and do not thrive so well. From 1st November a little salt is sprinkled on each trough of cut roots. Under this treatment the best Blackface wether lambs should weigh, by about 20th December, 34 to 36 lbs., and be worth 28s. to 32s. Smaller lambs take a little longer, but all should go off by the middle of January, as they are not economical for hogging.

Blackface cast ewes fed on turnips for from twelve to fourteen weeks, and **wethers** from the hills at three-years-off, weigh, killed and dressed, 60 to 70 lbs.; wethers finished on turnips a year younger, get up to about the same weights, but the public taste is not now in favour of mature wether mutton, and few are kept.

The produce of a Blackface ewe by a Leicester ram is called a "cross" or "mule"; that by a Cheviot ram a "half-

long." The latter name is given because a Blackface was at one time termed the "short" sheep, and a Cheviot the "long" sheep. As ewes, these sheep of mixed breed are good milkers when kept under favourable conditions, but they are not so hardy on mountain land as Blackfaces. A Blackface ewe carries a lamb by a Leicester three or four days longer than she naturally does one got by a pure Blackface ram. Cross lambs pay much the same as Blackfaces when forced, but they cost more and eat more. The Border Leicester-Cheviot cross suits better for early fattening. Cheviot wether lambs are slow feeders, and generally require to be kept on till spring, when they become the most valuable light-weight Scotch sheep in the fat market. They are unsuitable for finishing on rape in autumn. The feeding qualities of half-longs resemble those of pure Cheviots more than Blackfaces.

Milk-sickness in Lambs occurs in upland districts with an abundance of "draw-moss"—sheathing cotton sedge, *Eriophorum vaginatum*, or spret, *Juncus articulatus*. The malady appears in May, soon after the lambing begins, and continues with greater or less severity till the end of the month, being most deadly in good growing seasons. At times as many as one-third of the lambs born on one day will die. However plentiful and good grass may be in June, the evil influences which are liable to be exerted when the sheep are feeding freely on draw-moss or spret do not occur with them, and late lambs rarely suffer. The disease appears in the case of lambs of about two or three days old, in the form of inflammation of the stomach, and they die in convulsions within a few hours. The *post-mortem* appearances are different from those present when lambs "burst" after taking too much milk, as they are liable to do on rich low-country pasture. A good *precautionary measure* against milk-sickness is to give one teaspoonful of whisky in a teaspoonful of water twice daily for three days, the ewes which have not lambed being "shed in," so that the work of treating every lamb under three days old may be made possible. A teaspoonful of castor oil is also effective if given before the lambs sucks. There is not much chance of treatment being successful after the symptoms appear, and no hope of natural recovery. Another means of prevention is

to turn out the rams a week earlier than usual so that a large number of lambs may be dropped before the advent of the most dangerous season.

The Shepherds' Calendar in the Southern Highlands of Scotland

January 1st.—The rams come in from the ewes on the hills, and, to restore their lost condition, usually go to winter on turnips in the low country, at the cost of about 6d. per week, or, if wintered at home, receive an allowance of 1 lb. of Indian corn, or its equivalent in some other concentrated food, daily in addition to hay.

February.—Bring in weak ewes to low pasture and give about ½ lb. of concentrated food per day till after lambing time.

March.—Continue to bring in thin sheep to feed.

April.—Bring home ewe hoggs that have been wintered away.

April 15th to 18th.—Lambing generally begins, but on high and exposed places it may with advantage be a week later; and on favoured spots where spring food comes early, a week earlier.

May.—Mark Cheviot and cross lambs during the last week.

June 20th.—Clip Cheviot and Blackface eild sheep and mark Blackface lambs.

July 7th.—Clip milch ewes during the second week.

July (towards the end of).—Dip against maggot, using materials containing a preparation of arsenic and sulphur like those of Cooper and Bigg, the ewes and lambs together—August being the worst fly month. Great attention is necessary to see that the lambs find their mothers again, else they will thrive badly.

August 1st.—Start drawing four-year-old wethers to go to the butcher, fat from the hill, during the next three months.

August.—Lamb sales in full swing. Wean all hill lambs at dates to suit markets and other conditions. This permits of the ewes making up their condition in that excellent recruiting month.

September.—Ram auctions are on, and draft-ewe sales begin.

September (end) or October (beginning).—Draft ewes go



A. Lonk Ewes.
Bred by J. Hague, Spread Eagle, Whalley.



B. Lonk Ram, "Deerplay Boy."
Winner of five first prizes, including the Royal Lancashire Show Cup in 1904.
[*G. H. Parsons, Alsager, Cheshire.*

[*p.* 544



A. Rough Blackface Horned Cast Ewes of the Lancashire Hills.
After breeding fat lambs by a Longwool ram.



B. Rough Blackface Horned Shearling Ram.
Bred near Coniston, Lancashire.
[*Photo by Sydney Pennington, M.R.C.V.S.*

[*p.* 544



A. Lonk Sheep, on Langsepp Moors.
On the coal formation where Yorkshire, Lancashire, and Derbyshire join.



B. Lonk Lamb Ram, "Worstorne Wonder."
Bred by J. Hague, Spread Eagle, Whalley.

[*Photo by G. H. Parsons.*

[*p.* 544



A. Swaledale Ram.



B. Swaledale Ewe.

Both bred by John Wm. Hastwell, Howgill Foot, Winton, Kirby Stephen.

[*E. Yeoman, Barnard Castle.*

[*p.* 544



A. Limestone Ewes.



B. Limestone Rams at a Year Old.
All bred by T. A. Cornthwaite, Crawthorpe Hall, Burton, Westmorland.
[*C. Rowbotham, Burton.*

[*p.* 544



A Derbyshire Gritstone Rams.



B. Derbyshire Gritstone Ewes and a Lamb.
Bred by Wm. J. Clark, Alport Bakewell.

[*p.* 544

away—a little earlier than formerly, to suit the English trade, for which they are wanted to lamb early next year. Commence winter dipping.

October (mostly in the *1st and 2nd weeks*).—Winter dipping to be done in dry weather and in the middle of the day, to avert the evil consequences of frost following at night before the sheep get dry at the skin.

November 1st.—Kiel stock sheep with the mark of the farm, and send off the hoggs (recently dipped) to winter on grass. Some get them off a little earlier if possible. In stormy weather the kieling is delayed till after the hoggs are away.

November 17th to *24th.*—The rams go out to the ewes on the hills, and must be daily seen to be attending to their work. To clip the tails and in some cases the insides of the thighs of Blackface ewes before they go to the ram greatly reduces the number of tup-eild sheep—as much as 75 per cent. on some farms. The work is done by a shepherd with four cuts of the shears while the sheep stands between his legs—a cut on each side of the tail and one on each thigh. Long-wool rams that have been well fed and tenderly reared should be fed by the shepherd with 1 lb. or so of oats as he goes his round, to prevent them losing condition too rapidly.

December.—Disturb sheep as little as possible, but watch carefully that the rams are doing their duty.

Habits of Mountain Sheep, Shepherding, and Shelter

The daily **duty of the hill shepherd** is to see that the sheep travel freely over the ground to which they belong, to get a variety of food, as, if allowed to become lazy, some of them tend to lie on the sweetest patches and make the grass foul, while they do badly themselves. Mountain sheep naturally lie at night on the heights, unless they be driven in by bad weather; and good shepherding encourages the sheep to follow their healthy instincts. In winter, between October and March, they get up during the long nights to feed and change their quarters. If the night be fine, they spread out and may go further up the hill, but, if snow or storm threatens, they turn down to natural or arti-

ficial shelter, and their second lair may be a long way from the first.

Mountain sheep naturally **incline to pasture** on the restricted area or "heft"[1] on which they have been born, with the limited number of sheep that naturally run together and form a "heft." Two, or usually more, hefts compose a "hirsel," or herding numbering 500 or 600 breeding ewes and 120 to 150 hoggs under the care of one shepherd, aided by a boy in summer. Sheep belonging to the different hefts meet on their unfenced marches, but do not as a rule mingle to any great extent. A shrill whistle given by the shepherd on his fingers is sufficient to separate them and cause them to retreat to their own ground. Sheep on heathery ground encroach to some extent during summer upon adjoining grassy land, and in winter sheep on grassy land encroach on adjoining heathery ground—in both instances drawn by the abundance and change of seasonable food and the scarcity or unseasonable character of their own supply. In winter weather, too, sheep from the dead side of a hill seek the sunny side, especially when snow covers the surface too deeply for them to "work," *i.e.*, scrape with the fore feet to get at the grass underneath.

As the practices of shepherding vary in different districts, no absolute rules can be laid down, but the **general movement of hill sheep** is as follows:—From the beginning of lambing in April till weaning in August (a period when sheep rest but once during the night), the shepherd goes round the heights in the early morning to see that all his sheep move down to the generally richer land. Little difficulty is experienced with the morning start, and the rapidity of the descent may be encouraged by placing rock salt at the lowest part of the ground. Sheep are very fond of licking salt, and they thrive better in consequence, owing to its strengthening and purifying influence on the blood and the check which it gives to the development of liver fluke and other worm parasites. During warm weather in spring, it is sometimes very heavy work in the afternoon for both man and dogs to get weak ewes with young lambs out to the hill tops. The shepherd sees all his ground once and most of

[1] The word is equally applied to the sheep and to the area they graze on.

his flock twice daily if he be up, as anxious shepherds usually are, before the sheep move in the early morning. Those that specially need attention are the ones that tend to lag behind when he is late. From August till November 22nd, when the rams go out, sheep should be kept to the higher parts of the land, so that the exposed places may be utilised as much as possible before the storms of winter set in, and meanwhile the low pasture is allowed to rest, and clean, and accumulate winter food. There the stock will be much confined by succeeding storms. During a stormy autumn it is a test of the shepherd's skill to determine to what extent it is necessary to let his sheep come down, to prevent their losing condition and becoming difficult to winter. With the least indication of snow, sheep are brought to an "innerly" shelter during the night, and to a place of safety to feed by day. The **best shelters** from cold winds are those formed naturally by the inequalities of the surface of the ground, as rocky knolls, ravines, and other hollows. Natural shelters may sometimes be improved by a few yards of stone dyke (5 feet high) connecting prominent boulders, or projecting from a boundary fence, on exposed hills. The best shelter from snow, the chief danger, is a small plantation surrounded by a dry-stone dyke. The double fence stops the snowdrift and the formation of deep wreaths, which settle in the lee of a stone wall and cover the sheep which naturally go there for shelter. Sheep have not the instinct or sense to avoid a sheltered hollow where snow is sure to collect to cover them. Circular "stells" made of dry-stone walls are more generally available, the size being regulated by the number of sheep in the heft. A "round," 30 feet in diameter, will accommodate 160 sheep. The circular form rarely permits of the settlement of snow inside, for, during a snowdrift the whirl of wind that generally prevails within raises and carries it over the wall. In the case of a heavy fall of snow without wind, the sheep moving round keep the snow underfoot.

Snow stells should be located on dry ground on the lower parts of the hirsels, one on each, where sheep naturally resort in winter. No hollow in which deep snow might lodge should intervene between a stell and a feeding ground so exposed that the snow is likely to be sufficiently blown to permit of the sheep working as soon as the wind goes down.

When sheep get caught in a place surrounded by snow-wreaths, a passage has to be made for them to travel in by treading. A circle is made a better shelter for all weathers when 6 or 8 yards of wall project outwards on at least two opposite sides. Such wings also act as "wears" or guides to the sheep when entering the "lunky" or hole in the wall large enough to admit one at a time. Although it be left open, sheep rarely enter a round except during a snowstorm.

"Black weather" stells of various forms are needed at other periods of the year for the protection of the flocks during rough weather, and should be erected on the more elevated parts of the farm. For newly-shorn sheep and lambing ewes, artificial "bields" are specially required. Near the brow of a hill, or where the sheep find resting-places and some degree of natural shelter, is generally the proper position in which to erect breakwinds. A small round with two or three projecting wings is as good a shape as any for shelter; and as an enclosure to accommodate a ewe needing special attention, it is also a great convenience in the lambing season. Other stells may consist of a few roods of stone dyke in the form of a crescent; the three legs seen on a Manx coin, diverging from a common centre; or a capital T turned with the top downhill.

The Lonk sheep is a native of North Lancashire, the West Riding of Yorkshire, and some of the Derbyshire moorlands, which grow strong, coarse, tufty herbage called "lonk"—famous for grouse and sheep's fescue. The district round Clitheroe and Skipton is one of its strongholds. It resembles the Scotch Blackface, but is leggier, with a larger, longer body and a bigger head (a longer and narrower face, with a deep jaw and Roman nose), a longer and rougher tail, and in the ewe stronger horns. The horns of the ram coil more quickly and come out a little further back, and the back edge stands up higher than that of the Blackface. The wool comes close up to the back of the horn. The black and the white of the face and legs are distinct and clear. Brown is objectionable. The face and legs should be free from wool, except a small tuft on the forehead and a little fringe on the hind leg. In constitution it is not so hardy as the Scotch sheep, but it has a much closer, finer, and probably a little heavier fleece, which

weighs 4½ lbs. to 5 lbs. in the case of ewes kept in moderate condition, up to 6 or 7 lbs. for ewe and hogg on the best pastures.

The rams have been used to cross with Scotch ewes to increase the size and improve the wool, but the attempt has not succeeded, as the constitution of the produce is weakened. The sheep are mostly kept in small flocks of not more than 200. Sometimes they are all sent off to winter in the lowlands in Cheshire and Derbyshire, at 5s. to 7s. each, from wet country, unfavourable for them in winter. The ewes return about the beginning of March, and hoggs in the end of April or beginning of May. Some farmers do not send their sheep away, but supply them with hay and a few oats. Ewes begin to lamb about the middle of March; the earlier, the fewer deaths of lambs. Wether lambs fit for the butcher go off in August and September, and the rest run over to the following autumn, and kill as exceptionally lean mutton up to 70 and 100 lbs.; they handle hard on the back, and the backbone stands up. Lean mutton is in special request among the cotton spinners of Manchester, and the founders in the Black country, who have a strong aversion to fat.

The Lonk Sheep Breeders' Association and Flock Book Society issued the first volume of *The Lonk Sheep Flock Book* for 1905. From this *brochure* of 18 pages we learn that the name "lonk" is most probably derived from the word Lancashire, and that the breed is old and "well adapted to a mountainous district, which does not seem to be favourable to any other breed"; also that it is the duty of the Association to encourage its increase in quality and quantity.

The Rough sheep or the Blackface Mountain (horned) breed of the North of England is smaller than the Lonk. It differs conspicuously from the Lonk in its wool, which is stronger and coarser. The black of the face is not so clear, possessing often a brown tinge. It is practically identical with the Blackface sheep which existed in the Highlands of Scotland into the latter half of last century, but its wool is not so long and strong as that of the modern Scotch variety. It is a true mountain slow-maturity type, hardier than any of the other allied breeds of the North of England, bigger and hardier than, and preferable to, the Dale breeds on the most

exposed places, like Ravenstone Dale and the higher western hill ranges of Lancashire, Cumberland, and Westmorland, such as Orton and Shapfell—through the latter of which the London and North-western Railway from Carlisle to London passes. It is as incapable of improvement beyond what the local circumstances of soil and climate will permit as other mountain breeds. Some varieties on poor land are small and not of much account to look at; but the better types are big sheep, and the ewes, being good milkers when brought into lowland pasture, produce good cross-bred lambs, although they are rather slow feeders.

The Swaledale is one of the best-known remaining representatives of a number of varieties of Yorkshire horned breeds which were classed as Dale sheep, and were originally formed to suit their local surroundings by commingling, in varying proportions in different districts, the blood of the hardy Mountain sheep and that of the old Teesdale Long-wool, which is represented by the modern Wensleydale. They are very similar to, if not identical with, the Neasham sheep—named from this central market town, which holds large annual sheep fairs in September. The type extends westward to the Pennines and into Westmorland, Sedbergh, Penrith, Kendal, and the surrounding dales, and is a very good and hardy breed, and much in favour with butchers, having dark grey faces with, generally, mealy noses and mottled shanks. They are proportionally longer than Scotch Blackfaces, and look smaller, although they are big bodied and handle well, but are not so well woolled in front. The face is weaker than that of a Scotch Blackface, and the tail is long, like the tail of the Lonk. They grow a shorter stapled wool of finer quality, closer put on, except at the breeches, where it is long and coarse and gives them a badly balanced or light fore-quartered appearance. A good clip averages 5 lbs. for ewe and hogg, and sells for about the same price as Scotch Blackface wool, and is used for the same purpose by carpetmakers. It is not unlike the Lonk wool, but a shade coarser.

Swaledale **ewes** are rapidly increasing in numbers and in popularity, as they are good grazers. It is claimed that the draft ewes fatten more readily than the Scotch Blackface, and

that they are better milkers and produce better and fatter lambs when crossed with the Wensleydale Long-wool ram. But the lambs are lighter in the face and not so clear in the complexion as the Wensleydale Scotch cross, and the wool is fluffier and not so long and nicely stapled. The ewe lambs of the Scotch cross have a preference in Yorkshire over the Swaledale cross for breeding second crosses, which are fuller of quality about the head and fleece, and not so light in the face as Swaledale crosses are liable to be. Many thousands of ewe hoggs and draft ewes from Scotland are taken to Yorkshire annually—the ewes to cross with the Wensleydale and the hoggs to breed pure Blackfaces, generally for three seasons, and afterwards cross with the Wensleydale. Many of the Blackface and dale-bred wether lambs are grazed on the Derbyshire moors. The so-called "Scotch bred" flocks are principally found in Wensleydale, Bishopdale, Coverdale, Nidderdale, and the moors above Kettlewell and Buckden. The Scotch Blackface and Swaledale breeds have recently been successfully blended in an experimental way by John Blakely, at Dalwyne Farm, Barr, Ayrshire, who introduced ten ewes and a ram. Crosses both ways were longer in their necks and tails, and leggier than pure Blackfaces, but they were generally heavier sheep. Although the wool was closer and appeared to be finer, an expert woolstapler valued it 1d. per lb. less than Blackface wool, owing to the presence of kemps and greys. The fleeces of the ewes weighed only 4 lbs. against 5 lbs. given by the Blackfaces on the same ground. The resulting presumption is that on bare, hard grass land in the southern Highlands of Scotland, Swale ewes and their Blackface crosses would nearly hold their own with pure Blackfaces, although their long neck and legs would be against their finding purchasers, especially in a bad market; but on deep land, growing spret, *Juncus articulatus*, or heather, *Calluna vulgaris*, and drawmoss, *Eriophorum vaginatum*, the Scotch sheep is decidedly the more suitable.

Swaledale **rams** are sought after to breed with the commoner sheep more nearly allied to the Blackface mountain type, to improve both bone and quality. The overfeeding of rams has been known to ruin a good hardy flock. Stock rams pasture on the hills with the ewes in summer. The running stock does not as a rule receive any food in winter

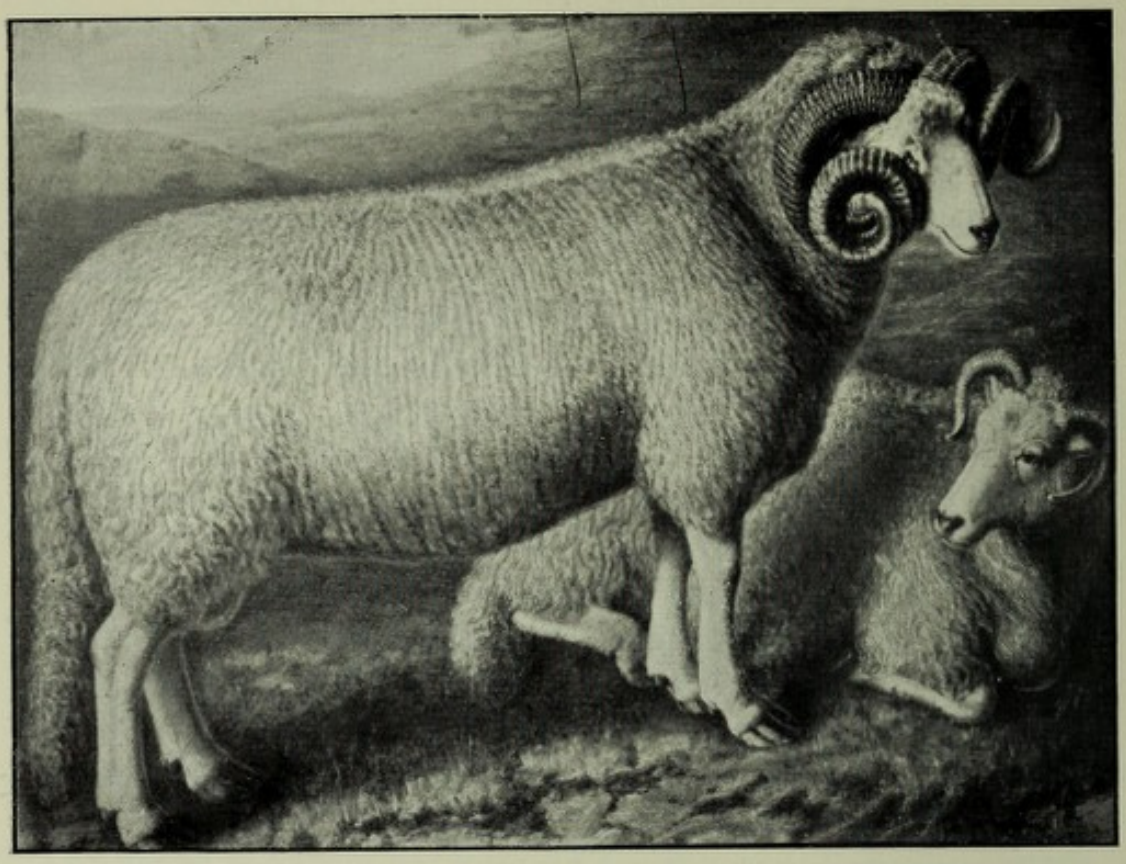
but hay, and that sparingly, till the latter part of February and March, except during a snowstorm. From half to the whole of the ewe hoggs are wintered away in the lower parts of Yorkshire at about 6s. each. Lambing begins about the middle of April.

The Silverdale are somewhat of a lowland type of Dale sheep, belonging to a district bordering Morecambe Bay and the Lakes.

The Derbyshire Gritstone sheep were known as the "Dale-o'-Goyt" breed till 15th October 1906, when at a meeting at Bakewell the "Derbyshire Gritstone Sheep Breeders' Society" was formed, and the name adopted as the more appropriate and distinctive title, distinguishing them from the old Limestones, and indicating the geological formation on which they have been bred pure for more than 100 years in the bleak hills and dales of the Peak of Derbyshire. The breed is extremely hardy, hornless, and dark or mottled on the face and legs, and does not include the horned Gritstones of Woodland and Yorkshire moors. In size and general appearance it resembles the Herdwick more than any other mountain breed, but it is declared on the most reliable authority to be quite distinct. The wool is among the shortest, closest, and finest varieties of mountain wools. It fetched as high as 34s. per tod of 28 lbs. in 1905-6, in spite of its being liable to the occurrence of black patches, especially that grown on the belly, thighs, and rump. The ewes are the best of mothers, and the lambs feed quickly, and they produce mutton of the finest flavour, not over fat. Indebtedness is acknowledged to W. J. Clark, Secretary of the Derbyshire Gritstone Sheep Breeders' Society, and of the Farmers' Club, Bakewell, Derbyshire, for much of the foregoing information, and for the photograph originals of Plate CLX.

The Limestone breed has only recently attracted general notice, although it has existed for many years as an important local variety.[1] The home of the breed

[1] The father and grandfather of R. Parker, Moss End, Burton, Westmorland (who has been good enough to supply valuable information regarding the breed), bred Limestone sheep on the same farm for nearly one hundred years.



A. Penistone Ram and Ewes.
Named from the market town south of Huddersfield, Yorkshire.
"Large, coarse sheep, with long and muscular tails."
[*From Low's Collection of Paintings in Edinburgh University.*



B. Penistone Ram's Head.
[*J. W. Duckett, Penistone.*



A. Penistone Ewes.



B. Penistone Ram.
The property of J. Turner, Boardhill, near Penistone.

[*Bilteliffe Bros., Penistone.*



A. Old Norfolk Blackface Horned Ewes.



B. Old Norfolk Blackface Horned Ram.
The property of Garrett Taylor, Trowse House, Norwich.

[*pp.* 552 *and* 553



A. Herdwick Ewes.
With faces nearly white, and strong wool (used for carpet-making).
The property of Wm. Bowness, High Yewdale, Coniston, Lanca-hire.



B. Herdwick Ram, "Kelso."
Many prizes; twice First at the Royal Show—at Carlisle, 1902, and at Park Royal, 1903.
Bred by John Bennett, Sillathwaite, Kinneside, from a sire bred by Newby, Muncaster Head, and sold in 1902 to Mackreth, Ambleside.

[*Alex. Booth, Hensingham.*

[*pp.* 552 *and* 553

embraces some eight parishes or townships on the dry limestones in the lower districts of Westmorland, only a few townships being in the higher parts of the county. It also extends to a limited degree to the Derbyshire hills—the Pennine range.

Points.—Both males and females are horned, and the faces, legs, and wool are white. The wool is very long, and it is finer in quality on the fore quarters than on the hind quarters. The breed possesses a noble carriage. It is very hardy and active, and admirably suited to mountain climbing, though on dry lowland pasture it thrives well and reaches its maximum size.

There has been little or no change in the characteristics of Limestone sheep from time immemorial. The attempt to introduce sheep of other breeds from other parts of the country, usually by strangers coming to settle in the district, has failed, the native dry heaths, or bare mountain pastures being unsuitable to any but the Limestone breed. On the other hand they do badly on wet and spongy land. The ewes are most prolific, and will readily cross with rams of other breeds, but it is then necessary to bring them in from the heath not later than the beginning of October. They make good mothers if not interfered with, but, if approached or handled, they are liable to become petted, and even to run away from their lambs. Shearling wethers on ordinary pasture will weigh 18 to 21 lbs. per quarter dressed at nineteen to twenty months old, and highly-fed cast ewes have run up to 28 lbs. per quarter. The outside show of fat is not so good as in the Lincoln and Leicester breeds, but the quality of the mutton is unequalled by that of any other English breed, except the Herdwick and the Welsh mountain sheep. The ewes resemble the ewes of the Dorset Horn, in that they come in season at almost any time, and consequently may be used for the production of Christmas fat lamb.

The modern **Penistone breed** is akin to the Limestone breed, with a white or light grey face and well-developed horns. It is found in small numbers in the vicinity of Penistone, the highest market town in England.

According to Low, the Penistone breed owes its preserva-

tion to the high and exposed character of the country on the coal formation (26 miles by 20) which it occupies on the confines of Yorkshire, Lancashire, and Derbyshire. It is possessed of a very long tail, and it is said on authority to resemble most the Lonk of the various Heath breeds to which it is related. (See also Appendix S, p. 740.)

The Old Norfolk Horned breed belongs, on the authority of Prof. Low, to "the same general type as the Blackface Heath breed," although, owing to its location on light chalky soils in a dry climate, the "wool, 2½ to 4 lbs. the fleece, is fine and 'silky,' and possessed of sufficient felting properties to fit it for being made into second or livery cloth." It proved in competition with imported merino wool to be inferior for this purpose, and the breed has become almost extinct. "They were long the prevailing breed of Norfolk and Suffolk," but in Low's time (1845) the earlier maturity breeds, chiefly the South Down, had driven them out of the better country to the "higher lands of Norfolk, Suffolk, and Cambridgeshire." They were noted, says Low, for "hardiness and robustness, great length of limbs, and flatness and lankiness in the body, and too great wildness of temper. . . . They hold their necks erect, and in their carriage resemble antelopes. . . . No finer lambs are brought to the English markets than the first crosses between them and Leicester or South Down rams." The small **extant remnant** of the breed is to be found in the flocks of T. Betts, Mangreen, Norfolk; Lord Coke, of Holkham; Russell Colman, of Crown Pound, Norwich; and the Executors of the late Col. Harry M'Calmont, Newmarket, Cambridge. The last-named flock contains thirty-five ewes, which yield about 8 lbs. of wool each. The wether sheep are kept till three years old, and disposed of to the butchers at Newmarket Christmas market, at prices up to 6 guineas each. The symmetry of the breed has been enormously improved by selection and in-breeding, and it now consists of remarkably handsome animals with jet-black faces and legs, gay, high-set, expanding horns, and black-spotted bodies (Plate CLXIII.). The ewes are very prolific, excellent mothers, and good grazers, but they require a large roam. They never suffer from foot-rot, and so free are they from the common diseases, that old



A. Herdwick Gimmer Hoggs.
With faces still dark. Sheep accustomed to run on the open fell, summer and winter.
The property of Mrs Bowness, High Yewdale, Coniston, Lancashire.



B. Herdwick Shearlings.
Faces lighter than as hoggs. The ram took First at the Cambridge Royal as a shearling, and the ewes First at Eskdale as lambs.
Bred by Rt. Hon. Lord Muncaster, Muncaster Castle, Robinglass.

[*p.* 554

age is the most common cause of death. When ready for the butcher, the Norfolk sheep carries a large proportion of lean, and no breed can show the same proportion of red meat to fat at the end of the saddle cut. The breed gained 1st prize in the carcase competition at Smithfield Christmas Show in 1900, and 2nd in 1901. Garrett Taylor, Trowse House, Norwich, writes on June 30, 1906:—"One of the drawbacks to the Norfolk Horned sheep is, they can jump like goats, and are very difficult to keep within bounds, very wild, and very slow meat-producers; but when once fat, the flesh is most excellent and of a very rich flavour"; and little wonder, for, as explained at page 613, it was one of the original parents of the Suffolk breed. They possess very much the same qualities as the Down.

The Herdwick breed is the hardiest of all British mountain sheep. It is found in greatest numbers through the Fell districts of North Lancashire, Cumberland, and Westmorland. A few flocks have been taken to Wales and other parts, and there is a distinct tendency towards the increase in the total numbers of the breed. It is recorded that about the time of the **Spanish Armada,** "forty small sheep managed to save themselves from the wreck of a Spanish vessel stranded on the sandy coast of Drigg, and were claimed as flotsam and jetsam by the then lord of the manor." **Youatt's statement** (shortened) is more circumstantial but quite different, viz., that—

"In the beginning of the eighteenth century a ship was stranded on the coast of Cumberland, that had on board some Scotch sheep which seem to be now unknown. They were purchased by some farmers at Wasdalehead, Gosforth. They were small and active, and evinced a peculiar sagacity in foreseeing the approach of a snowstorm, for, a little before its coming, they clustered together on the most exposed side of the mountain, where the violence of the wind prevented the snow from lodging. They were continually moving about, and by their ceaseless activity they scraped away the snow, however deeply the herbage might be buried. With such a degree of interest, and almost of superstition, were they regarded, that the owners formed an association to keep them to themselves. Each agreed never to sell a ram and

not more than five ewe lambs in one season. Nevertheless the sheep gradually found their way to the adjoining mountains. They were called "Herdwick" from the custom of farming out a flock to a herdsman, who retained a number of them in lieu of wages."

Another account by the **Rev. T. Elwood**[1] says the sheep came from a Norwegian vessel, and that "they were taken possession of by the lord of the manor, and on their increase being found hardy and suitable for the mountains, were let out in 'herds' or flocks with the farms." He supports the theory of the Herdwicks coming with early Norse settlers by references to many Norse words, names of places and country customs still existing in the Fell districts of Cumberland, Westmorland, and North Lancashire, and to the evidences of Norse relations with the coast of Ireland, the Faröe Isles, Orkney, Shetland, and the Hebrides.

Any attempt to cross the breed with the object of improving it as a mountain sheep has been unsuccessful.

The colour of the head and legs of the lamb when dropped should be black, or more correctly very dark blue, and a shade of grey through it, but free from any tinge of brown or speckle; the body white, or preferably grey; white tips to the ears; and a fringe of white hair round the hoofs. The white extends from the starting-points indicated and forms rings which gradually develop round the muzzle and limbs, till at four years of age the face and legs are left either white, like the hoofs, or steel-grey in colour.

Points of a ram.[2]—Horns may be present or absent (although they do not appear on the ewe), smooth, and not too thick, coming out of the head well apart and well back. The ears, white or nearly so, should be sharp or pointed, and set well up as an indication of hardiness; the head a good size, broad in the forehead, nose well arched and broad; a deep cheek-bone; eyes bright; the face a light "rag" (grey or white) in full-grown sheep, with plenty of white bristles on the back of the head, and a "toppen," not too large,

[1] Paper on the Mountain Sheep by the Rev. T. Elwood, M.A., rector of Torver, Coniston, in Part I. of the *Transactions of the Cumberland and Westmorland Antiquarian and Archæological Soc.*, 1898.

[2] With acknowledgments to John Newby, Aulthurstside, Broughton-in-Furness.

on the forehead. A little one indicates wool, too much implies softness. The neck, carrying the head gaily, should rise well up from the shoulders, which are usually sharp at the withers, although a broad shoulder is preferable; the top or back straight and wide, and the ribs well sprung from the back bone; the figure compact; the fore legs short, with plenty of bone and good big joints, but fine between, and big white feet; the hind legs in proportion; flat, clean shanks, with plenty of white bristles inclining upwards; the loins deep; and thighs muttoned well down to the hocks. The fleece should be genuine wool, not hair, the staple strong, with a mane like a lion's, standing well up round the shoulders and down the breast; the wool a good length on other parts, and knit together with a lash on the top. The first essential in a well-bred Herdwick is a good coat, and the next good bone. A few kemps in the wool when a sheep gets to six years old indicate the true Herdwick character. The animal should walk freely, and be square on his limbs in travelling to and from an observer, and have a good thick tail.

When turned up for examination to rest on his rump, he should have a wide breast keeping the fore legs well apart, and be well covered underneath with soft wool. The best sheep are grey below, and they are none the worse for being grey all over the body, showing a grey "pelt" after shearing. The hind legs should lie flat on the ground and well apart.

The points of the female, making allowance for sex, are with few exceptions those of the male; but strength is the predominating feature in the ram, and quality in the ewe.

Management.—The ewes begin to lamb in the lower valleys about the middle of April, and as late as the beginning of May on higher farms. A ram hired at from £1 to £2 for the season, or bought at £3 to £4, is put to seventy ewes, and all the live produce is kept till three years old. The districts of Keswick, Borrowdale, and Ennerdale are noted ram-breeding centres. Ewes clip round about 3 lbs. of wool, hoggs and wethers 4 lbs. or more, and rams 7 or 8 lbs. The larger, softer, and more woolly varieties are found in the lowlands, and the hardiest and healthiest specimens, often very small, on the fells, where the pasture is of the scantiest and poorest description, growing much fern, which, in spring, is eaten to some extent in the early, tender, rolled-up stage, and "savin"

Juniper communis, which is the winter stand-by of the sheep in hard weather when "ling" heather, *Calluna vulgaris*, fails them, and practically nothing else can be got. The lips are at times so injured by the hard, sharp spines that they grow together and require to be severed with a knife to part them. Fell sheep can easily jump a six-foot wall. **Ewes** do best to lamb first at three years. There is no fixed age at which they are cast. They are drawn by the condition of the teeth and the appearance of the eye. Those from the mountains go to the adjoining lowlands and into Yorkshire and Wales (where they thrive admirably) to breed cross lambs by Long-wool rams. The "wicks" or maggots of blue-bottle flies have always been troublesome, but they became worse after the '87 Jubilee year, and involved incessant labour during gleamy summer weather in "shedding"-in the sheep to clean and hand-dress them about the tail and breeches, as well as to sprinkle their backs with a preventive mixture, such as a strong sulphur dip put on with a heather "kow," or sulphur and train-oil rubbed on lightly by the hand. Crude carbolic dips encourage the flies to strike, and give no protection. On some farms there is a considerable loss in lambs from balls of wool in their stomachs, taken in while they are sucking.

The hoggs are wintered in the low country from some farms at a cost of 5s. to 5s. 6d. They leave in mid-October and return on "Hogg-day," April 5th; but on some high places they do so badly on their return after low-country feeding and flushing, that they are best wintered on hay at home. Different flocks keep their own ground and do not mix much with neighbours, if sheep that tend to stray are regularly sold. The mutton is of excellent quality. Ewes when fat make 10 lbs. to 12 lbs. per quarter, and wethers at three years old, 14 lbs. on the fell. Rydal wethers go up to 18 lbs. when fat. Wethers used to be kept till four years old before the price of wool fell. It went down to 4s. 3d. per 17½ lbs. (the local stone) in 1901-2 from the highest point, 20s., about twenty years before. It rose to 10s. 3d. in 1904, and prevented the threatened depletion of Herdwick stocks. At 3d. per lb., making a return of 9d. per sheep, the wool from 1000 sheep only amounted to £40, which was not sufficient to defray the cost of wintering the hoggs. The

sheep generally go with the farm and belong to the landowner, who receives 5 per cent. on the value of the sheep as additional rent. The number of sheep which each tenant was permitted to run on the fell was restricted at one time to the number the rented enclosed land was capable of wintering, but the regulation is now relaxed.

On Gaitscale or Crinkle Crags, belonging to Black Hall farm, at the head of Duddon Valley, Ulpha, Cumberland, near Broughton-in-Furness, Herdwick ewes are from time to time found with fourteen ribs on each side, or fourteen on one side and thirteen on the other. The peculiarity is

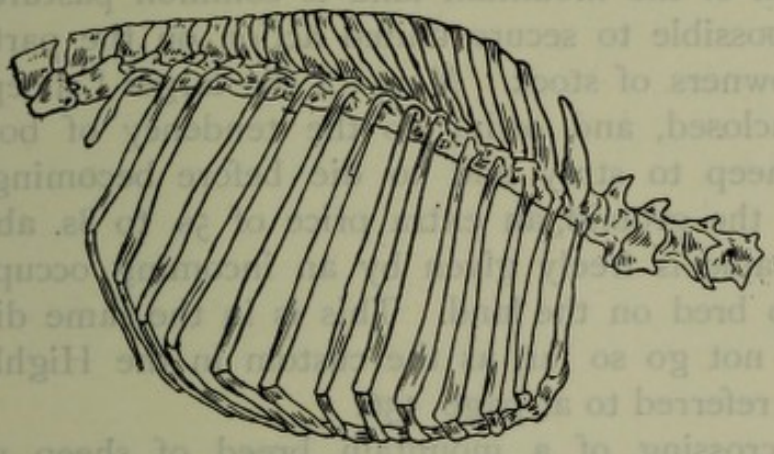


FIG. 41.—SKELETON OF THE THORAX OF A HERDWICK SHEEP, showing an additional (14th) floating ventral rib.

(Drawn from the photo of a preparation made in the Anatomical Department of Edinburgh University, under the direction of Prof. Cunningham.)

becoming less frequent under the influence of imported rams from a distance which possess the normal number of thirteen ribs on each side.

There are some unique customs in the management of this breed which are not commonly met with among other breeds of sheep, such as smearing the teats of the ewes with plasters of pitch when it is desired to prevent the lamb sucking; and painting the wool of show sheep and the rams a bright red colour, so that the shepherd is enabled to distinguish the latter in uneven hilly ground, even three miles away, by the aid of a field-glass.

The Welsh Mountain Sheep.[1]—This breed has existed on the Welsh hills, it may be said, from time immemorial.

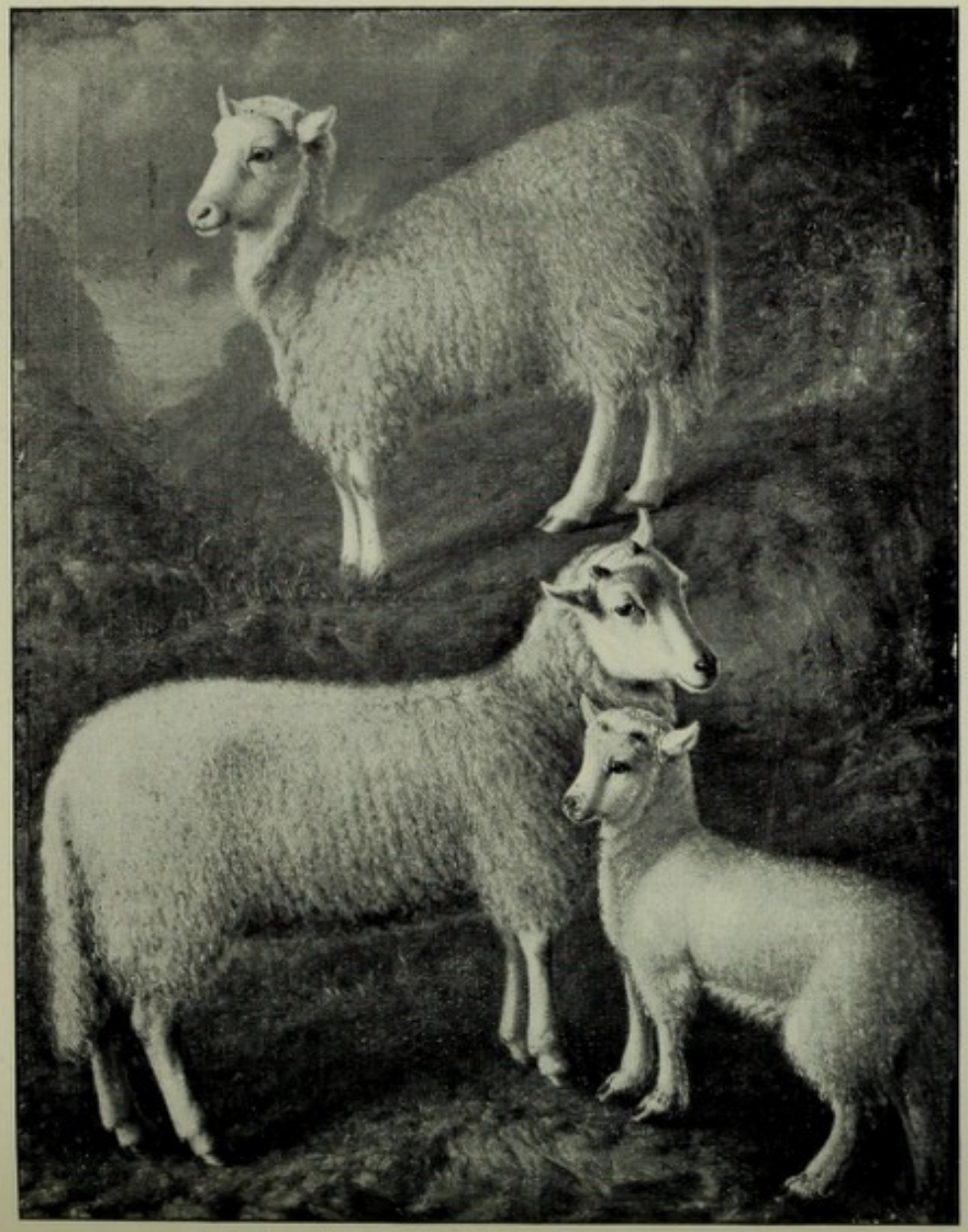
[1] The Author is indebted for much of the following information to Owen Price, of Naubyrham, Cray, Brecon, and Professor Gilchrist.

On the highest hills the original breed still exists in its pristine purity of blood, though "owing to the superior quality of the pasturage on the eastern slope of the Berwyn, Merioneth Hills, and Plynlimmon, over that on the western slope, the sheep are there of a larger and better type, and possess much finer wool." In the lowlands, including the richest pastures of the country, the breed has been increased in size and modified to some extent (though the general characteristics have been well maintained) by crossing with various larger early maturity breeds. The improvement of the breed has been restricted by the fact that much of the mountain land is common pasture, where it is impossible to secure united action on the part of the various owners of stock. Many of the larger "sheepwalks" are unenclosed, and owing to the tendency of bought-on Welsh sheep to stray and to die before becoming accustomed to the ground, an extra price of 5s. to 8s. above the market value is freely given by an incoming occupant for the sheep bred on the land. This is in the same direction, but does not go so far, as the custom in the Highlands of Scotland referred to at page 536.

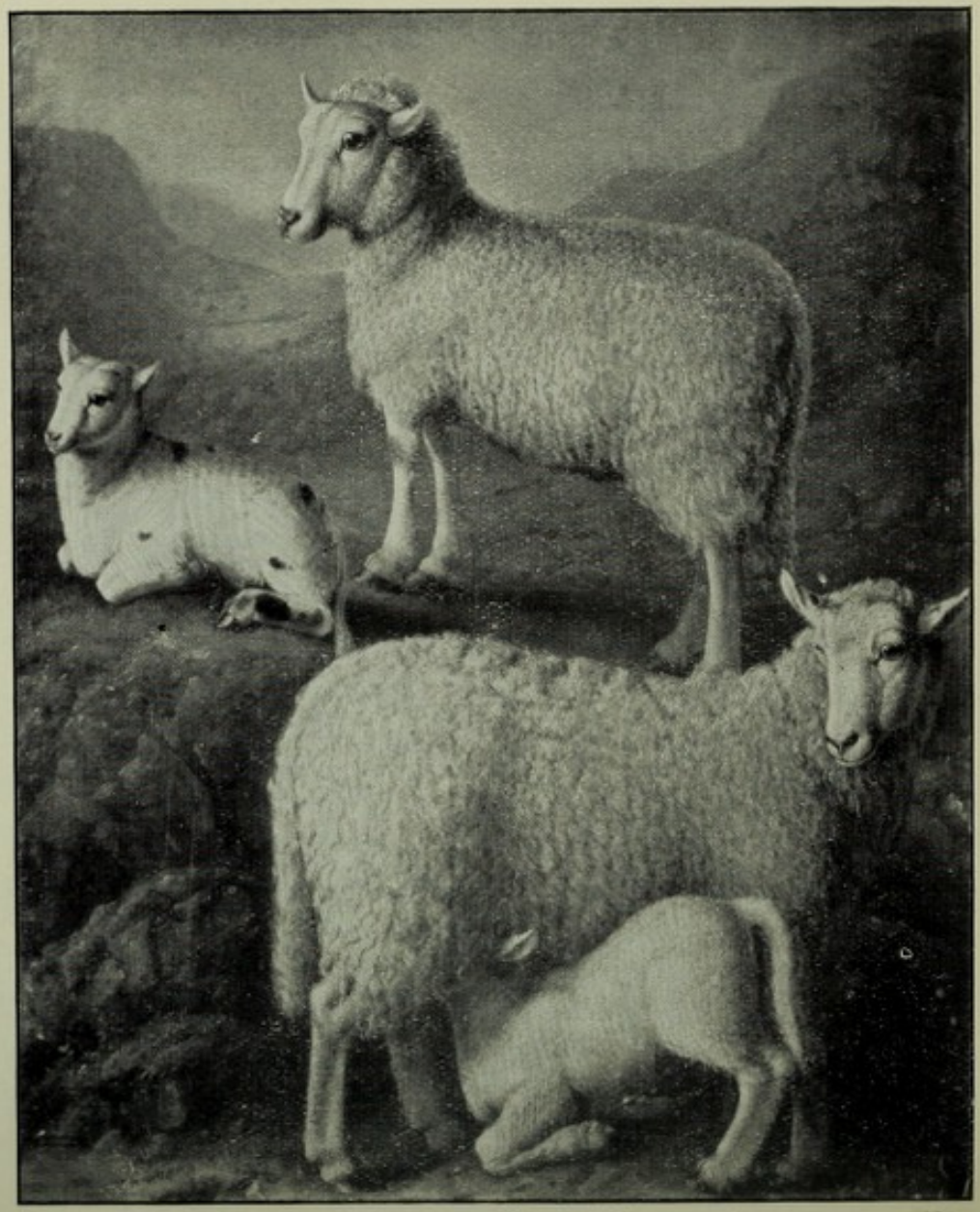
The crossing of a mountain breed of sheep with an improved early-maturity breed, which invariably possesses a less hardy constitution on that account, can only be regarded as an improvement when it is possible to place the mountain sheep in a position in which it will be independent of severe weather and scarcity of food, which, by the application of Darwin's law of the survival of the fittest, exercises an immense influence in forming the character of a mountain sheep.

The **characteristics** of the **pure breed** are, a yellow face and legs, short fine wool, and usually a narrow body descending towards the shoulder. The rams possess gracefully curved horns, while the ewes are generally hornless. The breed is noted for hardiness and for an activity which renders it difficult to fence in those which are taken down to the lowlands to feed. The mutton in the London market is regarded as of the finest quality, and classed with Scotch mountain mutton and that of the Southdown.

The dead-weight of the real pure-bred Welsh sheep does not exceed 28 to 32 lbs., but specimens, the "improved"



A. Old Welsh—Fine Wool Mixed with Hair.
Soft-woolled ewes and Radnor ewe and lamb—one of the parents of the modern Radnor breed.

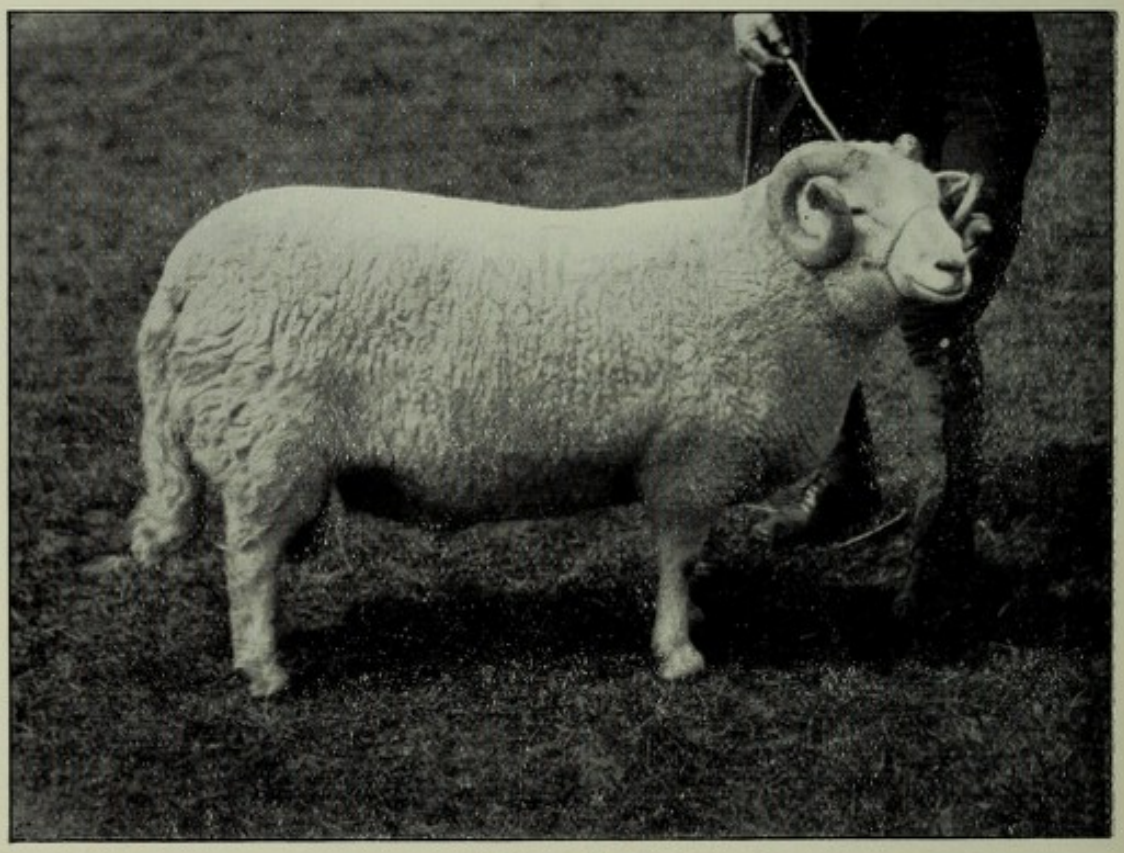


B. Old Welsh Carnarvon (Upland) Ewe and Lamb.
Ewe and lamb from Anglesea.
[*From the Low Collection of Paintings in Edinburgh University.*



A. Welsh Mountain Sheep, often used in Sheep-dog Trials.

[*J. L. Newman, Rockhamstead.*



B. Welsh Ram.
Won First, Shropshire and West Midland, and Second, R.A.S.E. Show in 1903.
Owned by Conwy Bell, Rhuddlan, N. Wales.

[*G. H. Parsons, Alsager, Cheshire.*



A. Kerry Hill Ewes.
First prize, Shropshire and West Midland shows, 1899 and 1900, and never beaten.



B. Kerry Hill Ram, "Champion Sam" (44).
First prize, Shropshire and West Midland show, 1899, and many other prizes; never beaten.
All bred and owned by Evan Kinsey, Maesmawr, Caersws, Mont.

[*p.* 560



A. Kerry Hill Ram Lambs.
Bred by R Morgan, Bahaillon, Newtown, N. Wales.



B. Kerry Hill Wether Lambs.
Small or medium-size, and second quality, but well-marked faces and legs.

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A. (KERRY EWES.
First, Radnor, etc., etc.
P. James, Upper Hall, Knighton, Radnorshire.



B. RADNOR RAMS.
Bred by J. W. Owens, Llanevon, Penybout, Radnorshire.
[*E. J. Evans, Leominster.*

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A. Exmoor Ram in Winter Coat.
Owned by Ed. J. Stanley, Quantock Lodge, Bridgewater.



B. Exmoor Ewe.
The property of Sir Wm. R. Williams, Bart., Barnstaple, North Devon.

[*p*. 560

variety, run up to 36 or 40 lbs., and on the best pasture four- or five-year-old wethers even weigh 50 lbs.

In 1905 the **Welsh Mountain Sheep Breeders' Association** and Flock Book Society was formed, with J. Marshall Dugdale, Llwyn, Llanfyllin, as the first president. When the first volume of the *Flock Book* appeared in 1906, twelve governors and twenty members in all had joined the Society. The previously accepted description of Welsh sheep was modified "in order to meet the requirements of very high mountain flocks as well as the more lowland ones," and published in the *Flock Book* after full and repeated discussion. The following **distinguishing characteristics** of a Welsh ram are extracted from vol. i., page 11:—*Head* masculine, wedge-shaped, tapering towards the nose. *Face* slightly tanned or white. *Forehead* broad. *Muzzle* black, if possible. *Horns* fairly strong and well curved, not too close at the roots. *Eyes* prominent and bright. *Ears* small and thin, obliquely set. *Shoulders* nicely rounded and level with the back. *Tail* long, strong, and bushy. *Legs* fine, comparatively short and slightly tanned or white. *Skin* pink, with mellow touch. *Wool* white, short, thick, firm to handle; a small proportion of kemp not to disqualify.

The influence of crossing has been to produce thicker sheep of "square" and equally balanced frames, which in suitable localities, where turnips and other artificial food can be conveniently provided, return more profit than the pure breed under liberal treatment. The great differences in size and appearance are accounted for by the different breeds used in crossing. In some places the Radnor Forest sheep has been employed for the purpose. In Anglesey and South Carmarthenshire, where the largest sheep (running up to 15 and 20 lbs. per quarter) are to be found, Leicester and Lincoln blood has been introduced; and on the highest hills in Breconshire the Cheviot cross has proved to be hardy and suitable to the surroundings.

The weight of the Welsh fleece differs with the size and character of the variety of the breed producing it, from 2 lbs. up to the weight of the larger English Down fleeces, the staple of the improved specimens being longer and more open as well as more heavy.

The russet-rooted wool called *gwar goch*, which may be seen in lambs in front of the top of the shoulder, may be

eliminated by careful breeding. The famous Welsh-flannel, Welsh-shawls, and woollen goods of various sorts (with which the names of Owen, Owen, & Co. are associated), are made from those parts of the fleece which yield the finest of wool fibre.

Mountain flocks range on the hills from April to November, but come down to the low land during the winter months. The ewes are cast at four years old, and crossed usually with a Shropshire ram with the object of producing fat lambs for the May market.

The Kerry Hill is the most important of a number of recently formed breeds of Welsh sheep. It derives its name from a continuous range of hills extending 15 miles east and west through the parish of Kerry (22,000 acres) in Montgomeryshire, although registered flocks are also found in Radnor, Hereford, Salop, Worcester, Denbigh, Brecon, and Cheshire. The annual fair of the village of Kerry, near Newtown, had been held from time immemorial on September 16th, but since the formation of the Kerry Hill Sheep Breeders' Association, it has been altered to the first Friday in September, "when drafts of ewes, rams, and ram lambs from all the leading flocks are offered for sale, at one of the finest shows of sheep in the kingdom," the auctioneers being Messrs Morris, Marshall & Poole, of Chirbury, Shropshire, the Secretaries of the Flock Book Society.

The **foundation breed** of the Kerry Hills was described in 1809 in the *Agricultural Survey of Wales*, "as the only sheep which produces perfect wool, that of every other Welsh breed being more or less mixed with 'kemp.' . . . The characteristics of the breed are large, woolly cheeks, white bunchy foreheads, whitish heads covered with wool, no horns, and a beaver-like tail. They are very hardy and comparatively tame, and not so disposed to ramble as most other hill sheep. In shape, however, they lack compactness and symmetry. . . . They weigh when fat from 10 to 14 lbs. per quarter."

Thomas Halford, Newtown, North Wales (to whose historical notice of the breed, written in 1898, indebtedness is acknowledged), says that the Kerry Hill sheep about 1840 were "larger and heavier woolled than the pure Welsh sheep," had "nice heads, with white faces and legs, but in many cases speckled with small black spots, or they had self-coloured

tan faces, with legs to match." The wool on the body was fine, but so very coarse below that it was always separated from the fleece and sold at a lower price. After the enclosure of the farms by the proprietors, especially near Kerry Pole,[1] many tenants bent on improving their flocks went, between 1840 and 1850, to Knighton Fair to buy rams "at from £1, 10s. up to the extravagant price of £3." The concurrent extension of root cultivation and a general improvement of agricultural practice led to "a notable improvement of Kerry Hill sheep, as somewhat similar circumstances had led to the development of the Southdown breed (p. 602). From about 1855 Kerry farmers ceased to go to Knighton for their stock rams." They could do better by exchanging rams among their own flocks; and soon the farmers from about Knighton came to Kerry for their rams and paid much higher prices. Thus the "Clun Forest sheep with the slightest possible amount of cross, and that only of the Shropshire," was used to improve the Kerry Hill sheep, which "took about twenty-five years to evolve," and, in turn, the Kerry Hill sheep was meanwhile drawn upon for the regeneration of the Radnor breed in the Knighton district. It is claimed "that the beautiful and distinctive speckled faces of these sheep have been retained and increased by selection rather than by crossing from 1840," and the hardiness of certain strains of this improved breed points to the presumption being correct. The Kerry Hill sheep has now a good claim to be considered a distinct breed, although it has no longer any right to be regarded as a Hill or Mountain sheep in the sense that it can live all the year round on high exposed places without being hand-fed on roots and hay.

Professor D. D. Williams, in the *Farmer and Stock Breeders' Year Book*, 1907, says:—"The chief characteristics[2] of the breed at the present time are speckled or mottled face and legs [black and white, not too black], compact body,

[1] In estate improvement special credit is due to the late John Naylor, who, following the object-lesson of a previous owner, Wm. B. Pugh, during a period of thirty years on the Brynllywarch estate, took a leading part in fencing the hill pastures, draining the lowlands, and providing the buildings necessary for an improved system of farming. Those examples were followed by David Davies, M.P., on Gwernygoe estate, Edward Davies, of Plasdinam, and others.

[2] Fully detailed in vol. v. of the *Flock Book of Kerry Hill Sheep*, 1905.

a clear pink skin, with a close, tight fleece of good wool averaging from 5 lbs. to 8 lbs. per fleece, and a long bushy tail."

A. Sparrow, of the "Butchers' Hide, Skin, & Wool Company, Limited, Birmingham," writes :—"Kerry wool would be equal to the finest wool we have if it were not for the Welsh cross in it which throws a thread of kemp, especially in the britch." His estimates of the current prices (February 1907) of the following related breeds of sheep are: Shropshire, up to 13½d.; Kerry, up to 12½d.; Clun, up to 11½d.; Radnor, up to 11d.

The *Flock Book of Kerry Hill Sheep*, edited by William Langford of Chirbury Hall, was first issued in 1894 by the "Kerry Hill Sheep Breeders' Association and Flock Book Society," but after a period of hesitation by the breeders, was re-issued in 1899. It is intended to "preserve the true character, quality, and type" of what it claims as "the best of all 'Hill sheep.'" The objects of the Society are to get the breed recognised among the breeds of the United Kingdom, and to promote the breeding of first-class rams, so that eventually it may be possible to secure uniformity in quality and in colour of face. As the result of the establishment of the *Flock Book* and the system of registration, the Society increases yearly in membership, and experiences a growing demand for the best sheep. It is affiliated to the "National Sheep Breeders' Association," and it had for the first time four classes allotted to the breed at the Royal Show at Lincoln in 1907.

"The **ewes** are easily kept, extraordinary sucklers, and in addition to rearing or fattening their lambs, grow and thrive rapidly when depastured on the lowlands." Halford says that "more than sixty years ago, thousands of draft ewes of Clun Forest and Kerry Hill sheep were taken into Essex and other eastern counties for crossing, principally with Leicesters, for the production of fat lambs for the London Market. The ewes were splendid nurses, the lambs nice weights, not too large, and the dams fattened off quickly after their lambs left them. The wethers kept until five or six years old, when drafted, went into the parks, home farms, etc., to make unsurpassed mutton for the tables of the upper classes." Now the wethers are fed to kill at a year old at an average live-weight of from

65 to 85 lbs. per carcase according to the locality in which they are produced. The ewes after rearing their lambs go chiefly to the Midlands, but also to Hereford, Worcester, Gloucester, Essex, Cheshire, and other counties, to breed fat lambs by Shropshire, Oxford, Hampshire, and Southdown rams.

The following is a statement of receipts and expenditure in connection with a **fat lamb breeding and feeding experiment** conducted on Dolforgan estate with the object of having the ewes and lambs in the hands of the butcher in twelve months. The ewes were a score of middle class Kerry Hills, the ram a very superior "Oxford Cross" (out of a Border Leicester-Cheviot ewe, by an Oxford ram).

1904.	EXPENDITURE.	£	s.	d.
Sept. 6.	By 20 Kerry Hill ewes at £1, 18s. 6d.	38	10	0
„ „	Grass keep for ewes up to 1st March	7	0	0
„ „	Grass keep for ewes to various sales	4	5	6
„ „	Grass keep for lambs to various sales	4	10	0
„ „	Shepherding 365 days at 3d. per day	4	11	3
„ „	Three tons of cake and corn at £8, 2s. 4d.	24	7	0
„ „	Auctioneers' commission on sales	1	9	0
„ „	Dipping and other dressings	0	5	0
„ „	Castrators' fees	0	2	8
„ „	Services of ram, 20 ewes at 1s.	1	0	0
„ „	Interest on money advanced	1	5	0
„ „	Tithes, rates, and taxes	1	10	0
1905.				
Sept. 6. „	Balance, being profit	22	0	7¾
		£110	16	0¾

1905.	RECEIPTS.	£	s.	d.
May 1.	To 1 barren ewe sold shorn	2	10	0
June 13.	„ 9 fat ewes sold at £2 each	18	0	0
June 13.	„ 6 single lambs at £1, 15s. 3d. each	10	11	6
June 13.	„ 9 twin lambs at £1, 10s. each	13	10	0
July 25.	„ 7 fat ewes at £1, 19s. each	13	13	0
Sept. 1.	„ 3 ewes retained for stock, £1, 19s.	5	17	0
Sept. 1.	„ 15 fat lambs, 14 twins, 1 triplet, at £2	30	0	0
Sept. 1.	„ 2 fat lambs, triplets, £1, 10s. each	3	0	0
Sept. 6.	„ 115 lbs. of wool from ewes, 1s. 0¾d.	6	2	2¼
Sept. 6.	„ 35 lbs. of wool from lambs, 10½d.	1	10	7½
Sept. 6.	„ Manurial value of cake and corn	6	1	9
		£110	16	0¾

NOTE.—The ewes were very healthy, and all lived. The lambs were all born alive; one small triplet and a twin about a week old died; all the others went to the butcher. The ewes were wintered on grass, receiving each ½ lb. of corn per day a month before being due to lamb; the feed was gradually increased until ewe and lamb consumed a little over 1 lb. per day. The ewes were somewhat deficient as nurses up to the time that the lambs could take full advantage of the feed; afterwards they all ran fat together and made a good finish. A. ANDERSON.

Dolforgan Estate Office, 22nd November 1905.

The **Radnor breed** was described in the 1893 edition of this work as **the Tanface,** a very old Welsh mountain breed, still met with, but in smaller numbers than formerly, in Radnorshire, about Abbey-cwm-hir[1] and St Harmon, and shown as a distinct class at the Radnorshire Agricultural Show annually held at Pen-y-bout—short-legged, hardy little sheep, with a close fleece of fine wool on the back and sides but rather coarse underneath. During the intervening fourteen years it has become more important and better known, and also more nearly related to, although smaller than, the Kerry Hill sheep, which it also resembles, as the accompanying Plates show. They are well described as short-limbed, low-set sheep, with speckled faces and legs; only a few retain the original tan colour, but they differ considerably in different districts. In the northern parts of Radnorshire they have been crossed mostly with Kerries to secure the fashionable speckled faces, but in the south, also with Shropshires of a clean-headed type, the progeny being used again in the surrounding flocks. Some flocks are very hardy and live on the hills for nine months in the year, but others are only on them from July to October. They take longer to fatten than the Kerry Hill sheep, and on the average are not so heavy, yearling wethers varying from 120 to 150 lbs. live-weight.

The cast ewes go into the fat lamb trade with Kerry ewes, and other relative qualities have already been discussed under the Kerry breed.

The **Clun Forest breed,** although related through Shropshire and Long Mynd (or Mound) ancestors, differs from the Kerry and Radnor breeds. It belongs chiefly to the Clun district of Shropshire. The original Clun Forest sheep was small and speckle-faced. Its modern representative was produced by crossing with hardy, blackfaced Long Mynd mountain rams, now extinct, and latterly with Shropshires. It is now three parts Shropshire, and may rank as a hardy variety of that breed specially suited to its local surroundings. The ewes are excellent mothers; they produce Easter fat lamb, which would weigh, if kept till early summer, 17 lbs. to 18 lbs. per quarter. Ewes and two-year-old wethers rise in

[1] Cwm-hir (pronounced *coom here*), Welsh for long-valley.

weight to 28 lbs. per quarter. The wether mutton is sold in the "West End" as Welsh, dressed with a tuft of wool on the tail, which is left its full length on account of the breed being semi-mountainous.

The Exmoor Horn Sheep[1] has existed from time immemorial on the Exmoor and Brendon Hills in West Somerset and North Devon. **Charles Vancouver,** in a *Report on the Agriculture of Devon*, 1808, states that—

"The common Exmoor sheep are generally preferred in the open and more exposed parts of Exmoor, owing to their extraordinary hardiness, and the activity with which they continue working in search of food. The wethers at two-and-a-half or three years old make delicious mutton, weighing from 12 to 15 lbs. per quarter, and commonly shear a fleece of from 4 to 5½ lbs. of unwashed, moderately long, staple wool (value, 9d. per lb. against washed wool about 13d.), which, before the cloth manufactures fled from this part of the country into Yorkshire, was much used by them. The wool of the third-cross with the merino was three times the value of the native fleece, and the carcase is stated to have been rather improved."

Professor W. C. S. Spooner writes in 1844, "that the Exmoor and the Dartmoor sheep are the principal forest breeds in the West of England, located in the higher situation of Devon and Cornwall, a hardy race, adapted to the poverty of the pasture which the forests of Dartmoor and Exmoor afford. Though bred on the heath, they are fattened in the plains. The Exmoor is rather smaller than the Dartmoor, and the ram has a beard somewhat like that of a goat,[2] which it much resembles in habits, activity, and boldness. In other respects the breeds are alike. The ewes of both take the ram early.

In *The Farming of Somersetshire*, the late **Sir Thomas Dyke Acland,** in 1851, wrote of the Exmoor as "a native breed known as Exmoor or Porlock. The hill-country farmers generally keep a breeding flock of ewes and a flock of wethers to run on the hills. The general yield of wool is 5 lbs. Sheep from an ordinary flock, when fat, weigh from 11

[1] Condensed from notes extracted from the historical preface to the first volume of the *Flock Book*, edited by W. Dicker, for the Exmoor Horn Sheep Breeders' Society, 1907.

[2] "This characteristic has now disappeared."—W. DICKER.

to 12 lbs. per quarter; from an improved flock, they may reach 16 to 18 lbs. a quarter." Another writer speaks of them as "a breed of sheep with [black muzzles], white faces, and legs, taper horns curving downward and outward, close-set, long-stapled fleeces, with wool up to the cheeks, peculiarly rounded instead of square-formed carcase, broad loins, though with slack girth behind the shoulders, and high necks. The original Exmoors milk better than the improved, and old ewes especially, and young ones, if they are well kept at tupping-time, are very prolific. There are instances of ewes rearing three lambs well after the first fortnight." The ewes are always brought down to the lower ground to lamb, and get a few turnips and oats, and they come in again from the hills in November to the poorest enclosed lands. They lamb at two years old, and have the reputation of being good mothers. They are generally drafted after three crops of lambs. A good useful ram can be bought for from £5 to £10, and choice blood relatively more. Exmoor sheep have been exhibited for many years at the Royal Agricultural Show, the Bath and West of England, and the Somerset and Devon county shows. *The Bath and West Journal*, 1860, states that the Exmoors exhibited at the show "were greatly admired, not only for their symmetrical proportions and the quality of their flesh, but also for their wool, and an adaptation of form to mountain districts." The farmers who occupy farms lying between 900 and 1300 feet above the sea, are careful to breed from ewes of good constitution, rain-resisting wool; and that will produce lambs that can be fattened as hoggs. The **Exmoor Horn Sheep Breeders' Society,** founded in 1906, has for its object the encouragement of breeding and the maintenance of the purity and the characteristics of the breed at home and abroad.

The entire flock of a noted local breeder was sold by auction, at a farm on the borders of Exmoor, in September 1906, when a pen of two-teeth ewes fetched 62s. a head. The ewes averaged 45s.; ewe lambs, 34s.; and fat wether hoggs, 50s. each.

Youatt says that "both the Dartmoor and the Exmoor sheep owe much to the cross with the New Leicester, with respect to early maturity, increased size—so far as it is desirable—and a far more valuable fleece."



A. Exmoor Shearling Ewes and a Lamb.
First, R.A.S.E. Show, Cardiff, 1901.
Owned by C. N. Skinner.



B. Exmoor Ram.
Trimmed for show, and carrying prize decorations on his horns.
The property of Amos Skinner Lovelace, of Winsford, Somerset.
(The Exmoor Sheep Breeders Society now bars trimming at its local shows.)



A. Dartmoor Ewe.

[*C. Reid, Wishaw.*



B. Dartmoor Ram.

[*J. T. Newman, Berkhampstead.*

[*pp.* 568 *and* 569

The **Dartmoor** is the largest hill or moorland sheep in the country. It has been bred in its native district (both sides of Dartmoor) by the fathers and grandfathers of its oldest present-day owners, and is a very old breed which, like many of the Long-wools of the country, was improved, years ago by a dash of Leicester blood. The size has increased and the quality of both flesh and wool has gone up in recent years by careful breeding and selection. The flocks winter on grass and a little hay. Nothing but show sheep get corn or roots. The ewes lamb about the end of February or beginning of March. The Dartmoor winters are so long that few breeders attempt to produce fat lamb, but the cast ewes go to little farms more favourably situated, and, being exceptionally good milkers and accustomed to rough it on the moors, produce the best of fat lambs by Down or South Devon rams while preparing themselves for the butcher.

Dartmoor fat wethers are usually sold between one and a half and two years old, and average about 20 lbs., while some run up to 24 lbs. per quarter.

The breed is preferably hornless, but now and then a ram develops little backward-pointing horns about 2 inches long. They are good travellers, big, long, and strong legged, long and strong necked sheep, firm to touch, and well fleshed all over, with good scrag and neck vein. The *head* is large and well proportioned; the ears a good medium size (not too small, else the sheep will be small), well covered inside and outside with hard hair showing dark spots, and set on almost level, not flat but doubled in and placed so that an observer can see inside as the animal looks at him. Dun patches on the hair of the face are objected to, but black spots of hair of the face growing on a black spotted skin deepening towards a black muzzle, and also a few round the eyes, are characteristic. The wool, often 15 inches long, beautifully fine in quality and very strong when tested by breaking, is like that of the Devon Long-wool in staple, but finer and more even all over and more wavy or curly. It extends over the pall and well down at the knees and hocks, and a little appears on the hind legs. The skin underneath is a clear pink colour, spoken of as "bright red." The usual average weight of fleece is about 15 lbs. for ewes in some of the best flocks, like that of H. J. Kingwell, Great Aisle, South Brent, Devonshire,

to whom indebtedness is acknowledged for the foregoing information about the breed.

Plan of a Circular Sheep Yard erected at Whakaki,

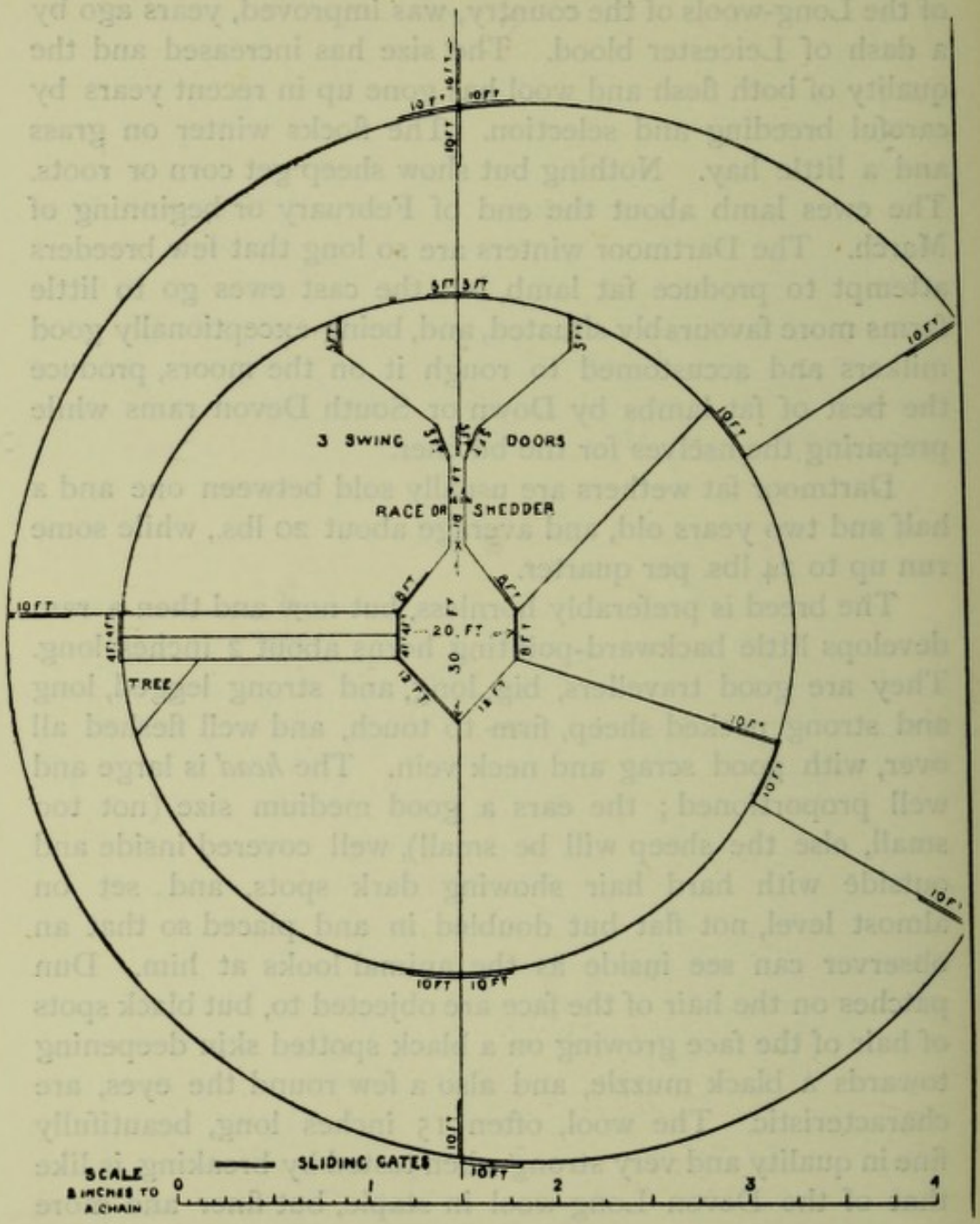
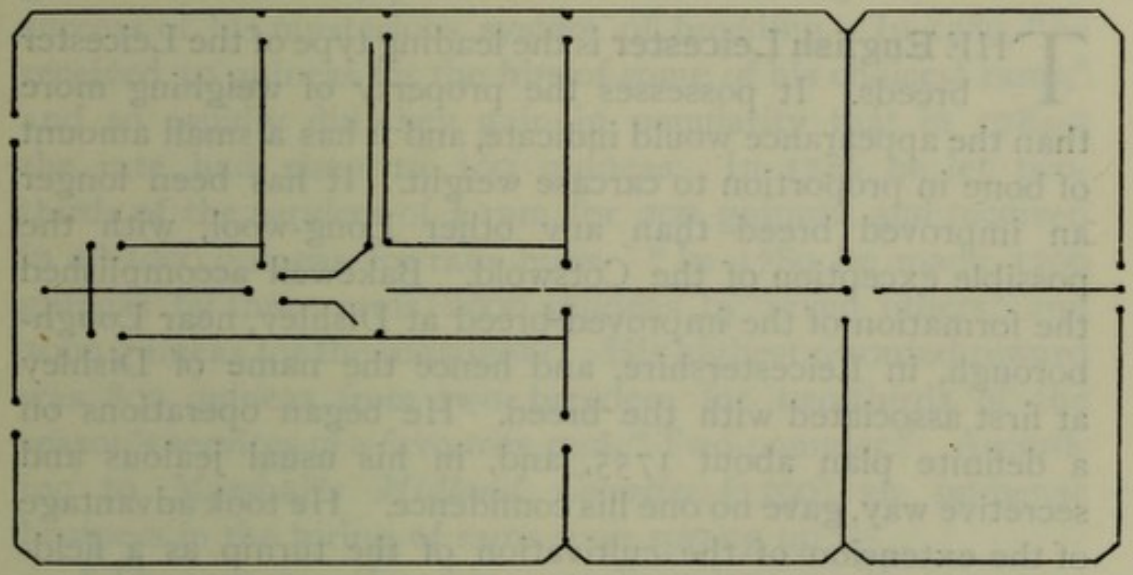


FIG. 42.—PLAN OF A CIRCULAR YARD FOR HANDLING 4000 SHEEP.

Napier, New Zealand, by F. MacRae, late manager to John Hunter Brown, and suitable for three men handling a flock of 4000 sheep in this country. By means of the three swing doors, located at the end of the race or shedder, one man

can separate a flock into four divisions. He uses the central door to divide the two smallest lots of sheep, so that he seldom requires to move his hands. The two 4 feet alleys beside the tree are employed when sheep are being branded or handled for fat. Other sheep pass through the yards without being caught or touched by hand. All gates marked with a double line on the plan, open, with the exception of the three swing doors, by sliding to one side without crushing the sheep, and being in line with the fence are out of the way when open.

Plan of a Rectangular Yard for drafting into three lots; 90 yards by 45 yards would work from 5000 to 6000 sheep.



SCALE, 68 feet to 1 inch. [*W. Cooper and Nephews.*]

FIG. 43.—PLAN OF A RECTANGULAR YARD FOR HANDLING 5000 TO 6000 SHEEP.

CHAPTER XXVI

BREEDS OF LOWLAND LONG-WOOL SHEEP

English Leicester—Dishley Sheep Society—Border Leicester—Wensleydale—Lincoln—Lincoln-Merino, or Corridale—Kent, or Romney Marsh—South Devon Long-wool, or "South Dum"—Devon Long-wool—Cotswold—Roscommon.

BREED HISTORIES AND CHARACTERISTICS

THE **English Leicester** is the leading type of the Leicester breeds. It possesses the property of weighing more than the appearance would indicate, and it has a small amount of bone in proportion to carcase weight. It has been longer an improved breed than any other Long-wool, with the possible exception of the Cotswold. Bakewell accomplished the formation of the improved breed at Dishley, near Loughborough, in Leicestershire, and hence the name of Dishley at first associated with the breed. He began operations on a definite plan about 1755, and, in his usual jealous and secretive way, gave no one his confidence. He took advantage of the extension of the cultivation of the turnip as a field-crop supplying abundance of winter food, to transform the old ungainly slow-maturity Leicester, which had been bred merely for size and a heavy fleece, into a compact, symmetrical, moderate-sized animal, possessing great aptitude to fatten, and, above all, a marvellous power of communicating its tendency to early maturity and its refining influence to those breeds with which it was crossed. He began by selecting animals nearest to the type he aimed at—"those possessed of the most perfect symmetry, with the greatest aptitude to fatten, and rather smaller in size than the sheep then generally bred." The value of the carcase was the chief aim, and the fleece was a secondary consideration. He fixed and improved what came to his hand by in-and-in breeding. There is no evidence in support of the assertion that he "crossed his Leicesters with different sorts of sheep." Marvellous

results were got by his methods and the matchless skill he instinctively had in mating breeding animals. He originated the practice of **letting rams for the season,** in place of selling them outright, which retained a large number of sheep from which to select what was required for breeding to different types of his own flock. The advantage extends also to the hirer, who can acquire through hiring a share of the services of a better animal than he could often afford to buy, and also secure more frequently change of blood. So much was the system opposed, that the first ram he let, about 1760, only realised 16s., and two others were hired on the same day at 17s. 6d. each. For many years only a guinea, and "on rare occasions two or three," for the use of a ram were got. It took twenty years to convince his neighbours of the success of his mysterious system of breeding. In 1780, "he received 10 guineas for the hire of some of his choicest rams," and so rapidly did they gain in popularity that in 1784-5 the rate had risen to 100 guineas. In 1786 he let two-thirds of the services of a ram for 200 guineas, and received in all 1000 guineas for ram hires. "In 1789 he made 1200 guineas by three rams, 2000 guineas by seven others," and 3000 guineas for the remainder. His highest recorded reward was 800 guineas from two breeders for two-thirds of the season's services of a favourite ram, "Two-pounder." According to Marshall's *Midland Counties* (1790), an immense business in the hiring of rams soon sprang up:—

"The ram was placed in a small enclosure with two ewes. The ewes in season were brought to him singly, and each was served once only; by this means, from 100 to 120 instead of the usual number of 60 or 80, were served by one ram in the course of the season. The hirer was expected to keep him well, to permit him to serve none but his own ewes, and only the stipulated number of them, and to send him home safe about the beginning of December. The owner, on receiving him, immediately set to work to get all his former fat upon him, and to make him look as handsome as ever for the next show."

At these fairs men selected the sheep for their purposes, and offered the sums they were prepared to give to the owners who were in attendance.

The Dishley Society was formed with rules of extraordi-

nary stringency, dated 1790, for the preservation of the purity the new Leicester breed, but it attempted to create a sort of monopoly to promote the interest of a small ring, consisting of Bakewell and his friends. No member could hire or use a ram that did not belong to one of the twelve members; or let rams at less than 10 guineas, or to ram breeders at less than 40 guineas; or in greater number than thirty in one year; or sell ewes or rams of his own breed to breed from to outsiders, unless he sold the whole flock; or show his rams to others except at specified times. The only unselfish condition worthy of special notice and special study was that "no member shall give his rams, at any season of the year, any other food than green vegetables, hay, and straw." There are not a few ram breeders of the present time who would be the better for Bakewell's autocratic interference with their methods of sharing the trust which nature has confided in them.

Such **fame** did the **Dishley Leicesters** acquire, says Youatt, that, "within little more than half a century they spread over every part of the United Kingdom," and "at the present day (1837) there are very few flocks of Long-wool sheep existing in England, Scotland, or Ireland which are not in some degree descended from the flock of Bakewell, although some flocks of the pure Cotswold breed remain. No other sort of sheep possesses so great a propensity to fatten or is fit for the butcher at so early an age. On good keep it will yield a greater quantity of meat for the same quantity of food than any other breed of sheep, but they cannot travel far for their food, nor can they bear, so well as many others, occasional scantiness or deprivation of nourishment."

The mutton was never in high favour either with the butchers or the consumers, being coarse in the grain and "somewhat insipid," though "tender and juicy when not over-fattened." **Other drawbacks** were the scarcity of doubles, owing to the preference shown to large single lambs at the period when high prices ruled, and the discarding of ewes that bore twins; deficiency in milk secretion; delicacy of constitution; shortness and lightness of fleece. The redeeming feature of the breed "consisted in the improvement which it effected in almost every variety of sheep that it has crossed."

The line of limitation was drawn by Sir John Sinclair, when he wrote :—

"The Dishley breed is perhaps the best ever reared for a rich arable district, but the least tincture of this blood is destructive to the mountain sheep, as it makes them incapable of standing the least scarcity of food."

This refers only to stock to be retained for breeding, as marked success has attended the crossing of mountain ewes with Leicesters and other Long-wools, when the progeny goes directly to the fat market, or is supplied with ample food during winter. Some of the defects introduced by the mistakes of the early breeders, such as entirely ignoring the fleece, have been got rid of. Bakewell bred a sheep to meet the **demands of the markets** of the day, which were for excessively fat, large joints, the small lean mutton now in favour being at a discount. His reply to a criticism of it was :—

"I do not breed mutton for gentlemen, but for the public; and even my mutton may be kept leaner to suit every palate by stocking harder in proportion, and by killing the sheep in time."

The once all-pervading *Leicester had to give way* to the competition of other Long-wools which had been improved by its influence, and to the Down breeds, especially the Shropshire.

"The **pure-bred flocks** are now confined to East and North Yorkshire (on the Wolds, and in the vales of York and Pickering), Cheshire, Cumberland, Durham, and Leicestershire."

Rams are regularly exported to New Zealand, Australia, South America, and France. They would in most foreign parts have been even a greater success, but for the preference given by many breeders to Lincoln sheep, mainly on account of their abundant growth of long, lustrous combing wool. *Notes on Leicester Sheep*, by W. A. Brown, Secretary of the Leicester Sheep Breeders' Association (formed in 1893), show that "the Leicester as he is now bred has a good proportion of lean flesh," and also that the breed is capable of attaining immense weights of produce in flesh and wool—an aged ram scaling 472 lbs. and a shearling 336 lbs., and nine gimmers yielding 16 lbs. of wool, and forty shearling rams 17 lbs. each. The same authority gives the **"points" of the present-day Leicester** as follows :—

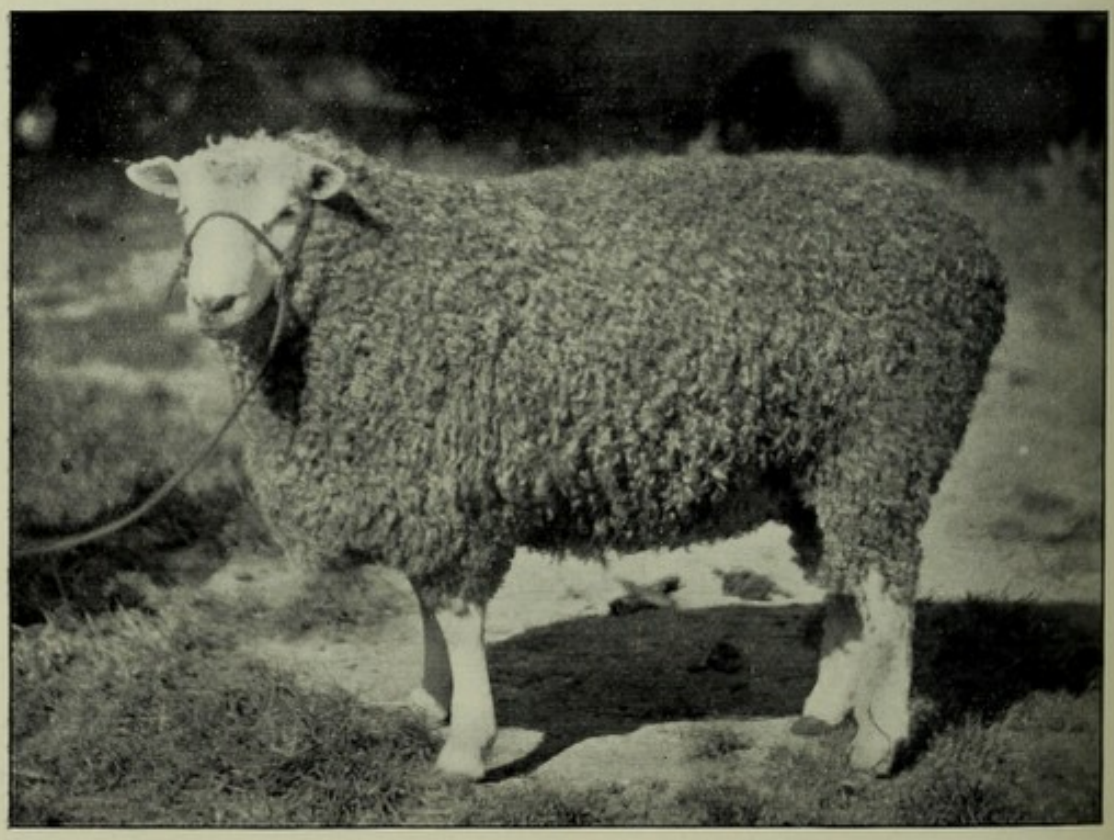
"Lips and nostrils black, nose slightly narrow and Roman, but the general form of the face wedge-shaped, and covered with short white hairs; forehead covered with wool; no vestige of horns; ears thin, long, and mobile; a black speck on face and ears not uncommon; a good eye; neck short, and level with back, thick and tapering from skull to shoulders and bosom; breast deep, wide, and prominent; shoulders somewhat upright, and wide over the tops; great thickness from blade to blade, or through the heart; well filled up behind the shoulders, giving a great girth; well sprung ribs, wide loins, level hips, straight and long quarters; tail well set on, good legs of mutton, great depth of carcase, fine bone; a fine curly lustrous fleece (the sheep are well-woolled all over), free from black hairs; with firm flesh, springy pelt, and pink skin. The general form of the carcase is square or rectangular; legs well set on, straight hocks, good pasterns, and neat feet."

The typical sheep of this breed is of a mild disposition, and thus inclined to the rapid laying on of fat. The head is not short, though smaller than that of the Border Leicester. The face and ears have frequently a blue tinge, although not so deep as that of the Wensleydale, and the hair is not so hard as in the case of the Border Leicester. A pinky face and soft hair indicate want of constitution. The hind-quarters are frequently not so large as they ought to be, owing to the great development of the fore quarters and trunk.

The Border Leicester was bred at first from Bakewell's Leicester by crossing with the Cheviot, but it now ranks as a pure breed, and is one of the best and the most popular of the varieties of Leicesters. The Culleys, who were disciples of Bakewell and introduced his methods into the Border country, took the new breed to Fenton, near Wooller, having migrated from the county of Durham in 1767. Other immediate followers as Leicester breeders were Thompson, of Chillingham; Jobson, of Chillingham Newtown; Robertson, of Ladykirk; Smith, of Learmonth; Compton, of New Learmonth; Smith, of Norham; and Riddell, of Templedean. The breed is very largely used in Scotland for crossing with half-bred, Cheviot, and Blackface ewes. The mutton of the



A. English Leicester Shearling Ewes.
Sent by W. A. Brown, Elms Villa, Driffield, Yorks.



B. English Leicester Ram.
First prize at the R.A.S.E. Show at York, etc., 1904.
Bred by E. F. Jordan, Eastburn, Driffield.

[*p*. 576



A. English Leicester Ewes and Lambs.
Pedigree prize-winners.



B. English Leicester Ewe (in full fleece).
Both owned by J. E. Ward, Stanthone, Middlewich.

[*Photos by G. H. Parsons, Alsager, Cheshire.*

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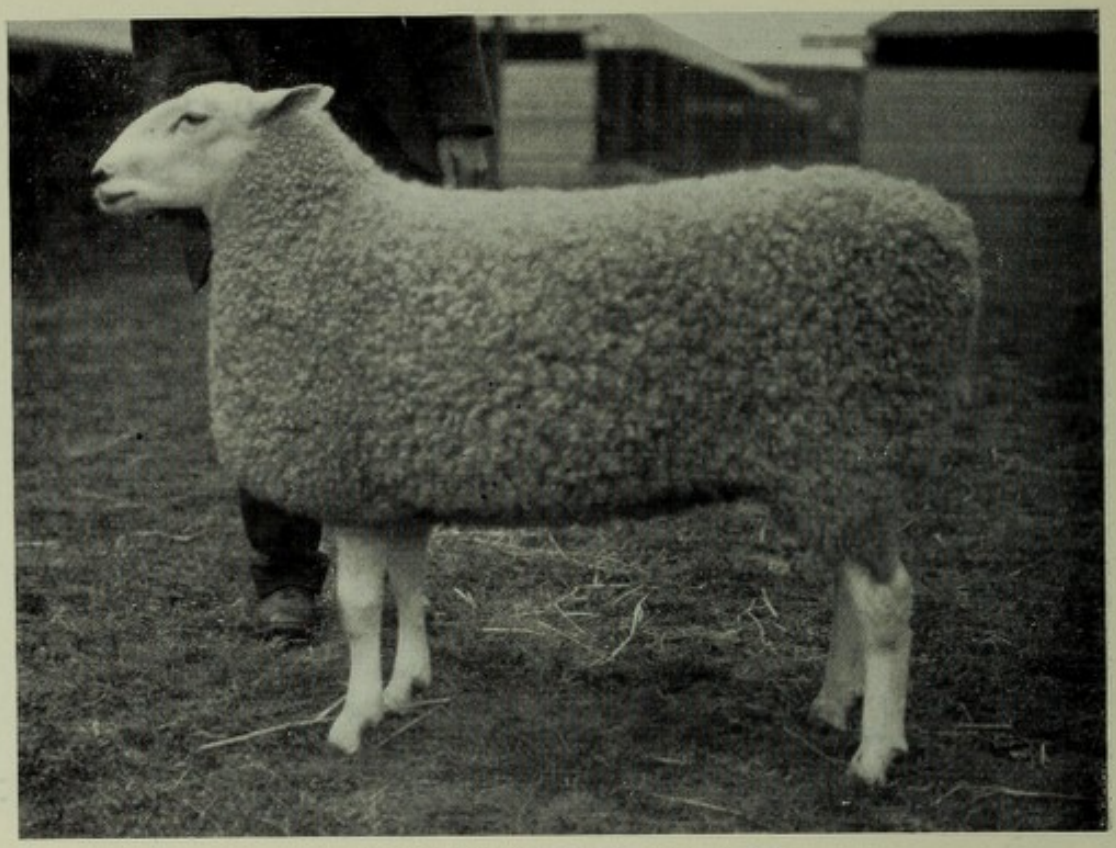

A. Border Leicester Shearling Ram.
Gained the President's Medal, and Breed Champion at the Highland Show, Glasgow, 1905.
Bred by David Hume, Barrelwell, Brechin. Sold at Kelso to A. Laidlaw for £130.
(The misty appearance of the coat is natural.)
[*Brown, Lanark.*



B. Border Leicester Ewe.
The property of the Rt. Hon. A. J. Balfour, Whittingehame, N.B.

[*p.* 576



A. Wensleydale (Blue-headed) Ram.
First, R.A.S.E. Show, London, 1904.
Owned by Exrs. of T. Willis, Manor House, Carperby, Aysgarth Station, R.S.O., Yorkshire.



B. Wensleydale (Blue-headed) Gimmer.
Unbeaten showyard record, including First, Royal, and Royal Lancs., 1905.
Bred by Exrs. of T. Willis, Carperby, S.O.

[*Photo by G. H. Parsons, Alsager, Cheshire.*

[p. 576



A. Lincoln Longwool Ewes in the Wool.
First, R.A.S.E. Show, Park Royal, 1905.
[*J. T. Newman, Berkhampstead.*



B. Lincoln Longwool Ram.
First and Champion Medal, R.A.S.E. Show, Park Royal, 1905.
[*J. T. Newman, Berkhampstead.*



A. Corriedale Merino-Lincoln Ewes.
Bred since 1888 from half-breds.
Produced by the finest Lincoln rams on stud Merino ewes.



B. Merino-Lincoln Ram.
Both owned and bred by J. Stringfellow, Chertsey, Canterbury, New Zealand.

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pure-bred sheep is not of first-rate quality, being somewhat coarse in the grain and tallowy in the fat, but it is not so much a mutton-manufacturing as a ram-producing breed, and the mutton from the progeny of the rams mated with all varieties of mountain ewes, is an early maturity product.

Special Points.

(1.) The *head* well carried, long, broad between the eyes but not high on the crown, nor too heavy behind the ears; the two latter characteristics in the male involving difficulty in lambing in this as well as in other breeds:

(2.) The *profile* slightly aquiline, tapering to the muzzle:

(3.) The *muzzle* large, open, and black, with wide nostrils:

(4.) The *hair* on the face and legs uniformly white and hard (but not so wiry as in the case of the Cheviot), and extending well back behind the ears, free from any trace of wool:

(5.) The *ears* not too large nor drooping, and white inside and out; black *spots* appear sometimes with age:

(6.) The *ribs* well sprung in a fine circular arch more noted for width than depth, and "carrying the mutton high":

(7.) The *belly* light, said to "carry little offal," and giving a leggy or high-standing appearance when the animal is shorn:

(8.) The *wool* long, soft, and in little locks or *pirls*, but not too open: especially on the ribs, it should fill the hand

(9.) *Fat tegs*, at twelve to fourteen months old, *weigh* 23 lbs. to 25 lbs. per quarter, but many are fed off at an earlier date at lighter weights to suit the market.

Brief Calendar of events in a Border Leicester flock:—

January 1st.—Ewes begin to get a little better treatment—either a little concentrated food in boxes, or a limited quantity of swedes.

February 1st.—Ewes begin to lamb.

April.—Pedigree Border Leicester lambs are tattooed on the bare skin, inside the ear, with flock marks, and Border Leicester hoggs are clipped.

June 1st.—Border Leicester ewes are clipped.

July 1st.—Border Leicester lambs may be speaned or weaned at any time in July—the sooner the better on suitable pasture.

July 20th.—Border Leicester stock ewe lambs are speaned.

October 1st.—The tups are put to the ewes.

November 28th to December 10th.—Hoggs put on to turnips where grass fields have failed.

The **chief difficulties** of a shepherd in charge of Border Leicesters are—when they suffer from lameness, from maggots, or from being broken on the crown by flies; hoove in lambs; and keeping thin hoggs (especially tups) dry in winter, to prevent their legs twisting.

The Wensleydale is a large, high-standing, long-sided, firm-fleshed Yorkshire-Leicester breed, with a characteristic deep blue colour in the skin of the face, legs, and ears, which sometimes extends to the whole of the body, though the shade is darker on the bare or hairy parts. The dark colour is cultivated, because in the extensive use of the rams in crossing with the Scotch Blackface breed it is found that dark blue rams throw dark grey-faced lambs, a point which is considered valuable.

The lambs bred in this way are termed "crosses" in Scotland, where they are extensively kept for "hogging." In the east of Yorkshire and in Lincolnshire, where many thousands of them are annually bought for breeding to early-maturity rams, and for fattening during winter, they go by the name of "Mashams," from the market where they are sold.

Bright and lustrous wool of open character, of good length, and divided into uniform little knots or "pirls," should cover nearly the whole surface of the body, and be free from mistiness on the back. A fine tuft should cover the forehead between the eyes, and finely pirled wool the back of the head, round the ears, the back of the hind legs down to the hoofs, and at times even the fore legs. The belly and scrotum should also be covered. Hairy wool on the thighs, where the coarsest wool tends to grow, is objectionable.

The head is of a good size (with a strong muzzle, especially in the ram), and gaily carried on a long and strong neck well set on the shoulders, giving much greater style of carriage to the breed than is usual with other English Leicesters; hair is entirely absent about the forehead, the back of the head, and the ears; and there is no coarse hair on the rest of the face.

The sheep of Upper Wensleydale, **two hundred and twenty-five years ago** were the Blackface horned breed, and in Lower Wensleydale the Whiteface horned breed, of the mountains of the North-West of England, and to this day, in some places, the modern representatives of these breeds are known locally as Wensleydales. The last of the Whiteface horned sheep disappeared from Wensleydale about one hundred years ago, and all the available evidence indicates that they were replaced by a branch of the improved Teeswater breed. **The original breed** was, according to Youatt, "probably from the same stock as the old Lincolnshires, a tall, clumsy animal, polled, and with white face and legs, but with characteristic black spots on the face and ears"; of slow maturity; yielding a very heavy carcase of fine-grained meat. The wool was "remarkably long and coarse, but thinly set on the skin," and the "ewes were exceedingly prolific." The breed was "among the first to experience the beneficial effects of a cross with the Dishley sheep—a somewhat kindred breed, but possessing very good points in which the others were manifestly deficient." The cross resulted in "very considerable diminution of size; the carcase was rounder and more compact," and came to maturity earlier. "The Leicester mutton was not so delicately flavoured as the Teeswater," and yet the result of the cross was, "that the flesh of the Teeswater was evidently improved. The staple of the fleece was shortened, but the wool was finer and closer," and a greater amount was produced.

It is believed that the **improved variety,** under the name of "Mugs," began to be **introduced** over one hundred and thirty years ago, and Wensleydale became in due time the chief home of the breed, which, like many other old-fashioned forms of Long-wool sheep, was driven out of its original habitat by the more-rapid-maturity improved Leicester.

An officially acknowledged **description of the Mugs** before 1840 has been given on the authority of "an old breeder" as follows:—"They were of large size, standing high on the leg, of a good length, and with particularly good strong loins and legs of mutton. Their great defect was behind the shoulder, and a want of thickness through the heart, while their necks were long and weak. The

wool was nicely curled and of good quality, and the head and ears white, with black spots."

It is not definitely known to what extent and at what time before 1839 improved Leicester rams were used to change the original Teeswater sheep into the one just described. But a very famous ram, Richard Outhwaite's "Bluecap," a half-bred Leicester, born in that year, exercised a most important and far-reaching influence on the breed. He was sired by "an elder Bluecap, bred by the famous Leicester breeder Sonley, of Lund Court, near Kirby Moorside"—a "very big Leicester" which cost 40 guineas for one year's service, put to ewes that had for several years been bred from "a very grand Teeswater tup." Outhwaite's "Bluecap" "had a very dark blue head, and his skin was nearly black, although covered with fine, white, lustrous wool."

The practice of letting rams for the season led to the wholesale distribution of "Bluecap's" blood through his numerous three-parts-bred sons, who seemed to have nicked remarkably well with the ewes of the leading breeders of the time, a result clearly attributable to the previous judicious introduction of Dishley-Leicester blood. Under the influence of this cross the "sheep began to be stronger in the fore-rib, shoulder, and neck"; and "a race of sheep was produced combining the hardiness, activity, and lean flesh of the Teeswater with the symmetry and early maturity of the improved Leicester." By 1860 the leading flocks had assumed a uniform type.

The **special properties** claimed for the improved breed are:—"That they are good breeders, excellent mothers, good feeders, have a good leg of mutton, and a class of wool that makes a higher price than any other Leicester wool. The ewes frequently produce 70 to 80 per cent. of twins." It has been asserted "that with the rise in the value of wool and mutton about the time of the American Civil War, an attempt was made by a class of breeders to increase the weight of the fleece and carcase to meet the wants of the times, and for this purpose Lincoln rams were resorted to." This cross has not tended to establish uniformity and elevate the average of quality, but, as breeders naturally aim at what best suits the market, any objectionable features thus introduced will in course of time drop out and disappear.



A. Romney Marsh or Kent Ram Lambs.
Owned by A. Lynn, Westhoke House, Lydd, Kent.



B. Half-Bred Ewe Lambs, "Hunthill."
A Champion pen of three. Three times shown, and three times First, including H.A.S., Kelso, 1898.

The breed was first introduced into Scotland by Thomas MacQueen, of Crofts and Muil—both in Kirkcudbright—to cross with Blackface mountain sheep on the heathery hills of the Southern Highlands. There, for over sixty-five years, they have, in virtue of being the hardiest and most active of all the varieties of Leicesters, maintained their ground, although on some of the grassy green hills and better classes of lowland pasture, good enough to develop the bone of the Border Leicester, the latter (owing to a greater tendency to early maturity and fat-production) has supplanted it. Cross hoggs are particularly well suited to feeding off in spring, producing mutton of the "primest quality."

It is claimed for the Wensleydale ram "that he is large and strong-boned, with great length of side and more lean flesh than any other long-woolled breed," and that "no other breed of rams can compare with the Wensleydale for getting breeding cross-breds." The cross-bred progeny of Wensleydales are sure to grow in favour as heavy fat sheep become more and more unpopular.

The **name of Wensleydale Long-wool** was given in 1876—in preference to the time-honoured local name of "Mug" and to that of "Yorkshire-Leicesters" by which they were known, and are at times still called, in Scotland—to overcome the difficulty of finding a proper designation for them in the show catalogue, when the Yorkshire Agricultural Society first offered prizes for the breed.

In May 1890, vol. i. of their *Flock Book* was published by the "Wensleydale Long-wool Sheep Breeders' Association and Flock Book Society," with an appended list of 125 members, including 104 breeders. In September of the same year, the first volume of the *Flock Book*, compiled by the "Pure Select Wensleydale Sheep Breeders' Association and Flock Book Society," was issued with a list of 45 members, 33 being breeders. The relative positions of the two societies had materially changed within fifteen years, for in 1905 the latter, or "Blueface," Society had a membership of 100, 78 being breeders; and the former, the original Society, 70 members, including 50 breeders. The Blueface Society gives yearly about 30 guineas in prizes, and its annual show and sale is growing in popularity with both buyers and sellers.

The nose should be wide, and in the rams strong and slightly arched; the back of the head flat, and the ears large, but well set on and well carried. The breed is specially noted for the absence of patchiness or excess of fat. The crosses bred from it are slower in coming to maturity than those of the Border Leicester or the other breeds of long-woolled sheep. The superior quality of flesh produced, the hardy constitution and active disposition, enable it, however, to maintain the position of first favourite in many districts; though it must be admitted that in some counties, such as Dumfriesshire, Border Leicester rams have displaced the Wensleydale in breeding half-bred lambs by Cheviot ewes, and to some extent among Blackfaces.

The Lincoln Long-wool is white-faced, with a tuft of wool on the forehead. It is as large as any sheep in England, though not larger than the Cotswold or South Devon. It was produced by crossing the Old Lincoln, which was famous for its wool, with the English Leicester.

Professor Low, in *Domesticated Animals of the British Isles*, classes the Lincoln with the Romney Marsh as "Long-woolled sheep of the fens and alluvial country," in contra-distinction to the long-woolled sheep of the plains, such as the Leicester and Teeswater breeds. He writes of the Old Lincoln as "of large size and coarse form; and describes the wool as long, thick, and tough in the filaments, of inferior felting properties, but tolerably soft to the touch, and rarely approaching to the harsh and wiry character of hair," unsuitable for carding, and never prepared except by combing for worsted yarn. "The fleeces weigh from 10 to 12 lbs., and those of rams and fat wethers often greatly exceed that weight. They fatten slowly, and consume much food, but are valued by the butchers for their tendency to produce internal fat." Such was the animal that by frequent crossing with the improved Dishley Leicester was after many years transformed into the present-day Lincoln. It is said to have been reduced in size, and its aptitude to fatten and tendency to early maturity increased, "while the wool is shorter and finer, though it wants the toughness, softness, and length of fibre of the true Old Lincoln breed," the wool of which was "altogether peculiar, and such as no country in Europe

produced." Low deplores the fact that refinement was introduced by crossing, rather than by applying Bakewell's methods within the breed itself. Probably many of the disadvantages proceeding from crossing have since been eliminated by selection, as there is no long-wool breed in the country which can produce anything like the same quantity or quality of long, strong, lustrous wool as the Lincoln. The staple[1] of well-bred tegs should be about as broad as two of a man's fingers. It is its power of wool-production and great size which have brought it into high repute in sheep-rearing countries abroad, although it is admitted that the mutton is only of second-rate quality.

The **export record** of the breed during 1906[2] beats all previous records of the Lincoln or any other breed in this country. For the year ending 30th September 1906, certificates were issued by the Lincoln Long-wool Sheep Breeders' Association for 3674 rams, 1614 shearling ewes, 339 ram lambs, and 333 ewe lambs; or a total of 5960, an increase of 1758 over the previous year's total. Another important incident in the history of Lincoln sheep was the sale of the entire flock (950 animals) of Robert and William Wright, of Nocton Heath, Lincoln, through F. Miller, of Birkenhead, to **Señor Manuel Cobo,** of Buenos Aires, for, it is believed, the sum of £30,000. The flock was founded in 1790, and it had been one of the most prominent flocks, winning prizes at shows and bringing high prices for rams for export. As the **Board of Agriculture Returns** for June 1906 showed a total of 993,983 sheep in Lincolnshire, or an increase of 10,146 over the figures of the previous year, the breed is too largely represented in this country to materially suffer from this loss. The same purchaser secured the Royal Champion Shearling Lincoln ram, "Riby Derby Champion," for the **record price** of 1450 guineas, at Henry Dudding's annual sale. The prices paid at that sale show the value attached to the best Lincoln blood when offered by public auction. Fifty-six rams averaged £151, 1s. 9d., and 23 ewes £16, 17s. 4d., or a total of £8848, 17s. 6d. for 79 sheep. The

[1] The word staple here refers to the natural locks, consisting of many fibres of wool arranged naturally in bundles, but it is also sometimes wrongly used with reference to a single fibre.

[2] See the *Live Stock Journal Almanac* for 1907.

activity of the demand was indicated by there being no entries for the sale, usually held in August, by the Lincoln Sheep Breeders' Association. The recent rise in the price of wool has had much to do with the unprecedented rise in the prices of Lincoln sheep.

The Lincoln-Merino "Corridale" breed was started in 1888 by J. Stringfellow, of Chartsey, Canterbury, New Zealand, by mating Lincoln stud rams with stud Merino ewes, and by subsequent selection to prevent them going too much to the Merino side, as then they become less robust. "The sheep has a great constitution, and with a few exceptions a really good fleece of superfine combing or fine combing wool." The flock has taken over 200 first prizes at four shows in seventeen years, and there is a ready sale for rams. In 1905 a lot of ten went to South America at 20 guineas each.

The Kent, or **Romney Marsh,** is a hardy, white-faced breed. It has been somewhat modified and improved by crossing with the Leicester; but it was early discovered that improvement for a breed like the Lincoln, where abundance of food could be provided by arable cultivation, was no improvement when gained at the cost of hardiness in the case of a sheep which had, like the Romney Marsh, to find its winter food in unsheltered pastures. The breeders, taking their type from the symmetrical Leicester, preferred to improve the breed by careful selection of the best to breed from, and no doubt the exceptional hardiness of the Romney sheep and its adaptability to different conditions abroad, are due to this fact. Kent sheep are not as a rule even now artificially fed in winter when on natural pasture, and, like the Scotch mountain breeds undergoing similar treatment, they do not lamb till April. A lamb to each ewe is under such circumstances a satisfactory yield. The wool, which belongs to the demi-lustre type, is good, and the breed is one of the closest coated of the long-wools. **Points.**—The forelock is sometimes wanting, and on account of this and other irregularities the breed is not uniform in type, though the best sheep are compact and symmetrical in form, and noted for great breadth of forehead and strength



A. Romney Marsh or Kent Ewe.
Champion at the Waikato Agricultural Show, 1904.
Owner, W. S. Allen, "Annandale," Piako, Morrinaville, Waikato, New Zealand.



B. Romney Marsh or Kent Shearling Ram in Wool.
First at Windsor Show, 1889.
Owner, Henry Page, Walmer Court.



A. South Devon Yearling Ewes.
Winners of several prizes.



B. South Devon Yearling Ram, "Coleridge" (7706), born 1904.
All bred by T. S. Walters-Symons of Coleridge, Chillington, Knightsbridge, S. Devon.



A. Devon Longwool Ewes (a pen of five).
First, B. & W., and the Royal, and Champion at New Quay, in 1888.



B. Devon Longwool Two-shear Ram.
First, R.A.S.E., Nottingham, in 1888.
Both the property of Sir J. H. H. Amory, Bart., of Knightshayes, Devon.

[*pp*. 584 *and* 585



A. Devon Longwool Ram Lambs.
Winners of many prizes, and clipped 8 lbs. of wool each at 4 months.
Owned by Gordon C. Skinner, Pound, Bishop's Lydeard.



B. Cotswold Shearling Ram.
First prize, Gloucester Show, 1904. Owned by William T. Garne.
[*E. Debenham, Gloucester.*

[*pp.* 584 *and* 585

of bone. The backs of fat sheep of this breed are hard to the touch, and the shoulder and backbone are liable to stand up too prominently, yet the mutton ranks next to Down mutton in quality, possessing, in comparison with Lincoln mutton, a much greater proportion of flesh to fat. The breed has been in high favour for over twenty years in the North Island of New Zealand, where much of the pasture-land is steep, and where a lighter and more active sheep is wanted than the Lincoln or the Leicester.

In recent years its merits have become appreciated in Argentina and several of the other sheep-breeding South American republics. The numbers of rams, and latterly ewes, exported to these and other foreign parts, including Canada and South Africa, have steadily increased since the foundation of the Kent or Romney Marsh Sheep Breeders' Association in 1895, and the compilation of the *Flock Book*, of which the twelfth volume appeared in 1906, containing a list of eighty members of the Association. This combined movement has led to the extension of the area occupied by the breed in this country. Very successful registered flocks are now established in Herts and Rutlandshire, which supply home evidence of the well-known adaptability of the breed abroad to different conditions of soil and of management. So stringent are the regulations for entry in the *Flock Book* laid down by bye-laws, that "no flock shall be eligible for acceptance for entry unless its owner is a member of the Association, and that all rams used therein during the three seasons preceding the application for registration shall have been registered rams"; also, "that no ram or ewe or ram lamb or ewe lamb bred by a non-member shall be eligible for registration unless it be proved to the satisfaction of the Council that its sire was a registered sheep and its dam by a registered sire." A detailed annual list of winning sheep at shows, and their owners, is likewise included. During the thirties and early forties of last century much interest was taken in **grazing contests**, which were held in different districts of the Romney Marsh, under the direct management of local committees. The sheep entered for competition were removed from the control of the owners to selected grazing lands, and no artificial food or fodder was supplied. Judgment was given at the expiry of the

allotted period, and prizes awarded to the most useful sheep.[1]

The South Devon Long-wool, or "South Dum," is an ancient local breed of conspicuous merit, the principal breed in Cornwall, and very largely met with in Mid-Devon. It has been recently brought into prominence by the formation, in 1903, of the South Devon Flock Book Association, and the issue of the first volume of the *Flock Book* in 1904. E. H. Hoskin, of Cartuther Barton, Liskeard, is credited with taking the lead in establishing the Association. The particulars of no less than 129 flocks, and a list of 161 members, are recorded. Many of the foundation flocks date back to considerably over a century, although many had been established within twenty years. It is claimed that the South Devon sheep possesses great robustness of constitution, is large, symmetrical, and well-grown, with plenty of bone and muscle; vigorous and thrifty, and equally adapted to the fold or to grazing land; a rapid feeder, and one that readily responds to liberal treatment, but able to thrive upon hard fare and in exposed places. The fleece is of great merit—a long staple of lustrous wool, curly and dense on the pelt, and free from kemp. The head is broad and rather long, and rough with wool; the ears fairly long, of medium thickness, covered with hair, often spotted. The carcase is noted for being full of lean meat, and for good development of the valuable parts. The Smithfield records of 1902 are ample evidence of the early maturity of the breed. The first pen of wether lambs gave the average daily gain per head of 11.46 oz. from birth, and the premier pen of wethers 7.57 oz. each. The South Devon differs from the Devon Long-wool in being larger, and in having a heavier fleece.

The Devon Long-woolled sheep is a local breed which is likely to become better known to the foreign buyer as a result of the establishment of a *Flock Book*, the first volume of which appeared in 1900. Low's *Domesticated Animals of the British Islands* (1845) shows that the breed was formed from two originally distinct breeds of great size, but coarse, inferior quality, by crossing with the improved Leicester,

[1] See the *Kent County Examiner and Ashford Chronicle*, September 27, 1895.



A. Cotswold Ram Teg (with a grey nose).



B. Cotswold Ewe Teg.

Both the property of Russell Swanwick, Royal Agricultural College Farm, Cirencester.

[*F. Savory, Cirencester.*

[*p.* 586

viz., (1) the "Southam Notts" breed in the south from the vale of Honiton westward, "with brown faces and legs," carrying "a fleece of long wool, moderately soft, weighing from 9 to 10 lbs.," the wethers scaling, at thirty months old, 22 to 25 lbs. per quarter; (2) the "Bampton Notts" breed on the borders of Devon and Somerset. "They had white faces, a very heavy fleece of long wool, and weighed 30 to 35 lbs. per quarter at two years old." The first introduction of Leicester blood gave very satisfactory results, but modern attempts to use it to further refine the breed have not been satisfactory. It is claimed in the historical statement in vol. i. of the *Flock Book*, that the breed possesses size and strength of constitution, a heavy fleece of excellent wool, and a long, wide, and deep carcase of excellent mutton, not over fat. As a breed it is admitted to be irregular in type, owing to the great varieties of soils, light and heavy, and the different elevations above the sea of the lands on which different sections of the breed are kept. The ewes are usually good nurses, and the lambs strong, active, and easily reared. The rams of this and of the South Devon breed will no doubt in time prove useful sires in a foreign country like the Argentine, when put to cross-bred flocks that possess too much Lincoln blood, for the production of the best quality of mutton and lamb for exportation. The breed claims to have produced the heaviest recorded carcase of a sheep fed in this country, and killed in 1846—that of a wether weighing 78 lbs. per quarter, bred and fed by Thomas Kingdon, of Thorverton, Devon. The Bath and West of England was the first Agricultural Society to offer special prizes for the Devon Long-wool breed, at Taunton Show in 1870.

The Cotswold is generally supposed to derive its name from the Cotswold Hills; but the writer of the historical statement published in the first volume of the *Cotswold Flock Book* points out that it is not improbable the "sheep gave the name to the hills upon which they exist—'cotes' meaning buildings in which they were formerly housed, and 'wold' being a wild, open country." Gloucestershire, which may be regarded as the centre of the home of the Cotswold sheep, was in the time of the Romans, early in the second century A.D., the seat of a large trade in the manufacture and

sale of woollen cloth. From this it may be inferred that considerable care was devoted by our ancestors, even at this remote time, to the breeding of sheep, which there is no reason to doubt were the progenitors of the Cotswolds of the present time; so that the breed is one of the oldest, if not the oldest, in Britain. The trade in both sheep and wool was maintained throughout both Saxon and Norman times, and at the present day considerable numbers of Cotswold sheep are annually exported to Germany, to the United States of America, and other foreign parts, where they are appreciated for their large size and for the power they possess of stamping their distinctive characteristics when crossed with other breeds.

They, too, have been improved by introduction of Leicester blood. They are extremely hardy, and well suited for feeding on stiff land, even when it is pretty wet. The flesh becomes coarse when sheep grow aged. At twelve to fifteen months old, tegs ought to weigh 25 lbs. to 28 lbs. per quarter. Those more moderately fed, and "run over" till two years old, get up to 35 lbs. or more per quarter.

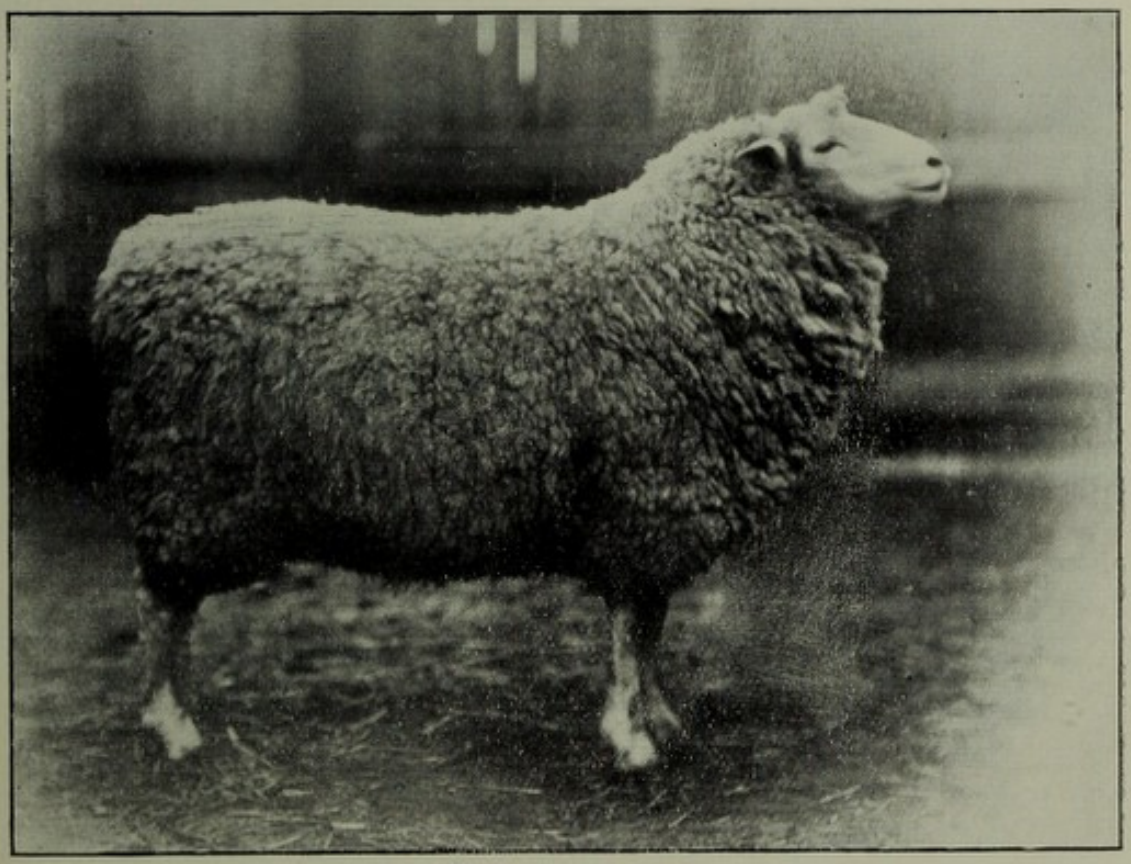
Points.—Faces strong, usually white, sometimes grey, with legs to match. Dark colouring on these parts gives the Cotswold more the look of a Down cross, and helps to sell the mutton at a higher price. A large tuft of wool covers the forehead, and when full grown ought to hang down almost to the nostrils. The ewes are fairly good milkers; and they are also prolific when not too fat or with too large a rump. The fleece of wool averages from 8 to 10 lbs. for ewes. The fibre is long, neither close nor too open, and rather coarse in quality. The belly, and particularly the scrotum or "purse," should be well covered with wool.

Through being an old breed of good size, it is well suited to crossing with ewes of short-woolled, smaller boned, and finer varieties, provided the head of the ram is not too large, with the object of avoiding the difficulty the ewe might experience in giving birth to the lamb.

The Roscommon Long-wool is now the only remaining distinct Irish breed of sheep, believed to be centuries old. It is noted for being "a hardy and active forager," and "a big upstanding sheep, taller than either the Cotswold or Lincoln, of great substance and quality, which thrives well on bleak,



A. Roscommon Ewes.
First prize pen of Hogget Ewes. Bred and owned by M. Flanagan, Tulsk, Co. Roscommon. When dressed they made an average weight of 43½ lbs. per quarter.



B. Roscommon Ram.
Owned by Matthew Flanagan, Lomona, Tulsk, Co. Roscommon.

[Photos by J. Lafayette, Ltd., Dublin.

exposed uplands, and on its native fertile plains, and is consequently a good tenant-farmer's sheep. It was indebted for its improvement in symmetry, like all other British Long-wools, to the English Leicester. It is also claimed that careful selection of rams by private breeders has probably had more to do with the breed's present improved position than any other influence. It is not an early-maturity breed, being naturally fed and not forced, although the ewes, which are hardy, good milkers, produce early-maturity lambs by Shropshire and other early-maturity rams. Mature sheep of both sexes make heavy weights, as records in the *Roscommon Sheep Breeders' Flock Book*, established in 1895, show: for example, a three-shear ram dressed to 288 lbs., or 72 lbs. per quarter; a ram lamb to 28 lbs. per quarter; hogget rams, 50 lbs. per quarter; and old ewes to fully the latter weight. The breed is hornless, and the head gaily carried; the face long and white, with or without a tuft of wool on the forehead; the muzzle of the ram strong; the ears fine in texture, white or pinky, and of medium length; the tail broad, and well set in; the fleece white, long, and heavy, with a broad staple and bright texture. At the block test competitions at the Dublin winter shows, the mutton has been proved to be "splendidly grained, evenly mixed with fat and lean, and of excellent quality."

CHAPTER XXVII

SHEEP—SHORT-WOOLS, INCLUDING THE DOWN BREEDS

Horned White-faces—The Merino—Dorset Horn—Western Sheep—**Hornless White-face**—The Ryeland. **Hornless Dark-faced Down Breeds**—South Down, or Sussex—Shropshire—Dorset, or West Country—Hampshire—Suffolk—Oxford.

HORNED WHITE-FACED SHORT-WOOLS

THE **Merino.**—In the matter of wide distribution, this breed occupies among sheep the position held by the Shorthorn among cattle. By far the largest number of sheep in the Australian Colonies, in the Argentine Republic, in the United States of America, and at the Cape of Good Hope, belongs to this breed, or to crosses which are nearly related to the Merino. All are believed to have sprung from the Spanish Merino,[1] though there are many distinct types known by specific names—as, for example, the Vermont Merino, the highly bred American sheep; the Rambouillet, or French Merino; the Negretti, to which the German Merino belongs; the Saxon Merino; and the various off-shoots of these varieties to be found in the colonies of Australia and Tasmania.[2]

Description.—The breed is white in hair, hoof, horn, and wool;[3] the bare portion of the muzzle is of an orange fleshy

[1] Probably introduced into Spain by the Phœnicians or Carthaginians about 1100 B.C.

[2] For details of the different strains of Merino blood, see the Author's work on the *Rural Economy and Agriculture of Australia and New Zealand* (1891). See also, *Sheep Breeding in Australia*, by George A. Bruni (Walker, May, & Co., Melbourne).

[3] A **black flock** of pure Merinos was established by the late Hon. W. Allen, of Braesides, Dalveen, Queensland, in the early eighties of last century. It once numbered 2000, but it was at a later date reduced to about 650. Black ewes mated with a black ram breed true to colour, the

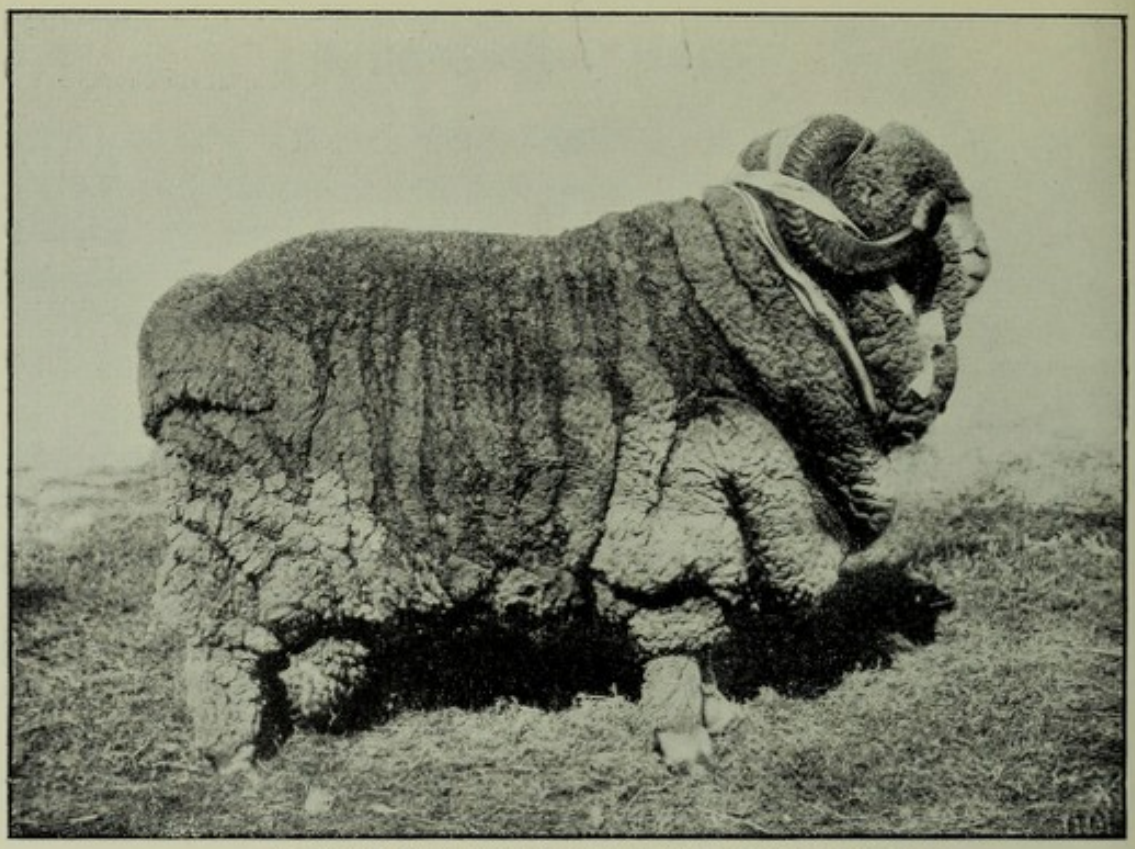
colour (white being objectionable); the eyes are light grey; the horns in the male well developed, spirally coiled inwards. In the case of ewes, the great majority are absolutely without horns; when horns do appear, they are comparatively insignificant. To the touch, the back is thin-fleshed, and slightly elevated at the withers; the backbone is rather sharp. The skin of some breeds is often very much wrinkled, more particularly about the neck, but the great majority of the Australian Merinos are comparatively plain-skinned. Irrespective of the difficulty of shearing, wrinkles are not liked in the camp except as an indication of purity of breed. If it were not the case that the progeny of Vermont and other wrinkled sheep lose the wrinkles, the infusion of fresh blood of this kind would be less in favour. There is a tendency to the production of coarse wool fibre, especially on the crowns of the wrinkles when these are large and numerous. Wool should be abundant, so that at shearing-time little but the nose and hoofs are to be seen projecting from a flouncing ball of white wool. The part of the face not clad with wool should be covered with soft silky hair. In well-bred sheep the wool is close, dense, and fine; though it varies in these characters, as well as in length and profusion, in the different varieties of the breed, and even within these varieties, according to the locality in which they are reared and kept, or to the nature of the country, food, and climate. Sheep generally produce finer wool after they have been once shorn. Uniformity in the quality is striven for; the wool of the hind quarter or thigh should not be hairy or strong in staple, but should resemble the wool of the side or fore quarter as much as possible. On being parted for inspection, down the side, shoulder, or back, it should divide freely, without any sign of adhesion or matting, which stamp it as inferior for the purposes of combing wool. A fine, wavy, bright staple should be presented down the sides of the opening (a condition usually more pronounced near the fore quarter than on the thigh), and at the bottom of it a bright flesh-coloured

tongue, the roof of the mouth, and the skin being black, with the exception of a white spot on the forehead and another on the tip of the tail They yield about ¾ to 1½ lb. less of wool than white sheep, but it has sold at nearly double the price. The sheep are very hardy, and "their jumping powers are extraordinary."

streak of skin. A real Merino fleece, as it grows on the sheep, should be firm as a board, and packed like a cauliflower—the tips of the wool being even, neither fuzzy nor straight, nor standing up in places. With greater length of staple, which is not a natural characteristic of the breed, the density which is of so much importance is lost.

There are (or were in 1893) several **breeders of pure Merino sheep** in this country, all of whom have a favourable report to give of the success of this cosmopolitan breed, even in our humid climate, which is very different from that of the parched-up country from which the Merino was originally dispersed. Among these may be mentioned the names of Sturgeon & Son, Grays Hall, Essex; Finlay Campbell, Brantridge Park, Balcombe, Sussex; L. A. Macpherson, Wirley Grove, Pelsall, Staffordshire; Purvis Russell, Warroch, Milnathort, Fifeshire. The Grays Hall flock was descended from a choice lot of Negretti Merinos, consisting of four rams and forty-six ewes, imported from Spain in 1791 by George III. The Brantridge Park flock was begun in 1885 by the importation of ten ewes and two rams from New South Wales, the direct and pure-blooded descendants of the famous Camden Stud flock, which was formed by blending the blood of a number of Merinos imported into that colony from the Cape in 1797 with a selection made in 1804 from the Royal flock above referred to. The ancestors of the Wirley Grove flock were imported from Canterbury, New Zealand, in 1887, and an offshoot of the flock has been established with success, at an elevation of five hundred and fifty feet above sea-level, at Corrimony, twenty-four miles from Inverness. Much valuable information regarding the character of the Merino when bred in this country has been provided by the history of a flock of about four hundred pure-bred Merinos, which was kept for a period of thirty years, ending about 1870, by Thomas Drewitt & Sons, auctioneers, Guildford.

It is generally supposed that Merino wool is liable to degenerate when grown in this country, but the consensus of opinion of those who have personal experience is against this view, if care be taken in breeding, and if the animals be not forced with rich food. Samples submitted to experts in the wool trade in London have been pronounced equal to



A. Merino Ram, "Wellington" (fine woolled), 5 years.
Eleven times Grand Champion of the yard, twelve times Champion of section, and sixteen first prizes.
Bred and owned by A. A. Dangar, Gostwyck, Wialla, New England, New South Wales.



B. Merino Ram, "Cannie Chiel" (by "Eclipse").
Strong comb, Champion ram, New South Wales S.B.A., Sydney, 1903.
Bred by Hon. S. M'Caughey, Coonong, Narrandera, N.S.W.

[*p.* 592

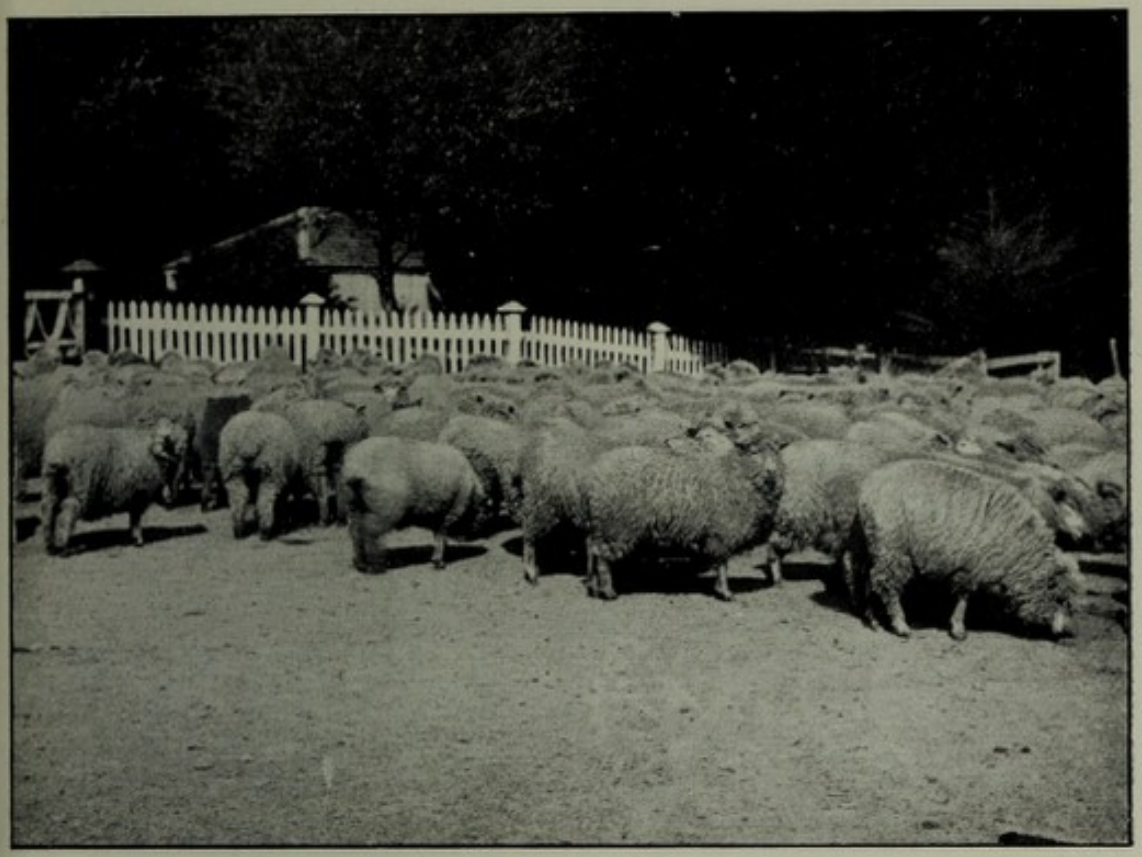


A. Merino Ewes, 1½ to 3½ Years Old.



B. Merino Ewe, 6-tooth, 14½ lbs. Scouring Wool.
Champion grass-fed ewe at Ballarat and Stawell, and many other prizes at good shows.
Both owned by the Exrs. of W. M. Bullinant, Longernong, Victoria.
[*Saml. G. Spink.*

[*p.* 592



A. Merino-Leicester 2-tooth Ewes.
Bred by New Zealand Land Association, Ltd., Woodlands Estate, Titapu, Waikatu, N.Z.

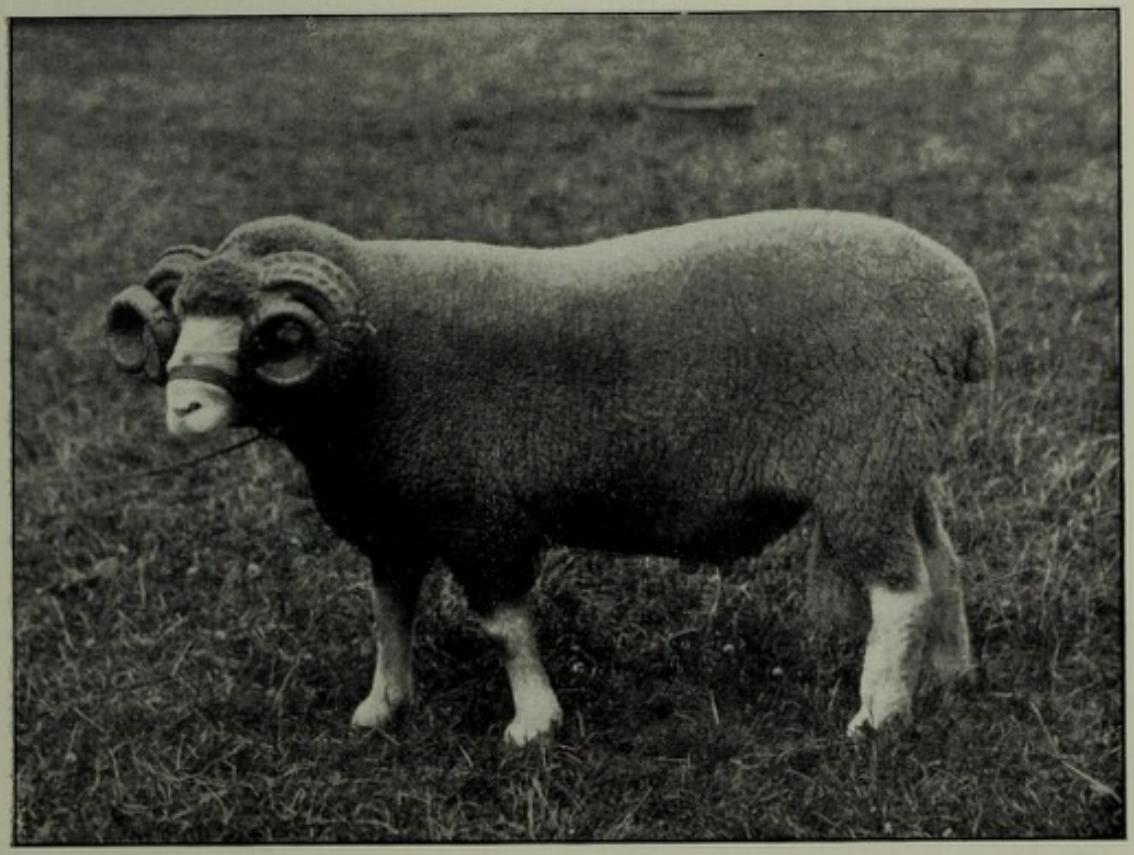


B. Merino-Scotch Blackface Cross Rams.
Owned by L. A. Macpherson, Corrimony, near Inverness.

[*p.* 592



A. Dorset and Somerset Horn Ewes.
The property of H. Davis, Preston Farm, Milverton.



B. Dorset and Somerset Horn Ram, "Prince."
First at Plymouth in 1890.
The property of Herbert Farthing, Thurloxton, Taunton.

[*p.* 592

the best class of wool of New Zealand growth, in respect of quality, density of staple, and growth. There is also a decided prejudice against Merino mutton imported from the Argentine Republic, and from Australia and New Zealand, owing to its dark colour, especially after it has been frozen, and its thinness as compared with that of the carcases of home-fed British sheep. Merinos are undoubtedly chiefly famous for wool production, and they are slow in coming to maturity for the butcher, the mutton being prime at three years old, but at its best, when produced on natural food, the mutton is not inferior to that of our mountain breeds. Crossing with most of our early-maturity breeds has proved successful in hastening maturity in the produce.

The weak point of the Merino breed, as a general-purpose sheep, is its slowness in maturing its mutton, but this is a defect for the remedy of which strong inducements are offered in connection with the Colonial and South American mutton trade with this country.

The Dorset Horn is a sheep with white face and legs, and a pink or flesh-coloured nose like that of the old Somerset breed, which seems to have been a superior variety of the white-faced but black-nosed Dorset, which, according to Morton's *Cyclopædia of Agriculture*, was "one of the oldest and best of the Upland short-woolled horned races—a breed prevailing in Dorset, Somerset, and Devon." **Spooner says** of it :—"The Somerset sheep is a variety of Dorset possessing the same peculiarities, and differing from it in being larger and taller but lankier, and in having more arched profiles, and pink noses and lips instead of black or white. The wool, too, is somewhat longer, and the lambs are larger." The Somersets were said to have greater fecundity, though not such good mothers. The former distinctions, including the black noses, have disappeared with in-breeding and selection. The lamb arrives at maturity more quickly than the Downs, and in certain districts Down flocks have been superseded by the breed. "The chief home of the leading Horn flocks is now in the southern and western parts of the county, with Dorchester as the centre, and in the Isle of Wight, where very old-established and extensive flocks are kept." The general features are pleasing. The head

stands well up, the horns thin, with a symmetrical curl, the face rather long and thin, and the eye quick and lively. The heart-girth is specially good, and the hind quarters squarely set and well fleshed down. The ewes are excellent nurses, and produce 130 to 180 per cent. of lambs; they are good folding sheep, and the mutton is well flavoured. The breed had a class to itself for the first time at the Royal Show at Battersea in 1862.

Thomas Halford, writing (1898) on Kerry Hill sheep (p. 563), says that the Dorset Horn breed, just before the middle of last century, was "so like the pure Welsh sheep, with the exception of size, that I thought they had been imported from Wales. I did not know then that the counties of Somerset, Devon, and Cornwall had been part of Wales, and existed as West Wales in early times, and that the aborigines had been pure Welsh. I now quite believe that these Dorset sheep are the indigenous breed of the country, and were left behind by the Welsh when they had to escape from their foes across the Bristol Channel to South Wales."

The **general management of the breed in Dorset** is as follows:[1]—"About one to one and a half ewes are kept to the acre, according to the quality of the land and the amount of water meadow and pasture attached to it. They require plenty of room, and are generally allowed to roam the pasture in the daytime, being brought on the arable land at night. They take the ram fully two months earlier than any other breed, and the general lambing time for the flock ewes is November and up to the middle of December. The off-going ewes are sold in lamb in the months of May, September, and October, and most drop their lambs in September and October, the lambs being fattened for the London market. The flock ewes generally lamb down on the grass; they are then put on roots, the lambs being allowed to run forward. The lambs remain with the ewes till May, when they are weaned, and go on to good grass till the fodder crops—rye, vetches, or trifolium — are fit to feed. They remain on vetches till about the end of June. As most of the lambs are fattened, they receive as much cake and corn

[1] The following quotation is borrowed from the prefatory note in vol. i. of the *Dorset Horn Sheep Breeders' Association Flock Book*, by Thos. H. Ensor, Secretary, published in Dorchester in 1892.



A. Western or Old Wiltshire Ram and Ewes.
The property of C. H. Monk, Sheepcote Hall, Aylesbury.



B. Cross-bred Tegs from Dorset Ewes by a Shropshire Ram.

[*p.* 594

as they will eat, about ¼ lb. to ½ lb. per head per day, with generally some peas. With such keep they are in a good season fit to turn out about the first week in April. The lambs born in October and November receive good feeding, and are generally ready for the butcher at from ten to twelve weeks old, when they average from 10 lbs. to 14 lbs. per quarter. They then make from 40s. to 50s. each in the London market. The off-going ewes are fattened off as well as the lambs, and, when they have been highly kept, are ready for market at the same time. They average from 22 lbs. to 28 lbs. per quarter. Shearing generally takes place in June, when both the lambs and ewes are shorn. The lambs yield from 2½ lbs. to 3 lbs. of wool, and the ewes from 5 lbs. to 7 lbs., and yearling rams from 10 lbs. to 14 lbs. The wool of the Horn lamb is much prized on account of its whiteness and the fine point it possesses, whilst the fleeces command better prices than those of most other English breeds." The breed usually divides with the Ryeland the premier awards for fine white short wool at the Royal Show. The **chief market** for the breed is Dorchester Poundbury Fair, held on the last Thursday of September. It was established in 1848, and twelve to sixteen thousand sheep are there annually exposed for sale.

The **special peculiarity** of the breed is, that the ewes take the ram as early as April or May, and breed "house-lamb" for Christmas. They are ready to take the ram again soon after lambing, and two crops in a year may be got, although the practice is not one that can be recommended for general adoption. The ewes are often tupped for the last season by a Southdown ram, so that the lambs possess dark heads with no horns, and become ripe sooner. Downs or Down crosses are usually supposed to give the best quality of mutton, and hence the run upon dark faces and legs.

The Western sheep is a remnant of the old slow-maturity, white-faced horned Wiltshire breed, **described by Low** as the "largest of the fine-woolled sheep of England. Its fleece was not only light (about 2½ lbs.), but its belly was destitute of wool." This he attributed to the warm, dry, chalky soil of the area. Like the old Hampshire, which it strongly resembled, it was rapidly supplanted or crossed out by the

early-maturity and symmetrical Southdown, and its modern prototype now fattens quickly when grass comes. Plates of the gaunt and ungainly pure breed are given in the illustrated edition of *Low's Domesticated Animals*, and the original oil-paintings from which they were taken are preserved in the Agriculture Department of the University of Edinburgh. The **present localities** of the modern representatives of the breed are in the neighbourhoods of Aylesbury, Bucks, and Northampton, where a number of farmers keep small flocks. The largest, numbering about sixty ewes, is that of C. H. Monk, Sheepcote Hill, Aylesbury, who has had the breed for about thirty years. Although somewhat like the Dorset Horn when the latter is newly shorn, they are of quite a distinct breed, but, probably owing to the difficulty of procuring fresh blood, some farmers have crossed their flocks with the Dorset. The **striking peculiarity** of the Western sheep is that it produces a very light, worthless coat of hairy wool which falls off in April and May, except in the case of sheep in low condition, on which it clings a few weeks later. The lambs even peel all over in July as clean as if they had been shaven. They are born with long tails. Ram lambs are in great request at an average price of about £3, 10s. (or £5 for the best) for crossing with Hampshire or with Welsh ewes to produce fat lambs. Western Hampshire cross-bred lambs dropped in February or March, weigh from 6 to 8 stones (8 lbs.) in the end of May or beginning of June. Plate CXCI. shows typical representatives of this breed of sheep, which are symmetrical, thick at the heart-girth, and weigh heavier than they look. Ewes frequently scale 11 to 12 stones each. They take the ram about the middle of September. The black spots on the skin are characteristic of the breed, but thought by some to be the result of in-breeding. The grey shading which appears on the noses of some sheep is probably derived from an early dash of Southdown blood.

Hornless White-faced Short-wools

The **Ryeland breed**, named from "a district in the southern part of Herefordshire, on which rye used to be grown," is discussed at considerable length by Youatt (1837), but with a deal of speculation and uncertainty. It appears to have been originally a small but very hardy white-faced

polled breed, with wool growing close to and sometimes covering the eyes. The weight of fleece rarely exceeded 2 lbs., but "it possessed a degree of fineness unequalled by any other British breed. There was a strong resemblance to the Merino ewe, which, "with the peculiar character of the wool, led to the suspicion that the Ryeland was of foreign extraction." The exceptional practice of cotting or shutting them up in close houses—where they were fed at night "with hay, barley, straw or pease-haulm"—during winter, to preserve the wool and save them from rot, was accepted as additional evidence of the truth of the conjecture, although "the Hereford breed of sheep [presumably the Ryeland] was well known so early as the year 1343." The Ryeland strongly resembled one of the various strains of early Shropshires, not only in wool but in "a striking similarity of form and appearance." It is also recorded that "our earliest writers on the sheep speak of the Ryeland as standing at the head of the short-woolled breeds"; and according to Herbert this breed "almost exclusively, in early times of sheep-husbandry, extended longitudinally through those districts from the Thames to the Tyne, and the Cotswolds were produced by a cross between the Ryeland and some heavy sheep. . . . In the course of years the Ryelands were gradually displaced by a heavy sheep over the greater part of the counties other than Herefordshire." When Merinos were first introduced into England it was sought to make them hardier by repeated crossing with the Ryeland, but the "scheme was abandoned," as was also the attempt to cross the Ryeland with the Merino, "since they appeared as if they were varieties of the same breed, as the first cross detracted much from the beauty of the English sheep, although the wool was improved and the tendency to fatten not impaired." "The Ryelands were also crossed, and that to a very considerable extent, by the Leicesters, but at great sacrifice of the fineness of the wool. It was likewise thought that the delicate flavour of the mutton in the Ryeland sheep was impaired and almost lost, although that of the Leicester was improved." By this means the Ryeland wool was converted into a combing quality—the fibre being "lengthened and somewhat thickened, fitting it for other and exceedingly valuable purposes"; and the Ryeland sheep, which could scarcely be much improved

in bulk by selection, was enlarged in carcase and lengthened in fleece by careful and repeated crossing." The greater part of this change took place between 1800 and 1828, though at the latter date it was actively progressing. The old Ryeland's **fattening record** on turnips was to produce "before Lady Day almost as much loose fat within them as they were pounds per quarter. . . . The superabundant fat did not load the muscles externally, as in the Leicester . . . and the flesh was on that account more generally acceptable," more especially as it "developed particularly on the loins and haunches."

Ladylift, in the *Hereford Times*, December 20, 1902, ventures the theory that the name of "Ryeland" was corrupted from "Rhulan," a district of Radnorshire, which at one time possessed a much wider signification than it bears at present. In support, he goes on to say that:—

"The sheep from which the celebrated Leominster wool was shorn—the 'Lemster ore,' as it is called by Drayton and Camden—and which are commonly supposed to be identical with the Ryeland, are spoken of by celebrated writers—by Dyer in his *Fleece*, and by Philips in his *Cider*—writers who were not only poets but distinguished as antiquarians—as 'bred in Cambria,' which assertion is corroborated by the learned annotator of the latter poem, the Rev. Charles Demster . . . who goes further, and fixes the part of 'Cambria,' whence they came, as the 'Radnorshire Hills.'"

A local writer says:—"Camden, in describing the town of Leominster, said:—The greatest name and fame is of the wool in the territories round about it, which, setting aside that of Arabia and Tarentum, all Europe counteth to be the verie best. Low considered it probable that it was descended from the soft-woolled sheep supposed to have been in the possession of the earliest Celtic inhabitants of the British Islands. From time immemorial the tract of country lying between the Severn and the mountains of Wales carried a small, hornless breed, noted for the softness of their wool. In the county of Hereford it was most frequently met with; though it spread into other districts, reaching Monmouthshire in the south, and Shropshire in the north (where its successors have long been known as the Clun Forest breed). The breed also extended eastward into Gloucester and Warwick. There were many local names attaching to the breed according as large numbers of them were found in a particular district. Ultimately it obtained

its modern name of the Ryeland breed from certain sandy tracts formerly devoted to the production of rye, situated southward of the River Wye. The breed originated at a time when the country was little cultivated, but was in a state of extensive forests and heaths. It had to exist on poor soil and herbage; it is not surprising, therefore, that it was of small size."

The **Modern Ryeland**[1] exemplifies what Youatt says of the general good qualities of the breed. Its size and wool-cutting properties have been increased without materially affecting either the hardiness of the sheep or the quality of the mutton. In a good flock, wethers at twelve months weigh 18 to 20 lbs. per quarter, and ewes at two and three years old from 20 to 25 lbs. While the breed does best on good sheep land, it thrives on tracts of cold, damp soil growing inferior herbage, where other breeds would starve. The average yield of wool in a flock where the lambs are kept as tegs is 8 lbs. per fleece, and the quality is so fine that it usually carries off the premier prize in its class at the Royal Show, or it shares the honours with the wool of the Dorset Horn breed.

A ram of good type has a masculine *head*, fairly broad at all points, moderate in length, and covered with wool down to the eyes, a little strip on each side of the face, but not extending across it; the *face*, a dull white colour, distinct from the "china" white of the Border Leicester, but dark skin about the nose and eyes; the *ears* of moderate length, carried well back, and dark in colour—if partially covered with wool, it must be white; the *neck* is of moderate length, of good substance, especially good at its junction with the trunk, and set on so as to give the head an appearance of being bridled; the *throat* free from jowl or loose skin; the *tail* broad; the *leg of mutton* broad across and well let down; the *legs* straight, and well apart, the *wool* of good deep staple and thickly set on the skin, the purse, belly, and all parts of the body being well covered, also, frequently, the legs below the knees and hocks. The feet are so well protected by good

[1] For most of the following information indebtedness is acknowledged to John T. Pinches, Secretary, Ryeland Flock Book Society, Limited, Stoneleigh, Ryelands, Hereford, who supplied extracts from the Preface of the prospective first vol. of the *Ryeland Flock Book*, written by himself, as the result of personal knowledge dating back to 1850.

thick hoofs of strong texture, that the breed is not so susceptible to foot-rot as most other breeds.

As a sire the Ryeland ram is most impressive, and in high favour for producing fat lambs by ewes of his own or other breeds. The lambs are generally born fat, and they retain their condition when well managed in virtue of their natural hardiness of constitution. **The ewes** have been repeatedly used as the foundation on which to start to breed up a Shropshire flock, on account of their symmetrical form and hardy constitution.

Ryeland sheep were supplanted to a large extent some years ago during the rage for Shropshire and other improved Downs, but the tendency of recent times has been to breed them up again, and to improve the form by selection. It was estimated in 1903 that there were only about thirty flocks of Ryeland sheep in existence at that time—twenty-five being located in Hereford and Brecknockshire, and two or three in each of the counties of Monmouth, Gloucester, and Worcester. Now (1907) they number at least two hundred.

Hornless Dark-faced Short-wools

The Sussex, or **Southdown,** is the breed through which all the other Down breeds have been formed, by crossing it with the old-fashioned varieties of the different districts. It is short-legged, and in all respects most compact and symmetrical, but particularly good in the hind quarters. The present improved and peculiarly handsome form of the breed has been attained by selection from the original stock, which was light in the fore quarters, and leggy. No outside blood was introduced. (See Appendix T.)

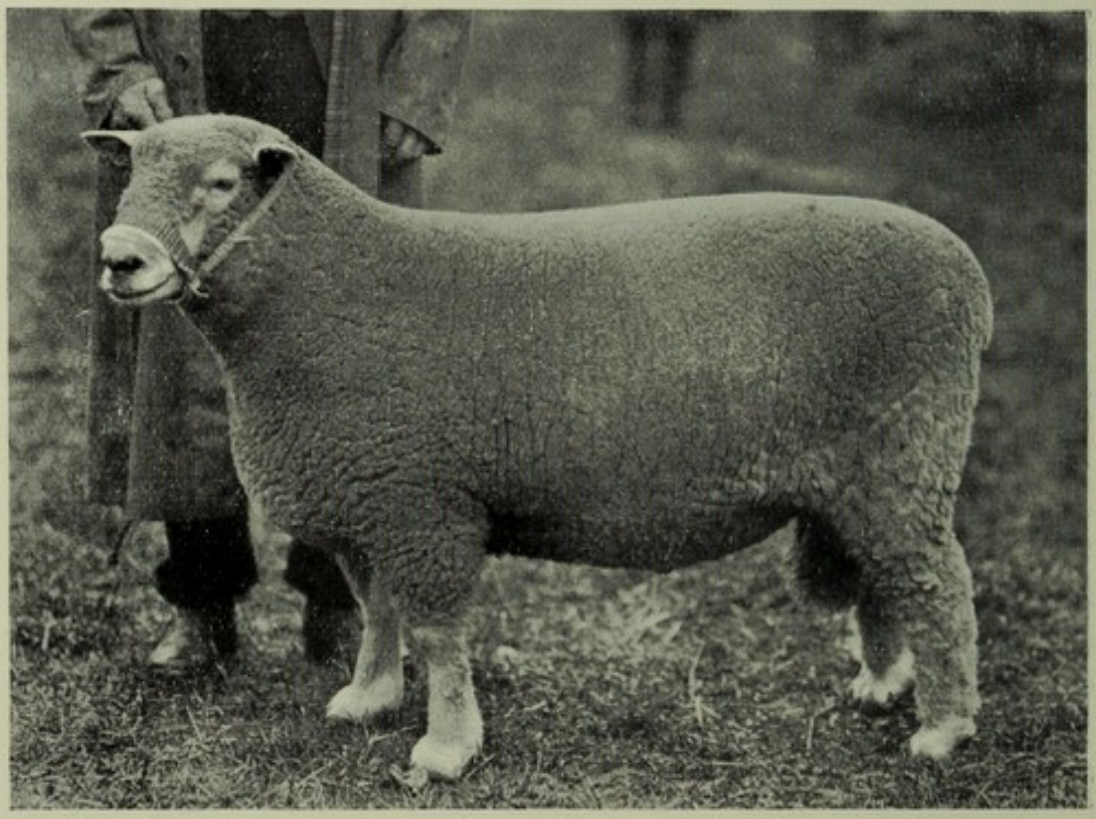
The head is small and neat, woolled close up to the ears and on the forehead; naked ears are most objectionable. The hair on the face and legs is of a grey-brown colour.

The fleece is short, close, and of fine quality, and should be free from hard projecting fibres; that from a ewe weighs from 3 to 4 lbs. Open, long, coarse wool has been imported into some flocks in the attempt to increase the size by crossing, and it is very objectionable. Any darkness or dullness in the colour of the skin when the wool is parted is also an objectionable feature in the show-ring.



A. Ryeland Ewes.

[*J. T. Newman, Berkhampstead.*

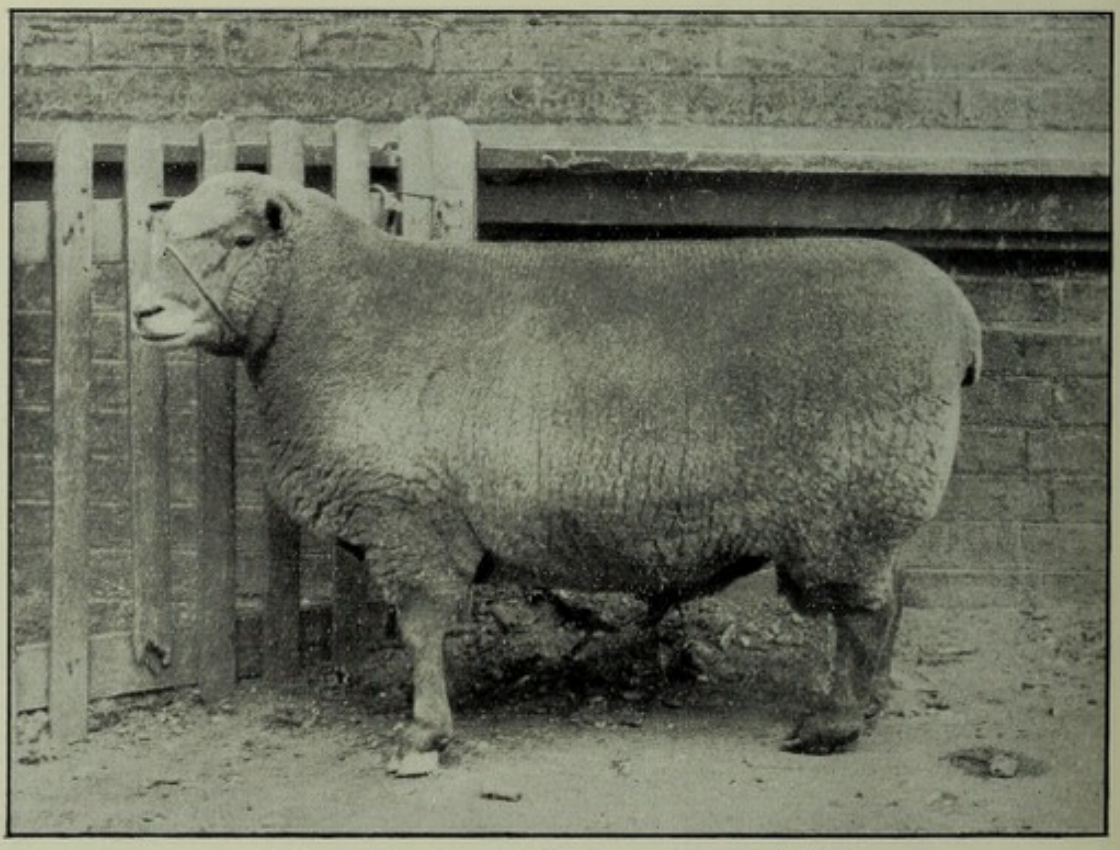


B. Ryeland Shearling Ram.
First, R.A.S.E. Show Park Royal, 1905.
Owned by W. T. Barnley.

[*J. T. Newman, Berkhampstead.*



A. South Down Ram, in "Field" Condition, after service.
Champion, Royal Counties Show, 1900.
Exhibited by Pagham Harbour Co., Selsey, Chichester.



B. South Down Ram, "Babraham Buller" (3530).
Champion, R.A.S.E. Show at York, 1900.
Bred and shown by C. Adeane, of Babraham Hall, Cambridge.

[*R. H. Lord, Cambridge.*



A. South Down Ram-Judging, Royal Show, 1905.
His Majesty King Edward's Champion in the foreground.
[*J. T. Newman, Berkhampstead.*

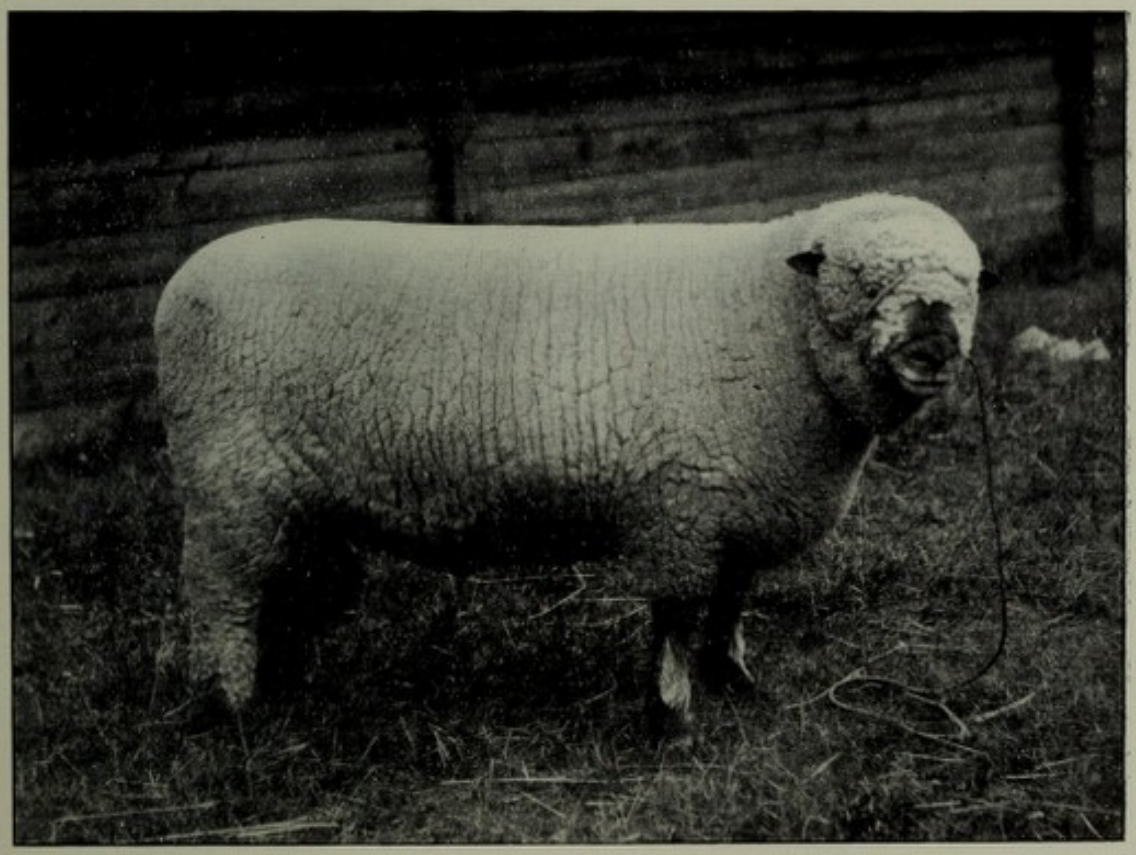


B. South Down Ewe Lambs.
First pen, R.A.S.E. Show, Cardiff, 1901.
Bred and shown by C. Adeane, of Babraham Hall, Cambridge.
[*C. Reid, Wishaw.*

[*pp.* 600 *and* 601.



A. Shropshire Shearling Ewes.
Won nine first prizes at good contests, including R.A.S.E. and H. & A. S. Shows, 1904.



B. Shropshire Shearling Ram.
Won six first prizes, including the R.A.S.E. and H. & A. S., 1904; also first at the Royal in 1903 and 1905. All owned by Sir R. P. Cooper, Bart., Shenstone Court, Lichfield, Staffs.

[*Both photos by G. H. Parsons, Alsager.*

[*pp.* 600 *and* 601

The flesh is of excellent quality, but it can be easily made too fat. The average weight for well-kept tegs should be about 18 lbs. per quarter at twelve months. The offal, as compared with that of other breeds, is of small amount. Fat wethers rising two years old, belonging to Earl Bathurst, and sold in Cirencester market in the first week of December 1884, dressed to 138 lbs. per carcase, or 34.5 lbs. per quarter dead-weight, and yielded 65.83 per cent. dead-weight to live-weight. But since that time the demand for sheep of this age and size has almost disappeared.

The original habitat of this breed was the region of the South Downs of Sussex and the neighbouring counties. Low described them as "a range of low chalky hills 5 or 6 miles in breadth, stretching along the coast upwards of 60 miles, and passing into the chalky lands of Hants on the west." The old beliefs, that they are not good rent-payers, except in their native district, and specially liable to foot-rot, have been disproved by modern experience.

The genius who began in 1778 to take the lead in improving the breed was **John Ellman** (1783-1832). He occupied for fifty years the farm of Glynde, near Lewes, in Sussex. In the time of **Arthur Young**, who wrote in 1788, the Southdown was speckle-faced, and one of the smallest of many local varieties of fine-woolled, but ill-shaped, semi-mountain breeds of sheep, producing mutton of extremely fine flavour. Ellman has recorded[1] that "at the outset of the work of improvement little in-breeding was practised. As improvement progressed it was otherwise, and the difficulty of obtaining good animals from other flocks was an impediment to perfection. For many years the Southdown sheep were remarkable for their strength of constitution, but as the march of intellect discovered new phases, the tide of emulation fairly setting in, the Bakewell school hurried agricultural improvements at a hazardous pace." Although Bakewell urged it, the Southdown breed was never crossed with the improved Leicester. Whatever the origin of the breed, which is lost in antiquity, there can be no manner of doubt that the influence of situation, including elevation,

[1] In a paper revised by his son Thomas Ellman of Beddingham, and published in the *Report of the Proceedings of the Southdown Sheep Club*, in 1893.

climate, and soil, on the light chalk formation, as well as the management, greatly influenced their size, quality, and appearance, and the character of their wool. The present agitation to divide the breed into two types supports this generally accepted view of the influence of environment, although the proposal is strongly opposed by the great majority of Southdown breeders. The "Upperdown" sheep resemble most the original Southdown breed, while the short-necked, wide-chested, short-legged "Underhill" sheep, that take most of the prizes at the leading shows, illustrate a divergence from the true hill type which has taken place in flocks kept in East Anglia, on the weald, and on flat meadowland in other parts of the country, all differing from the orographical character of the South Down range.

Ellman predicted what would happen, when he wrote:—"Depend upon it that the rich pastures of inland countries deteriorate the quality of the mutton, and interfere with other properties which have distinguished for ages this hardy race of animals. In stating this, I do not infer that Southdown sheep cannot retain properties to recommend them for general purposes, even when fed upon rich pastures, *but unless fresh blood from Sussex Downs is frequently introduced into those breeding flocks* which are removed into other districts, *the resemblance, the quality of mutton and wool*, will be changed, and the *hardiness* of the animal interfered with."

Low stated that "it is to the effects of careful culture, under favourable circumstances, that the modern breed of the Southdown owes the superiority which it has acquired over all the other short-woolled sheep of the Midland and Southern counties of England. With the advancement of tillage, and the larger proportion of turnips and other succulent plants, the breeders of Sussex had the means of treating their animals well while advancing to maturity; while increased attention was given to the selection of the breeding parents, and to the consequent calling forth of those properties of form which evince the tendency to arrive at early maturity of muscle and fatness. . . . The breed has spread over a great tract of country, and either superseded the pre-existing varieties, or been so mingled with them as to have modified all their characters. . . . It has superseded the ancient breeds of Berkshire, Hampshire, and Wiltshire,

and greatly circumscribed the limits of the horned Dorsets . . . It has extended into Herefordshire, and partly into Devonshire and the lower parts of Wales, and northwards even to Westmorland and Cumberland. But, beyond the limits of the true chalk, or of the calcareous districts in contact with the chalk, it is only found occupying tracts of narrow extent, or is employed as a means of improving the flocks of the heaths, commons, or other tracts which are still occupied by races of small short-woolled sheep." Prior to 1814 there was a premium upon the breeding of short-wools to supply the home demand for the manufacture of woollen cloth, a market which was lost to the home producer, when, on the advent of peace, Europe and Australia sent increasing quantities of merino wool, which was finer, and proved to be more suitable for the purpose. From that time forward the larger long-woolled sheep of the lower country have extended and displaced many of the short-woolled varieties, or in certain cases become mingled with them.

The *Southdown Flock Book* is published annually by the Southdown Sheep Society (incorporated). Vol. xv. was issued in 1906—the tenth by the Society. Vols. i. to v. were brought out by the Southdown Sheep Breeders' Association. The Society encourages breeding by offering substantial money prizes, or gold and silver medals, for Southdown classes at the leading shows.

The Shropshire is a medium-sized breed, and is the most cosmopolitan of all the Downs, owing to the thick and uniform cover of flesh on its back when handled for the butcher at any age; its hardiness of constitution and tendency to early maturity; its wonderful adaptability to many differing soils and climates; its unique success in crossing with sheep of almost any pure breed, or the common mongrels which constitute a large proportion of the sheep population of the world; its fairly heavy fleece of good bright wool; the superior quality of its mutton, and to some extent the darkness of the hair of the face and legs, which in common with similar darkness in other breeds is generally held as an indication of superior quality of mutton. Over 2000 registered Shropshires were exported during 1906 to the following countries:—Australia, New

Zealand, Tasmania, Japan, Canada, United States of America, Argentine, Uruguay, Chili, Brazil, Jamaica, Demerara, Natal, South Africa, Algiers, Germany, France, Russia, Spain, Sweden, Denmark, and Finland.

The Foundation Stock from which the modern Shropshire breed has been developed since the beginning of last century was the original breed of Shropshire and Staffordshire. It was described in 1792 by the Bristol Wool Society, quoted by Professor John Wilson, of the Chair of Agriculture in Edinburgh University, in vol. xvi. of the *Journal of the Royal Agricultural Society*, as follows:—"On Morfe common, near Bridgnorth, there are about 10,000 sheep kept during the summer months, which produce wool of a superior quality. They are considered a native breed, are black-faced, or brown or spotted-faced, horned sheep, little subject to either rot or scab, weighing—the wethers from 11 to 14 lbs., and the ewes from 9 to 11 lbs. per quarter, after being fed with clover and turnips, and clipping near 2 lbs. per fleece; this appears to be the original stock from which the present breed of Shropshires has sprung." The Morfe common sheep was said by Youatt to "resemble the Ryeland in many points," or to be a variety of that breed. Cannock Chase, in Staffordshire, also contributed a similar but heavier type of sheep, from which many of the Staffordshire flocks are descended. There can be little doubt but crossing with the improved Southdown was the means by which the early slow-maturity breed was developed into the modern hornless form.[1] The two pioneer breeders were Samuel Meire, of Berrington, and afterwards of Harley; and George Adney, of Harley, the blood of whose flocks is to be found in "nearly every flock of repute at the present day." The improved Shropshire got a strong impetus to its further development by the recognition of the breed at the Royal Show at Gloucester in 1853, "but it was not till 1859 that it was admitted into the Royal Society's prize sheet and recognised as a distinct breed." At the Royal Show in 1862 there were 133 Shropshires of all classes present, in 1874 there were 186; but in 1876 the numbers rose to 509, and in 1884 to 876. At the 1884 show, held at Shrewsbury, sixty exhibitors hailed from

[1] Prof. D. D. Williams, in the *Farmer and Stock Breeders' Year Book*, 1907, associates the Long Mynd breed with the ancestry of the Shropshire.

fifteen counties, whereas the Southdowns—the great rivals of the time—that were present came from eleven breeders located in six counties. The irregularity of type which at one time existed in the breed has disappeared.

The ewes are prolific, as "with ordinary management at least 50 per cent. of doubles may be looked for." They are well adapted as cast ewes for the "lamb and dam" trade, "for not only do they feed their lambs well, but as a rule they are ready for the butcher when their lambs go." The breed is responsible for having supplanted or reduced in numbers many of the original breeds of the country, possessing as it does "all the quality of the Southdown, with considerably more size, and carrying a large proportion of lean meat to fat." For example, it has encroached upon the Roscommon breed in Ireland, where it is in high favour, upon the Southdown, the Ryeland, the Cotswold, and numerous local English breeds, which have entirely disappeared. Although it has established itself in full perfection as a pure breed with Thos. A. Buttar, at Corston, in Forfarshire, it has been overshadowed by the Oxford Down as a sire of cross lambs in the Scottish Border country. It was extensively tried in Scotland for this purpose about 1884, but, when kept to finish on turnips in spring as hoggs, they proved to be smaller than Border Leicester crosses, and failed to supplant them. Another disadvantage of the Shropshire when used to cross with sheep on hill pasture, is that the lambs for the first few days are too bare to resist the cold in wet and stormy weather. The breed has had unparalleled success as a sire in all countries producing the main imported supplies of mutton for the British market, with the conspicuous exception of Argentina, where every other breed has been bested by the Lincoln—the chief consideration of sheep-breeders so far having been the quantity and quality of long wool. In New Zealand, where "there is no sheep equal to the Shropshire for producing lambs for freezing," crosses three or four months old weigh 39 lbs. each carcase. The success of the Shropshire as a general-purpose sheep for the production of mutton and wool is focussed in a *brochure* issued by Alfred Mansell & Co., secretaries to the **Shropshire Sheep Breeders' Association and Flock Book Society**, Shrewsbury, England, in 1901. The Association was formed in the autumn of 1882,

at a meeting called by Lythall and Mansell, and a history of the breed from the pen of Alfred Mansell, College Hill, Shrewsbury (to which indebtedness is acknowledged), appeared in vol. iii. of the *Flock Book of Shropshire Sheep*, published in 1885.

Points.[1]—"*The Ram* should be masculine in character; face not too long between eye and muzzle; strong nose; broad between the eyes and between the ears; strong, thick neck, well arched into shoulder; head and face completely covered with fine white wool, except the nose, which should be a mellow black; ears also dark in colour, and small or medium; fleece very dense, fine, and of medium length; the whole body and legs covered with an equal quality of wool—coarse wool about the thighs, or light, thin wool on the shoulder points being great faults, as also black or grey wool. The skin should be pink, and free from blue or dark spots; the body square, on short, straight, stout legs, without gross, coarse bone, and the back and ribs well covered with lean flesh."

The Ewe possesses the same characteristics, but should be feminine and gay in appearance, having a finer head and neck. A good average weight for a fleece in an ordinary ewe flock is 7 or 8 lbs.; those of ram tegs and highly-fed ewes more; but heavy "clips" of wool are frequently coarse.

Shepherds' Calendar of the Ashlyns Hall flock of Shropshire ewes belonging to Sir Richard Cooper, Bart., of Berkhamsted:—

August.—The work of the year begins with the close examination of the flock and the removal of the faulty ewes, if any remain in the flock so late in the season. The flock is made up to its numerical strength of 200 by selected shearling ewes, which are numbered in large figures (3-inch), so that they can be readily identified. All ewes are selected and apportioned to the different sires, which are allowed to run with them, excepting show rams in high condition. In that case, the ewes are accompanied by a teaser, and all, in turn, taken to the selected sire. Mean-

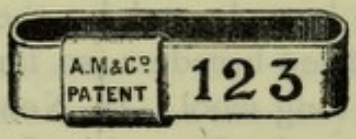


FIG. 44.—PATENT LOCKING EAR-TAG.

[1] Specially prepared for the Author by Thos. A. Buttar, Corston, Coupar-Angus, N.B.

while, the ewes run over the stubbles, and are as often as possible changed to fresh pasture to keep them improving in condition.

September.—This is the month in which the greatest proportion of the flock is served by the rams. During the first few weeks a special mark is placed on the served ewes at the end of each week, so that the ewes can be drawn into the lambing-pen weekly in order of service. Special attention, including drenching, is necessary to prevent lung or throat worms among the lambs.

October.—The shearling ewes are put to the ram early this month, so that they may lamb a little later than the older sheep, and in better spring weather. The rams are generally withdrawn at the end of October (although the rule is not absolute), and winter dipping is then done.

November and December.—The ewes are allowed to run on the grass with, when necessary, an allowance of hay, and as far away from the lambing-pens as possible, until they are well advanced in lamb, when they are brought nearer home, and a little dry artificial food is given, say ¼ lb. each, gradually increasing to 1 lb. per day.

January and February.—Lambing begins about the 8th of January, and practically closes about the end of February. The greatest number of lambs come in the latter month. All are registered within a week by notch marks in the ears. The number is entered in the private flock book against the entry of the dam, and a distinguishing number with paint is placed on each to correspond with a similar number on its sire. Lambs at a week or ten days old are drafted to the adjoining fields by day and taken into open sheds at night, to harden them off until they are fit to lie night and day in the fields, probably with the shelter of some protection cloths round hurdles. Meanwhile the ewes are well fed on artificial food, and as much kale, swedes, and hay as they can eat; the lambs running in front, and getting crushed oats and linseed cake. A plentiful supply of rock salt is put within reach of all.



FIG. 45.—SYSTEM OF NOTCHING THE EARS.

When the figures required are above 5 or 50, two cuts are made, *e.g.*, for 79 cut 50 and 20 on the off ear, and 5 and 4 on the near ear. A hole in the centre of both ears denotes 300.

April.—Liberal feeding continues, but is varied by the substitution of mangels, kale, rye, and clover seeds about the middle of the month. The one-year-old rams for show purposes are early shorn, and shearing the ewe flock may be begun in the last week of April.

May.—The general shearing is completed early in the

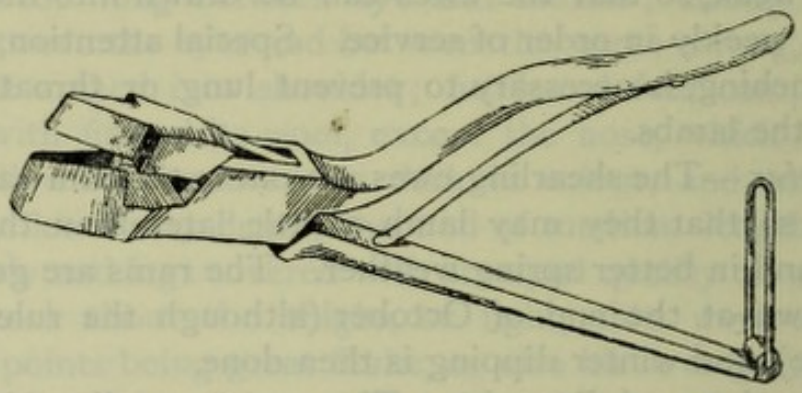


FIG. 46.—FINE-POINTED NIPPERS FOR NOTCHING THE EARS OF LAMBS.

month, and at the same time the unshorn lambs are dipped. Each lamb is given one of Cooper's tablets, made of compressed sulphur-arsenic dip material, as a precaution against parasitic worms in the alimentary canal—the lambs being fasted over night, and for an hour afterwards. It may be

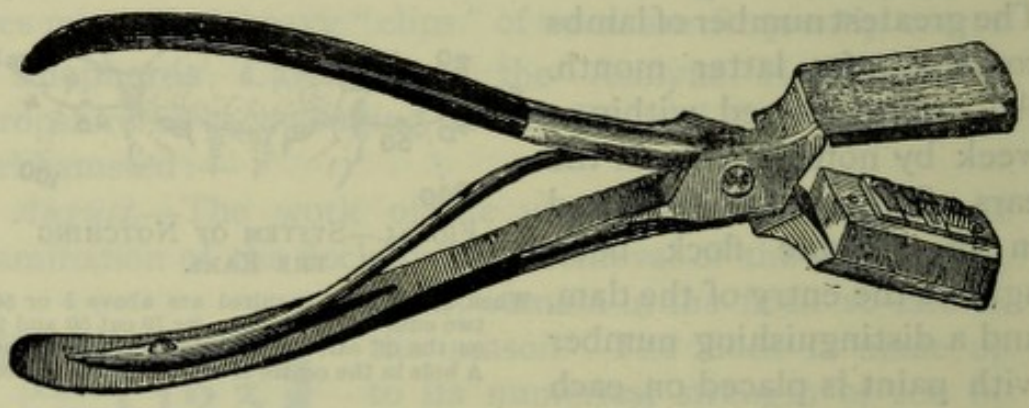
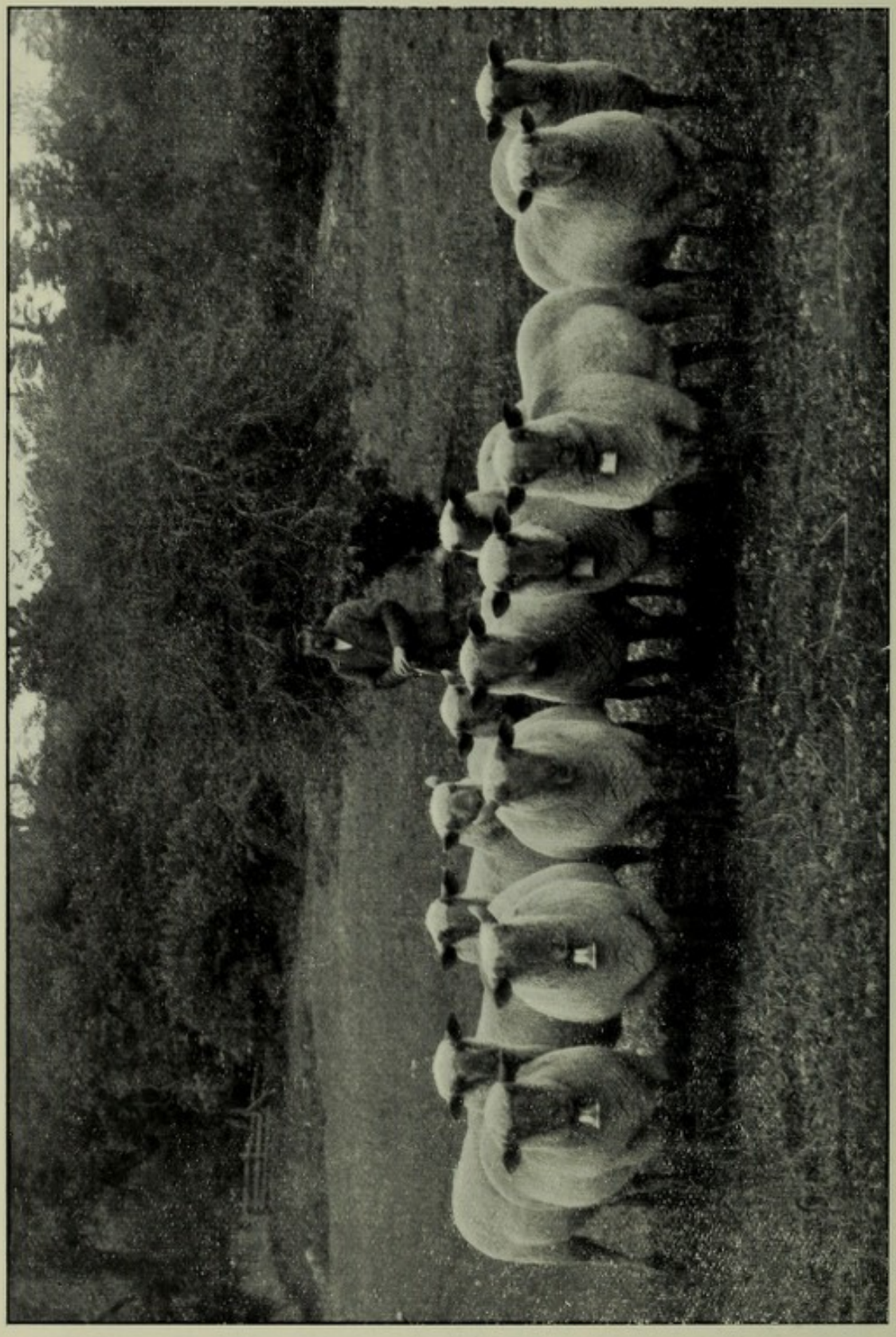


FIG. 47.—TATTOOING IRONS, CALLED A "TATTOOER."

necessary to repeat the dose every month or six weeks until November.

June.—The summer dipping of the whole flock is carried out towards the end of June. The lambs are also weaned, and the ewes placed on the worst pasture, as far from the lambs as possible, until August, with little attention, in the hope that they may lose excess of condition.



DORSET DOWN EWES.

First prize at Dorchester Agricultural Show in 1905. The property of T. O. Boatswain, Forston Grange.
[*W. G. Cox, Weymouth.*



A. Hampshire Down Shearling Ewes.
First, R.A.S.E. Show, Park Royal, 1905. The property of James Flower, Chilmark, Salisbury.
[*C. Reid, Wishaw.*



B. Hampshire Down Shearling Ram, "Flame."
First at the Wiltshire, Oxford, B. & W., Royal Counties, and R.A.S.E. Shows, 1905.
Owned by James Flower, Chilmark, Salisbury.
[*G. H. Parsons, Alsager, Cheshire.*

[*p.* 608



A. Hampshire Down Ewe Lambs.
First, R.A.S.E. Show, 1905. Owner, H. C. Stephenson.
[*J. T. Newman, Berkhampstead.*



B. Hampshire Down Ram Lamb, 20 Weeks Old.
Owned by James E. Rawlence, Canal, Salisbury.
[*H. B. Collis, Canterbury.*

[*p.* 608



A. Suffolk Down Ram, "Playford Model."
A Champion winner. Owned by S. R. Sherwood, Playford, Ipswich.



B. Suffolk Ram Lamb.
First, R.A.S.E. Show, Park Royal, 1905. Owner Herbert E. Smith.
[*J. T. Newman, Berkhampstead.*

The Dorset Down, or **West Country Down** breed,[1] was brought into prominence outside its county area by the formation of a Dorset Down Sheep Society, at the meeting of the Milborne Farmers' Club in November 1904, about eighty years after the modern type of the breed was established. The breed is also called the "Improved Hampshire." It is "a middle type of Down sheep pre-eminently suited to Dorsetshire," originally formed by breeding Southdown rams to Hampshire ewes, and using the rams from the flocks thus formed to improve the original Down sheep of the west, which it is claimed trace back for a very long time before the Hampshire Down breed was established. Two names are specially mentioned in connection with the work of improvement, viz., (1) Thomas Homer Saunders, of Watercombe, near Dorchester (followed in his work by his son, Thomas Chapman Saunders); and (2) Humfrey, of Chaddleworth, near Newbury. Humfrey selected rams from the celebrated flock of Jonas Webb; and Saunders, selecting his rams from Northeast's flock, carried off nearly all the prizes in the "short-woolled other than Southdown" classes at the Royal shows of Chester in 1858 and Warwick in 1859. Since that time, when the "Western Country Downs" acquired a high reputation, rams from these flocks have been extensively used to refine many of the flocks of Hampshire and Wiltshire. And Dorsetshire breeders have gone to the leading flocks thus improved for requisite changes of blood, "with the result [says the *Flock Book*] that the Dorset Down breed now registered, although of finer bone and often of lighter colour, are closely related to, and possess the principal features of, the Hampshire Down type, modified by local conditions."

"A good type of Dorset Down should be free from all coarseness, the chief points being a rather long, full, clean face and under-jaw, with a bold, bright eye, and full muzzle; the ears should be fairly long, thin, pointed, whole-coloured, and carried well above the level of the eyes; the neck strong and well set on. The animal should be fairly fine-boned, and covered with a close, fine fleece going well down to the

[1] Indebtedness is acknowledged to the preface to vol. i. of the *Dorset Down Flock Book*, and to a speech by Henry Duke reported in the *Dorset County Chronicle* of 24th November 1904.

hocks and knees, round the cheeks, between the ears and on the forehead; but wool under the eyes, or across the bridge of the nose, on the ears, or below the hocks and knees is to be avoided. It is desirable that the face, ears, and legs should be of a greyish-brown colour. The Dorset Down should embody the good points common to all breeds of sheep, but should be especially good through the heart and behind the shoulder; it should also have a well let-down and rounded leg, and, whilst not standing too short, there should be no tendency to legginess."

It is claimed that the Dorset Down is a rent-paying type, which, stocked thick on the ground, produces the small mutton of the finest quality sought for in the best markets, viz., from 66 to 72 lbs. at eight to nine months old, or from 40 to 48 lbs. as sucking lamb at ten to twelve weeks old: and that they are equally at home between hurdles, and spread over the ewe-leases upon which the Dorset flocks are kept six or eight months of the year. In comparing Hampshires and Dorset Downs, it has been stated that 120 Dorsets could be bred and kept in place of 100 Hampshires; that the Hampshire butchers' teg would weigh 9½ stones (of 8 lbs.), or 19 lbs. a quarter, worth 8d. per lb., against the Dorset 8½ stones, or 17 lbs. a quarter, at 8½d. a lb.; and that the Dorset Down fleece often averages 5 to 5½ lbs., or rather more than the average Hampshire flock, and fetches 1d. a lb. more at sale. The breed reaps all the marketing advantages which quality confers on a prime as against a rough or coarse-feeding sheep or its product. It is estimated that there are about 100,000 Dorset Down breeding ewes in the country, and about 40,000 of these were entered in the first volume of the *Flock Book*—a fact which demonstrates how quickly and widely a knowledge of the value of registration is spreading in this country.

The Hampshire Down sheep, says the preface to the first volume of the *Flock Book* published by the Hampshire Down Sheep Breeders' Association in 1890, "undoubtedly dates its origin from the crossing of the old Wiltshire horned sheep and the old Berkshire knot with the Southdowns, which were introduced into Wiltshire and Hampshire early in the nineteenth century." The first results were different

types of large, coarse sheep in different districts. In north and east Hampshire the breed was dark brown, almost black on the face and ears; with Roman nose, greatly developed neck muscles, and large leg bones, a tendency to the production of "snig horns," or loose scurs, and wool growing below the hocks and knees, with only an occasional white spot on the hair-covered surface. In Wiltshire a larger-framed and less symmetrical animal, often with speckled faces and ears, was produced. It was the genius of Humfrey, of Oak Ash and Chaddleworth, near Newbury, that conceived and guided the process of unifying and refining the various types by introducing Sussex or Southdown blood—a work which also benefited the Dorset Down breed, as shown on p. 609. The modern Hampshire occupies a large area in the counties of Berks, Hants, and Wilts, "while many pure flocks exist in Gloucestershire, Somerset, Surrey, Sussex, Kent, Herts, Cambridge, Essex, Norfolk, Bedford, and the Midlands generally." One feature of the breed is that it is "adapted for the high-lying and barren uplands of the chalk, where holdings are exceptionally large, and flocks number from 1000 and upwards." The general run of flocks is seldom under 300, and in vol. xv. of the *Flock Book* the registered flocks numbered 363.

Prior to 1861 the Royal Agricultural Society of England recognised only four classes of sheep: (1) Leicesters; (2) Long-wool, not Leicesters; (3) Southdowns; (4) Short-woolled sheep, not Southdowns. An addition to the list was announced in 1861, of Hampshire Downs, Lincolns, Cotswolds, Dorset Horns, Oxford Downs, Romney Marsh, Mountain, and Irish long-woolled breeds.

The Hampshire is larger, coarser-looking, squarer, and lower-set than the Shropshire, and when young not easily fed to "handle fat," though often forced to great weights by high feeding. Ewes on good land are frequently allowed 1 lb. each per day of a mixture of equal parts of linseed cake and peas or cracked Egyptian beans, until the lambs begin to eat; then it is gradually taken from the ewes and given to the lambs. With abundance of natural food in addition to the concentrated mixture, a ram lamb may increase from 19 lbs. at dropping in January to 150 lbs. live-weight on 1st August. It is a common and successful practice to put them to the

ewes at about seven months old, and sometimes as early as in July. Lambs can be got early, as the ewes come in season sooner than most other sheep. Ewes are generally cast in early autumn at four and a half years old, after rearing the third crop of lambs. Ewe lambs can be put to the ram to produce lambs at one year old, but the practice is not to be encouraged. "A well-bred **fattening lamb** on good keep will increase at the rate of ¾ lb. per day from birth, and will weigh 113 lbs. on 31st May." Of this, 68 lbs. or 60 per cent. will be dressed carcase, or 17 lbs. per quarter. The great success of the Hampshire in competition with other breeds at Smithfield (see the annual official reports) is partially due to the advantage of early birth. The mutton is of fine quality, not so fat as that of the long-wool breeds, and all over firm to the touch.

Points.—The head large, and free from "slugs" or "snigs," with a strong Roman nose; the faces and legs a uniform dark brown or almost black; light faces indicating recent crossing with the Southdown. The wool free from black patches, growing close up to and round the ears, dense and fine over the body, and white when shed, with a pink skin underneath. The average weight of fleece is 4½ to 5 lbs. for ewes. The ears are of a good size, more pointed than in the Southdown, of a dark mouse colour behind, and free from light specks. The fore quarters are particularly good, and the top of the shoulder exceptionally broad. A conspicuous defect at one time prevalent in ordinary specimens of the breed was a want of girth and slackness behind the shoulder, but this defect has been bred out to a considerable extent.

The Suffolk sheep was formed towards the close of the eighteenth century and the first half of last century, by crossing ewes of the hardy Blackface Norfolk Horned mountain breed (see Plate CLXIII. and p. 554) with Southdown rams, to give symmetry of form, compactness, and early maturity. The general interbreeding of these two distinct strains of blood is described by W. and H. Raynbird, of Hengrave, in an *Essay on the Agriculture of Norfolk*, written for the Royal Agricultural Society in 1847. About this time they were known as "Southdown Norfolks," and locally as "Blackfaces." It was not till 1859 that they were designated "Suffolks," when

classes were provided for them at the Suffolk Agricultural Association's meeting. Among early breeders, George Dobito, of Lidgate, Suffolk, took the leading part in establishing the Suffolk as a distinct breed soon after 1850. Other noted ram-breeders were—J. Walker, of Loudham Hall, Suffolk (1830); J. M. Green, of Stradishall, Suffolk (1850); Peter Portway, of Sampford, Essex (1850); George Kent, of Gazeley, Suffolk (1860); and General Hall, of Six Mile Bottom, Cambridge (1850). The breed is mentioned in *The General View of the Agriculture of Suffolk* as far back as 1797. Some pure-bred flocks of the present day date back to 1790, which throws light upon the fact that recent attempts at the importation of foreign blood into the breed have not proved successful. Those in the eastern districts partake strongly of the old Norfolk characteristics, viz., dark face, light bone, and active habits. Those to the west are, as a rule, kept on better land; they have lighter faces and greater aptitude to fatten, and grow to greater weights.

The Suffolk breed was not recognised as of sufficient importance to form a class at the Royal Agricultural Society's shows until 1886. Since that time it has made rapid progress.

The **Suffolk Sheep Society** was established in the same year, "for the purpose of promoting the purity of the breed, and providing a reliable guarantee to buyers by maintaining a register of pure-bred sires." "Under the certificate of the Board of Trade, dated 17th July 1891, the Society's mark—a lozenge, with or without a letter 's,' supported by two shepherd's crooks crossed—was duly registered, and by order of the Council, 'sheep lambed subsequently to 1890 will not be registered as pure-bred Suffolk sheep unless they bear the registered mark of the Society and the breeder's registered flock number tattooed inside the *left ear*.' A subsequent order provides that rams shall bear their individual registered number tattooed inside the *right ear*." Flocks are inspected prior to registration, and re-inspected every fourth year.

The following are the **distinguishing points** of the breed adopted by the Society:—*Head*, hornless; face black and long, and muzzle moderately fine — especially in ewes (a small quantity of clean, white wool on the forehead not objected to). *Ears*, a medium length, black, and of fine texture. *Eyes*, bright

and full. *Neck*, moderate length, and well set (in rams stronger, with a good crest). *Legs* and *feet* straight and black, with fine and flat bone; woolled to knees and to hocks, clean below. Fore legs set well apart. Hind legs well filled with mutton. *Belly* (also *scrotum* of ram), well covered with wool. *Fleece*, moderately short: close, fine fibre, without tendency to mat or felt together, and well defined, *i.e.*, white, not shading off into dark wool or hair. [The new-born lamb has a uniform grimy colour all over the tips of the wool, not patchy like the lambs of the old Norfolk breed, due to patches of black or blue skin growing black wool.] *Skin*, fine, soft, and coloured pink.

It is claimed for the **breed** that it **excels** in the following particulars:—in *activity* of movement, in good *carriage*, and high *courage;* in *fecundity*, to the extent of producing over thirty lambs to the score of ewes; in *early maturity*, as the ram lambs are so large and well developed that they are usually preferred for breeding purposes to older sheep; in *hardiness*, as the breed has not been pampered, and will find a living on bare pastures where most other breeds would starve. The *mutton* is very fine, possessing an exceptionally large proportion of lean meat. It commands the highest prices in the market. The *constitution* is unusually robust and hardy, the animals possessing great power of endurance when driven long distances. Their being almost exempt from foot-rot has raised their reputation as good "rent-payers," and has led to the displacement of a good many "half-breds," at one time largely kept in the marsh-land districts.

The **Suffolk ram** crosses admirably with all white-faced ewes, producing a black-and-white speckle-faced lamb, and a carcase full of lean meat, very well suited to the requirements of the butcher. No other British breed of sheep can produce a saddle-cut of mutton with such wealth of lean red meat in proportion to fat as the Suffolk and the old Norfolk breeds. **At the International Live Stock Show at Chicago** (22nd November to 5th December 1903), the first prize in the dressed carcase competition went to a Suffolk wether exhibited by Wisconsin Experiment Station. The championship in the sheep carcase competition or "block test" at the **Smithfield Club Show** was won for the five years (1902-6) by Suffolks or Suffolk-cross lambs; and the reserve for the

championship also in 1901-5. The most successful cross was that between the Suffolk ram and large-framed Cheviot ewes from Sutherlandshire brought into prominence by Charles T. A. Robertson, Upper Ifold, Dunsfold, Godalming, and bred by him at Little Horringer Hall, Bury St Edmunds. In 1905 he began selling weekly drafts of Suffolk-Cheviot tegs at eight months old in the middle of October, and at the end of two months an average of 61s. each was realised. The bareness and consequently unprotected condition of the Suffolk-Cheviot lamb at birth prevents its extension to hill pastures.

An experiment showing how the **Suffolk ram** mates with **Merino ewes** was carried out at the Colonial College, Hollesley Bay, in 1894-96. At fifteen months old the progeny averaged 94 lbs. per sheep live-weight, which yielded 60·64 per cent. of dressed meat of "excellent quality, fine in grain, and of good flavour, with a large proportion of lean." The Suffolk-Merino wool, 7½ lbs. to the fleece, was "most excellent of its kind, with a 'soft handle,' and withal quite firm in staple."

Historical statements of the "genesis" of the breed of Suffolk sheep, with a summary of its unprecedented successes at carcase competitions (to which indebtedness is here acknowledged) were issued in 1905 by Ernest Prentice (Secretary and Editor), 64 Oxford Street, Ipswich, as a preface to the *List of Members of the Suffolk Sheep Society.*

During the past few years Suffolk ewes and rams have been **exported** to the Colonies, and to Austria, Spain, France, Germany, Denmark, Russia, Finland, Switzerland, South America, and North America. In January 1893, the "American-Suffolk Flock Registry Association" was incorporated, "to establish, maintain, and publish a register of pedigrees of pure-bred Suffolk sheep, and information concerning the breed." Sec.—G. W. Franklin, Atlantic, Iowa.

The **chief localities** of the breed in this country may be recognised by the four districts into which flocks are divided for the quadrennial inspections—(*a*) East Suffolk; (*b*) Mid, West, and South Suffolk; (*c*) Cambs and Norfolk; and (*d*) Essex. Four divisional challenge cups, the "Bristol" Champion Challenge Cup (for best flock) and the "Pretyman" Challenge Cup (for best ewe lambs), are offered each year for competition.

In Scotland, no one has done more to popularise the breed than William Ford, Fentonbarns, East Lothian, who

among many other prizes gained the sheep championship of the Scottish National Fat Stock Club Exhibition in Edinburgh in 1898, with a pen of Suffolk wethers, and the reserve numbers in 1899 and 1900, with pens of Suffolk half-bred wethers.

The **Oxford Down** breed was **originated** about 1830, by the crossing of Cotswold rams with improved Hampshire ewes, and in a few cases with Southdown ewes. The aim, said Pusey, was to secure "the superior quality, and therefore higher price *per pound*, of the mutton as compared with long-woolled sheep, and the superior weight of wool and of mutton as compared with short-woolled sheep." The **accredited originators** of the idea lived near Witney, and seem to have acted independently. They were—Samuel Druce, of Eynsham; John Gillett, of Brize Norton; William Gillett, of Southleigh; and Nathaniel Blake, of Stanton Harcourt. They were speedily joined—if they were not preceded—by J. T. Twynam, of Whitchurch Farm, Hampshire, and by John Hitchman, of Little Milton. The breed was **first named** "Down-Cotswolds," changed about 1857 to "Oxfordshire Downs," and shortened in recent years to Oxford Downs. Clare Sewell Read referred to them in the *R. A. S. E. Journal* for 1854, "as the glory of the country — the most profitable sheep to the producer, the butcher, and the consumer." It is the largest Down, although Hants tegs (being dropped sooner, and being consequently older) weigh more at the London Christmas fat stock shows. The breed has been since the early fifties of last century a frequent winner of prizes in competition with other breeds at the Royal, the Smithfield, and other leading shows. Their honours include the Smithfield fifty-guinea cup for the best pen of sheep in the shows of 1872, 1875, and 1887.

The most **famous ram** which stamped his characteristics on the breed, as "Hubback" did among Shorthorns, was "Freeland," bred by A. F. Milton Druce. He was hired for the season by John Tredwell, Upper Winchendon, Aylesbury, and the following year sent to the States, "where he won the championship of the sheep classes at the Philadelphia Centennial Exhibition." America early showed its appreciation of the breed, as an association for the publication of an



A. Suffolk Down Ewe, with Triplets.
Imported into New South Wales by G. R. Jackson, Ferndale, Mohonga, *via* Altury, N.S. Wales.



B. Old Norfolk Blackface Horned Ewe and a Hornless Ram, by a South Down Ram.
One of the ancestral parent breeds of the modern Suffolk, on the hills of Norfolk, Suffolk, and Cambridge.

[*From the Low Collection of Paintings in Edinburgh University.*



A. Oxford Down Ewe and Lamb.
From the breeding flock of John Tredwell, Upper Winchenden, Aylesbury.



B. Oxford Down Shearling Ram.
Champion at the R.A.S.E. and other shows.
Bred at Heythrop, and sold to D. Maclennan for Buenos Aires.

[*pp.* 616 *and* 617

Oxford Down Record has existed in America since 1881. Vol. i. of the English *Oxford Down Flock Book* did not appear till 1889, the Oxford Down Sheep Breeders' Association having been formed in 1888 at the annual Oxford Ram Fair, held on the first Wednesday of August.

The **distinguishing characteristics** of the ram is given as follows in the *Flock Book*:—"He has a bold, masculine head, well set on a strong neck; the poll is well covered with wool and adorned by a top-knot; the ears are self-coloured, and of good length; the face is a uniform dark brown colour; the legs are short, dark coloured (not spotted), and placed well outside him . . .; the mutton is firm, lean, and of excellent quality; the fleece is heavy and thick on the skin." The wool is longer and more open or loose than that of other Down sheep—in fact it ought to be classed as long-wool; fleeces of ewes average 6 or 7 lbs. each.

Flocks of cross ewes are sometimes kept for breeding fattening tegs. When they become light-faced, after frequent crossing with the Cotswold, a pure Hampshire ram is turned in for a year, and when rather dark a Cotswold is used in preference. A Shropshire ram on such a cross ewe produces a sheep with a better covering of flesh along the back than the Oxford Down will do.

Oxford Down rams were **first introduced** into the Border district of **Scotland** by the late Walter Elliott, of Hollybush, Galashiels, about 1867, and in 1885 he wrote to the Author: "This year there would be about 100 rams sold at Kelso, and I consider them the most useful sheep introduced into our country of late years." For a number of years they were put to Cheviot and Scotch Blackface ewes, and their use had almost been given up when it gradually became realised that they have no equal in producing crosses for hogging by the Leicester-Cheviot ewes, and that they also cross well with Border Leicester ewes. The cross progeny of the Oxford ram is slower in reaching maturity than the progeny of the Border Leicester, but it can be fed to greater weights in spring, 65 to 68 lbs. per carcase, without becoming too fat to be classed as finest quality.

The following **table of figures** (from the *Kelso Chronicle*), giving the **numbers of rams** exposed during eight years at the annual sale, held under the auspices of the **Border Union**

Society at Kelso in the middle of September, shows the very important position the breed occupies in the Southern counties of Scotland, and also how it is gradually supplanting the Border Leicester rams for crossing purposes. The special merit of the Oxford Down cross is the larger proportion of lean mutton to fat than is given by the progeny of the pure Border Leicester ram.

	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.
Border Leicesters .	1186	893	871	953	938	927	988	960
Half-breds (Leicester-Cheviots) .	359	350	332	374	341	343	325	368
Downs (mostly Oxfords) . . .	620	461	648	651	705	779	1071	[1]1051
Totals . .	2165	1704	1851	1978	1984	2049	2384	2379

[1] Of Downs in 1906 there were 62 Suffolks, 55 Hampshires, and the others were Oxfords.

CHAPTER XXVIII

MANAGEMENT OF SHEEP ON ARABLE LAND AND LOW-COUNTRY PASTURE—THE EWE AND LAMB

Tupping Time—Effect of "Flushing"—Winter Pasture—Prolific Tendency—Ewes not in Lamb—The Lambing-pen—Poisonous Plants—Parturition and Associated Dangers—Early Treatment of the Lamb—Food of the Ewe—Lambs' Food—Castration—Tetanus—Marshall's Work on the Filiform Appendage—Washing—Shearing by Hand and by Machinery—Weaning.

"TUPPING" or "Ride" time commences usually, where the climate is moderate, about the first week of September, or at any later period, varying with the district, till about 22nd November (Martinmas), when hill rams go out to the ewes. The date is often governed by the time the ewes begin to come in season: for instance, Hampshires will tup in the beginning of August, whereas mountain ewes frequently do not begin to stand to the ram before the end of October. Cast ewes (four-year-old) and "culls," or those unfit for breeding, are "drawn" out when the lambs are weaned, or at any more suitable time before the ram is put amongst them.

By putting ewes on good food, such as rape or mustard, for ten days before tupping time, they get into an improving condition, and in consequence produce more doubles. The object may also be accomplished, if the green food cannot be had, by giving each one ½ lb. of oats daily. The effect produced by thus "**flushing**" or artificially stimulating ewes shortly before and during tupping time, has been dealt with by Dr Francis H. A. Marshall in a preliminary paper communicated to the Royal Society (London), and published in the *Proceedings* (1905). The conclusions reached in this paper are based upon statistics collected by the Highland and Agricultural Society for Scotch Blackface, Cheviot, Border Leicester, and half-bred ewes in the year 1904-5. It is

shown that the percentage of lambs produced was as a rule very appreciably greater among those flocks which underwent a process of flushing, and that the percentage of barren ewes in the same flocks was generally less than the average. Conversely, the occurrence of a snowstorm, or the loss of a good field of pasture from the run of a flock during tupping time, will correspond with the stoppage of twins in the following lambing season. The condition of the ewe, not that of the ram, seems to be all-powerful in controlling the number of doubles. Only when the environment is favourable can the hereditary tendency to be prolific —which has been noticed in the ewes but not yet remarked in the ram—have any important influence.

Too much care cannot be exercised in arranging the ewes and rams according to their different qualities and characters, so that the flock may maintain a definite type of its own. One ram to sixty ewes is the usual proportion; but a "shed" tup may be allowed a greater number, even one hundred or more, if a "chaser" or "teaser" lamb, with a cloth sewed on his belly, be put out to find the ewes as they come in season. A ewe remains in use for about twenty-four hours. If not settled, ewes "come back" to the ram at the end of thirteen to eighteen (usually sixteen) days. The mechanical way of finding this out is to use three colours of paint, say blue, red, and black. The breast, or sometimes the inside of one fore leg of the ram, is first rubbed with blue for rather more than two weeks. Red is used for the next period of sixteen days, and black for a third period. The ewe's rump is thus marked while being tupped, and according to the colour of the last marking the time of lambing is approximately predetermined. A ewe marked twice should be put to another ram for a third trial, as she is less likely to hold to the first ram than to another. This is most easily accomplished by running several lots of ewes with the accompanying rams together. At the end of six weeks, when the tups are taken up, the ewes should run over stubbles and poor pasture, or follow fattening sheep to pick up what remains of turnips or other rejected food: they should be kept thriving, but must not be made too fat.

Ewes going on pasture during winter may be given an allowance of ½ ton of roots per hundred per day till lambing

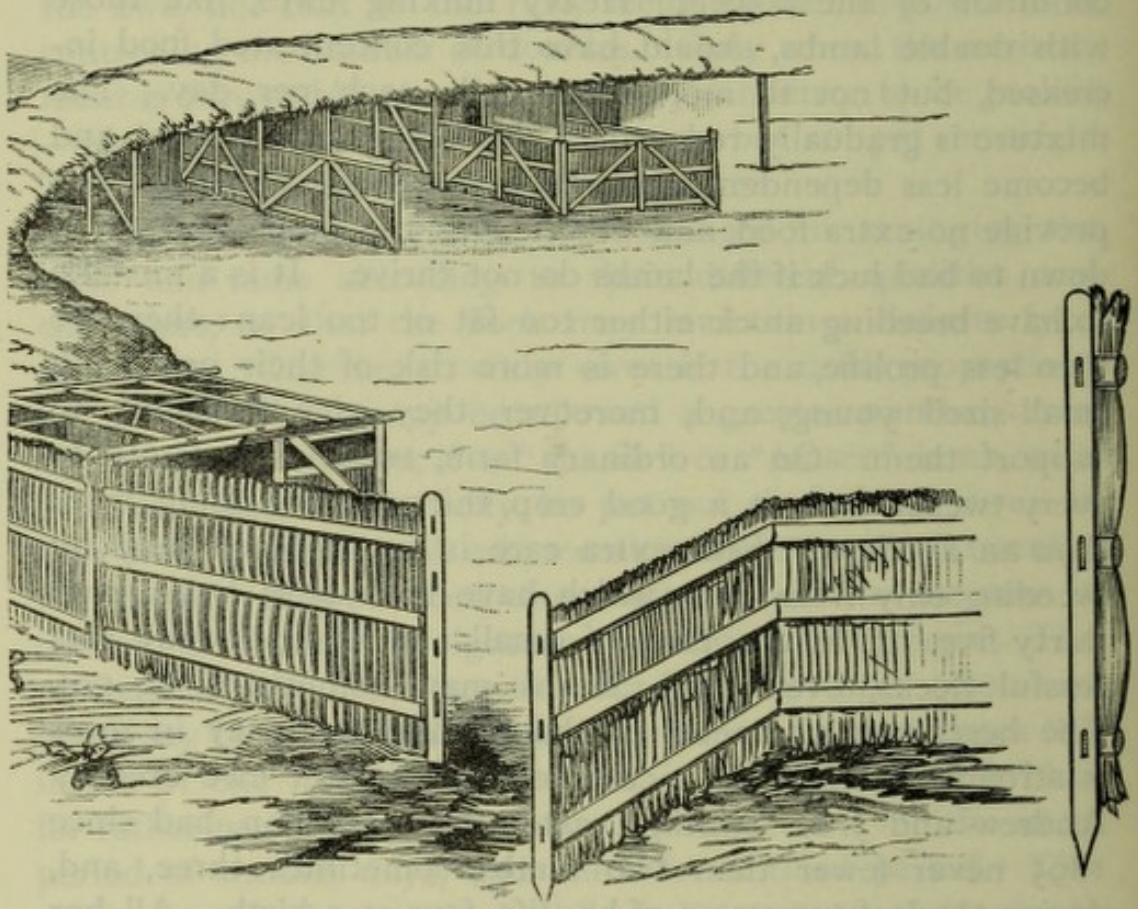
begins; and after they have lambed, 1 ton per day, or 22.4 lbs. each, along with 1 or 2 lbs. of hay or good oat straw in racks. The amounts should be slightly increased if snow covers the ground. Ten days before lambing begins each ewe should have ½ lb. daily of a mixture of concentrated artificial food—such as crushed peas, Egyptian beans, and cake, with oats (whole), and bran, varying in relative proportion to one another, and also in quantity, to suit the condition of the bowels. Heavy milking ewes, like those with double lambs, should have this concentrated food increased, but not to more than 1 lb. each per day. The mixture is gradually reduced as the lambs learn to eat and become less dependent upon their mothers. Some farmers provide no extra food, and others give too much, and set it down to bad luck if the lambs do not thrive. It is a mistake to have breeding stock either too fat or too lean: they are then less prolific, and there is more risk of their producing small-sized young, and, moreover, they give less milk to support them. On an ordinary farm, twenty-five lambs to every twenty ewes is a good crop, thirty lambs being more than an average. With extra care in management, and by breeding only from ewes which have been born twins, even thirty-five, or, in the case of small and exceptionally successful flocks, even forty lambs may sometimes be got. The hereditary character of the **prolific tendency** in ewes is strong; for example, a cast Border Leicester ewe bred by Andrew and J. K. Smith, Leaston, East Lothian, had since 1895 never fewer than two lambs, sometimes three, and, during the last two years of her life, four at a birth. All her female progeny have invariably borne two or three lambs at a time. Five living lambs at a time is no very unusual event to find recorded in agricultural papers.

Ewes not in lamb (eild) may be noticed near to or during lambing time by the following signs:—

1. By their jumping and playing in good weather; 2. By being less bulky than the others in the region of the abdomen; 3. By no lamb being felt when the ewe is turned up, and the tips of the fingers pressed against the lower part of the belly; 4. By having no "show," or increase in the size of the udder; 5. By the appearance on the bare skin about the udder of a considerable amount of yellow waxy excretion which does

not look as if it would naturally clean off; and 6. By the wool near to the udder being more firmly attached than the wool of a pregnant sheep.

The lambing-pen is an open, well-littered yard, often erected at a suitable spot in a field of roots, and constructed of hurdles thatched with straw to provide warmth and shelter for the young lambs in stormy weather. The walls may alternatively be made of two webs of sheep wire-



[*After a sketch by Commander M. J. Harrison, R N.*

FIG. 48.—VIEW OF ONE SIDE OF A LAMBING-PEN.

netting (4-inch mesh) placed 6 inches apart, and packed with straw between. The pen should be placed on dry ground, with a southern exposure, in a sheltered place if possible, and on a slope sufficient to let surface water readily escape. Small covered pens, each about $4\frac{1}{2}$ feet square, are ranged round the north, east, and west sides, numbering thirty to thirty-five, for the accommodation of two hundred ewes. The cost of the labour of erecting a lambing-pen of the size named is about £3. Ewes "coming near their work" are brought in at night, so that they may be more carefully tended. Ewes

do not lamb so frequently at night as late in the evening and early in the morning, and lambing is easier in moist than in dry weather.

The period of gestation in ewes is between twenty-one and twenty-two weeks. The shepherd should live in a wooden house on wheels, fitted with a stove, and placed close to the pen, to enable him to give his undivided attention to the flock.

Rhododendron, laurel, ivy, and azalea leaves are a frequent cause of poisoning amongst "grit" ewes, brought near the homestead for lambing, if they get into the garden and browse on the leaves, or eat them through the fence, as they will do when green food is scarce and their pregnant condition gives them a ravenous appetite. "*The symptoms* are very acute: there is great tympany, laboured breathing, dullness, a green sputum runs from the nostrils and mouth, the animal is unable to stand, and will lie for several days with occasional fits of struggling, and death ensues if it is not treated with purgatives and stimulants. The ewes will recover, but the lambs are invariably born dead." **Henbane** (*Hyoscyamus niger*) produces similar symptoms. A few cases are on record of sheep being poisoned by eating the leaves of **Foxglove** (*Digitalis*) when snow is upon the ground. Tannic acid is said to be an antidote; failing this, treat as usual for vegetable poisons (p. 258).

During parturition assistance by hand should never be given too soon. Should the head of the lamb protrude, immediate action is necessary to prevent its death by strangulation. When parturition is normal the two fore legs appear first, then the head. A steady pull by the legs is usually successful help. In false presentations, large lambs require to be turned right round before they can be got away. Turning is most easily accomplished when the ewe is suspended by an assistant holding her by the hind legs. The hands, after washing with strong carbolic soap, should be smeared with carbolic oil, one part of pure carbolic (Gresser's or Calvert's, not the crude or brown form) to twenty of sweet oil. Half an ounce to one ounce of the mixture should be put into the vagina afterwards, to prevent inflammation (the result of injury, or of the presence of putrid matter, as when the lamb is dead), which induces "straining."

Inversion of the uterus (commonly called the "lamb-bed," or in Gloucestershire the "wither" or "wether") is thus prevented. When protrusion occurs, the exposed part should be washed with tepid water cooled after boiling, and a wine-glassful of laudanum per pint added, as cold water is liable to give pain, and, while the ewe is held up by the heels, pressed gently back into its proper position, with the hand held flat, care being taken not to pierce the organ with the fingers. The oil should in such a case have a few drops of laudanum put into it to help to soothe and to allay the irritation. To retain it in its position, a 1-inch mesh net made of strong twine may be put on the top of the wool round the hips and covering the tail, the ends passing along the sides of the ewe, and terminating in fastenings to a rope tied round the heart-girth, after the fashion of the cow-breeches described at p. 338. If a net be not at hand, locks

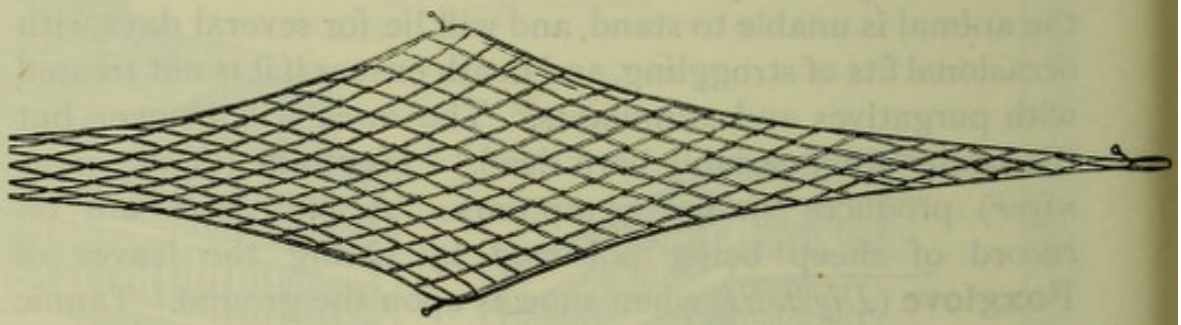


FIG. 49.—NET BREECHES FOR A EWE.

of wool can be tied tightly across from hip to hip, or the lips of the vulva may be stitched together. The last, though successful, seems a cruel and drastic remedy, but it should be remembered that while the womb protrudes the pain is acute and the life of the animal is in danger. The ewe should be separated from her lamb, kept quiet, and given a drench containing laudanum and whisky.

Inflammation after lambing, or septic metritis, is a fatal enzootic disease which occurs in sheep from three to twenty-four hours after lambing, and runs its course in three to eight days. Ewes which survive that period usually recover, but the lambs of those which suffer are liable to "joint-ill" or "navel-ill." Both are aggravated by, if they are not originally traceable to, the unclean state of the lambing-pen. "*The symptoms* are loss of appetite, high fever, constipation followed by diarrhœa, colicky pains, brown-coloured discharge from

the vagina, coma and delirium, and death. *Treatment.*—Give a mild laxative, as 4 oz. of linseed oil with 1 oz. of turpentine, and follow with stimulants and sedatives, as sweet spirits of nitre and laudanum (2 teaspoonfuls of the former and one of the latter) in water every four hours, or whisky, a tablespoonful, and a teaspoonful of laudanum in milk, at the same interval. Irrigate the lamb-bed with a sedative and disinfectant lotion of Jeyes' fluid and tepid water, 1 teaspoonful to a pint, every four hours. Apply hot cloths to the loins. Separate and provide for the lamb independently. All litter from affected pens should be burnt, and the pen should on no account be used again. The rest of the ewes should be removed from the vicinity, especially those yet to lamb, and the attendant changed. The bodies of dead ewes should be deeply buried in quicklime, and the lambing-pens treated with quicklime also."

After-pains or **parturition fever** occurs especially in highly-fed or forced ewes that are penned on turnips and get little exercise. It may follow either easy or difficult lambing. "The **first indications** are seen two or three days after lambing; the ewe, having a wild appearance, neglects her lamb, the urine is high coloured, there is frequent straining, and signs of pain when the loins are pressed. *Treatment.*—Anodyne enemas, as laudanum and warm water (a wine-glassful to the pint); a purgative of epsom salts or linseed oil, followed by stimulants (whisky) or sweet spirits of nitre, in doses as recommended under 'Inflammation after lambing.'"

Navel-ill or **joint-ill** is a form of blood-poisoning in lambs contracted shortly after birth, usually within a fortnight. "The **inciting organism** gains an entrance to the system by means of the umbilicus, the lamb becomes very lame, the joints are hot, swollen and painful, and there is marked fever and prostration. *Curative treatment* is usually of little use, for even if a lamb's life be saved, it is unhealthy and unthrifty. *Preventive treatment* is most important. Where lambing-pens are used, they should be kept scrupulously clean. Lambs dropped in open pastures never suffer from "navel-ill"; it is therefore much better not to use permanent but temporary lambing-pens.

The Early Treatment of the Lamb.—When it is

necessary to bring lambs that have been chilled into the house, they should not be placed near a fire, because a sudden change of temperature gives an injurious shock to the nervous system, which may result in physical collapse, or even in death. Cows' milk, given at blood heat, 98° F., *without water*, should have in it a little gin, or sweet spirits of nitre, to aid urination. Stricture of the neck of the bladder, the result of exposure to cold, is most common in male lambs, and is relieved by providing shelter, and gently rubbing the belly with the hand while the lamb is held up by the fore legs. Persistent cases are sometimes relieved, when the lamb is valuable, by dipping his hind quarters in a bath of warm water not over 110° F. The lamb must subsequently be well dried and kept warm, to prevent a chill.

A motherless lamb, while young, should be fed five or six times a day, to prevent indigestion, accompanied by scour. The giving of a little cows' milk to a lamb while it is sucking its mother often induces diarrhœa or constipation, and in cold weather results in the development of swelled and stiff joints.

In "**twinning on**" a second lamb to a ewe which has lost her lamb, the skin of the latter may be put on the living lamb for a few hours to give it the smell with which the ewe is familiar, and by which she is able to distinguish her own lamb if she has been allowed to lick it. Should she not have smelled or licked it, another lamb may be at once substituted for the dead one without any further precaution than that of rubbing its body over with the slime adhering to the skin of the dead lamb. Whisky rubbed on the ewe's nostrils and on the lamb soon after lambing, when the instinctive fondness for the young is strongest, temporarily suspends the ewe's power of scent sufficiently to deceive her.

The Food of the Ewe.—About the end of March or beginning of April, ewes on arable land in the Midland counties and South of England are removed from around the ewe-pen, where, to encourage the flow of milk, they have had sprouting white swedes, or late-sown green-round turnips, which stand the winter well. The lambs are allowed to run before the ewes, and thus to secure the best of the young sprouts, by the hurdles being made so that they can pass through while their mothers cannot.

One acre (15-ton crop) is usually set aside per week

during winter for every two hundred ewes, or 24 lbs. each per day. Shelter can be readily provided when necessary, by thatched or wattled hurdles set up to form a cross thus +. The ewes are run for a week or ten days on early pasture ("seeds"); next for three weeks on rye, which ought to be finished before the end of April; then on clover, vetches, mustard, or some other forage crop; mangels follow; and later on, to give a change of food, cabbages are thrown to them while at pasture in the field.

The practice of training **Lambs** to eat cake early is most important in feeding to produce fat lamb. Lambs are taught to eat cake and corn before being weaned, by enclosing their troughs within hurdles through which they alone of the flock can pass.

Store male lambs are castrated at two or three weeks old; but not during frost, which would induce stiffness; nor in a hot sun, which might cause excessive bleeding if the testicles be removed by pulling. Lambs on rare occasions faint after castration, but soon recover consciousness. **Marking,** by taking nips from the ears (see p. 608), if not done previous to this time, is also now performed; while the tail also is **docked**, to keep the sheep clean, should the solid excreta at any time become abnormally soft, as is frequently the case when lambs are put on luxuriantly grown food produced on naturally rich or highly-manured land, or when lean sheep of any age begin to improve rapidly.

There are three common ways of Castration:—*First*, Either the scrotum or purse is slit or the top is cut off by a knife, and the testicles are drawn away by the teeth of the operator: *Second*, They are removed by iron clams and the actual cautery after the scrotum has been cut into; if a lamb is stiff next day, it should be bathed with hot water in the region of the wounded part: *Third*, By hazel-wood clams dipped in powdered sulphate of copper, after being spread inside with lard, placed so that the neck of the cord supporting each testicle is gripped by a clam which is thus fixed on for half an hour. The pressure stops the circulation of the blood in the testicles, and prevents bleeding after they have been cut away. The top of the scrotum is removed, as the operator has then greater freedom in adjusting the clams than when

slits are made. This last way of making the incision possesses also the advantage of providing a free vent for the escape of humours which form in the wounds during the process of healing, though on the other hand it reduces the size of the "purse," which is a disadvantage in marketing when the animal is ready for the butcher. The two latter methods are not so liable to produce inflammation, and there is no danger, as in the case of drawing the testicles, of rupture, or bleeding in the region of the kidneys, causing a lamb to pine more frequently than to die immediately after the operation. The third method is the safest, but it takes much more time in execution than the others. It is the most suitable when well-developed lambs or old sheep are castrated.

Tetanus, Lockjaw, or **Trismus,** is a spasmodic closure of the lower jaw which occurs in sheep, especially after castration, docking, or shearing. It is produced by the Tetanus bacillus, which is about on the surface of the ground or on dirty instruments, and, finding lodgment in the fresh wounds made during these operations, manufactures a toxin which gets into the blood. *The symptoms* are:— "A spasmodic motion of the head, grinding of the teeth, and fixed jaws, the neck stretched out and head bent back. The stiffness may give way to convulsions followed by renewed stiffness." *Preventive treatment* involves giving sheep fresh, clean pasture, and avoiding dusty or dirty folds, also disinfecting instruments before, during, and after an operation by immersion in Jeyes' fluid—1 teaspoonful to a pint of water, or, better, 5 per cent. carbolic acid. "*Curative treatment* is directed to wounds where the organisms can be destroyed by weak solutions of corrosive sublimate; to the absolute quietness of the patient; to the administration of epsom salts as a purgative; and smearing the teeth every four hours with extract of belladonna as a sedative."

A peculiar form of Castration was extensively adopted when it was the practice, before the existence of railway facilities, to travel by road in October mixed droves of "cast" ewes (five years old) and old rams of the Cheviot or the Blackface breed from the Highlands of Scotland to the Southern counties. There the ewes were put to long-wool rams for one or two seasons to breed half-bred or cross

lambs, to be fattened on turnips as hoggs; and the rams were sent to the butcher. To prevent the Cheviot rams getting the ewes in lamb on the way south, the "worm" (filiform appendage) was cut off. Dishonest breeders of Wensleydale rams at one time also practised it, to save themselves the trouble and expense of keeping their lambs of different sexes in separate flocks.

The **Copulatory organ or penis** of the ram is a curiously complicated structure, which has been described anatomically by Dr F. H. A. Marshall.[1] The urethra, or passage through which the urine and seminal fluid pass when ejected, is prolonged within a filiform appendage, about 1½ inches in length, and arising from the left side of the organ, as shown in the figure. It opens to the exterior at the end of the appendage.



FIG. 50.

Distal end of ram's penis, as seen from the left side, showing glans, accessory glans, filiform appendage, and knob-shaped protuberance at proximal end of appendage. The prepuce is represented as having been folded back. Slightly reduced.

Dr Marshall has shown that this filiform prolongation has an erectile structure, and since, if it is cut off, the ram is rendered barren, there can be little doubt that its function is that of insertion into the uterus or womb during copulation.

Washing, which should be done ten days before clipping, is usual in the case of most Lowland breeds of sheep, though it is not practised with the Scotch Blackface breed. It is never done in salt water, as this injures the wool for keeping. There ought to be a watertight box in the centre of the pond for a man to stand in while doing the washing, in place of his having to get into the water. The washer takes hold of a sheep and keeps it moving in the water until the "yolk" or "eik" is washed out. This yolk, which keeps the wool soft and greasy to touch, is an excretion from the skin chiefly but possibly also to some extent from the wool itself. It contains much potash, and is used in the manufacture of fancy soaps. It is most abundant on certain strains of the Merino breed. Hill sheep, such as Cheviots, are simply

[1] *Anatomischer Anzeiger*, vol. xx., 1904.

thrown into a large pond and made to swim through it once or possibly twice; but the operation has become less general than it was in the seventies of last century when the price of wool was very high.

The time of Clipping or Shearing is dependent on the weather, and, in the case of lean sheep, on the "rise" of new wool. Unless for special purposes, sheep are clipped in the new growth of wool. Cheviot rams for sale as breeders are an exception.

Eild sheep, or those not giving milk, are shorn first: from the beginning of May onwards, in the South, and ewes three or four weeks later. Exposure to cold by early clipping greatly diminishes the flow of milk, and might also cause death in some cases from inflammation. The new wool left upon breeding ewes or sheep in poor condition is not so dense or close as that of fat sheep, and consequently not so effective as a means of protection. Show sheep if clipped early require to be kept under cover. Fat sheep clipped for the spring market have, by law, woollen sheets put on them if the weather be at all cold, and neglect to comply with this regulation is punishable. Lambs are not shorn the first year, except in a few districts of England where they are highly fed, and are a good size when summer arrives. Twenty-five to thirty stock sheep of a large breed is a good number for a man to clip in a day: the cost averages about 4s. per score when done by piecework. If the shearer be restricted to twenty per day, as in the case of fat sheep for market, which require to be clipped over the back and to be done bare and well, the cost is raised to 5s. per score.

Shearing by mechanical means is general in our Australian colonies, where the numbers of sheep are counted by tens of thousands, and where labour is not only expensive but difficult to control. They are also securing a footing in some districts of this country in two forms: the mechanical-power machine for large flocks, driven by an oil-engine; and the handpower machine, shearing one sheep at a time, worked by a strong boy, or by petrol.

The **advantages of the shearing-machine** over the hand-shears are—(1) an increase of work is done, by some 20 to 25 per cent.; (2) unskilled labour can be employed at a cheaper rate; (3) more wool can be removed; (4) the work is more

uniform; and (5) no injury is done to the wool by making double cuts, which shorten the fibre and increase the amount of waste in manufacture. The Wolseley machine was the first to come prominently to the notice of the public, but there are now a number of patentees of machines which, differing in minor details, are in certain broad principles like the pioneer machine (see the Cooper-Stewart machines, Plates CCIII. and CCIV.). Each machine is driven by a flexible shaft making from 2000 to 3000 revolutions per minute. The cutter is nicely adjusted to a comb, in the manner of the comb-like cutting teeth of an ordinary hand horse-clipping machine, and moves from side to side 4000 times per minute over the comb, which rests upon the skin of the sheep, and threads its way among the wool close to the surface of the body. As the points of the cutter are protected by the comb, it is much less likely to cut the skin; yet the machine does cut it if care be not exercised, and the skin be not pulled level. Before the workman lets the sheep escape, it is usually "buisted" or **marked** by a large iron letter dipped in hot (but not quite boiling) Archangel tar, darkened in colour with a little lamp-black. As the wool grows pretty long, these markings become first indistinct and then unreadable, and paint or red kiel, after being mixed with water or linseed oil, is rubbed on some part of the wool. The mark need not be extensive in the case of Lowland sheep, as it injures the wool to which it is attached. Paint mixed with oil is less bright at first, but it is the more durable of the two.

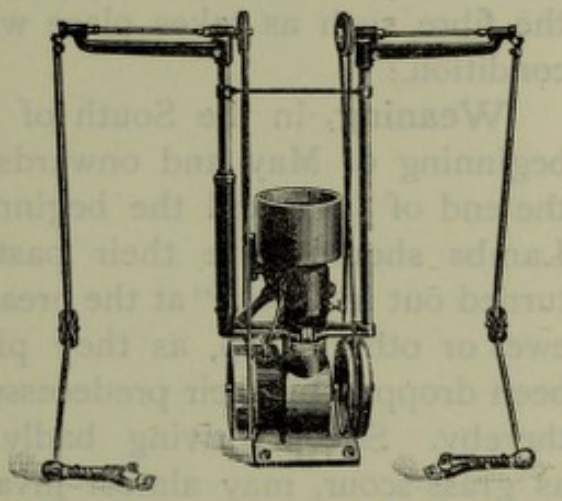


FIG. 51. COOPER-STEWART'S AUTOMATIC DOUBLE SHEARING-MACHINE.

Driven by one gallon of petrol a day. Costs £25.

After all visible and removable impurities such as dung ("clarts") are removed, each fleece of wool is carefully rolled inside out into a bundle, except in such cases as that of Scotch Blackface wool, which is turned the other way. The neck end is last rolled on, and, to tie the whole together,

it is made into a band by twisting. The wool should be at once, while warm, packed in strong canvas bags or sheets, as the operation is then more easily and better accomplished.

Certain lands and climates produce better and finer wool than others, whatever be the breed of sheep. Rich and also heavy soils produce strong wool; light soils, as Down lands on limestone formations, wool of a finer quality. Wool felts, mats, or "wauks" (*i.e.*, sticks very closely together) on the backs and necks of lean sheep in wet winters, and is thereby lowered in value. The best wool is got from sheep that are kept constantly thriving; there is then no break in the fibre, such as takes place when sheep get very poor in condition.

Weaning, in the South of England, is done about the beginning of May and onwards; in the North, the time is the end of June and the beginning of July, and even later. Lambs should have their pastures frequently changed, if turned out in a field "at the breadth," and should never follow ewes or other sheep, as they pick up parasites which have been dropped by their predecessors, and are seriously injured thereby. Sheep thriving badly from ordinary causes, such as grass-scour, may almost invariably be "set going" by a change to sainfoin, in those districts where sainfoin flourishes, or by the addition of a moderate allowance of cake or corn to the natural food. Ewes immediately after weaning, with the extra feeding discontinued, are run over the poorest and barest pasture to dissipate the milk, which, unless precautions be taken to prevent it, is liable to cause swelling of the udder for a few days. It is quite unnecessary to milk ewes at this period by hand, as was at one time the custom even in hilly districts. Ewe-milk cheese, of a rich green colour, and of very fine flavour, was at one time largely made in this country; but, as ewes were milked from behind, the operation was not one of the cleanest either for the milker or for the product.

When lambs are to be fed on a bulky, well-grown forage crop, as clover, rape, or vetches, they should at first go on for a few hours each day, and be turned out for a time into a grass field at night. This should also be done in wet weather if possible, especially if the land be at all heavy.

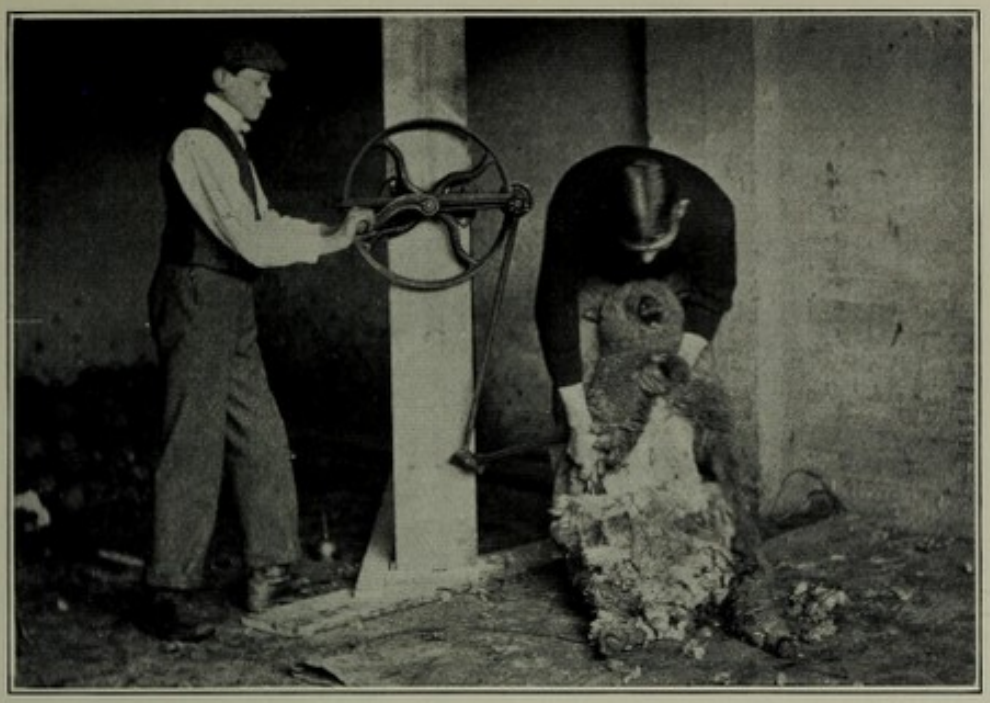


Shearing Scotch Blackface Mountain Sheep at Overshiels, Stow.

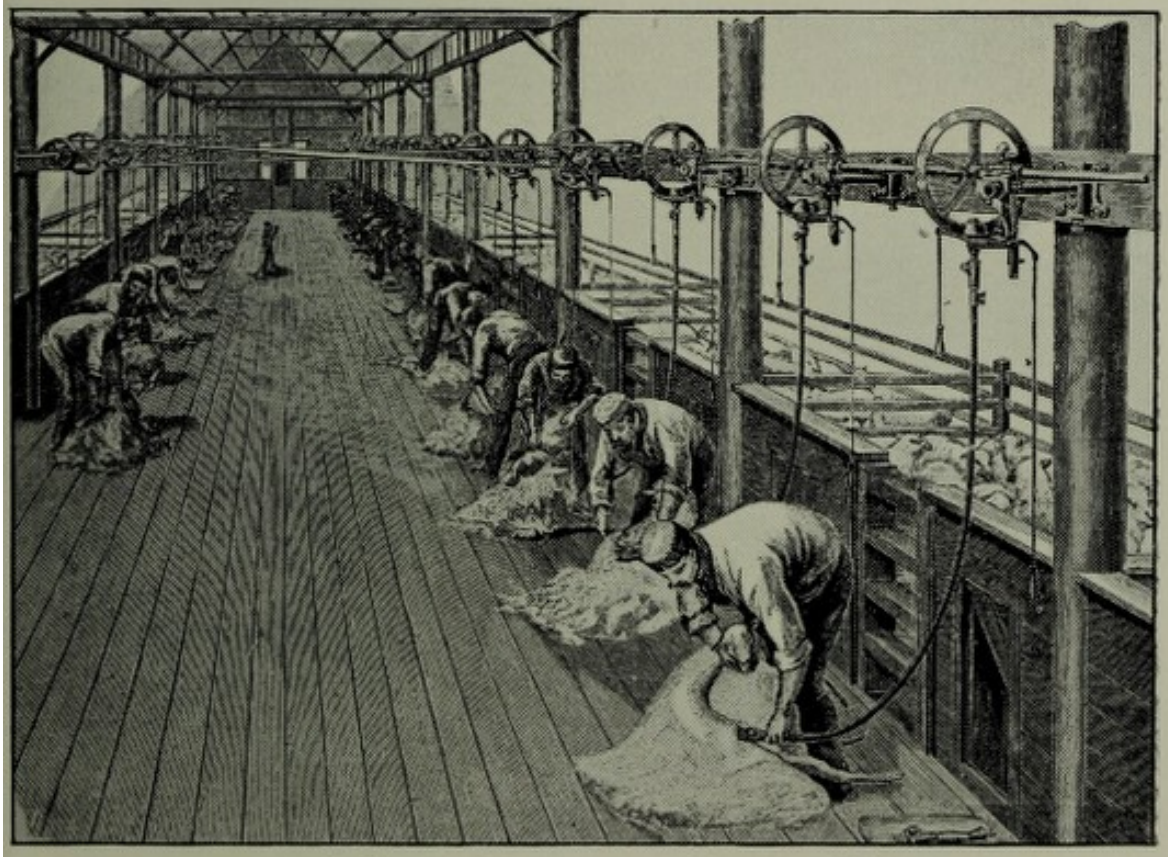


THE COOPER-STEWART SHEARING-MACHINE.

[*Wm. Cooper & Nephews*



A. Champion Hand-power Shearer
[*Wm. Cooper & Nephews.*



B. Wolseley Sheep-shearing Machine at Work.

[*pp.* 632 *and* 633

There is risk of hoven, which may end fatally, if lambs are suddenly put on wet clover; or of impaction, developing into "stomach staggers," if the clover be very dry, or if there be not a proper supply of water. Sheep, contrary to a common erroneous belief, drink freely in dry weather, and those giving milk more than others.

CHAPTER XXIX

MANAGEMENT OF SHEEP (CONTINUED)—FEEDING

Penning of Sheep on Forage and Root Crops—Dentition—Troughs—Urinary Disorders—House Feeding—Amount of Food—Experiments by Lawes and Gilbert and the East of Scotland Agricultural College—Calculation of Yield per Week according to Food consumed.

SHEEP **in the South are closely penned** between two sets of low hurdles,[1] the first being moved forward at least once a day, and those behind every second day. The grass on any given part is thus consumed at once, and, if properly attended to, it need not be eaten so closely as to injure the crowns of the roots to the detriment of future growth. It is then left to spring afresh without any further bleeding, and the consequent check to growth which ensues each time it is nibbled by sheep. When the crop is of moderate size, larger breaks are given, and the hurdles are not so often lifted. In Scotland and the North of England, sheep run unrestricted over the whole field at one time. This practice is more wasteful of food, but there is little expense for attendance, and, moreover, Scotch breeds of sheep are more active than the large English breeds, and require to be at liberty to move freely about.

Fattening tegs, and on arable farms stock tegs, go on to soft turnips, such as greystones and whites, in the end of September or beginning of October, and in a few districts even earlier. If not quite ripe, turnips ought to be pulled a few days before the sheep reach them. This makes them sweeter, and helps to prevent indigestion, which shows itself in the outbreak of scour, and in an increased death-rate. Soft turnips are followed in order by yellows, green-rounds, swedes, and in spring and early summer by mangels. Roots, unless when thrown on the grass in spring and summer,

[1] Hurdles like those shown on page 655.

should, as a rule, be cut and fed from troughs, as they go further, and the practice pays in the end. If tegs are made to bite turnips, they break their milk incisor teeth in frosty weather, and cannot then feed satisfactorily.

A mixture of **concentrated artificial food** (bruised cake and grain) prevents scour and various other ailments in fattening tegs. It is best to begin with a small quantity, and

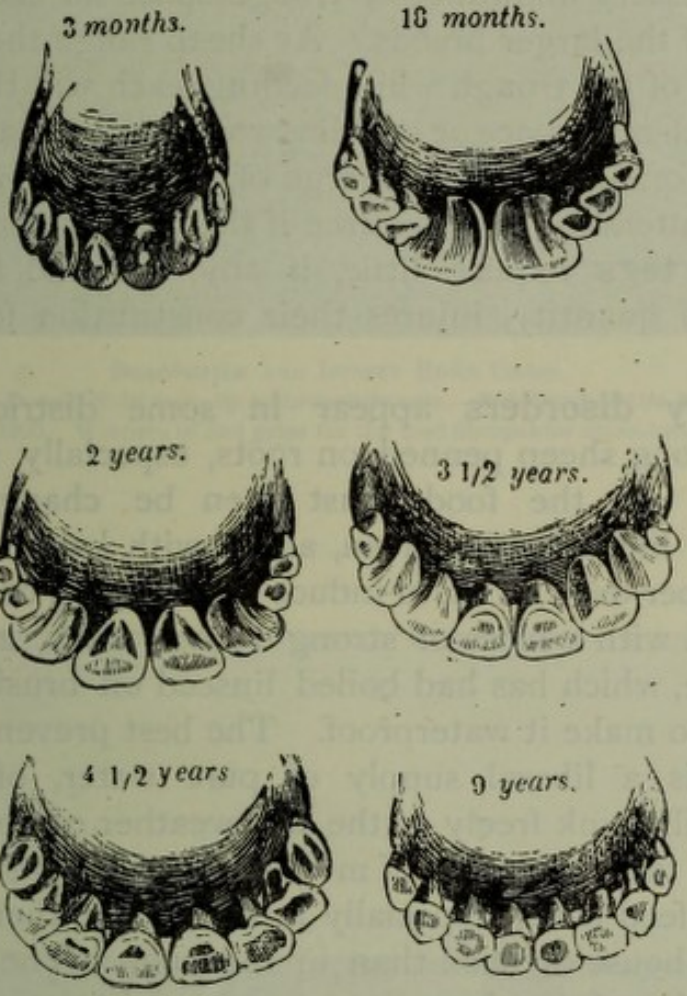


FIG. 52.—SLOW-MATURITY DENTITION. When forced, sheep get their permanent teeth a few months earlier.

to increase to about ½ lb. at the New Year (average ¼ to ⅓ lb.), and then to increase in the proportion of ½ lb. per 100 lbs. live-weight till the time of sale. Concentrated food is sometimes mixed with chaffed hay or straw, but it is a more common practice to give long hay in racks, and the other foods separately. When the market price makes it expedient, 1 ton of hay may be set aside per acre of roots—that is, 1 ton of hay to 15 tons of roots, or an allowance of a little over 1 lb. of hay per sheep per day.

Turnip-troughs, 9 feet long, should be almost square in cross-section, and ample in size. For the "artificial food" a second set of troughs is necessary, but they do not require to possess such capacity; the cross-section of the latter might be in the form of a right angle. Troughs, when not in use, should be turned over with the mouth down, to keep them clean and dry. A length of 8 inches to 9 inches is the necessary allowance of trough-space for each sheep, in the case of the larger breeds. As sheep range themselves on both sides of the trough while feeding, each will thus have at least 18 inches of space or standing room. One man can easily cut roots for, and take full charge of, a flock of two hundred sheep, or attend to four hundred if the roots be not cut.

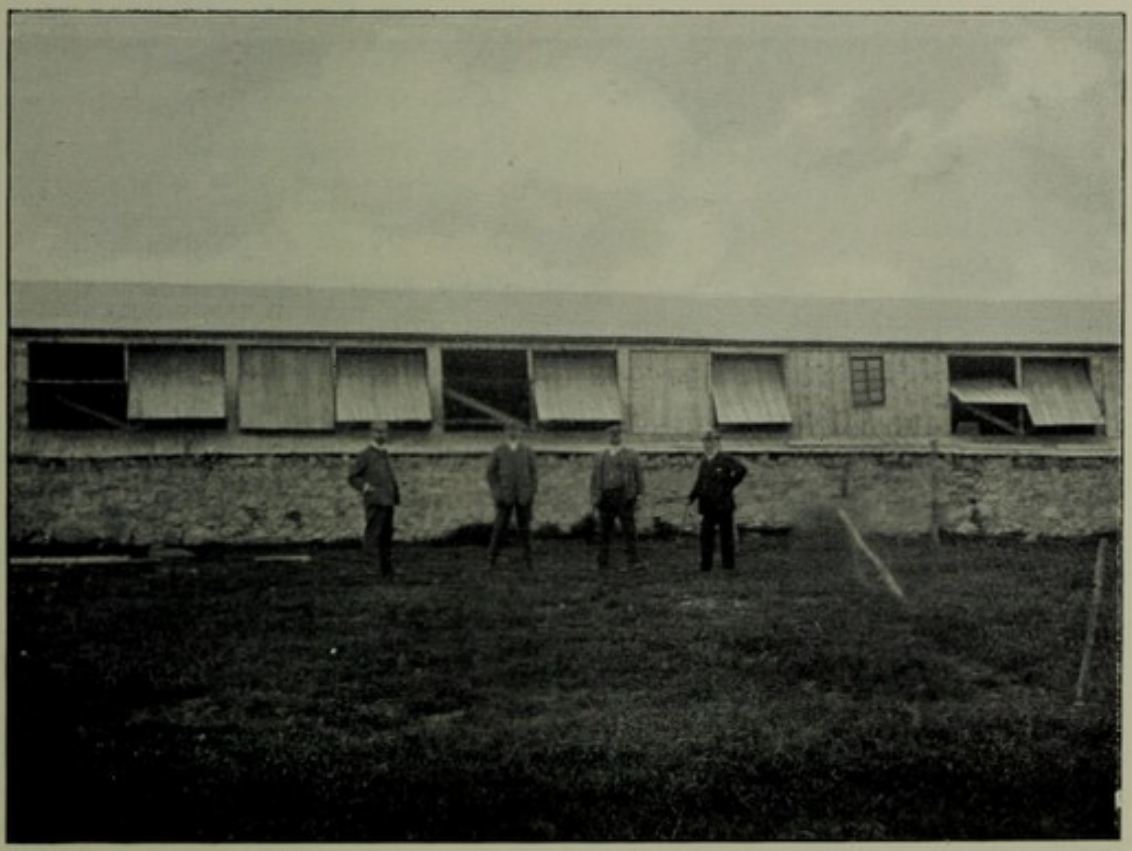
Stock tegs require little, if any, artificial food which, if given in quantity, injures their constitution for breeding purposes.

Urinary disorders appear in some districts late in spring among sheep penned on roots, especially swedes and mangels. All the food must then be changed without delay, and linseed cake given, along with ½ dram of nitrate of potash per day. And, to induce warmth, the back ought to be covered with a piece of strong canvas cloth, 2 feet to 2½ feet square, which has had boiled linseed oil brushed on one side of it to make it waterproof. The best preventive of this affection is a liberal supply of pure water, of which the animals will drink freely as the dry weather of spring comes on, and as the proportion of moisture in the roots decreases.

Sheep feed faster, especially in stormy weather, in a well-ventilated house or shed than in the open. The practice of **house-feeding fattening sheep** has been initiated and made a decided commercial success by John Ross at Millcraig, Alness, and it is extending in Easter Ross. It has proved invaluable on farms where it is impossible to give the lambs fresh pasture on which old sheep have not grazed. Those suffering in consequence from internal parasites like *Strongylus contortus* which as "piners" would certainly have died, can be saved. And all classes of fattening sheep feed more quickly and on appreciably less food. A well-ventilated shed, 110 by 60 feet, costing about £200, will accommodate 400 sheep—the space being divided into four equal sections of 1500 superficial feet to hold each 100 sheep. The ideal



Shropshire and Dorset Horn Cross.
Pen of lambs from Dorset Horn ewes by a Shropshire ram. Exhibited at the Highland Show at Stirling, 1900. Winners of 2nd prize for the best Shropshire cross-bred lambs.



Shed for Feeding Sheep in, at Millcraig, Alness.

[p. 636

shape of a division is a square, as sheep run less when people go among them than in a long house. With such ample room, the floor is easily kept by bedding from becoming wet, which would injure the hoofs and make the sheep lame. The food is given in light, easily-moved, five-sided racks 2 feet high, spread equally about the floor. Each of the five sides or openings to accommodate two sheep are 20 inches wide, or 10 inches per sheep. The cost of making the boxes in quantities is only 1s. each. Cabbage is an excellent green succulent food to give, if finished not later than Christmas, and turnips and swedes afterwards. Cross-bred lambs receive ½ lb. of cake and meal per day, and older sheep in relative proportion to size and age about twice the amount.

One hundred sheep are as many as ought to be placed **in one lot** if fed on roots. In Gloucester and some other districts, where the sheep are heavy, that number would be advantageously divided into two lots by hurdles, or by a strong handmade 4-inch mesh wire net 4 feet high. An ingenious and handy adaptation of the "Corrimony" wire fence has been added to the means for fencing sheep folded upon turnips.[1]

Amount of Food.—A Cotswold teg, or one of any of the larger breeds, from eleven months old (1st January) till fat, will eat, along with the other food mentioned, 24 lbs. of roots daily, if fed three times a day—younger sheep eat less in proportion to their ages. Lean sheep eat more in proportion to their weight than fat ones. A Cotswold cast ewe will consume up to 35 lbs. of roots per day.

One average acre of turnips (15 tons) will feed two hundred sheep for one week, at 24 lbs. each per day.

Experiments by Sir J. B. Lawes and Dr Gilbert showed that Cotswolds gave the largest average increase per head per week and also per 100 lbs. live-weight. Cross-breds came next, then Hampshires, Leicesters, and last of all Southdowns—the increase in all but the Leicesters being in inverse proportion to the quality of the mutton. Under cover, three sheep, of 100 lbs. live-weight each, consumed approximately the same amount of food as was consumed by two sheep of the same age and breed weighing 150 lbs. each. The mixture consumed per 100 lbs. live-weight per week was 4¾ lbs. cake, 4¾ lbs. hay, and about 70 lbs.

[1] Invented by A. Walker, Stagebank, Heriot, Scotland.

roots = about one-seventh of the live-weight, after deducting the moisture of the food. The increase was nearly 2 per cent. live-weight = 2 lbs. per week for a 100 lbs. sheep. A usual increase is 1 lb. of live-weight to 8 or 9 lbs. of solid food, moisture being deducted. About 58 per cent. of the fasted live-weight of sheep, moderately fat, is butchers' carcase (Warington); very fat sheep give 6 to 8 per cent. more in the case of refined breeds, such as Southdowns. Lean sheep give about 50 per cent., and old ewes, unless of the more fleshy breeds in good condition, often little over that proportion. In ordinary sheep passing from store to fat condition, 68 per cent. of the increase is carcase.

The following calculation shows the amount of **mutton produced from the food** already recommended. The amount is reduced to percentage to correspond with Lawes and Gilbert's 8 lbs. or 9 lbs. dry food example. A little more food is allowed for sheep kept outside. This drawback is so far made up for by the advantage gained from giving a *mixture* of concentrated food.

Food per day, per 100 lbs. live-weight, would thus be ½ lb. cake and corn, 12 lbs. roots, and 1 lb. hay; or per week:—

3½ lbs. cake.				
7 lbs. hay.				
10½ lbs.	– 1½ lbs.	moisture	(= 14 p.c.) =	9 lbs. dry food.
84 lbs. roots	– 76½ lbs.	,,	(= 90 p.c.) =	7½ lbs. ,,
			Total,	16½ lbs. dry food.

This should give 2 lbs. increase of live-weight = 1 lb. in 8¼ lbs. dry food.

The last or confirmation section of **two series of experiments** of the Edinburgh and East of Scotland College of Agriculture, conducted by Wm. Bruce, B.Sc., Senior Lecturer, and reported in Bulletin VIII., 1905, dealt with 132 half-bred hoggets by Leicester-Cheviot parents, divided into six lots of 22 sheep folded in a turnip field in areas of 50 yards square each. They were valued on 3rd December at £1, 16s. per head, or what proved to be 4½d. per lb. live-weight, and fed alike till 10th December, when the first of three weigh-

EDINBURGH AND EAST OF SCOTLAND AGRICULTURAL COLLEGE EXPERIMENTS

Weights of 132 *half-bred hoggets, and food; also results obtained*

Lot.	Description of Food.	First average live-weight.	Final average live-weight.	Total increase in 104 days.	Average increase per head per week.	Average dead-weight.	Percentage of dead- to live-weight.	Gross cost of food per cwt. of live-weight increase.	Net cost of food per cwt. of live-weight increase.	Net cost of food for 300 sheep. Average increase 39 lbs.	Profit.
		lbs.	lbs.	lbs.	lbs.	lbs.		£ s. d.	£ s. d.	£ s. d.	£ s. d.
V.	Bombay cake .	96.50	134.23	830	2.54	69.86	52.04	1 9 11	1 3 1	114 5 0	3 10 8¼
III.	Linseed cake .	96.41	138.91	935	2.86	74.04	53.30	1 12 10½	1 4 10½	123 2 0	3 9 8¼
VI.	Bombay cake + grains . .	96.45	132.00	782	2.39	69.04	52.30	1 12 2	1 4 11¼	123 8 0	2 19 2
II.	Decorticated cake + grains	97.14	131.54	757	2.31	69.54	51.86	1 14 9½	1 6 1½	129 6 0	2 9 10¼
IV.	Egyptian cake .	95.64	131.09	760	2.32	68.73	52.42	1 14 2½	1 6 7	131 11 0	2 2 8
I.	No short food .	94.14	113.95	436	1.33	58.36	51.21	1 19 3½	1 12 1	158 16 0	1 4 10¾

ings took place, and when each was found to be consuming ¼ lb. of hay, ⅓ lb. of concentrated food-stuff, and 12 lbs. of roots daily. A second weighing on 2nd February and the final one on 24th March divided the test, extending over 104 days, into two periods of 54 and 50 days.

In addition to turnips supplied *ad libitum* at 10s., and ¼ to ½ lb. of hay per day at £3, 10s. per ton, the feeding-stuffs allowed to each lot, and prices per ton, were as follows:—1. Nothing. 2. Equal parts of decorticated cotton-cake, at £7, 9s. 7d., and dried distillery grains at £5, 7s. 1d. 3. Linseed cake (St Petersburg), at £7, 9s. 7d. 4. Undecorticated (Egyptian) cotton-cake, £5, 4s. 7d. 5. Undecorticated Bombay cotton-cake, at £4, 12s. 6d. 6. A mixture of equal parts of Bombay cotton-cake and dried grains.

The feeding-stuffs effected no saving of turnips. The linseed cake produced the greatest increase, which sold at 1d. per 8 lbs. less than the lowest of the other lots, but not at the least cost per unit, as in this respect it takes a second place to Bombay cotton-cake, which produced the finest quality of mutton.

Although the unfed lot, No. 1, sold at 5s. per 8 lbs. against 4s. 7d., 4s. 8d., and 4s. 9d. got for the other lots, all of which were rather fat and over the limit of 60 lbs. of dressed carcase, it yielded the smallest profit and enriched the land least of all. Live-weight increase per cwt. cost £1, 12s. for food, but left 7s. worth of manurial residue. It is thus evident that linseed-cake and Bombay cotton-cake are both eminently suitable as supplementary winter food, and that a mixture of foods is better than a single food.

The Cost of feeding a Hampshire teg for sixteen weeks during the finishing process is as follows:—

Food.	(1) Per day.	(2) Per week.	(3) In 16 weeks.	Price per ton.	Total cost.
Cake and corn .	½ lb.	3½ lbs.	½ cwt.	£6, 10s.	3s. 3d.
Hay .	1 lb.	7 lbs.	1 cwt.	£3, 5s.	3s. 3d.
Roots .	20 lbs.	140 lbs.	1 ton.	£0, 6s.	6s. 0d.
				Total cost for 16 weeks .	12s. 6d.

To calculate the return of produce from the dry food consumed, say an increase of 1 lb. of live-weight for 9 lbs. dry material eaten :—

Dry Matter—
In 140 lbs. of roots, at 10 p. c. dry . . = 14 lbs.
In 10½ lbs. hay, corn, etc., at 86 p. c. dry . = 9 lbs.

Increase of live-weight.
Dry matter consumed weekly . . . 23 lbs. ÷ 9 = 2⅝ lbs.

To find the yield of mutton :—

				lbs.		lbs.
100	:	68	::	2⅝	:	1.74
		Percentage increase in finishing.		Live-weight.		Dressed mutton.

Weeks. lbs. Total return in 16 weeks.
Thus—Increase in 16 = 27.8, at 5s. per 8 lbs. . = 17s. 5d. (nearly).
Cost of feeding, 16 weeks . . . . 12s. 6d.

Net profit, 16 weeks . . . 4s. 11d.

The calculation assumes that the cost of shepherding and the average loss from death are more than counterbalanced by the value of the manure produced.

The above figures do not show the actual profit to the farmer by the transaction, as much depends upon the cost per lb. of the flesh of the lean sheep when bought, and whether the purchase price was more or less than the sale price. Here again is to be seen the superlative importance of a knowledge of the live-weight, in place of trusting to good luck to make a fortunate guess "by hand and eye" at the weight of the animals. The ordinary farmer only attempts this guess once annually, consequently he has little practice, and is most likely to make a mistake.

Sheep, either rough or clipped, are sometimes sold by the feeder to the butcher by the pound, "sinking the offal," viz., 6d., 8d., 10d., or 1s. per lb. of dressed carcase, according to the quality and range of prices in the market. The butcher gets the head, feet, skin, and intestines, including "web tallow," all into the bargain. The web tallow, or store of fat which surrounds or encloses the bowels and stomach of a fat sheep, often weighs 10 lbs. to 14 lbs., and in the case of the Down breeds even more.

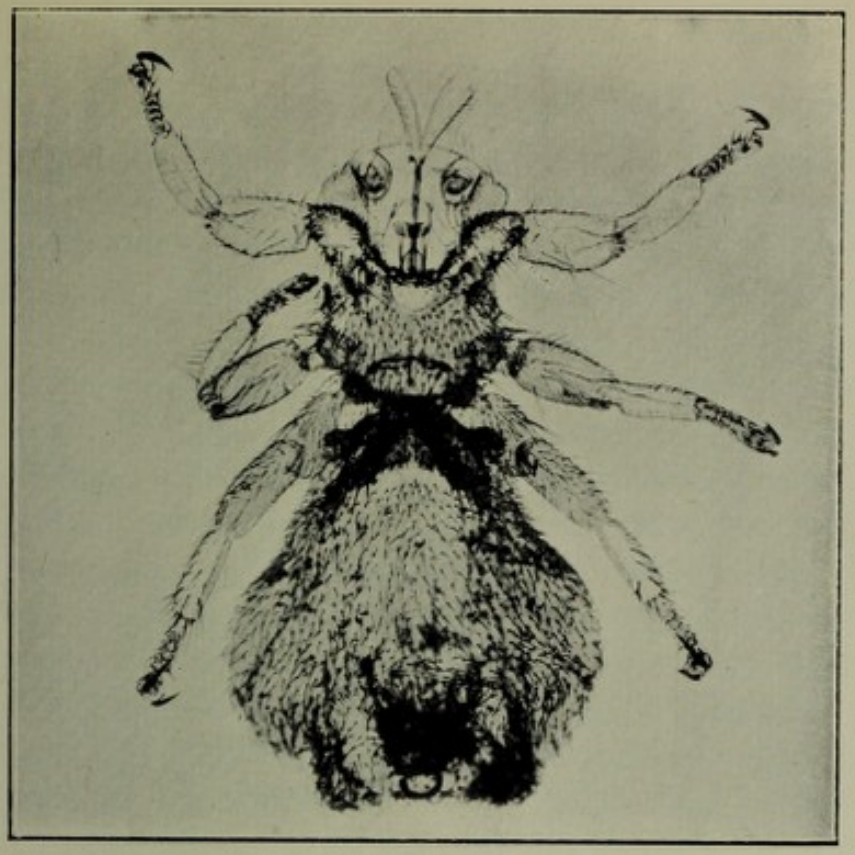
CHAPTER XXX

MANAGEMENT OF SHEEP (CONTINUED)—EXTERNAL PARASITES

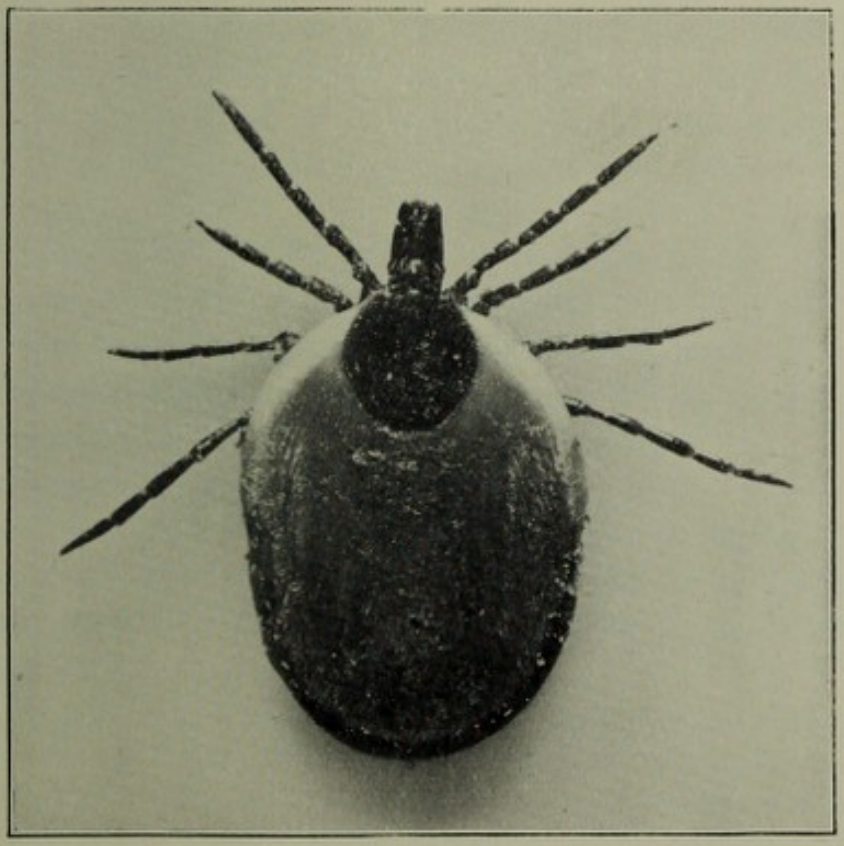
Dipping—Sheep-Dipping Orders (Scotland), 1906—Ticks or Kades—Grass-Ticks—Sheep Lice—Black Flies—Maggot Flies—Scab-Mites—Life-History of Scab-Mites—Dip Materials—The Dipper—Different Forms and Sizes of Dippers—Pouring—Smearing—Poisoning by Mercury and Copper.

DIPPING is practised in accordance with the custom of the district at various times during each of the four seasons,—spring, summer, autumn, and winter,—on a dry day and when the wool is dry; for example, immediately after clipping, or, still better, a fortnight later, when the wool has grown a little, to enable it to retain more of the effective material of the dip, and when the skin is not so liable to be scorched by the sun while wet. The lambs should go through the tank at the same time, but it is necessary to take precautions against the lambs losing their mothers entirely, or becoming prematurely weaned from other causes, and doing badly in consequence. To this end ewes and lambs should be dipped in small lots—hill sheep (for example) in their various hefts. Ewes and tups should either be dipped after tupping time or one clear month before it, in order to prevent "firing" the penis of the rams.

By the **Sheep-Dipping (Scotland) Orders** of the Board of Agriculture, dated 10th February and 9th April 1906, it is necessary twice during each year to thoroughly immerse sheep within the area referred to, in a sheep-dip approved by the Board, and made up in proportions authorised by it—the *first* dipping to take place between 1st January and 31st August, and the *second* between 1st September and 12th November. The Sheep-Dipping (Scotland and North of England) **Order of 18th February 1907** widens the area of



A. The Sheep Kade, *Melophagus ovinus* (♀), ventral. × 10.



B. The (Grass) Tick, *Ixodes ricinus* (♀), dorsal surface. × 8.

the Scotch Orders, and relaxes some of the regulations that experience had shown to be unnecessarily irksome.

The **object of dipping** is to ameliorate or prevent altogether the attacks of parasites, viz.—the kade, *Melophagus ovinus;* the louse, *Trichodectes sphærocephalus;* the sheep maggot flies,[1] *e.g.* the green bottle, *Lucilia sericata*, and the blue bottle, *Calliphora erythrocephala;* the scab-mite or itch-mite, *Psoroptes communis;* and species of tick or Ixodes. The Sheep-Dipping Orders referred to are directed against the last-named pest, but they **are defective** in that they do not prescribe double dippings with an interval of fifteen to twenty-one days between the first and the second section of the operation, in place of single dippings, which, as explained on page 647, are incapable of effecting the object.

Kades or Kaids are slightly flattened, six-legged, spider-like insects, resembling flies without wings, which move about in the fleeces of sheep, and live by now and then biting and sucking blood. They may be got rid of by timely dipping, and repeating the operation within three weeks, to kill the forms which have within that period developed from the egg, upon which dips exercise no injurious influence. They are most abundant on sheep in poor condition, and during winter when there is little sun, as they do not then come to the top of the wool to bask and so get shaken off. Their bite on man produces small, persistently itchy swellings.

Grass-ticks (eight-legged) fix themselves by sending their rostrum into the skins of sheep and other animals, as horses, cattle, pigs, dogs, rabbits, and also men. The females do not move about much after gaining a footing on an animal's hide, but become fixed, and gorge themselves with blood drawn from the unwilling host. They increase greatly in size, and finally drop off into the grass to lay their eggs. From the eggs hatch young six-legged forms, which after several moults attain the fourth pair of legs and the adult condition.

[1] Dr R. Stewart MacDougall, who has been investigating the sheep maggot flies on behalf of the Highland and Agricultural Society, with a view to determining the species which strike the sheep, has proved that the chief and commonest species is a green bottle, *Lucilia sericata.* The maggots of the blue bottle, *Calliphora erythrocephala*, were also found infesting the sheep.

The sucking lice are represented on the sheep by *Trichodectes sphærocephalus.* It has a head as broad as long. The general colour is whitish, with dark spots and a dark head. These lice exist usually in greatest numbers on the head and hairy parts of the body, and produce much irritation, which prevents sheep from thriving. With a little care, and by adopting the comparatively new practice of dipping sheep over the head, they can be quite destroyed. Most well-managed flocks are free from them.

Black flies, which are found often in swarms in the northerly parts of Europe and North America, are some-

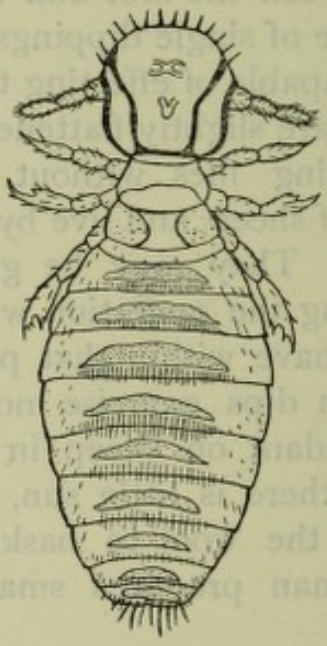


FIG. 53.—*Trichodectes sphærocephalus* (Nitzsch).
♀. Dorsal surface. × 30.

times a grievous pest to both animals and man. They belong to the family *Simulidæ* and the genus *Simulium.* By means of their piercing mouth parts, the females make wounds like mosquitoes and suck up blood. They may also live by sucking any raw surface, as an accidental cut made by shearing, or the crowns of rams that have been fighting. When very numerous, these flies irritate and unsettle sheep, and prevent wounds healing, especially if these be about the top of the shoulder, where the animal can do little to protect itself. The fles are small and black or greyish, with a humped thorax, short antennæ, and broad iridescent wings. Their larvæ are aquatic.

The maggot flies, the green and blue bottle flies, do

damage by laying their ova, during warm weather, on any part of the wool which has been wetted or soiled with solid or liquid animal excreta or certain inferior forms of dip material. In a few hours after the sheep are thus "fly-blown" or "struck," if the day be hot, the maggots are hatched, and immediately find their way to the skin, which they devour. They grow rapidly, and, if not destroyed, they are able to cause death within a few days. The presence of maggots may be easily detected by the wool on the parts attacked becoming damp on the surface and dark in colour, and by the restless and uneasy movements of the sheep—including turning round and attempting to bite the affected part, lying down often, then rising and running a little, and taking shelter away from the rest of the flock at the back of a wall or among rank undergrowth. A sheep may at times clear itself of its tormentors by rubbing in a loose sandy bank or "scaur"; but the shepherd has usually to dress each animal carefully, at least twice, with a strong-smelling solution which destroys the maggots without injuring the raw parts of the skin. No ordinary dipping material used for the destruction of the insect parasites previously described is strong enough to kill maggots. Sores should be kept soft and in a healthy healing condition by the application of carbolic oil. The spirit- or oil-of-tar is very useful, if there be no broken skin, to prevent a second attack in very bad cases, by sprinkling the top of the wool or any soiled part with it; but it darkens the wool, and it also causes much irritation on a raw or maggot-wounded surface. Maggot flies may be almost certainly prevented from striking the fleece if sheep are kept clean by clipping away all dirty wool in the region of the tail, and by dipping them at times with a strong-smelling solution containing a quantity of carbolic acid and sulphur. When it is important to have the scrotum well covered with wool, as is the case in certain breeds of sheep, ram lambs are not kept in the dipping-tank the usual time, as prolonged submersion has a tendency to make the wool fall off those parts. They are frequently not dipped in the usual way, but a concentrated solution of dip material, with a strong-smelling fly-powder added, is rubbed over the backs with a scrubbing brush. Sprinkling the backs with a mixture from

a rose can, or still better, a lime-wash spraying machine, is a common practice when large numbers of sheep require to be protected. The sheep are first packed closely together in a fold, so that the dipping stuff when showered on cannot fall to the ground. Maggots have been known to effect great improvement in a bad case of foot-rot by feeding on the diseased part, but their work would be difficult to regulate as a remedy for the ailment.

Scab-mites are microscopic, and very much smaller than any of the other parasites. When they are present, patches of the wool become white, and the sheep by biting detach quantities, and leave the wool in little white locks which give a rough and speckled surface. When felt by hand, there is a hard brittle scab on the skin at the roots of the wool, under which the creatures shelter. This scab must of necessity be cleared off to prevent the extension of the disorder, which is most contagious, and would ultimately prove fatal to life if not attended to. "The Highlands of Scotland," or north of the Forth and Clyde, was at one time the stronghold of scab, but the chief centre of infection, as shown by the weekly returns of outbreaks of the Board of Agriculture, has been transferred to Wales. It is to be regretted that it still lurks in some places in this country, since it is possible to stamp it out, as has been proved by the energetic action of the Stock Departments of the leading Australasian Colonies (States), where it has been completely eradicated. After a long drive or railway journey, when sheep from the Highlands of Scotland or Wales are packed closely and heated, scab is liable to break out in a few weeks, although not observed in the flock from which they came. The rule is to dip Highland sheep about a week, but not more than ten days, after coming off rail, and the danger disappears.

The Life-History of the Scab Parasite.[1]

The common scab, otherwise termed "acariasis" and "itch," of sheep is due to the injurious action of the scab-mite, *Psoroptes communis*, Fürst, var. *ovis*. This parasite is confined to sheep, and lives upon those parts of the skin

[1] From the Author's paper on "Scab in Sheep" in the *Transactions of the Highland and Agricultural Society of Scotland*, 1900, *q.v.*

which grow wool. Head scab is produced by another distinct species of mite, *Sarcoptes scabiei*, de Geer, var. *ovis*, which lives on any part of the skin growing short hair, but most frequently on the head. Burrowing more deeply into the skin, it resembles the *Sarcopt* which attacks the common goat, and it is not so easily reached by external dressings or dips as the *Psoropt.* It is with *Psoroptes communis*, the cause in this country of great pecuniary loss and much labour

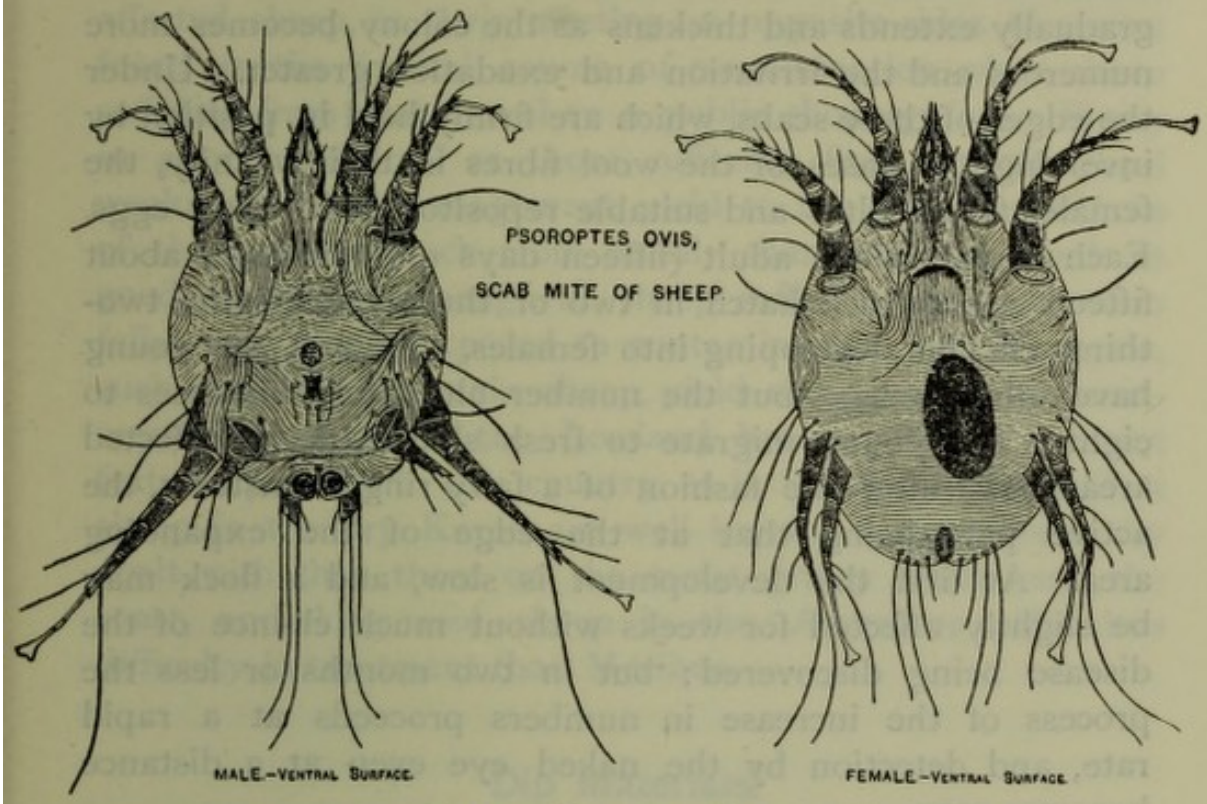


FIG. 53.—SCAB-MITES—MALE AND FEMALE (MAGNIFIED).
(Drawn from nature by Mrs D. Hutcheon.)

which might be rendered unnecessary, that we have now to deal.

The life-history of the parasite is simple; but an accurate knowledge of it is nevertheless all-important to those concerned, as upon this knowledge rests the chance of ordering aright the course of the treatment to be adopted. In the active forms it is easily destroyed by the poisons which effective dipping materials contain; but the eggs are, like the germs of so many low-life forms, practically indestructible by the ordinary means at the disposal of the farmer. It is therefore necessary to destroy all the moving *acari* by a preliminary dipping, and then, having waited until the eggs

hatch out naturally, overwhelm the individuals of the new brood by a second dipping before they are old enough to propagate their kind. If this work be perfectly done, the cure is complete; but, as will transpire later, it is not all so simple as it at first appears. The mites live by biting the external surface of the skin, which becomes very much irritated and inflamed as a result of the action of the effective hooked and pointed mandibles. Pustules form and exude a serous fluid which dries into a crust or scab. This gradually extends and thickens as the colony becomes more numerous and the irritation and exudation greater. Under the edges of these scabs, which are firmly held in position by involving the bases of the wool fibres in their vicinity, the females find shelter and suitable repositories for their eggs. Each female when adult (fifteen days old) produces about fifteen eggs, which hatch in two or three days, some two-thirds of them developing into females. At first the young have only six legs, but the number ultimately increases to eight. The young migrate to fresh skin, and the affected area grows after the fashion of a fairy ring in pastures, the active part being that at the edge of the expanding area. At first the development is slow, and a flock may be slightly affected for weeks without much chance of the disease being discovered; but in two months or less the process of the increase in numbers proceeds at a rapid rate, and detection by the naked eye even at a distance becomes easy.

Such is a brief account of the common means by which the affection spreads on a single sheep. A scattering of the colonies takes place as the animal bites or rubs in the effort to relieve the excessive itchiness with which scab is associated. This same effort is a fruitful means by which the parasite spreads from sheep to sheep. In the action of rubbing on earth-banks, walls, rocks, and rubbing-posts, a few scab-mites or their eggs are left on the "rub," to be transferred to the next sheep that come along to exercise the habit natural to them, although they may not be affected with scab. Scab-mites do not propagate away from the skin of a living sheep, but under favourable conditions the mature forms have been known to exist for a period of twenty-one days on "rubs" and in dry earth or manure upon which sheep have been

lying; and the eggs have been proved to retain their vitality for years in a dry and equable climate, and to hatch out on gaining access to a sheep. It is this wonderful vitality of the egg which has in a great measure led to the belief in the spontaneous-generation idea,[1] and which makes the stamping-out process difficult. But the chances of distribution by this means are enormously reduced when outbreaks are promptly dealt with and the sheep are not allowed at any period of the year to become badly affected. The mixing of clean and affected sheep, or their meeting on opposite sides of a wire fence, is the fruitful source of contamination when sheep suffering from scab travel on a public thoroughfare. Sheep in poor condition,[2] or those suffering from constitutional weakness or bad management, yield to the insidious attacks of the parasite much more readily than robust animals in good condition, although all sheep suffer in the end when fully and freely exposed to contamination. Others again, such as Welsh mountain sheep, yield more readily to treatment than many of the Lowland breeds. These are not features peculiar to this country, as in South Africa scabbed sheep in the dry Karoo are well known to be more easily dealt with than those on the moist grassy lands near the coast, and long-wool sheep in the Argentine offer less difficulty in treatment than Merinos.

Dip Materials.

The **poisons present** in all the common effective dips resolve themselves into a limited number of well-known chemical substances which, in wholesale quantities, can be procured at very moderate prices. They are essentially four—arsenic, sulphur, decoctions of tobacco, and carbolic acid. For 100 sheep, 10 lbs. of hellebore (boiled for an hour) and stavesacre are sometimes used with excellent

[1] Starlings and jackdaws, which settle on the backs of sheep in search of the larger forms of ovine parasites, are capable of transmitting scab from one flock to another located at considerable distances apart, and an extensive sheep farmer has suggested to us that flies might also, as in other cases of infection, carry the parasites from one sheep to another and further complicate the question of the unexplained causes of outbreaks.

[2] Some authorities say especially when beginning to thrive.

results as supplementary ingredients; and corrosive sublimate (perchloride of mercury) is recommended by Finlay Dun[1] as a cure for scab. This last, however, is so much more dangerous to the animals than arsenic that it is rarely resorted to.

A dip made with **white arsenic** (rendered soluble by boiling in 2.5 gallons of water 45 lbs. of commercial arsenic (As_2O_3) with 45 lbs. of carbonate of soda crystals, to form the arsenite of soda,[2] without leaving any free alkali) is immediately effective in destroying the mature *acari* of scab, although it is harmless against the young forms, which hatch out from the uninjured eggs in a few days after dipping. It is not dangerous to the sheep if used in moderate quantities, say 2 lbs. to 100 gallons of water. A case is recorded of sheep losing their teats after being dipped in a solution of double this strength. It is best for the farmer to purchase arsenic in solution, which can be got at two shillings per gallon, each gallon containing 5 lbs. of arsenic. Cold water is then added to the concentrated liquid, to reduce the solution to the standard strength.

Sulphur is commonly used in this country in the insoluble form of the flowers of sulphur, which merely mixes with the other dip materials. It adheres to the wool and exercises a prolonged influence—the odour evolved keeping off maggot-flies during summer. Whether administered internally or applied externally, it is extremely searching in its action, and its presence is inimical to the development of most of the common forms of ovine parasites. Its chief drawback is the difficulty of mixing it in the dip so that each sheep shall receive a proper proportion. This is partially overcome by associating with it an equal weight or more of black (soft) soap, which also aids in dissolving arsenic. In Australia, where sulphur has been most effective when skilfully handled in the extermination of scab, and in America and South Africa, where it has been skilfully handled and largely used, it is dissolved in combination with lime—25 lbs. of sulphur and 18 lbs. of slaked lime being made into the consistency of thick cream, and then boiled for twenty

[1] *Veterinary Medicines*, 8th ed., 1892.

[2] Cold water is then added to bring the amount up to 9 gallons of a standard solution containing about 5 lbs. arsenic per gallon.

minutes in 20 gallons of water, when the sulphide and hyposulphite of calcium form. The resulting orange-coloured liquid is finally mixed with sufficient cold water to make it up to 100 gallons. The chief drawback to this dip is the difficulty of preparing it in sufficient quantity to dip large numbers of sheep—say 25,000 to 100,000—in a short space of time. The authorities in the Orange River Colony have (1904) emphasised another possible objection by prohibiting its use, on account of the serious damage done by lime to the wool when the material is not properly made.

Tobacco is the most valuable of the effective dip materials for which may fairly be claimed the property of being non-poisonous to sheep. Although not so immediate in its action in killing living parasites as arsenic or carbolic, it is so distasteful to them that it is the best of all the dipping materials used for preventing living *acari* from gaining access to the fleece, and there re-establishing themselves, from "rubs" or from the ground on which scabbed sheep have been resting. The existing Customs restrictions on the importation of certain useful forms of tobacco for dipping purposes are so unnecessary and so troublesome that the matter requires reconsideration. Before leaf-tobacco for dipping purposes can be manufactured in a bonded warehouse under, practically, almost impossible conditions, it has to be mixed with impurities which render it unsuitable for other uses—for every 100 lbs. of dry leaf-tobacco, 10 lbs. of blue vitriol, 15 lbs. of common salt, and 2 lbs. of oil of turpentine. Ground tobacco, which can be bought in America at very moderate prices, is not admitted into this country—a grievance of which farmers have just cause to complain. The quality of the manufactured products of tobacco, in the form of paste and juice, is not to be always relied upon.

Carbolic acid[1] is effective in killing living parasites

[1] For the benefit of the ordinary reader we have retained the familiar and industrially more common name carbolic acid (phenol), although the cheaper and for the purpose more suitable, nearly allied phenolic substance cresol or cresylic acid (95 to 97 per cent. purity) is preferred to crude carbolic acid by the best so-called non-poisonous (carbolic) dip-makers. Cresol is liquid at ordinary temperatures, while carbolic acid is solid, although more soluble in cold water in the proportion of 11 to 29.

on sheep; but, if used strong enough to destroy the eggs of the scab-mites by coagulating the albumen in their substance, it is liable to irritate the skins of the sheep, and give such a shock to their nervous systems that the function of digestion is suspended, and the animals become hoven, as in tympanitis, and a speedy death can only be prevented by immediate washing in clean water. But when used in moderate quantities—viz., 1 gallon to 50 or 75 gallons of water—the mixture is so safe that it has been designated by the trade "non-poisonous" dip. Only cresylic acid of 95 per cent. to 97 per cent. purity is tolerably free from the risk of staining the fleeces of white-woolled sheep, as the lower grades contain pitch-oil, and are so irregular in strength that uniformity of results are difficult to obtain. But from the best manufacturers of "carbolic" sheep-dip this ingredient of a mixed dip can be purchased in 40-gallon casks at the reasonable price of 2s. 6d. per gallon, of such a strength that 1 gallon of the material is sufficient for 75 gallons of water. The ordinary farmer could not save much by preparing the carbolic acid at home. In conjunction with arsenic its effects are most satisfactory. It is not good practice to use a strong carbolic dip, or, in fact, any dip twice within fourteen days, as lambs especially are liable to swell in the limbs as if foundered; but a carbolic dip may precede or follow an arsenic or other dip within eighteen or twenty-one days with safety and with excellent results.

Pitch-oil we do not recommend for general use, owing to the objections which wool manufacturers have to its injurious effects on the colour and dyeing properties of the wool. See footnote, p. 652. It is a product of very irregular composition, got by fractional distillation of tar from blast-furnaces or gas-works. It is also known in the oil trade as lusuline, torch-oil, and black naphtha, and the valuable property which it possesses is mainly derived from cresol. The lower grades of pitch-oil should not be used for dipping

Cresol is generally considered to be superior to carbolic acid as an antiseptic and vermin-killer, and Allen speaks of it as on the whole less irritating to the skin, especially after the separation of an acrid phenoloid body of high boiling point.

For details, see *Coal-Tar and Ammonia*, by Professor Lunge, published by Gurney & Jackson, London; and a paper by Alfred W. Allen in *The Journal of the Society of Chemical Industry*, vol. ix., 1890.

purposes under any circumstances. Even the purest samples which come clear from the still, worth at present about 4s. per gallon wholesale, darken on being kept a couple of months, although no sediment settles. The naphthalene which it contains is largely accountable for the discoloration, and it is believed to exercise an injurious influence upon the wool when the oil is not thoroughly saponified by mixing with from 3 to 6 lbs. of black soap per gallon. This risk is minimised, if not wholly removed, when the oil and soap are mixed a few months before use, so that no crystallisation can take place, and the bath kept at a temperature of not less than 60°, but still better, 70° or 80° F., and, if the deposit from oil that has been exposed to frosty weather be removed before use, the dip ingredients carefully mixed, and the contents of the bath repeatedly and thoroughly stirred. Pitch-oil is of no value as a preventive of fly-blowing. The increase of the prices of burning oils and of carbolic acid which are made from coal-tar may check the use of pitch-oil as a dipping material.

Carbolic acid and other crude coal-tar products used by unskilled people as sheep-dips, are very liable to poison sheep by absorption. Though a light scum floats on the top, the danger is in the heavy products that sink to the bottom and remain in an undiluted condition. "The *symptoms* are rapid breathing followed by paralysis, convulsions, and death. *Treatment.*—Wash off the acid as quickly as possible, and give a dose of Glauber's salts."

A **stronger solution** of any one of the above-named poisonous substances would destroy the living external parasites which infest sheep, but at the risk of injury to the sheep. The desired result can be effectually secured without danger to the animals by the use of dips made up of combinations of two or more of these substances in the safe proportions which we have stated. The immediate action of arsenic and of carbolic dips can be fortified by the addition of sulphur or tobacco. Either addition also prolongs the action of a dip, and thereby materially adds to its ultimate efficiency. Considerable variety can thus be imparted to the means at the disposal of those to be intrusted with the eradication of scab, so as to enable them to select the combinations necessary to combat the special difficulties which present themselves in

different districts. While tobacco, which adds materially to the cost of a dip, may be useful among Blackface sheep, where there is the danger of a few undipped sheep mixing with those which have been dipped, it may be left out in those parts of the country where the sheep are so fully under control that they can be confined after dipping within enclosures where chances of contamination would be impossible. Tobacco is liable to discolour white wool and reduce its value. The amount of dip material necessary in autumn for 100 sheep may be stated in round figures at 80 gallons for mountain breeds and 100 gallons for the larger lowland sheep, smaller amounts being sufficient in both instances for recently shorn sheep and for lambs.

Caution.—The various simple ingredients have been named which may be employed by the few men who have studied chemistry, to make effective dips at home at a less cost than patent dips, but the ordinary farmer is strongly recommended in his own pecuniary interest, as well as on the score of humanity, not to attempt to combine materials the nature of which he does not understand, but to use the ready-made dips which experiment has shown to best suit his purpose. The manufacture of sheep-dip is a complicated technical process, which involves the application of wide knowledge and experience to produce an article which will do its work effectively and at the same time not injure the wool or endanger the life of the sheep.

The question as to **what dips to avoid** has been admirably focussed in a *brochure* by S. B. Hollings, Calverley, near Leeds.[1] He advocates the exclusive use of arsenic and sulphur dips, stating, "arsenic has proved so effective, that at least two-thirds of the entire arsenic production of the world is used for insecticides." Quoting W. J. Austin, Norandoo, Victoria, who as a test treated 10,000 sheep with a crude and a prepared arsenical dip, he says: "The wool from the prepared dip weighed an average of four ounces per fleece heavier, and realised a halfpenny per lb. more than the rest." He adds: "Crude arsenical wools are harsh, and a bad colour. Those with a prepared dip are brighter, softer, and

[1] *Damaged Wool and its relation to Sheep-Dips, from the Bradford standpoint.* Bradford: William Byles & Sons, Printers, Piccadilly, 1903. Price 1s.

better grown. Every Bradford man will bear me out when I say that, wool affected by any of the evils associated with the use of alkaline or crude arsenic, is *always* more or less wanting in colour, texture, and weight."

Instructions for building a Swim Bath in Brick and Cement.—The *bath* should be 9 ft. long, 3 ft. 3 in. wide, and 3 ft. 10 in. deep. Full details are given on sketch, page 656, which is drawn to scale, and will be found sufficient to guide a bricklayer in making the bath. The *walls* of the bath should be 4½-inch brick work, with 9-inch coping, all set in cement, with just enough above the ground to prevent rubbish

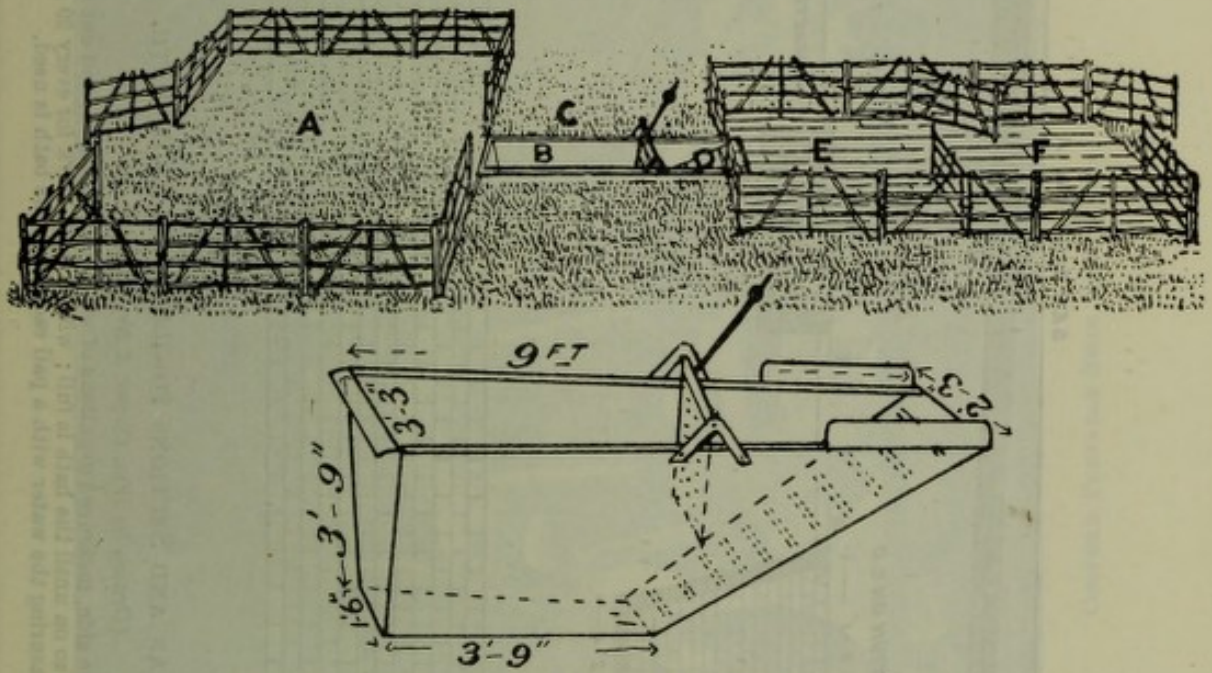


FIG. 55.—COOPER'S ORDINARY SWIM BATH.

A, Mustering fold. B, The bath. C, Place for a man with a crutch. D, Exit. EF, The draining pens.

from being kicked in. The *exit slope* should be 18 inches wide at the bottom, opening to 2 feet 6 inches at the top. The *bricks* in the floor of exit should be laid alternately flat and edgeways, the latter projecting so as to give a foothold to the sheep in walking out. The bricks of the floor of the bath may be laid flat, but the whole must be cemented to make it watertight. The *draining pen* should slope towards the centre, and also towards the bath, and this is better laid in brick and cement, or asphalte, though corrugated iron or tarpaulin will answer the purpose. *Quantities of materials* required are as follows:—Bricks, including draining floor, 1000; bullnose bricks for coping, 60; cement, 4 bags; sand,

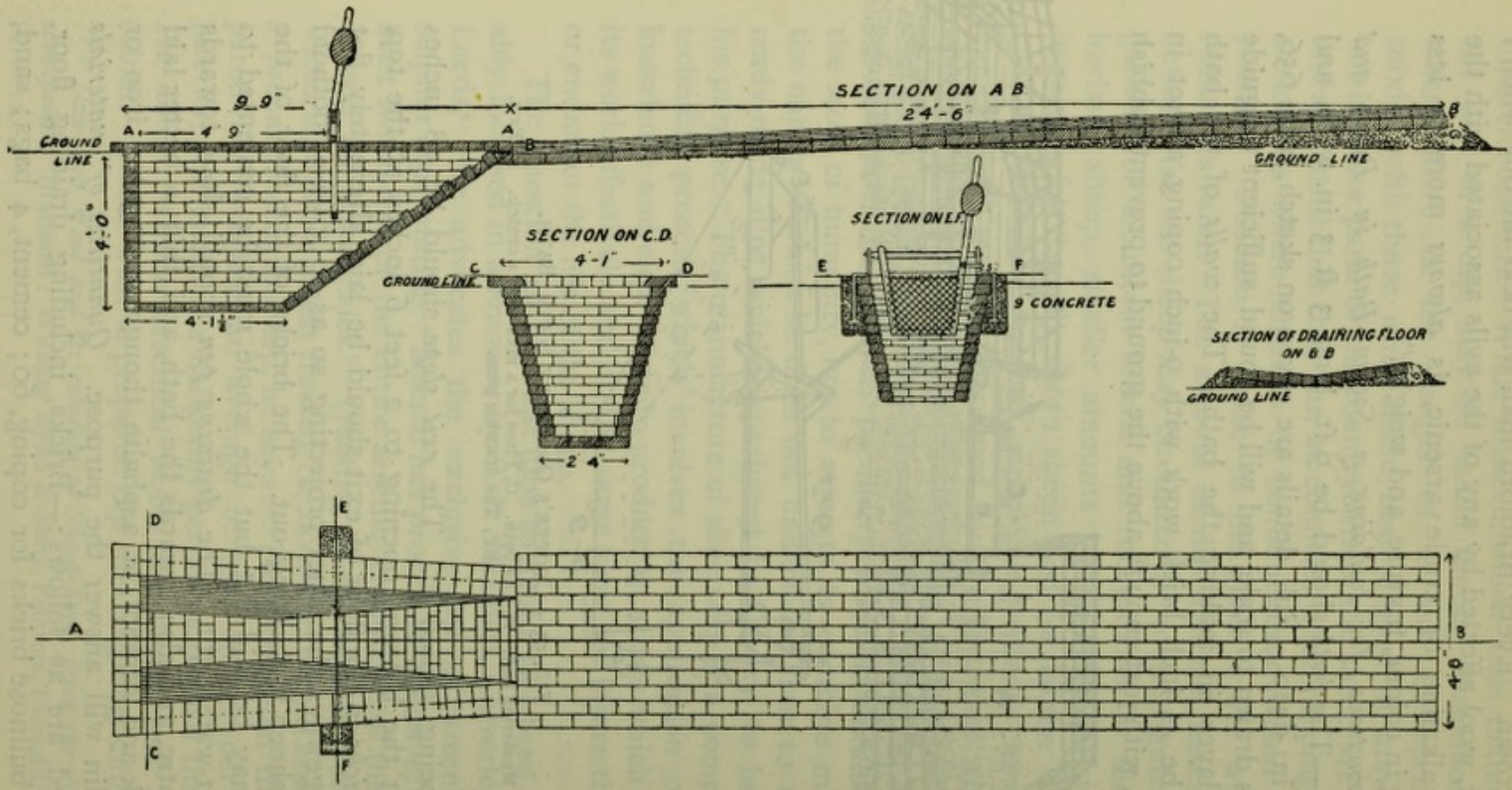
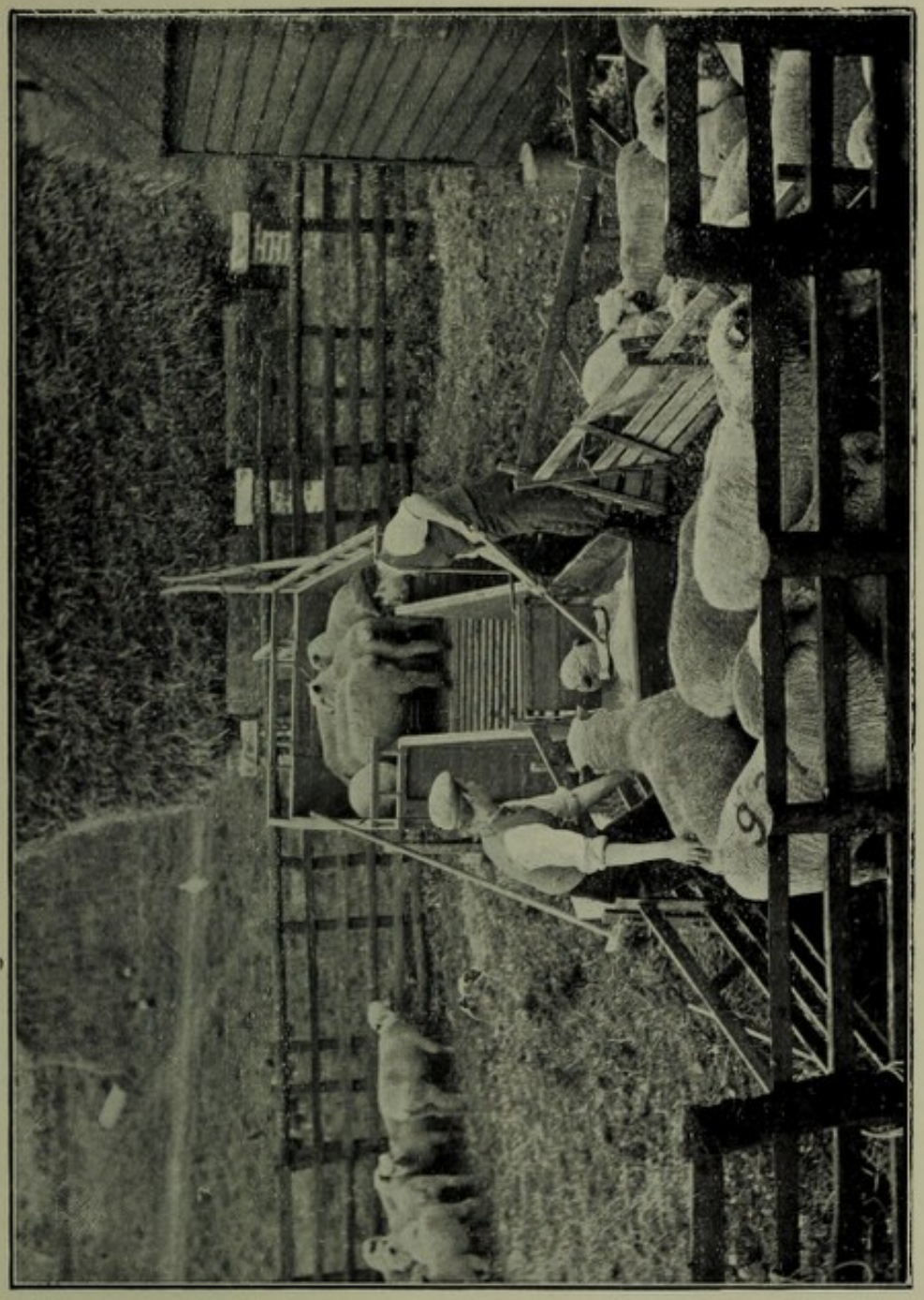


FIG. 56.—PLAN AND SECTIONS FOR BUILDING SWIM BATH.

(Drawn by Wm. Cooper & Nephews.)

The bath should be gauged. Nail a strip of wood to the side, measure 140 gallons of water into the bath, and cut a mark into the wood exactly at the water edge. Add another 20 gallons and make another cut; and so on until the bath is full; with a fresh mark for every 20 gallons. The measurements should afterwards be cut or burned into the gauge. This will save measuring the water with a pail each time the bath is used.



Cooper's Portable Swim Bath in Use.

1 ton. A *patent gate*, with supports to be built into the bath, as shown, is supplied by the Coopers for the sum of £1, 7s. 6d. The *draining floor* may be increased to any size desired. The larger it is, the more complete is the draining of the sheep.

A dipper consists of a mustering fold, a tank, and a dripper (see plan, page 658). The tank may be built of bricks drawn with cement, and may have a concrete floor. The old-fashioned tub into which sheep are turned on their backs is not to be commended. Heavy sheep are liable to be injured in lifting. The best form of fixed tank on a large

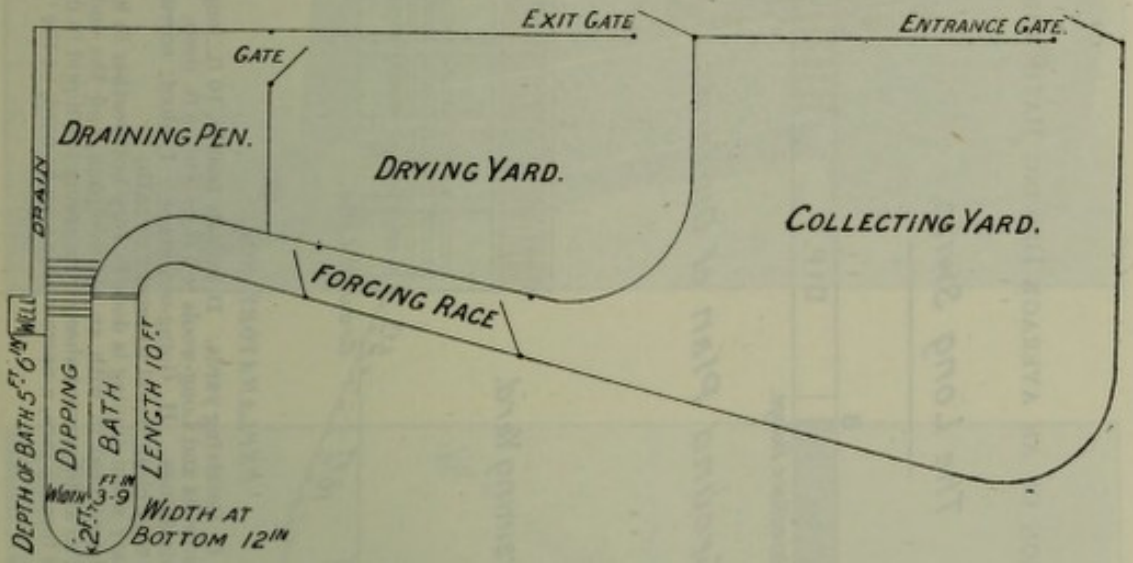
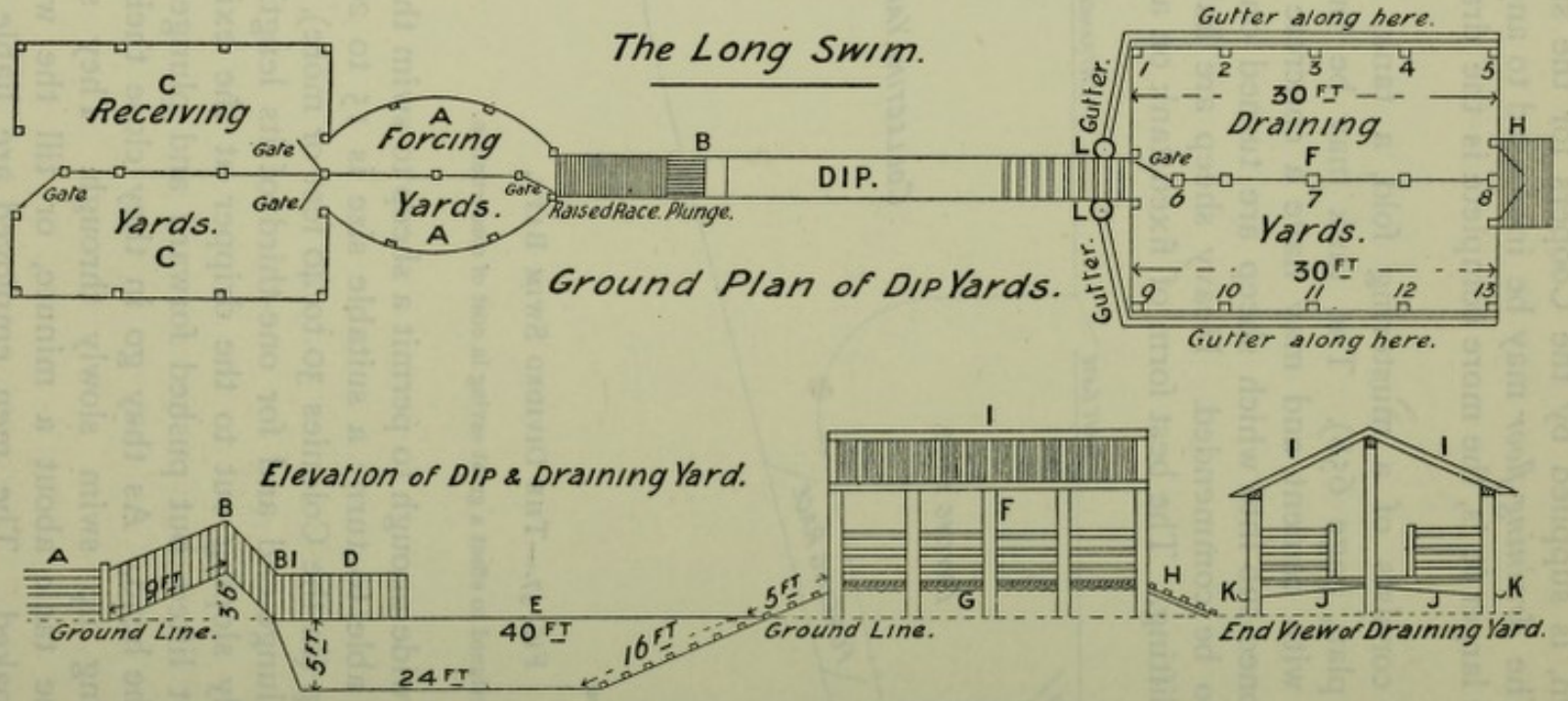


FIG. 57.—THE DIVIDED SWIM BATH.

Designed to effect a great saving in cost of construction.

scale is made wide enough to permit a sheep to swim through without being able to turn: a suitable size is 15 to 20 feet long at the top (in the Colonies 30 to 40 feet or more), 5 feet deep at the plunge-end and for one-third of its length, and then gradually sloping out to the dripper at the exit-end. Sheep are not lifted, but pushed forward and plunged one by one over the head. As they go in they close their lips, and on coming up swim slowly through. They should remain in the tank about a minute, or till the wool is thoroughly soaked. The men employed are liable to let them go too quickly, and one should be stationed at a convenient place with a forked stick or crutch to regulate the rate at which the sheep swim. The excess of dipping solution runs off the sheep to the floor of the dripper, and

FIG. 58.—COMPLETE PLAN AND ELEVATION OF AN AVERAGE DIPPING BATH FOR LARGE FLOCKS. (*See page* 657.)

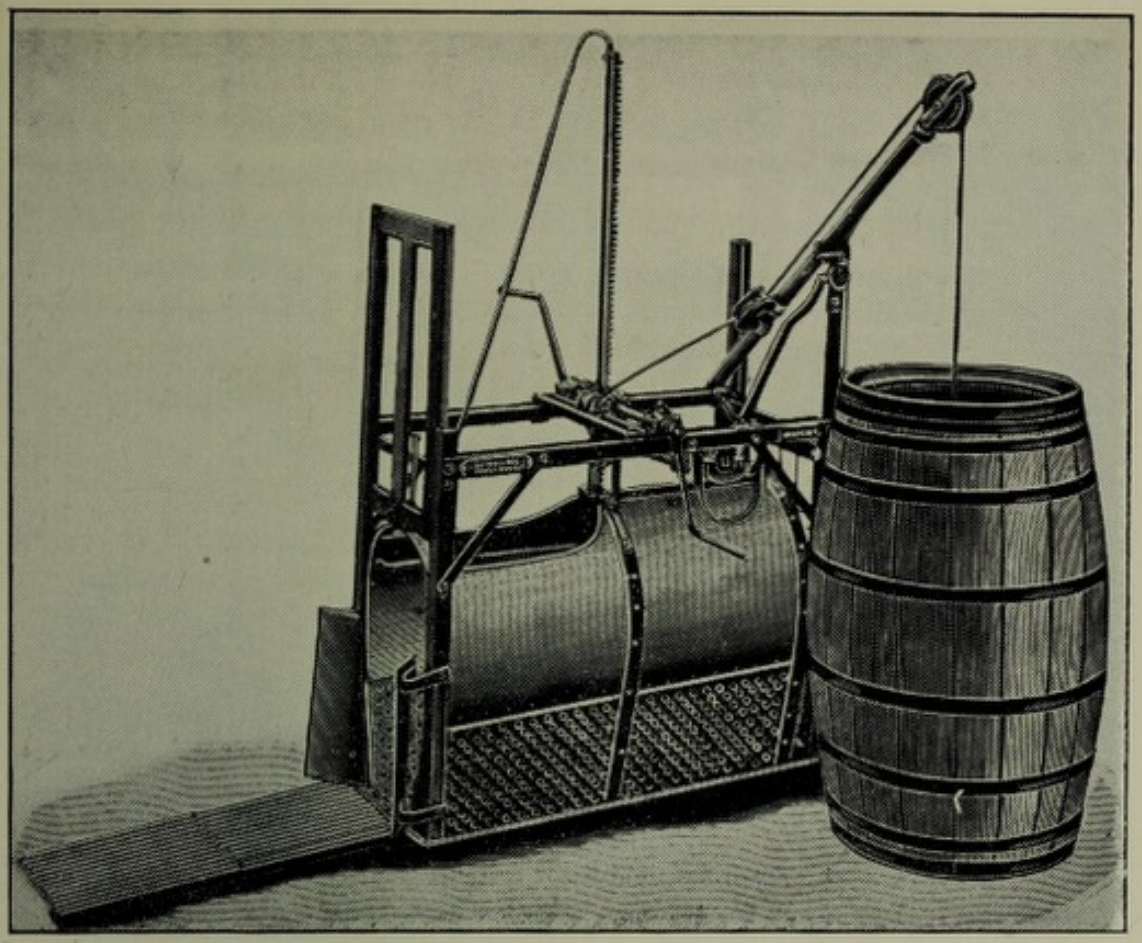


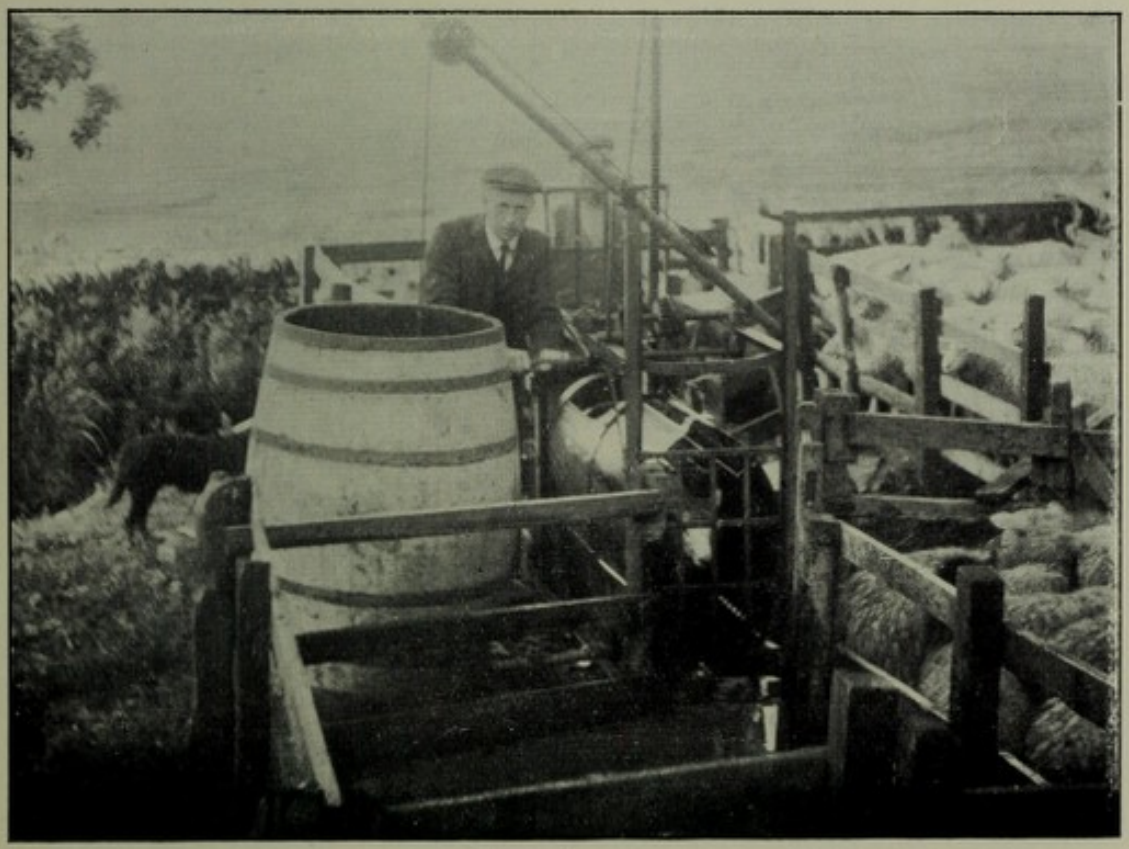
EXPLANATORY NOTES.

A, Forcing yards. B, Raised race and plunge. C, Receiving yards. D, Splash boards, 10 ft. long, 2 ft. high. (Sheets galvanised iron.) E, Dip, 40 ft. for Merinos, and 60 ft. for Cross-breds and Long-wools × 2 ft. × 9 in., 5 ft. deep. F, Draining yards. G, Galvanised iron under grating of draining yard to collect drainings. H, Going-out stage. I, Roof: corrugated iron, brushwood, or tarpaulins. L, Strainers to separate droppings and allow only clean liquid to return to bath.

N.B.—Roofing on draining sheds is only necessary when dipping is done in very hot weather in hot climates.

Memo.—The shoot for the plunge requires to be covered in with an old woolpack, and the end of shute, marked B1, should have an old bag nailed across at top to hang as a curtain, so as to prevent sheep from seeing the liquid in dip. As sheep slide down they push the bag aside and fall into dip. Instead of the above forcing race, a narrow race may be used, or the "walking-in" plan may be adopted.





SHEEP DIPPER.
Patented by J. & R. Wallace, Agricultural Engineers, Castle Douglas.

[p. 658

then back to a settling pool and thence to the tank, towards which the floor (best made of concrete) of the dripper slopes. After dripping, to avoid soiling or poisoning the pasture, the sheep should go for a time into a fold, or a bare paddock where there is no grass.

Quantities of Timber and Iron required to construct the Bath shown on page 658 opposite.

		£	s.	d.
	19—8 ft. posts at 1s.	0	19	0
Framing to carry Iron.	60 . . 12—10 ft. (super) lengths. 3 in. × 2 in. . .			
	30 . . 4—18 ft lengths, and 4—12 ft. lengths. 3 in. × 1 in. . .			
Bearers for Floor Joists.	120 . . 4—18 ft. lengths, and 4—12 ft. lengths. 4 in. × 3 in. . .			
Floor Joists.	220 . . 20—10 ft. lengths, 6 in. × 2 in. . .			
Batten Carriers.	120 . . 8—18 ft. lengths, and 8—12 ft. lengths. 6 in. × 1 in. . .			
	630 super ft. heart timber at 12s. per 100 . .	3	16	3
Side Rails.	516 . . 16—18 ft. lengths, and 16—14 ft. lengths for the 4 sides, and 8—12 ft. lengths, and 8—10 ft. lengths for the two ends 6 in. × 1½ in. . .	3	3	0
2-in. Battens for Floors & Gates.	Sold in lineal quantities, 2 in. × 1 in. in 150 18 ft. lengths. (135—18 ft. lengths will be required for the floor, the remaining 15 lengths coming in for gates, etc. Battens to be set about ½ in. apart.)			
	2700 feet at 2s. 6d. per 100	3	7	6
	In building a dipping bath of timber, tar should be plentifully used throughout to preserve it.			
Galvanised Iron under Draining Pens.	32—10 ft. sheets 26 gauge . . about	5	10	0
	About 80 feet of 5 in. spouting O. G.,[1] with two elbow joints	1	2	0
		£17	17	9

Wallace's Patent Dipper (Plate CCVII.) has a sunk galvanised iron tank or bath, into which a cage holding a sheep is lowered and elevated by rack and pinion. The inlet door closes automatically to prevent a second sheep from following. As the cage descends, the dip surges through perforated side plates, and thoroughly saturates the fleece. The exit door automatically lifts up when the cage on being raised reaches a certain point, and the animal is free to pass out. When it is clear of the cage, the exit door closes and stops the sheep stepping in at the other end. A supply of mixed dip is

[1] A trade term for a particular form of spouting.

placed in a barrel-shaped tank by the side of the dipper, and a uniform quantity of material is maintained in the bath by a regulating crane. A weight to counterbalance the cage, attached to a wire rope passing over a pulley, makes the raising and lowering of it easy. The weight is made to travel up and down inside the supply tank, keeping the dip at a uniform strength by agitation. The dip material running from the sheep is collected on a concrete floor and returned to a dripping or settling box on its way back to the bath.

The cost of dipping, which is usually done by contract in Southern England, is about 1d. each over a flock, including lambs. The cost of dipping material for Scotch sheep is from £5 per 1000 (or a little more than 1d. each) down to half that price.

Pouring is done by running a concentrated solution of, say, 5 gallons per score (against 20 gallons used in dipping) into "sheds" or partings made by the hand, at intervals, in the wool along the back, sides, and belly of the sheep. This is more effectual than dipping in a case of scab, but is more expensive, and, for ordinary purposes, unnecessary.

Smearing[1] with a mixture of equal parts of American or Archangel tar and grease, or better, butter, is a method of waterproofing the wool and destroying parasites that was at one time very largely and successfully practised in exposed hill districts, especially in the Highlands of Scotland and the North of England. It encourages the growth of wool more than any dip yet used, but wool is not so high in price that the increase will repay the extra cost of the operation. A limited number, however, of crofters in the Highlands and small farmers in the North of England now practise it. It darkens the wool, and often gives sheep, especially if lean, a "back-set" until the tar rises a little from the skin. Smearing should not be done before the middle of October, as a strong sun melts the smear, and it runs towards the points of the wool if it does not drip off, and moreover the sheep become fevered. In carrying out the process the smear should be laid well to the skin at the bottoms of partings in the wool, and as little as possible on it. The usual practice in pre-

[1] The Author is indebted for many of the facts on this subject to Stephen Brown of Borland, Lockerbie, N.B., formerly Killilan, Wester Ross.

paring the material is to thoroughly mix in a tub, a fortnight before the operation, as much as will be sufficient for forty mountain sheep, viz., 9 pints (Scotch [1]) of tar with 9 pints of butter, the latter melted to enable it to mix with the tar. Tar is a mild blister if applied alone to an animal's skin, and the grease is intended to dilute it. Hard grease, such as butter, also gives the tar consistency. A man smears twenty sheep per day, and receives from 2s. 6d. to 3s. for the work, besides food. The cost of smearing sheep is nearly 10d. each, made up as follows :—

9 pints of tar at 8d., ...	£0	6	0
40 lbs. butter at 6d., ...	1	0	0
Labour at 3s. 6d. per score, including rations, ...	0	7	0
Cost of smearing forty sheep . .	£1	13	0

Mercury poisoning takes two forms—the acute and the chronic—the former resulting from an overdose of calomel, or of corrosive sublimate, the latter from prolonged administration of mercury as a drug. Corrosive sublimate is a colourless liquid used as a disinfectant, and sometimes given by mistake. The *symptoms* are great salivation, colicky pains, fetid breath, followed by loosening of the teeth, partial paralysis, bloody diarrhœa, and death. In both cases the treatment is to administer large doses of white of egg.

In the case of sheep, mercurial poisoning was more common when salves or smears containing mercury were used. The practice then is to remove the wool and wash with an alkaline solution, and treat as for ordinary mercurial poisoning.

Copper poisoning occurs among sheep pasturing near smelting furnaces. They suffer from swelling of the joints, emaciation, and trembling fits. *Treatment.*—Remove to clean pastures, and give good food and tonics.

[1] A Scotch pint is about equivalent to $\frac{3}{8}$ of an imperial gallon.

CHAPTER XXXI

MANAGEMENT OF SHEEP (CONTINUED)—INTERNAL PARASITES

Internal Parasites—Two classes of worms—Cestode and Nematode—Tape-worm producing Gid—Liver-fluke producing Rot—Strongylus producing Husk or Hoose—Sheep Bot Fly producing Bots in the Head.

INTERNAL **Parasites.**—There are **two classes of worms** of which the intestines of domestic animals are the habitat, namely—the *cestode* or tape-worms and the *nematode* or round worms. The former require an intermediate host or "bearer" to complete the cycle of their life-history, but the whole life period of the latter is completed in the one host.

"**Three Cestode worms** are found in ruminants—*Tænia expansa*, *T. denticulata*, and *T. alba*. The first is the largest tape-worm known, reaching a length of 40 feet. *T. denticulata* is only about 18 inches, and *T. alba* about 9 feet long; all are unarmed, so they cannot attach themselves to the walls of the intestine, and are therefore easily expelled by a simple purgative; they are not common in Britain, and cause little functional derangement; but on the Continent, in Australia and in America, attacks of *T. expansa* have assumed an epidemic form, producing diarrhœa and emaciation, especially in lambs. *T. expansa* is also found in this country associated with nematode worms in the stomach and intestines of sheep, generally of the species *Strongylus contortus*,[1] a wire-worm about $\frac{1}{6}$ to $\frac{1}{3}$ of an inch in length,[2]

[1] **Young Cattle** also suffer from the attack of a nematode worm similar to *Strongylus contortus*, but larger; these worms fix themselves to the walls of the abomasum, or fourth stomach, and produce similar effects to those seen in sheep, and the *treatment* is the same as for sheep. *Cysticercus bovis* is the hydatid form of the *Tænia mediacannulata* of man. This cystic form is found in the muscle and connective tissue of cattle, and gives rise to what is known as "measly beef."

[2] Described and illustrated at pp. 385-8 of the Author's *Farming Industries of Cape Colony*.

Trichocephalus affinis, or whip worm, and *Strongylus filaria*, one of the worms which cause hoose in sheep. They produce a diarrhœa which, if not treated, often proves fatal. The fæces are of a brownish colour and very liquid, and emaciation is extreme. A *common treatment* is to give turpentine followed by tonics, sulphate of iron, and powdered gentian root, a teaspoonful of each ingredient to each sheep in their trough food." (See also Cooper's remedy on page 608.)

A sheep is very easily choked, and turpentine is one of the most dangerous drugs to administer, not only from its highly irritating and searching nature (liable to cause death by spasmodic closing of the mouth of the windpipe should it enter), but from the fact that it will hardly mix with any ordinary drench. The administration must be made with great care. To ensure safety, the turpentine ($\frac{1}{4}$ to $\frac{1}{2}$ oz.) should be thoroughly soaked into a little dry meal, and this again mixed with cold gruel, oil, or even water.

Should scour be the result of an overfeed of succulent grass, or be due to a sudden change of green food, the primary purgative and the secondary astringent action of the turpentine is generally what is wanted. Laxity of the bowels, when there is no positive derangement of system, is easily remedied by giving concentrated dry food, as cakes and meal, or a run on a sainfoin ley.

One stage of the development of *Tænia cænurus*, the tape-worm of the dog and fox, is passed in the brains of sheep, causing **gid** or **sturdy**. "The segments are evacuated by dogs on the pastures, and the eggs, picked up by sheep while grazing, are hatched in the stomach. The embryos make their way by the blood stream to the brain, where they form cysts, which gradually enlarge." The remedies are of more consequence to farmers who keep lean stock, and to ram-breeders, than to those who can send without much loss an affected animal directly to the fat market. A ram that has been cured of sturdy is none the worse afterwards for breeding purposes. The seat of disease is on the surface of the brain, at its base, or, in the Author's experience, most frequently in the lateral ventricles. These cavities are situated one on each side of the forward brain, and there a cyst, or in common language, a "water-bag" containing many young tape-worms, develops. This presses against the brain, caus-

ing absorption of the contiguous parts of that organ, and usually a thinning and softening of the skull in one or other of the hollows on the crown of the head immediately in front of a line drawn between the ears, where the skull is comparatively thin. Partial paralysis accompanies the later stages of the development of the malady, and the sheep becomes blind on, and circles to, the side opposite that on which the cyst inclines.[1] Boring with a trocar and cannula to break, or if possible, to extract the "bleb" and its contents, is easy in such a case. When the seat of the disease is far back in the brain, the skull is thicker over the affected part, and there is not sufficient time, before death is liable to occur, for the bone to become thin and soft by absorption. In Scotland this form of gid is known by the specific name of "thorterill." Piercing then leaves little pieces of bone, fractured from the skull, on the surface of the brain, which, although the disease may be cured, produce within a few days suppuration, which usually results in death. The late Principal Wm. Williams recommended in place of a piercer the use of a trephine (a little circular saw), to remove a minute round piece of bone. The skin is bared from the skull immediately over the spot to which the movements of the sheep direct suspicion. All detached pieces of bone are washed carefully away before the membrane covering the brain is broken. Piercing in the usual way through the brain to reach the bag is then performed with comparative safety. When the disorder is located in the forehead, or in the case of rams with skulls too thick to soften, the old remedy described by Youatt of passing a thin skewer or sharp steel wire up the nostril and right into the brain-box to reach and penetrate the water-bag, is the readiest and most simple, and often effective, means for a shepherd to employ. The wire is kept close up against the roof of the nostril, and should be only stopped by the skull under the forehead. After it has penetrated the skull, it should be partially withdrawn and returned two or three times in a

[1] In some cases the animal walks straight forward with head depressed, running against everything in its way, and frequently falling. Then it is likely that the parasite is attached to the *Corpus callosum;* if the animal walks straight forward with head elevated, sometimes reeling, the parasite will be found on the *Cerebellum*, or in the fourth ventricle. —PENNINGTON.

slightly different direction each time to give it a greater chance of success. If no benefit or only partial success follows within three or four days, the operation should be repeated, and this may require to be done two or three times more before a complete cure is effected. In districts which are much subject to this disease, to ensure the destruction of the embryo worms the skulls of dead sheep should be broken up and their carcases buried with quicklime in a compost heap. The dogs ought also to be dosed regularly with ½ drachm to 1 drachm of areca nut, which frees them from tape-worms, and lessens the risk of sheep, while feeding on grass, picking up segments of the worms passed by dogs.

Darnel rye-grass (*Lolium temulentum*), an annual weed in some pastures, is reputed to produce in sheep brain symptoms similar to those of sturdy.

Liver Rot.—There have been enormous losses in this country from "rot" in sheep, the work of a *trematode* worm, *Distomum hepaticum* or *Fasciola hepatica*, which is the cause of the disease. The "fluke," seldom more than an inch long, broad, thin, flat, and flounder-like, attaches itself by a sucker on the under surface. Sometimes hundreds have been found in the liver ducts of one sheep. Professor Leuckart in Germany, and A. P. Thomas in this country, traced, almost simultaneously, the life-history of this parasite through all its different stages, and published independent accounts of their investigations in 1882.[1] They find that the fluke lives for a time, and changes its form, in the body of a minute shell-snail, *Limnæus truncatulus*, which thrives in excessively wet places.

The sequence of changes in the animal system is originated by irritation, and consequent inflammation, beginning in the biliary ducts, and extending through the liver, interfering with the performance of its functions in aid of digestion. The stomach next becomes weak or disordered, poor and imperfect blood is formed, and time is all that is necessary to exaggerate the results into a persistent anæmia, which ultimately ends in death.

The great means of prevention are—to surface- or under-drain; to keep sheep from pasturing on flooded land; to have lumps of rock salt about the pasture; and to give

[1] See the *Journal* of the Royal Agricultural Society for that year.

liberal feeding. One fact in connection with this disease is worthy of special consideration. The presence of flukes in the liver, even in considerable numbers, does not necessitate the appearance of the dangerous symptoms described. Few sheep are killed in Galloway, a large district in the South-west of Scotland, without flukes being found in their livers: yet death from "rot" to any extent is very exceptional. When sheep first become affected, the stimulating influence on the liver makes them thrive rapidly for a time. This has led to the practice by some feeders of putting fattening sheep on flooded land to be "fluked." Rot certainly has done much damage among breeding flocks, and will continue to do so on damp undrained land in wet seasons, like that of 1889, but there are good reasons to believe that much of the death from so-called "rot" has been from a very different cause, which is described under lung disease at p. 669.

Husk or **Hoose** is a bronchial catarrh, the result of the irritating action of a number of long, hair-like, round white worms, *Strongylus filaria*, in the bronchial tubes. It is most common amongst lambs, if they be pastured on land recently occupied by sheep, as they pick up the eggs (*ova*) dropped by their predecessors with their food. The attack is evinced by a peculiar husky cough, made worse by exertion; by an unthrifty appearance; and by a mucous discharge from the nostrils, which often contains the worms or their eggs. Weak animals, and those which develop large numbers of worms, frequently die. To prevent the occurrence of this malady, sheep should be kept in good thriving condition, and young stock should never be put on land previously soiled by sheep. *Remedial treatment* is directed towards the destruction of the worms. A turpentine drench has been long considered efficacious; $\frac{1}{8}$ to $\frac{1}{4}$ oz. at a time being given to a lamb, and this repeated twice, with an interval of three days between the administrations. Turpentine is a most poisonous and dangerous drug if given too frequently, or in too large quantities, to sheep, as it sets up inflammation in nearly all the important organs of the abdomen; and most sheep thus poisoned will die within a few days, after evincing, by dullness, restlessness, and the grinding of their teeth, that they are suffering severe internal pain. A purgative only aggravates the condition, and

hastens death. Injections of tepid water may be employed to allay pain and relieve the constipated condition which accompanies turpentine poisoning.

A simple **drenching-tin** for sheep, the invention of one Armstrong, was described as follows in the *Sydney Mail*:—

"It is a tin cone, about 8 inches in length, about 1½ inch through at the butt, which is closed. At the mouth or narrow end, which is about ⅜ inch across, and open, the sharp edge is covered by a ring, so that it will not injure the sheep's mouth. Near the base of the cone, and about 1¼ inch from the end, there is an orifice 1 inch wide. The sheep are held, and the operator having the drench stuff in a bucket, dips the drencher, wide end down, into the mixture. By this action he instantaneously admits into the tin about one ounce of the drench, and raising it he is ready to pour the dose down the throat of the sheep. The cone is, in fact, a measure and drench combined. The large opening freely admits the air, the want of which is the great difficulty met with when a bottle is used. Six or seven men can easily drench three thousand weaners in a day."

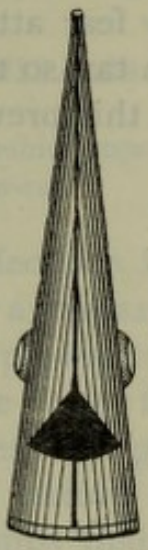


FIG. 59.—SHEEP DRENCHING-TIN.

The recent and more approved method of treatment is the injection, directly into the trachea, of ½ to 1 drachm of a turpentine and carbolic acid mixture, fully detailed at page 239.

The **Sheep Bot Fly**, *Œstrus ovis*, lays its eggs in the nostrils of sheep from the middle of May to the end of July, and, on hatching, the larvæ crawl up the nostrils. The fly causes as much excitement in a flock of sheep as the warble fly does among cattle. The sheep become most uneasy, keep their noses close to the ground and bury them in the dust. Sometimes they scatter in all directions to find shelter. At other times they form into a dense pack, and those on the outside stand with their heads in under cover.

"The larvæ crawl from the nostrils into the sinuses of the skull. Here they cause irritation and inflammation of the lining membrane, with the result that the animal has a discharge from the nostril, and sneezes and coughs."

A few larvæ do little harm, but if they are in great numbers the constant irritation produces loss of condition and emaciation.

Treatment.—Fumigate the nostrils with tobacco smoke to dislodge the larvæ.

In badly-affected pastures two or three furrows may be ploughed up, in which the sheep can bury their nostrils when they fear attack, or their feeding troughs may be smeared with tar, so that, while feeding, their noses become smeared, and this prevents the flies settling to lay eggs.

CHAPTER XXXII

MANAGEMENT OF SHEEP (CONTINUED)—DISEASES

Lung Disease—Trembling or Louping-Ill—Braxy—Double-scope—Temporary Blindness—Foot-rot—Blotches—Dew-rot.

Lung Disease.—Cattle are subject to an infectious lung disease; goats have been found liable to a disease of the same nature at the Cape; and the Author has proved to his satisfaction that sheep also take lung disease one from another, and die, under certain circumstances, in great numbers. It appears to possess very much the nature of a bad cold, and is more severe on old ewes and lambs than on other sheep. Should it break out in a flock during summer, or in fine mild weather in winter, deaths are not numerous; but in a cold and stormy season, which aggravates the disease, one-third to one-half is no unusual proportion of a flock to die.

The symptoms are a violent and painful cough, which seems to give no relief. When seriously affected, the animal falls off from the others, and gradually stops feeding. The breathing becomes increasingly heavy and laboured, with heaving at the flank, and moaning in the later stages, evincing the presence of acute bronchitis with severe pain. The ears droop in a peculiar manner, and the head hangs down, while foam appears at the mouth, and a tough yellow mucus at the nose and eyes. None recover after these acute symptoms set in, and death supervenes generally about the third or fourth day. The *post-mortem* reveals a highly congested state of the air-passages, and large portions of the lungs, usually the upper lobes, are found to be solidified, so that they sink on being immersed in water.

The most efficacious treatment is to inject by the intra-tracheal syringe, shown at page 239, 2 to 4 drams of the injection mixture there detailed, and to cover the backs

by sewing to the wool with stocking-yarn pieces of strong canvas, 2 feet or 2 feet 3 in. square, which have been water-proofed by brushing one side with boiled linseed oil, to keep rain off and heat in; the sheep should also be liberally fed, and kept perfectly quiet in a well-sheltered place. Any attempt to drug or fumigate the affected animals increases the number of deaths. A few usually die of consumption some months after the acute stage of the disease has passed. The late Principal Williams and some other authorities believed that the origin of the disease above described is entirely parasitic, the special worm being *Strongylus filaria*. To the public the difference of opinion as to whether the disease is parasitic or infectious is of little moment, as the remedial treatment recommended in either case is the same. There exist weighty reasons for the statement that much of the death from so-called "rot" in the United Kingdom in 1879 was largely due to this disease, and not so much to the liver fluke as was supposed, although in many districts fluke was prevalent and most destructive.

Wm. R. Davis says (1907):—"**Pneumo-enteritis** of the sheep, a disease classed by Nocard under the *hæmorrhagic septicæmias*, is not uncommon in this country; indeed, it occurs a good deal more frequently than is generally suspected. In the acute form the attack is very sudden; respiration becomes rapid, there is a frequent cough, a discharge, often bloody, escapes from the nostrils, the mucous membranes become purple, and spots may appear on the inside of the thighs. There is great distension of the abdomen, and after some hours, diarrhœa supervenes. The termination is usually death in a few days, sometimes even in a few hours. *Treatment.*—Medicine is useless; the pasture should be changed, salt and iron given internally to the sheep, and a dressing of salt applied to the land."

"In Asia Minor a contagious lung disease of goats has long been recognised. Whenever an outbreak occurs among the stock of the villagers, a strict cordon is drawn around the infected area until the destructive malady has ceased to exist. Some importations of Angora goats carried the disease to Cape Colony a few years ago, where it committed great havoc in 1881 and 1882, more especially in the districts of Somerset and Bedford. Several thousands of goats died. The mortality of an entire flock was at least equivalent to 90 per cent. in many places. Prompt measures were taken by the Cape Government to stamp out the disease by the

slaughter of all animals on infected farms, and just compensation to the owners of flocks was awarded. In a little more than twelve months the plague was by this means stayed, and the disease is now unknown in the colony. The Dutch and English farmers called the malady *lung-ziekte*, or 'lung-sickness,' by which name contagious pleuro-pneumonia of cattle is known by them. They aver that the symptoms and *post-mortem* appearances were precisely like those of animals of the bovine race that have died of pleuro-pneumonia. The diseases, however, could not be the same. The 'lung-sickness' of goats was not communicable to cattle. Even sheep that cohabited with them enjoyed perfect immunity from the disease."—*Agricultural Gazette.*

A **Departmental Committee** to investigate the diseases **Louping-Ill** and **Braxy** was appointed in October 1901, by the Right Hon. R. W. Hanbury, President of the Board of Agriculture, with Professor D. J. Hamilton, of Aberdeen University, as Chairman, and R. B. Greig as Secretary. The Report was issued in 1906 as a Blue Book, in three parts—Cd. 2932, 2933, and 2934. The objects of investigation proved to be only two of a "most interesting and important group" of at least seven "closely allied" diseases, which appear to be all acquired through the food, and caused by anaërobic bacteria (growing only in media from which the air is excluded), "whose habitat is in the alimentary canal, and all subject to a peculiar seasonal action of the blood." The following are the **names of the diseases,** the **seasons** when most prevalent, a general indication of the **localities** of the infected districts, and brief descriptions of the **specific bacterium** associated with each :—

A. "Braxy" (November to February). Widely distributed along the West coast of Great Britain and Ireland: small delicate rods, almost immobile, with a great tendency to spore.

B. "Louping-Ill" or Trembling (April to June). West and South of Scotland and North of England, and parts of the North-west coast of Ireland: large, thick, clumsy-looking rods, slightly mobile, with a tendency to develop oval or round spores of a brown colour, but also able to increase by fission.

C. "Black-quarter" (spring and autumn). Widely distributed: thick rods, more mobile than those of Louping-Ill.

D. "Struck" (early spring). Romney marsh: very large, coarse-looking rods.

E. "Malignant Œdema" (November to January, and

May to June). Scotland and North of England: long thin rods, very actively mobile, movement snake-like.

F. "Disease 'A'" (September to middle of December). West Highlands and South of Scotland: very large rods, with feeble motility.

G. "Disease 'B'" (October to January). West Highlands and South of Scotland: long thread-like rods, motionless.

H. "Deer disease." Alnwick Park, Northumberland: extremely long thin rods, motionless, or only slightly motile.

All are sheep diseases but the last, which is confined to deer. Louping-Ill and black-quarter also attack cattle, and louping-ill swine in addition.

Braxy or **sickness**, *Morbus subitarius ovis*, is a widely distributed disease in the United Kingdom, but chiefly within the area influenced by the Gulf Stream, viz., in the West of Scotland, the West of England (including Wales), the West coast of Ireland, as well as on the West coast of Norway, and the whole of Iceland and the Faröe Islands. In the Faröes, where it is very deadly, a protective vaccine, or weak culture of braxy bacilli, prepared by Prof. C. O. Jensen at Copenhagen, was introduced in 1897, and it has since been used with great success on 10,000 sheep annually. In some of the worst areas in the West and South of Scotland, 20 per cent. of the best of the sheep of less than a year old die under ordinary circumstances. In Scotland it prevails most in autumn, but sometimes it occurs in spring, when there are sudden and severe white frosts at night, and the grass is of a rank growth. The succulent green herbage or "tath" from the droppings of cattle is most liable to produce the disease, which runs its course so quickly within a few hours that no ordinary remedy is of much avail. The flesh of sheep which have died of braxy is deep red in colour, particularly about the abdomen, is eaten with safety, and when the hind quarters are dried into hams, ranks as a delicacy among people who have been accustomed from early youth to eat it. When cases of anthrax are mistaken for it, the people handling or consuming the flesh frequently die from contracting that disease. Putrefaction sets in immediately after death, and the smell and flavour are high and to many people objectionable. The first symptoms are, "a short, quick step, followed by unsteady gait, and a tendency to lie down and get up suddenly."

The blood becomes viscid and dark, and stagnates in certain parts before death; so that effective bleeding, which is usually attempted, is often impossible. To try bleeding, and to make the animal move about, are almost the sole remedial means at command, and that only in the early stages. The discovery of the specific bacillus by Ivar Neilsen in Norway, in 1888, was confirmed by Professor Hamilton prior to the beginning of the Committee's investigations in 1901.

The most **successful shepherds' treatment**—which is not incompatible with the finding of the Board of Agriculture Committee—is the drenching of hoggs in the third week of September, or before the braxy season, with a wineglassful of a mixture of **pigs' dung and sweet milk**, after they have been fasted for twenty-four hours in a clean fold. They are kept for two hours more before being turned into clean foggage.

The pig "is turned out on to foul ground," says a footnote, page 10, Part III., of the *Louping-Ill and Braxy Report*, but in the Scottish Border country it is kept in a clean house, and fed on grass or cabbages and milk for three clear days. The dung is gathered on the fourth day, and the drench for 100 hoggs made up of 1 lb. of dung to 100 wineglassfuls of milk, or, according to the Report, 1 pint of dung to 15 pints of milk. The treatment is most effective, but it reduces the condition of the hoggs, which is a serious disadvantage at their start in life, especially if the coming winter prove to be a trying one.

Louping-Ill is not certainly known away from Britain.[1] The **chief centres of attack**, which are unfortunately extending, are the western counties of Scotland, viz., Ross and Cromarty, Inverness, Argyll and the adjacent islands—including, in the Hebrides, the west centre of Lewis; a number of small areas in the central southern counties of Scotland; a large area in the north-west of England; and about a score of small centres in very divergent districts of the country, including Wales. It prevails most on grassy uplands, those growing nard or mat-grass, *Nardus stricta*, being particularly liable to produce it.

Sheep, more especially before they are a year old, are most

[1] Zündel, V.S., Strassburg, describes a disease in lambs very similar to that of louping-ill, in which an organism is found which, he says, "resembles the microscopic plant *Pleospora herbarum*."

liable to die when moved from healthy to infected ground, and a fence or stream often separates the one area from the other. Deaths from several of the other diseases named are frequently wrongly attributed to louping-ill. It exists in a chronic and in an acute form. "In the former, the sheep is usually convulsed at first, and afterwards more or less paralysed, lying sometimes for weeks unable to rise." The appetite is generally good, but few recover the power of their limbs. "Acute cases run their course to a fatal issue in a few hours, with symptoms of blood-poisoning." The disease has been long known, but its bacterial origin was unsuspected till 1881, when Principal Wm. Williams, working under the auspices of the Highland and Agricultural Society of Scotland, made the discovery that the sheep tick (Plate CCVA.) taken from trembling sheep contained organisms identical in appearance to those he found in the spinal fluid which he extracted from the vertebral column of affected animals. This exploded the theory of Brotherston, Botanist to the Highland Society's Louping-Ill Investigations Committee, that ergot was the cause. The investigations of the Departmental Committee did not confirm the belief in the **tick** as the **main carrier** of the disease, but "show that, at most, ticks can carry infection only under exceptional and accidental circumstances." The facts, however, remain that there is no louping-ill on land where there are no ticks; its appearance on fresh ground has been concurrent with the advent of ticks; it appears at the seasons of the year when ticks are in evidence, generally in spring, but in exceptional places in the West Highlands also in autumn. When ticks are not numerous, or when they are killed by dipping the sheep on infected land, the occurrence of trembling is at a minimum. Similar blood-poisoning and paralysis have been traced to the bite of a tick in South Africa and in Queensland.[1] When the ticks there are sought for and removed, the animals usually regain the use of their limbs within a few hours.

The blood of affected sheep "was free from any organism," and inoculation with it failed to convey the disease.

[1] See the Author's works, *The Rural Economy and Agriculture of Australia and New Zealand*, p. 333; and *The Farming Industries of Cape Colony*, p. 303.

The liquid in the peritoneal cavity (or within the lining membrane of the belly) sometimes swarmed with the large bacillus, and was turbid. In the clear liquid, in which only a few organisms are present, turbidity developed in twenty-four hours. Turbid liquid inoculated subcutaneously into a healthy sheep, usually kills it in a few hours, after much swelling of the inoculated limb. A little acetic acid simultaneously injected enhances the action of the bacillus, as it does that of black-quarter. The bacterial character of the disease was definitely established by repeated inoculations with this liquid or with a culture of the bacillus found in it. It was then discovered that in certain fatal cases the bacillus sometimes swarmed in the intestine, where the tissues and cavities of the body were free; and also that, after being taken in by the sheep with its food, it might multiply and be evacuated in quantity with the dejecta without injuring the animal. Except during the louping-ill season, the blood of a healthy sheep destroys the bacillus when it reaches it, but at spring-time it grows freely in the blood. Chronic cases are brought about by the slow poisoning which supervenes when the resisting power of the blood is partially lost and the invasion of the cavity becomes gradual. "Nervous symptoms are then manifested." By the passage of the organisms along the intestine without doing injury, the sheep are believed to be rendered immune, "so that when the period of danger arrives, they fail to take the disease." Sheep not thus "prepared have little power of resisting the passage of the organism into the peritoneal cavity, and consequently many fall victims to the disease," a fact which accounts for the large death-rate among lambs and hoggs, and the excessive mortality among sheep brought in spring from clean to foul ground. This is not an infectious disease, and few, if any, sheep take it a second time.

Preventive means.—Subcutaneous inoculation of their bacilli in this group of diseases (specially in the case of anthrax and louping-ill) "was found to be uncertain and unsatisfactory . . . sometimes ending in the death of the animal." "The results of 'drenching' or introducing the organisms by the mouth, proved eminently satisfactory," except at those times of the year "when the animals are in a susceptible condition," as "the disease may then be com-

municated and death ensue." "The drench was prepared by incubating the specific bacteria on glucose-beef-tea and mixing with a little water, a second dose being given a week to a fortnight later."

Certain other means of prevention have already proved useful in practice, viz., cutting or burning, at the proper season, all excess of rough herbage, and the pasturing of cattle along with sheep, especially during early summer.

Affected animals, not actually prostrate, should be kept in a perfectly quiet place, and, to prevent excitement, neither man nor dog should be allowed to approach within sight. When down, fat sheep should be killed at once: others in store condition may first be bled, if there be brain affection, then well fed, turned repeatedly from one side to the other, and moved regularly to fresh ground. A small percentage recover after becoming unable to walk.

Double-scope or **Death-scope** is supposed to be a pining disease, a remedy for which was discovered by a Yorkshire shepherd about the middle of last century. It is said to affect sheep "on hard, poor, rough land, where there is too much rough old grass, or on cold wet farms in high districts" in the North of England (especially Yorkshire) and in Scotland—the animals most commonly affected being hoggs or sheep under two years old. Attention is drawn to them by their thin and unthrifty condition and want of growth; and on examination the frontal bone proves weak or soft, and easily broken in by a blow with the knuckles, which is the remedy believed in by experienced Yorkshire shepherds, and by not a few observant sheep farmers who practice it on many thousands of sheep every autumn, in October or early November. The supposed remedy is little known, and not much believed in in Scotland, but John A. Willis expresses the common belief of Yorkshire farmers when he says: "Sheep usually recover if the skulls are broken in before the animals get very weak. I have five half-bred hoggs feeding for the butcher now (March 1905), and doing very well, that were so weakened by the disease as to be unable to travel to the railway station in October."

George Metcalfe, M.R.C.V.S., Settle, diagnoses the disease as "a form of anæmia which appears if sheep remain too long on pastures deficient in some constituent, probably

phosphates. . . . If changed on to freestone land, they will generally improve and do well." As a preventive, farmers usually move their sheep every week or two. Preliminary inquiries made by the Veterinary Department of the Board of Agriculture in the end of 1906, failed to find any scientific or other reason for cracking the frontal bones of affected sheep. If the operation be only a preliminary to a change to better pasture for thin sheep usually brought in from the moors, the credit is more probably wrongly allocated to a mistaken practice in place of to the change of food. The disease seems to be similar to **Vanquish,** which occurs on poor soils resting on granite, and which is checked by good shepherding and cured by a change to better pasture on another geological formation. Both diseases require to be fully investigated.

Temporary Blindness is most frequently met with after a long spell of cold wet weather. A dim, opaque scum forms over the pupil of the eye. This would disappear naturally in time, but, as the animal cannot see to feed, it falls off in condition, and may tumble into a hole. Bleeding at the eyes is the shepherds' remedy. A penknife is inserted between the frontal bone and the skin immediately above the inner corner of the eye, and a large vein, which bleeds profusely, is severed. The contagious form, *Epizootic conjunctivitis*, spreads rapidly through a flock in close contact, and the animals fall off in condition. The *treatment* is to keep the sheep as quiet as possible for the ten days in which the ailment runs its course, and bathe the eyes with a solution of boracic acid (2 drams to a pint of tepid water).

Foot-rot.—It was noticed that dipping with arsenic reduced the lameness of sheep suffering from foot-rot, and from this sprang the custom, for prevention as well as for cure in mild cases, of driving sheep once a fortnight through a trough containing a solution of arsenic. The drying and hardening action on the horn is injurious if repeated oftener. In very bad cases, all horn that has separated from the inner structure of the foot by inflammation followed by suppuration must be removed with a sharp knife, and the raw exposed surfaces, which would grow proud-flesh if not attended to, dressed with a caustic or acid mixture, as arsenic is hurtful to a large open sore. A flock of sheep may be badly injured in condition, and made to appear as if they were foundered,

if driven through a strong solution of arsenic when their feet are in a raw state; and serious consequences result if pellets of undissolved arsenic are left adhering to the hoofs.

"The natural home of the sheep is on dry and stony uplands where herbage is sparse, and long distances have to be covered to obtain their living; this exercise and sparseness of food keep the sheep in lean yet hardy condition, the hoof grows slowly and is consequently harder, and the wear and tear on sole and wall of the hoof are in due proportion; but, when sheep graze on the lowlands and on soft pastures where the herbage is luxuriant, the opposite conditions rule: the sheep become fat and heavy for their feet, the horn is soft, the wall grows more quickly, and the soft ground does not wear it down. The wall of the hoof turns in on the sole, sets up irritation and consequent inflammation, dirt lodges between the folds and crevices of the ragged horn and stops up its natural tubes; degeneration of the horn and foot-rot results. This inflammation may extend to all the sensitive structures of the foot, and even to the bone.

"That ewes in lamb so often suffer, may be put down to the fact that they are heavier by reason of pregnancy, and that they are also on the best and richest pastures, and therefore wear the feet little. Since sheep are all on the pasture and subject to the same conditions, foot-rot would arise from the same cause in many sheep at the same time; hence sprang the belief by some that foot-rot was contagious. There is, however, a **contagious form** of foot-rot,[1] not so common in this country as on the Continent: in it the horn is not first affected, but a discharge of a yellow sticky fluid of an ammoniacal odour runs from the interdigital glands, acts on the horn of the hoof, and produces an irritating effect similar to that of true foot-rot."

Treatment.—Sheep's feet should be examined regularly at short intervals, and all superfluous horn pared away; the wall of the hoof being reduced to the level of the sole. When the disease is contracted, all the diseased and loose and under-run horn should be removed, the feet pared to their proper shape, and the affected parts smeared with such dressings as the butter of antimony. Carbolic acid and tar

[1] See Professor Geo. T. Brown (Kt. 1898) in the *R. A. C. Journal* for 1892.

in the proportion of 1 to 20, acts as an antiseptic and keeps the foot clean. Other dressings are, copper sulphate and Stockholm tar, one part of the former to two of the latter; and various caustic pastes or "Shepherds' Friends."

When large numbers have to be treated, only the worst cases can be hand-dressed before going through the foot-bath. The trough should be 12 feet long, 1 foot deep, 8 inches wide at the bottom, and 14 inches at the top, but the ends only 3 inches high. The sheep then easily step into it when it is placed level on the surface of the ground, between two rows of hurdles or paling just far enough apart for them to pass through. The solution (strength, one pound of arsenic, dissolved by prolonged boiling with a little carbonate of soda to 5 gallons of water) is put into the trough, till it is from 1 to 1½ inch deep, so that it cannot rise above the horny part of the foot, else it might blister the skin and cause the hair to fall off. The sheep are driven quietly through, to prevent splashing of the liquid against the uncovered skin. Crude carbolic acid—strength, 3 or 4 parts to 100 of water—or pitch-oil, dissolved by boiling with black soap, and mixed with eight or ten times its volume of water, is sometimes used instead, or alternately with arsenic if the sheep's feet become too hard. The box should have a tight-fitting lid made to close when not in use, in order to prevent the poisoning of stray animals by drinking from it.

To help to maintain the feet in a normal condition, lime in the powdery caustic state is sometimes laid down at gateways or places over which the sheep walk. A common cause of foot-rot is dung or some foreign matter getting at the tender structures of the internal foot, on account of some softening, decay, or weakness of the outer horny box, and then suppuration and fungoid growth follow. Inflammation, which develops into foot-rot, not infrequently begins as a scald between the digits, resulting from the irritation produced by long soft grass in wet seasons. The feet of sheep that have been affected with foot-rot are more susceptible of the disease in future; thus foot-rot is difficult to get rid of when once well established.

Blotches,[1] causing lameness, originate in wart-like growths, which, in the first stages, are hard and scaly exter-

[1] Termed "oafe" or "orf" in Scotland.

nally, and gorged with blood within. They appear in some seasons about the coronet and lower parts of the legs. The affection is not contagious, although it breaks out in a flock suddenly, and at times attacks the greater number of them more or less seriously. Clover is thought to produce it, by mechanically irritating the skin of the legs frequently when sheep are on pasture in autumn, and it usually disappears when the flock is put on roots. Sheep fall off much in condition, and in some of the more aggravated cases die of blood-poisoning, pus having found its way into the blood by absorption of the fetid discharge which comes from the sores in the later stages of their development. The remedies are, to remove the sheep from the conditions under which the malady broke out, and to dress the affected parts without delay with the hot iron, or with carbolic, caustic, or acid applications.

Dew-rot is a cause of lameness which appears in April, and even to a greater extent in autumn, in damp, foggy weather, or when there are sudden changes of temperature at night, resulting in frosts or heavy dews. It appears at first in the form of white blisters, between the digits, or on the anterior surface of the coronet. The hair falls off the affected parts, which are left bare, and in a short time become open sores. If they are not at once treated by using a stimulating embrocation, after opening them with a knife, the inflammation and irritation spread until the whole foot-structure is involved, and the ultimate condition becomes something like an aggravated form of foot-rot, the horny parts sloughing off. When it takes this serious form, the proper treatment is to poultice with tar, bran, or linseed cake (ground and "burst" with hot water), to reduce inflammation, allay pain, and keep dirt from the wounds. Sheep thus affected fall very much off in condition, but there is no fear of death if proper precautions be taken.

The disease is reported to have appeared in Gloucestershire, for the first time, about 1870. Some places are more subject to it than others. The pastures are frequently worst which have not a good aspect, such as those lying away from the sun. Immediate and constant attention is positively necessary, to prevent the development of the mature form of the disease; and the whole flock must be removed, and put

on arable land which is not under pasture. Dew-rot very frequently appears among ewes that are going with the ram, and are consequently better fed at this time than usual. A rapidly improving condition may render the system more susceptible to the disorder, as is the case with many other diseases. Sheep that are being forced under high farming methods or for show purposes, are more liable to give trouble than those fed in a moderate way; and the death-rate, as a rule, is then much higher.

Another common cause of an excessive death-rate is allowing sheep, through bad management or want of proper food, to fall into an unthriving condition, or, in common language, to get a "backset." If hoggets are kept, more particularly late into spring, on a turnip crop which has not been properly cleaned of weeds while growing, a very alarming death-rate frequently occurs. There is a pretty wide-spread belief in Gloucestershire, both amongst farmers and shepherds, that chick-weed, *Stellaria media*, if abundant, is most hurtful to young sheep.

CHAPTER XXXIII

SHEEP DOGS

The Collie Dog—Appearance and Characteristics—Points quoted from Rules of Northern and Midland Sheep-dog Club—Type of the Old English Sheep Dog from the same Rules—Sheep Dog Trials.

THE **Collie Dog.**—The common belief that the collie is treacherous, is a calumny upon probably the most valuable and sagacious, mild-tempered and patient, servant of the sheep-farmer. It is quite true that a collie which has been brought up in the wilds may be shy and refuse to be patted or even touched by a stranger, but this is merely the result of training and surroundings upon a highly-strung nervous disposition. Dogs that are well treated are usually extremely sensitive, and seem to be as much discomfited by a moral rebuke—an unkind look, word, or action of his master—as most animals would be by physical chastisement. This indicates an amount of sympathy and good fellowship between the dog and his master, which is quite unattainable in the relationship which exists between man and such a noble and serviceable animal even as the horse.

The mental powers of a collie dog also develop under kind treatment, associated with firm and consistent management and control, such as is necessary in training a dog to work so that he will obey his master's call, and understand and act in obedience to his master's sign or gesture. When near at hand the word and look of the master form the chief means of guidance, but at a distance the whistle and motion can alone be relied upon. The period of life at which a dog is most susceptible of learning is when it is between six and twelve months old. A dog which is descended from working parents is usually more easily trained than one which is sprung from a fancy show-yard strain which has not been accustomed to work. It



A. Collie Dog Champion, "Wishaw Leader."
A well-known prize-winner. Owned by Robert Tait, Auchenstewart House, Wishaw.
[*C. Reid, Wishaw.*



B. Old English Bobtailed Sheep Dog.
[*J. T. Newman, Berkhampstead.*

[p. 682

is a question not yet determined how much this may be due to want of training in successive generations, or to the persistent in-breeding which is carried on among the best show-dogs. Though in-breeding is useful in preserving a show-yard type, it undoubtedly tends to spoil the temper and disposition for training and for work. Good show-yard quality is, nevertheless, not incompatible with first-rate working performances. There is no reason why attention should not be paid to both important characteristics, or why they should not be combined in one and the same animal; but to be successful in this effort, it would probably be necessary to insist upon greater posterior cranial development in the show-dog than is at present the fashion.

In describing the **external form or figure of the collie dog,** it may be said, generally, that the points nearly correspond to those of a hunting horse. The shoulders should be oblique; the withers narrow or sharp; the hind quarters long; the chest deep to give abundance of lung-room, but not wide, else the animal cannot gallop; the back broad, well-coupled, and muscular; the ribs well sprung; and the belly not too much tucked up like that of a greyhound.

The shape and pose of the ears and the tail are regarded with special importance. Prick-ears, giving the head a foxy appearance, are as objectionable as hanging or lop-ears. The ears should stand up while the dog is on the alert, and the tips should incline slightly forward, forming hollows to catch the sound similar to the hand of an aged person put up while listening, in the familiar manner which calls for no description. The tail should not be too short, or set on too low on the hind quarters. It should not be carried gaily, but should droop—not, however, lower than the hocks—the point turning slightly up, without the animal being cock-tailed or swirl-tailed; and in the case of the rough collie, it should be covered by a good flag all the way to the tip. A close under-coat of fur extending over the body is of great importance in a working collie, as although the straight hard outer hair, which acts as an outer covering of thatch, may get wet in stormy weather, the under fur keeps the skin warm and dry even when the dog is exposed for hours on the hill-side. Black-

and-tan dogs, especially of the darker shades, are frequently defective in the under-coat, owing to there being a stain in the blood from the so-called Gordon setters of comparatively recent times. The coat of the rough collie should not part along the back line while dry, and, if parted while wet, the second coat should still obscure the skin.

The hair on the forelegs is smooth and short in front, but it lengthens into a long silky fringe or feather down the back of the leg all the way to the pastern. The hind-legs are free from fringes, and they ought to be set on straight—not cow-hocked, "five o'clock" or V-shaped—else the stifle joints project and the power of motion is weakened. To be "hare-footed" or long-footed is objectionable. Dogs ought to stand on their toes or be "cat-footed." The collie-claw, or dew-claws, on the hind feet (parts strongly developed in the St Bernard, being in that breed frequently double), should be cut off with a pair of scissors at an early age in the case of dogs which are intended to work. If not removed they are liable to be torn when snow covers the ground and becomes slightly crusted on the top, as is the case when frost occurs after a mock-thaw; the toes of the dog sink, and the claws come in contact with the ragged edges of the broken snow-crust.

The dew-claw seems to be the remains of a natural and no doubt useful appendage, which existed in the common ancestors of some of our most distinct breeds of dogs, as the claws in question have been known to appear in puppies which were first crosses between a clawless spaniel and clawless English terrier, the ancestors of both breeds having been clawless for many generations.

The following descriptive points have been extracted from the Rules of the Northern and Midland Sheep-dog Club:[1]—

Type of Rough Collie.

Head.—Should be in proportion to dog's size. Skull moderately wide between the ears, and flat, tapering to the end of the muzzle, which ought to be of a fair length, but not too snipey, with only a slight stop.[2]

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[1] Secretary—Harold Macbeth, Sale, Cheshire. [2] See footnote, p. 686.

Teeth.—Strong and white. The top jaw fitting nicely over the lower; and where much over or at all under-shot, it should count against the dog.

Eyes.—Of almond shape, set obliquely in the head, and the shade consistent with the colour of the dog. A full or staring eye is very objectionable.

Ears.—Small, and when the dog's attention is attracted, carried semi-erect; but when in repose it is natural for them to be laid back on the ruff.

Neck.—Long and well arched, and shoulders muscular and sloping.

Back.—Rather long, strong, and straight, the loin slightly arched, and the chest fairly deep, but not too wide.

Forelegs.—Straight and muscular, with a fair amount of bone. The hindlegs should be rather wide apart, with stifle well bent, forming sicklehocks.

Feet.—Compact, knuckles well sprung, claws strong and close together; pads cannot be too hard.

Coat.—Should consist of a long straight outer coat, as hard as possible, with a dense growth of under-coat. The hair on thighs and tail should be as abundant as possible, but short and smooth on head and ears and below the hocks. A long frill and handsome mane, finishing with cape on the shoulders, is very characteristic of the breed.

Symmetry.—The dog should be of fair length on the leg, and his movements active and graceful.

Height.—Dogs, 22 to 24 inches; bitches, 20 to 22 inches.

Tail.—Of medium length; and when the dog is standing quietly should be slightly raised, but more so when excited.

Type of Smooth Collie.—The smooth collie should be the same in every particular as the rough collie, excepting the coat, which should be short, hard, and dense.

Type of Natural Bobtail Rough Collie.—The natural bobtail rough collie is the same in every particular as the rough collie, with the exception of a natural bobtail.

Type of Natural Bobtail Smooth Collie.—The natural bobtail smooth collie is the same in every particular as the smooth collie, with the exception of a natural bobtail.

Note.—In all cases of bobtails, a docked tail will disqualify.

Scale of Points.

Head	25
Ears	15
Body	10
Legs and Feet	15
Coat	25
Tail	10

Type of the Old English Sheep Dog.

Skull.—Capacious, and rather squarely formed, giving plenty of room for brain power. The parts over the eyes should be well arched, and the whole well covered with hair, as defined in "coat."

Jaw.—Should be fairly long and square. The "stop"[1] should be defined, but not to a great extent.

Eyes.—These, of course, vary in different colours of dogs. In the dark-blue shades they should be dark-brown. In the lighter colours they will be found to follow them, and become paler in shade, while where white predominates a "wall" or marble eye may be considered typical.

Nose.—Always black in colour; fairly large and capacious.

Teeth.—Strong and firm, and should be evenly placed in the jaw. Working dogs often have their incisors broken off. This is in no way detrimental.

Ears.—Medium sized, and carried close to the head, coated with hair of a moderate length.

Legs.—The forelegs should be straight and possess plenty of bone. They should remove the body a medium height off the ground without approaching legginess. They should be well coated all round.

Feet.—Moderately large, round toes, well arched, and pads capacious and hard.

Tail.—This is a most important point in the Old English Sheep Dog. Without a doubt many dogs are bred without the slightest approach to a caudal appendage; while, on the other hand, some in the litters will be found with half, three-quarters, and whole length tails. The breeding of those without tails should be encouraged and be persevered with, and be given preference to in judging, provided the dogs are good elsewhere. A tail of any length takes away the appearance and the "corkiness"[2] of the dog. A docked dog can generally be detected by the bluntness at the end of the stump.

Neck and Shoulders.—The neck should be fairly long, arched, and graceful, and well coated with hair. The shoulders should be set on slopingly, and the dog generally be found to stand lower at the shoulders than on his hind quarters.

Body.—Rather short, and very compact. The ribs should be well sprung, and the brisket deep and capacious. The loin should be very stout, and to a certain extent arched, while the hindquarters should be bulky, and the hams densely covered with a coat very often of a softer and more woolly description than is to be found on other parts of the body.

Coat.—Profuse, and of a good texture, *i.e.*, fairly hard and strong. There should also be a double or under coat.

Colour.—Varies; but preference should be given to dark-blue, light, or pigeon-blue and steel-grey dogs. The colours are generally

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[1] "The indentation between the skull and the nasal bone near the eyes."—*Vero Shaw's definition.*

[2] Compactness.



GROUP OF SCOTCH DOGS.
Collie from Tweeddale, Scotch Deerhound, Otter Terrier, and Scotch Terrier.
[*From the Low Collection of Paintings in Edinburgh University.*

intermixed with white, which imparts to the dog a more attractive appearance.

Height.—Fair stand and measurement at the shoulder, from 20 inches upwards. The bitches, of course, smaller than the dogs. Great height is not to be encouraged, for it takes away the corkiness and cobbiness[1] of the dog.

General Appearance.—He is a strong compact-looking dog, profusely coated all over. He has a peculiar springing style of movement and is thick-set, muscular, and able-bodied, with an intelligent expression.

Scale of Points: Total, 100.

Head	10	Ears	5
Jaw	5	Legs	10
Eyes	5	Tail (undocked)	10
Nose	5	Neck and Shoulders	10
Colour	10	Body, Loin, Hind quarters	10
Teeth	5	Coat	15

The **Tortoise-shell Collie** is a very old kind. A great number of them are wall-eyed or light-eyed, and they are said not to go blind.

Sheep Dog Trials have for many years occupied a good deal of attention and interest in certain localities of the United Kingdom; and thanks to such men as Edward W. H. Jones,[2] in Wales, and G. F. Bowden, of Somersal, Derbyshire, the method of competition is becoming more and more systematised. Trials have also become popular in America, where a considerable number of the best British dogs have recently been taken.

"The prescribed work or task," says Jones in his excellent little book, "is generally as follows:—Three sheep being set at liberty on a spot some half-mile distant from the shepherd and the dog, out of the dog's sight, and even sometimes out of the sight of the shepherd also, the dog has (1) to go to find the sheep; (2) bring them, over a course more or less beset with natural and artificial difficulties, to the shepherd, who is restrained from proceeding over a certain boundary to the assistance of the dog, and, with the shepherd's assistance when within this boundary, to drive the sheep to a small enclosure; and (3) pen them within a certain specified time—generally ten minutes." Out of a total of 60 points, the find = 18; the return = 30; and the penning = 12.

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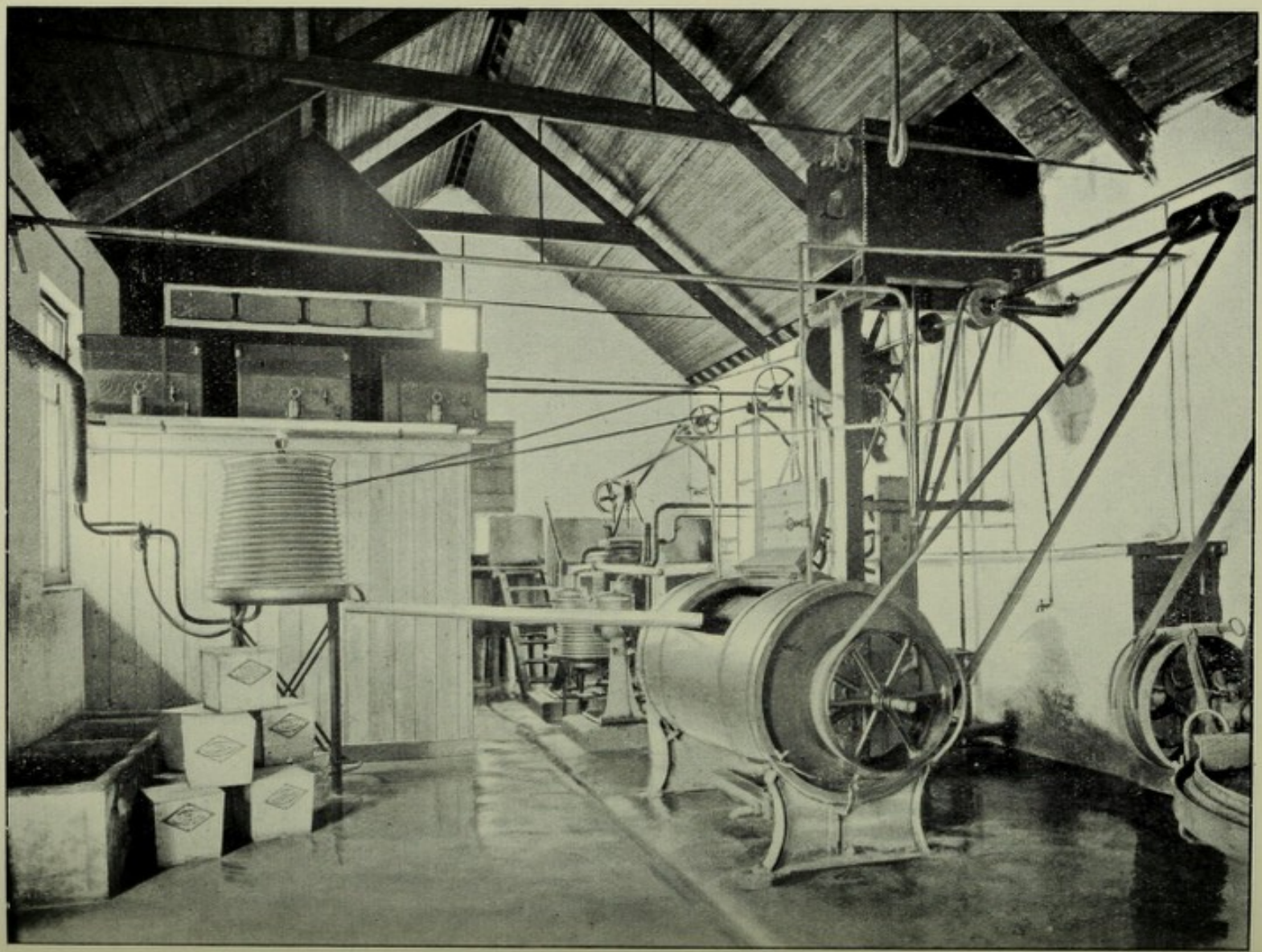
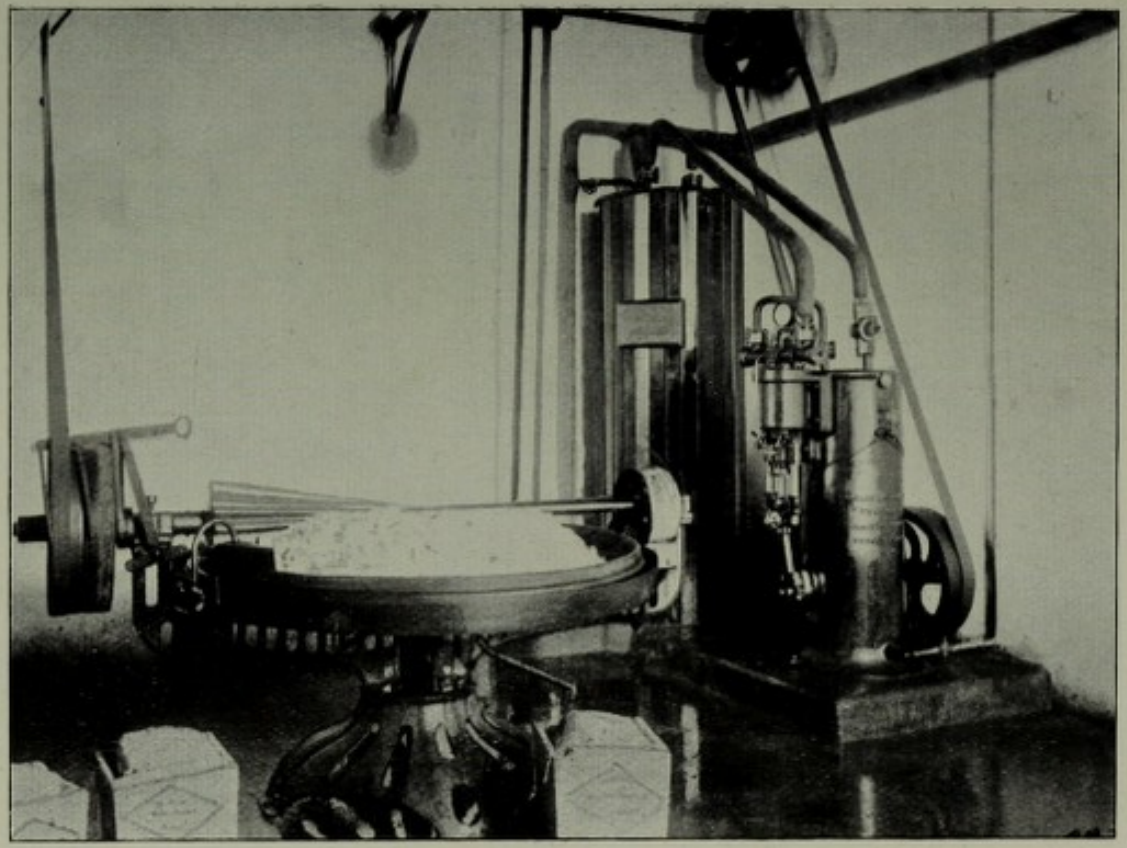
[1] Compactness.

[2] Author of *Sheep Dog Trials: their standard of adjudication, origin and progress; together with the Sheep Dog: its history, varieties, points, breeding, and training.* Printed at the Brecon and Radnor Express Office.



INTERIOR OF AN IRISH CREAMERY.
(Pasteuriser, Separator, and Coolers at back wall.)

Butter Worker.



Refrigerating Machine, with Evaporator behind.

INTERIOR OF AN IRISH CREAMERY.

APPENDICES

APPENDIX A

Important Developments in Dairy Plant—Refrigeration in the Dairy

(By Loudon M. Douglas, Edinburgh.)

Recent developments in Dairy Plant—**Refrigeration in the Dairy**—Imports of Butter and Cheese—Consumption of Butter and Cheese in the United Kingdom—Development due to Refrigeration—Butter-making in the Creamery—Mechanical Equipment—Supply of Milk for Domestic Use—Germs in Milk—Pasteurisation—Cheese-making—Definition of Refrigeration—Modern Refrigerating Machinery—Brine Circulation—Direct Expansion of Gas—The Air Cooler—**The Alfa-Laval Centrifugal Cream Separator**: its History and Development—**The Just-Hatmaker Milk Drier**: its Present and Prospective Success.

ALTHOUGH in this country the closing years of the nineteenth and the beginning of the present century have been marked by great progress in the dairy industry, we are still far behind Denmark, a country with an area similar to the province of Munster, which, under exceedingly unpromising conditions has become an object-lesson in agricultural organisation and butter production, to the whole world. The world's surplus butter and cheese supply finds a free and ready market in Great Britain. Our Colonies send one-fourth of the total imports. Table I. (page 690) gives in detail the trade and navigation returns for 1905, and shows whence we derive our imported butter and cheese.

The estimated produce and consumption of **butter and cheese in the United Kingdom** are given in Table II. (page 690).

We produce but a very small portion of what we actually consume, but great progress has been made in the United

Kingdom during the last ten years, more especially in Ireland. There the organisation of butter-producing factories has been so rapid that there is hardly a parish in the whole country which does not possess one or more creameries. The credit is due, to a large extent, to the efforts of the Irish Agricultural Organisation Society. Recently a similarly

Table I.—Imports of Butter and Cheese during 1905.

Country from which Exported.	Butter.	Cheese.
	Cwts.	Cwts.
Russia	461,140	...
Sweden	188,209	...
Denmark	1,630,363	...
Germany	5,372	...
Netherlands	209,897	214,009
France	348,442	48,884
United States of America	84,874	175,256
Victoria	237,574	...
New South Wales	168,531	...
Queensland	54,188	...
New Zealand	300,418	78,626
Canada	292,117	1,858,769
Other countries	176,739	67,116
Total Imports during 1905	4,147,864	2,442,660
" " " 1903	4,060,694	2,694,358
" " " 1904	4,241,005	2,595,297

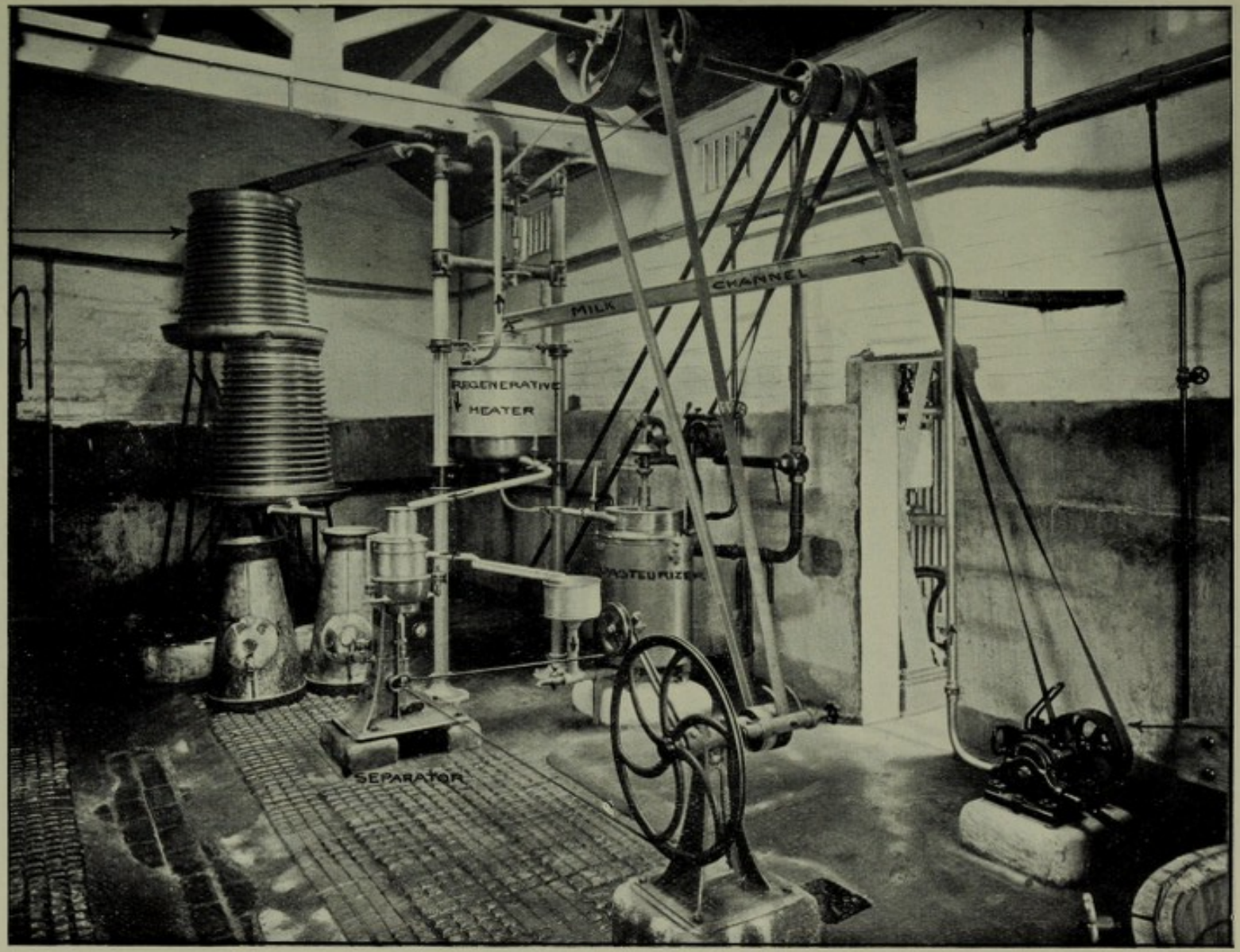
Table II.—Estimated Consumption per Annum of Butter and Cheese in the United Kingdom.[1]

	Butter.	Cheese.
	Cwts.	Cwts.
Average production (estimated) in the United Kingdom	3,211,000	1,366,000
Imports, less exports, received from British Colonies and Foreign Countries (average of 5 years)	3,638,000	2,520,000
Total consumption	6,849,000	3,886,000

constituted body, the Agricultural Organisation Society of England,[2] has commenced similar work in Great Britain, with every likelihood of success. All this development is entirely due to the use of refrigeration. The control of the temperature

[1] *Production and Consumption of Meat and Milk of the United Kingdom*, Royal Statistical Society.

[2] Dacre House, Dacre Street, Westminster, London.



View of a London Dairy.

[p. 690

was the prime difficulty with butter-makers before the present decade began, but within that period it has been recognised in every country where butter and cheese are made that the effect of cold, produced either by ice or refrigerating machinery, is the most important factor in the manufacture of dairy produce. In place of the slow processes which depended upon hand labour, we have beautifully designed mechanical appliances, which enable the work of butter- and cheese-making to be conducted in the most profitable way. The bye-products are utilised instead of being wasted, and therefore the utmost possible is made of the raw material.

There are **three distinct classes of dairying** which may be specially referred to: (1) Butter-making in the creamery. (2) The supplying of milk for domestic use. (3) Cheese-making.

Butter-making in the creamery is a comparatively modern idea, and enables the dairy-farmer who is remote from large centres of population, and is thus debarred from selling milk for household use, to secure a speedy cash return. His manner of doing it will be best understood if we describe the construction of a creamery, and then note the daily operations.

A creamery may be very simply built, if corrugated iron be used for the walls and roof. There are *four different departments*, viz.:—

(*a*) The receiving platform, from whence a pipe is led to the separator room. (*b*) The separator room, where the actual work of the factory takes place. (*c*) A boiler and engine room and coal store, where steam is generated and power produced. (*d*) A delivery shed, where the separated milk is weighed out to farmers.

This arrangement is capable of many variations, but in the main will be found a very suitable one. The first thing to provide is perfect drainage, and the surroundings should be hygienically clean. A plentiful water supply is absolutely indispensable. It is always well to fix the site for the creamery on a clear piece of land so that there will be room for a free passage-way right round the building, and so arranged that when the carts have delivered the milk at the receiving platform, they may at once proceed to the separated-milk delivery shed without obstructing the roadway. This

arrangement involves having separate entrance and exit gates.

The mechanical equipment will consist of the following items: (1) Boiler and engine, either separate or combined. (2) Milk receiving tank. (3) Pasteuriser. (4) Separator, or separators. (5) Circular conical cream cooler. (6) Pasteuriser for separated milk. (7) Circular conical coolers (two) for separated milk. (8) Separated milk tanks. (9) Cold water store tank. (10) Cream ripening vats. (11) Refrigerating machine. (12) Circular capillary conical cooler for cooling cream. (13) Churn. (14) Butter-worker. (15) Chilled water tank. (16) Cold store. (17) Pump for raising cream to ripening vats. (18) Centrifugal tester for milk, with a stock of bottles. (19) Pails, brushes, "Scotch hands," and general accessories necessary in a small factory.

This list contains the essential parts necessary to the conduct of a creamery business, and with a reasonable amount of knowledge which is not difficult to acquire, and a regular supply of milk, there is no reason why butter of the highest quality should not be made. The fitting-up of the motive power and the arranging of the steam and water pipe connections form a business in themselves, and it is generally best to employ the services of a skilled engineer. The size of the various appliances is regulated by the quantity of milk to be handled. In factories handling 500 gallons a day, one separator is sufficient, but where the quantity is 1000 gallons and over, two separators or more are required.

When the milk arrives, a sample is taken from each churn and placed in a bottle, which is duly numbered as a key to identification. It is not usual or necessary to test milk immediately after it is received. Samples may be kept for several days, but, in order to keep them perfectly sweet, small pellets, containing chloride of mercury, are used as an antiseptic. The butter-fat is not affected by its use. The milk is tipped into a general milk-receiving tank, from whence it travels to a milk heater, and is raised to a temperature of about 120° F., and allowed to pass to the separators. Separated cream generally contains about 30 per cent. of butter-fat. It must be cooled at once to about 55° F. by passing over a capillary circular cooler in which brine cooled by the refrigerating machine is circulating, and either pumped

or carried by hand to the cream-ripening tanks. The effect could be produced by using ice, but that is too costly. The cream is left in the ripening vats until fermentation is complete. Usually a pure culture is added, so that fermentation starts at once, and it continues until the next morning, when it will be found that the cream has increased in temperature to from 65° to 68° F. It has then to be passed over another capillary cooler and reduced from 48° to 50° F. by brine circulating from the refrigerating machine. From this temperature the cream will rise some eight to ten degrees during the process of churning, which is proceeded with at once. The most convenient way is to let the cream flow by gravitation over a capillary cooler fixed either on a platform or suspended by hangers over the opening of the churn. As soon as the churning is complete the buttermilk is washed out and the butter removed to the butter-working table, where it is again washed with cold water, which flows from an insulated tank in which the water has been previously cooled by means of a brine circuit from the refrigerating machine, to 38° F. After washing, the butter is ready to be packed in any convenient form of package. It will be, even in the hottest weather, sufficiently hard to make into small packages, rolls or pats, and can be sent out immediately for consumption, but, as it is not always convenient to send away butter when it is made, it is desirable to have a cold store to keep it in good condition. Butter produced as we have indicated will be of the most perfect texture and flavour, provided that the feeding of the cows has been properly carried out. It is often desirable to cool the separated milk by means of a very large capillary cooler through which water is circulating. Previous to cooling, it is a good practice to increase the temperature to 180° F., so that all pathogenic and other common germs are destroyed, and then to reduce the temperature to about 70° F. by means of water circulation. From the large cooler the milk is allowed to flow over a small cooler in which brine from the refrigerating machine is circulating, and its temperature is reduced from 70° F. to about 40° F. At that temperature the bacteria are inactive, and milk will keep for a considerable period.

The supplying of town's milk for domestic use has undergone many changes during recent years. It is necessary

to at once cool the milk after it has been drawn from the udder, as milk sent in a warm condition from the country dairy farm to a town, on a journey occupying from six to ten hours, is liable to develop lactic fermentation, which destroys the milk for domestic use. There is a germicidal action which at once sets in after milk has been drawn from the cow, and which continues for four or five hours until the weaker bacteria are destroyed, and the stronger forms become predominant. These, as it were, take possession of the milk and produce decomposition which exhibits itself by "souring," either quickly or slowly according to the external temperature. There is only one satisfactory way of dealing with the milk, *i.e.*, cooling to 38° F. as it leaves the cow. If the milk be cooled at once, carried from the dairy farm to a town in a refrigerated waggon, taken without delay from the railway station to the milk depôt, and either distributed or placed in cold store, it will arrive in the ordinary household in perfect condition.

There is the very serious question of the probable presence of **pathogenic germs,** such as those of *tuberculosis*, which may insidiously enter milk through a diseased udder in an otherwise healthy cow. In the present unsettled state of opinion on this question we are bound to assume that tuberculosis is capable of transmission from the bovine to the human subject, and to place this disease before any other as the most dangerous which may be conveyed by milk. There is only one known way by which the milk for domestic use can be rendered innocuous and free from pathogenic germs, and that is by the use of heat. Low temperatures check their multiplication, but do not destroy them. The result follows that in many places the practice is to pasteurise all the milk.

Pasteurisation means the heating of the milk by means of a continuous heater to 180° F. (a higher temperature will caramelise the milk sugar, and produce an objectionable taste), or by means of another form of heater for a prolonged period—twenty minutes or thereby—to 140° F.; but neither of these means is effective without subsequent cooling. The milk will become tainted if it be not cooled as rapidly as it is heated. Cooling, as the necessary complement of pasteurisation, is essential in modern dairy practice. From the pasteuriser the milk either runs or is pumped over a circular

conical capillary cooler, called the "primary" cooler, in which the ordinary water supply circulates. Here the milk is reduced to a temperature approximating to the normal temperature of the water, and is passed over a "secondary" cooler in which brine circulates at the temperature of about 35° F. The milk leaving the secondary cooler will test about 38° F. and, so far as our knowledge at present goes, it will be germ-free. Another method is to put the milk in bottles and place it in what is inaccurately termed a "steriliser." The steriliser is maintained for twenty minutes at a temperature of 140° F., and the heat has the effect of killing the mature organisms present, but not the undeveloped germs. Cooling is as necessary in this as in the other case, and the bottles are at once removed and placed first in a tank of running water, and afterwards in a cold store held at 38° F.

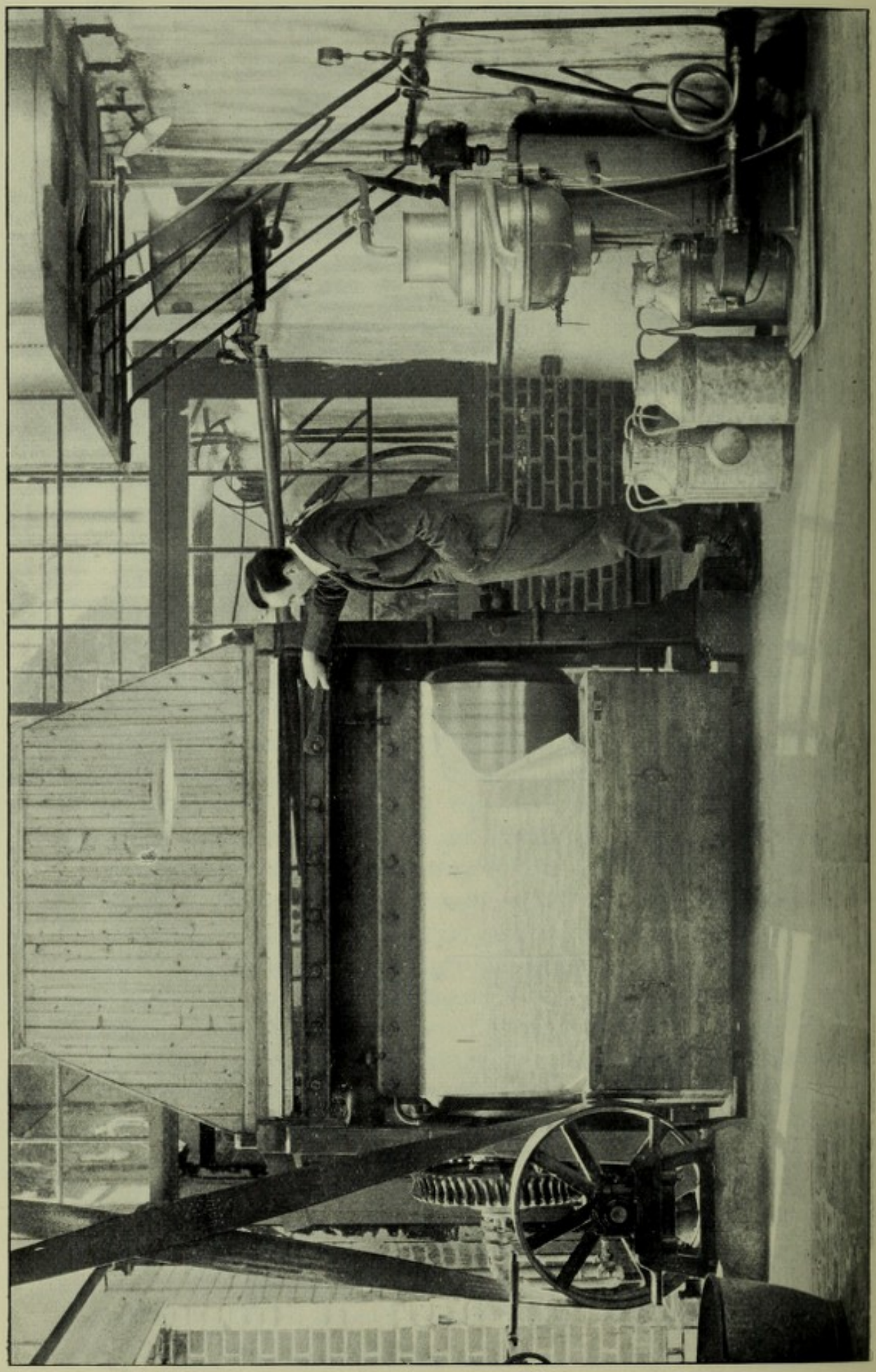
In Cheese-making, the use of the refrigerating machine is revolutionising the practice. It has, for example, been shown that in ripening Cheddar cheese, a better product results when the temperature is controlled than when it is left to chance. It is held by some authorities that curing at a temperature of 40° F. gives an infinitely better result than can be attained at higher temperatures, the loss being reduced to a minimum, the flavour perfect, and the production of deleterious moulds held in check. So, in the treatment of other classes of cheese, it is being gradually realised that the control of the temperature is essential to the profitable conduct of the business. The whole subject is at present hardly beyond the initial stages of experiment, but it may be assumed, however, that in the future much attention will be given to it. In Canada, from whence we receive three-fourths of the cheese we consume, experiments have been recorded, and many are now in progress, which it is believed will throw much light on the question.

The following **definition of refrigeration**[1] will add interest to the subject, which has hitherto been treated from the practical side :—

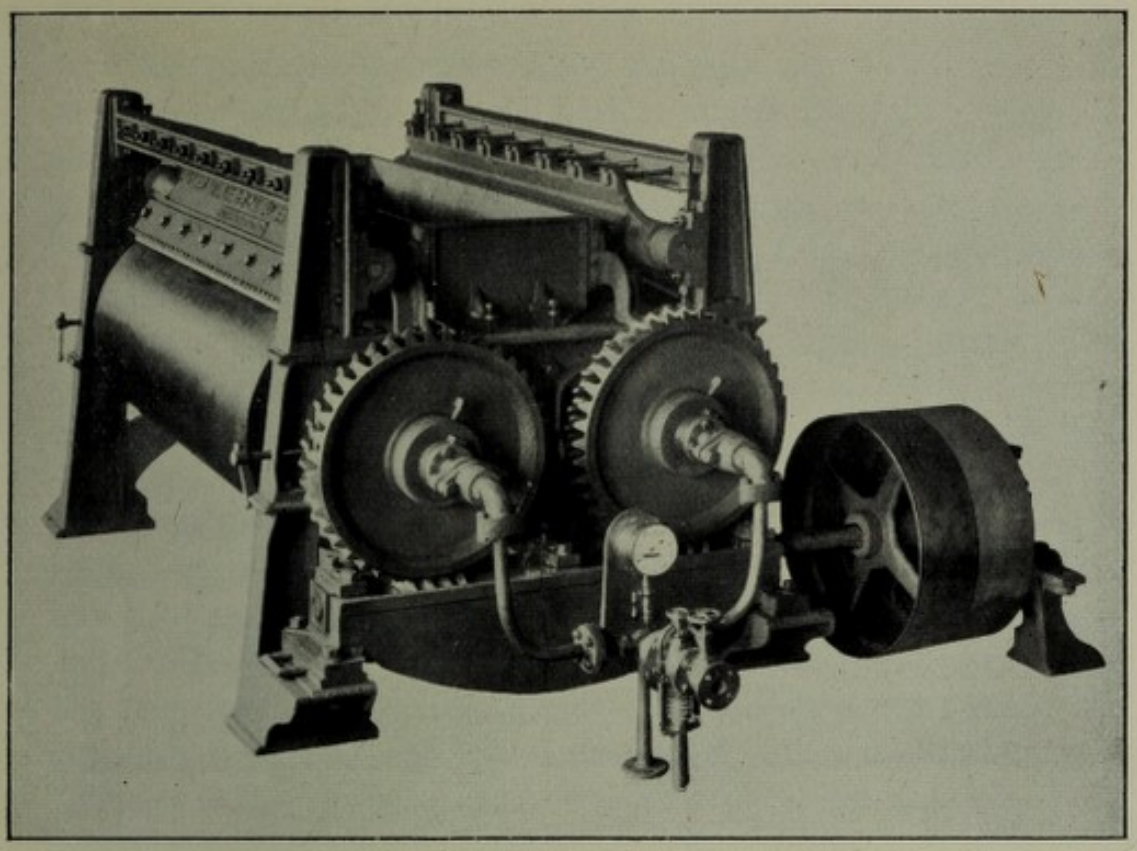
When a solid body is converted into a liquid, or a liquid into a gas or vapour, the change of state is accomplished in each case by the absorption of heat. While the change is going on the temperature of the body does not rise, and the

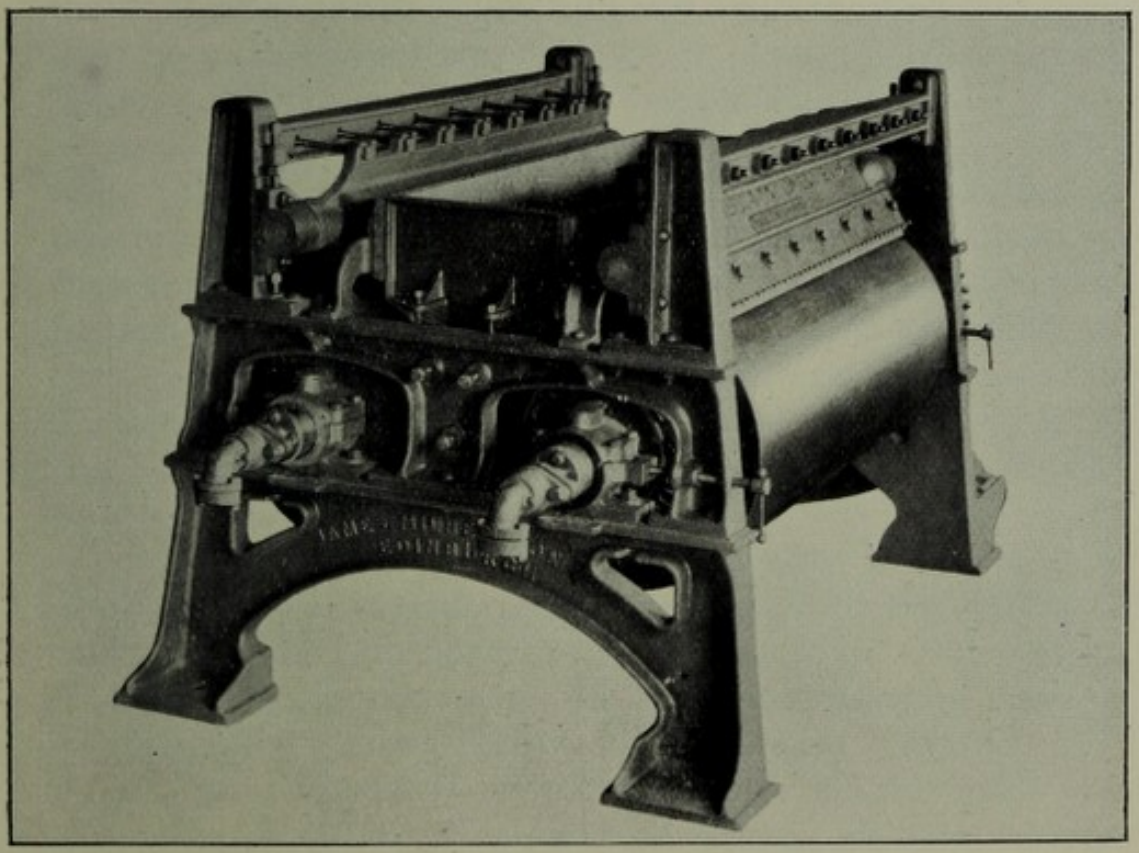
[1] From *Refrigeration in the Dairy*, by Loudon M. Douglas.

heat absorbed, being insensible to the thermometer, is called "latent heat." If we apply heat to a block of ice the temperature does not rise above the freezing-point—32° F.—until every particle of ice has become liquid, and similarly, when water is heated to the boiling-point the temperature remains at 212° F. until all the water has been turned into steam. The same law applies to liquefied carbonic anhydride, ammonia, and sulphurous anhydride, which are the substances chiefly used in refrigerating machines. Only, these liquids are so extremely volatile that the change of state takes place with great rapidity, and latent heat is absorbed at a corresponding rate. Very low temperatures are obtained by simply evaporating any of these liquids in the open air. But if we place one of them in a confined space, say a wrought-iron coil, and attach a pump to it, the suction of the pump produces a partial vacuum, which accelerates the speed of evaporation, and the absorption of latent heat goes on faster than ever. The necessary heat is drawn from the coil and from surrounding materials, and, if the coil be placed in the atmosphere of an insulated room, heat is rapidly withdrawn from the air and from any substances stored in the room ; or, on the other hand, if the coil be immersed in a tank of unfreezable brine, the temperature of the latter is soon reduced below the freezing-point, and if it be then pumped through a series of pipes or drums placed in the insulated room, it will reduce the temperature of the latter and its contents to any desired extent. The above-mentioned volatile liquids are valuable and cannot be thrown away, and we therefore transfer our attention to the other or pressure end of the pump. Here the reverse action takes place. When gases are compressed they diminish in volume, and their latent heat is given up and becomes sensible heat, which can be measured by the thermometer ; and if this heat be removed by a cooling medium such as cold water, the gases become liquid again, and if the ends of the two coils not connected to the pump are joined together, the liquid formed in the compression coil can be transferred to the suction or evaporator coil and used over again, and so on *ad infinitum*. One charge of carbonic anhydride, ammonia, or sulphurous anhydride would be sufficient for all time if we were able to produce machinery entirely free from leakages.



JUST-HATMAKER'S MACHINE FOR DRYING MILK





TWO ADDITIONAL ILLUSTRATIONS OF THE JUST-HATMAKER MACHINE.

[*pp.* 696 *and* 697

The **modern refrigerating machine** is constructed on the above lines. It consists of a pump specially designed and constructed to deal with the particular refrigerant used, and two coils or sets of coils of iron pipe, in one of which "cold" is produced by the evaporation of one of the above volatile liquids assisted by the suction of the pump; in the other, the gas produced by evaporation is again liquefied by combined pressure and cooling by means of water, and the liquid is transferred to the evaporator coil to do further service. Here a very important point has to be noted. If the liquid be allowed to flow back freely to the evaporator coil, very little refrigeration is effected. Its flow must be carefully proportioned, and we therefore introduce a regulator valve on the transfer pipe, which must be adjusted with the utmost care so that the flow of liquid shall not exceed the maximum which can be evaporated in the suction coil. Other volatile liquids besides the above, and compressed air, are used as refrigerants, and other systems than that described have been developed for the utilisation of the principle of latent heat, but they are not very extensively employed.

The **application of the theory of refrigeration** has been the subject of much study, and some considerable literature has been published concerning it. The most important methods may be summarised as follows:—

1. *Brine circulation by means of pipes or brine drums.* The brine circulates over the evaporator coils and immediately falls in temperature, owing to the absorption of its heat by the expanding gas inside the coils. From the evaporator it is pumped through pipes or drums in cold chambers or through the corrugations of capillary conical coolers, and in its passage takes up heat either from the surrounding air of the cold rooms or from the milk or cream passing over the coolers.

2. *Direct expansion of a gas through pipes in a chamber or in chambers.* This process is not applicable to the cooling of milk, and can only be successfully used in cold rooms. There is no evaporator used, the air of the chambers forming the surrounding medium from which the heat is extracted.

3. *The air cooler is applied also to cold stores, and is not available for cooling the capillary coolers.* It is a system, however, which lends itself to use in cheese factories. The

evaporation of the refrigerant takes place in coils over which a current of air from the chamber or chambers is carried by means of a fan, and in the passage the heat is absorbed by the refrigerating gas expanding in the coils.

The technical details of the application of refrigeration to dairy practice is a wide subject and cannot be adequately dealt with here, but during the last few years it has attained such prominence that it is necessary for those who are interested in the business that they should realise its great importance.

The **Alfa-Laval Centrifugal Cream Separator,** the ingenious invention of Dr de Laval,[1] came from Sweden, and was exhibited at the R. A. S. Show at Kilburn in 1879. Within twenty-seven years no implement has made greater progress in efficiency and in popularity. Its working capacity has been thrice nearly doubled: first, in 1891, by reducing the size of the formerly large hollow revolving steel bowl, and nearly filling with a series of cone-shaped "Alfa" discs, by which the milk is divided into thin layers and cream separation greatly accelerated; second, in 1900, by introducing the supply at that area of the revolving discs where the specific gravity of the milk is normal; and third, in 1906, by strengthening and detaching the spindle and raising the upper end of it upon which the bowl rests, above the centre of gravity of the bowl when full of milk. This reduces the vibration so much that the saving in the driving power is enormous. The work of separation now begins at once, and is not retarded in its progress by either cream or separated milk coming in contact with the supply of in-coming milk, as was formerly the case.

The second improvement which brought this about was invented by an American. Since 1891 the speed of the bowl has been reduced from 7000 to 5600 revolutions per minute, and the cost of driving in similar proportion. The percentage of fat left in the milk since these advances is only ·03 to ·08 per cent. Professor Stokes, P.A., Paddington, reported on a sample of milk separated by the "new model" machine as follows:—"It contains only one-fourth of the amount of butter-fat usually left in by separators. It is the smallest

[1] Acknowledgments are due to the article, "History of Agriculture," by the present writer, in *Harmsworth's Encyclopædia.*

amount of butter-fat I have yet found in a separated milk.' Over 200,000 "Alfa-laval" separators had been sold by 1900, 400,000 by 1904, and 550,000 by the early part of 1906; when the machine had been awarded upwards of 700 prizes. The "Maidstone Royal" machine, easily worked by hand by a dairymaid, with a separation capacity of 45 gallons of milk per hour, then cost £13. Fifteen years before, a 13-gallon separator cost £45. The last improvements have reduced the driving power, and to some extent the cost: for example, the "new model" 35-gallon size runs lighter than the former 18-gallon size, and the 90-gallon "new model" requires only two-thirds of the force needed by the older 66-gallon size. The Alfa-laval of to-day is capable of separating the cream from the milk at any temperature up to boiling-point, while the cream can be regulated to any thickness at any temperature. In this way both milk and cream are pasteurised, separated, and cooled at one operation with the combined use of Laval pasteuriser, separator, and cooler.

By passing new milk to be consumed as whole milk through the separator, even without heating, it is freed from disease germs and other impurities which are held by the slime which settles inside the bowl. The cream and separated milk can be thoroughly mixed immediately after the operation. If milk-consumers who are afraid of the germs of tuberculosis and other pathogenic germs were to realise this fact, the success of the Laval separator would be even greater than it is.

There are **many varieties of centrifugal separators** used in this country, but all follow the Alfa-laval by using discs of one sort or another to divide the milk into thin layers to facilitate the separation of the cream. The chief competitors of the Laval are, the Astra, a German machine; the Melotte, a French invention; the Princess, made by Watson, Laidlaw, & Co., Glasgow; the Wolsey, a Petersen machine, made in Birmingham; the old Alexandria, a Danish machine; the Perfect, a Swedish machine; and others.

The **Just-Hatmaker process** of drying milk has solved the difficulty of what to do with separated milk at creameries, or with large quantities of full milk for which there is not a remunerative outlet. Although much inferior, unattractive, and even unwholesome milk-powder has found its way into

the market from the milk-drying machine illustrated on Plates CCXIII. and CCXIV., as a result of unskilled or careless management, there is no doubt that by judicious and expert handling, milk can now be relieved of all but about 6 per cent. of its moisture without appreciably altering, or in any way injuring, the milk residue as food even for infants. It has been thoroughly tested, chemically and bacteriologically, at the Carnegie Laboratories, and under the supervision of the Officers of the Board of Health of New York. Hundreds of children of from five days to two years old have been fed with it. It has been shown to be "absolutely sterile and indefinitely preservable." In the stomach it coagulates into small, easily assimilated, granular particles like human milk, and is not liable to form large indigestible clots like ordinary cows' milk. The mechanism is quite simple. "Two polished metal cylinders, 28 inches in diameter by 5 feet long, are mounted parallel in a solid framework, and separated from each other about an eighth of an inch. They revolve inversely, making six turns per minute. Above them is placed a small box for holding the milk, in contact with a main reservoir, which feeds each box through a supply pipe. Steam, from the boiler of the engine producing the driving power, and at a pressure of three atmospheres, is introduced into the cylinders, the surfaces of which are thereby heated to a temperature of between 220° × 230° F. The liquid milk to be dried is allowed to fall in thin streams upon the heated revolving cylinders, and its water is rapidly evaporated." Each cylinder becomes covered with a thin layer of milk solids in a soft condition, which is removed by two fixed knives or scrapers nicely adjusted in close proximity to the surfaces of the revolving cylinders. The work is facilitated by a pad of steam which forms between the surfaces of the cylinders and the milk, and thus prevents it being scorched at the high temperature, at which, but for this mechanical protection, milk would readily assume a burnt flavour and odour. The heat of the subjacent rollers almost instantaneously dries the soft film or continuous sheet to a solid condition, and it subsequently falls, in a brittle condition, into the receiving box. On being put through a sieve to reduce it to a uniform powder resembling a coarse flour, it is ready to be made up in moisture-proof tins or bags for transport to market. It is only one-eighth the weight of liquid milk, and it can be immediately restored to the liquid condition by the addition of hot water at about 170° F. For cooking purposes it is most serviceable, being always at hand without risk of acidity. In all the industries in which milk is used it has proved successful; for example, for bakers,

biscuit-makers, confectioners, chocolate-makers, restaurants, etc. The greatest demand for it has been for chocolate making, but its general introduction is merely a matter of time, as it is a pure product of the farm in a most convenient form. The price at wholesale rates does not exceed that now being paid for milk from a town dairy. It will also prove an immense boon to long-voyage ships at sea, and to armies in the field. The success of the Just-Hatmaker process, especially in conjunction with the success of the milking machine, has put under requisition for milk-supply purposes vast tracts of land in Australasia and South America, which may thus enter into direct competition with the dairy industry of this country.

APPENDIX B

Two Typical Examples of the Stocking of Farms in Southern and Midland England

Data for Use in the Calculations.[1]

HORSES.—3 are kept per 100 acres arable on light land; 4 kept per 100 acres arable on heavy land; cost per annum for feeding each horse, £25; with shoeing and sundry bills extra, £30; one man and pair of horses cost £100 to £110 a year.[2]

Grass at 3s. 6d. per week for 22 weeks, = £3, 17s., which would pay the rent of 1½ or 2 acres. One acre of good old pasture, at least, should be set aside per horse.

Hay, 24 lbs. per day for 7 months = nearly 2¼ tons per horse. Consuming value, taken at half the sale value, = £2 to £2, 10s. per ton; or use 1 ton of hay and 1½ ton of good oat straw.

Litter, 1½ ton for the winter season. Averaging the yield of oats at 52 bushels per acre, 2 acres are consumed per horse when 3 bushels are given per week in winter and 1 bushel in summer. So much of this might be sold, and beans, bran, and other suitable feeding stuffs bought to take its place.

Sheep.—2 ewes with 2¼ lambs (a fair crop), or 2½ lambs (a good crop), are kept per acre on medium pasture in summer.

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[1] The prices current in 1885 are still retained, consequently allowance will require to be made from time to time for the fluctuation of the markets.

[2] The figures are stated for ordinary farm horses which do no exceptional amount of carting on the road. The cost of feeding the large lorry, van, or cart horse in town, where food requires to be purchased at the highest rates, amounts to about 14s. weekly, or £36 per annum, but this sum may vary, probably 2s. per week up or down, with the nature of the work done.

Roots : ½ ton given per day to 100 ewes on grass till lambing time, and 1 ton per day after lambing, or = 1 ton per day for four months, or, 120 tons ÷ 15 (average in tons per acre) = 8 acres per 100 ewes.

Ewes not on grass, and also clipped sheep or hoggets after Christmas, consume 24 lbs. per day : therefore 200 eat 1 acre (15-ton crop) in one week. Beginning with lambs put on in September, it is approximately right to say that 1 acre will keep 300 per week, on an average, during the first root season = 16 lbs. of roots per day, but that would not be quite enough for the larger breeds.

Hay should also be allowed = 1 ton per acre of roots.

Cake = ¼ lb. to each sheep per day for six months amounts to 70 lbs. more than 2 tons for 100 sheep. It is near enough, practically, to say 2 tons.

Bullocks.—1 acre of good pasture, or 1¼ acre to 1½ acre, according to quality, should, during summer, keep 1 fattening bullock, which ought to gain 20 stones of beef in 23 weeks. One store animal might be sufficient stock for 1 acre of second-quality land.

Turnips : ¾ cwt. per day, or 7 tons in six months, is nearly ½ acre for each bullock. If given 1 cwt. per day, 1½ bullock may be kept per acre of turnips (15 tons) between six and seven months. The price at 7s. 6d. per ton = 4½d. per cwt.

Hay, 1 stone (14 lbs.) per day for 26 weeks = 22¾ cwts. A large-sized fattening bullock should eat about 1¼ stone = 17½ lbs. per day. An ordinary crop of "seeds" hay = 1½ ton per acre ; a good crop, 2 tons.

Of natural hay, 1½ ton per acre is a good crop. Heavier crops become white at the bottom, and are not of such good quality, except on some rich moist meadows where the larger grasses greatly predominate.

Of straw, a bullock in a yard will eat and trample down 3 or 4 tons in six months ; 1 or 2 tons more could be trampled down if necessary.

Of meal and cake mixture, 6 lbs. per day to each bullock for six months gives a total of ½ ton, less 28 lbs.—say, ½ ton each.

Cows.—One cow can be kept summer and winter on 2½ acres of superior dairy-grass-land ; while 3 acres, up to 5 or 6 acres, of ordinary quality are necessary in a mountainous dairy district.

Hay cut from 1 acre of natural meadows = 1½ ton, or fully 18 lbs. per day per cow for six months ; this, plus ½ ton to 1 ton of good straw, is enough fodder for an average dairy cow : 24 lbs. of hay per day = 2¼ tons in seven months : 25 lbs. of hay per day = 2 tons in six months.

Mixed concentrated food, given in spring after calving and before grass comes, may vary in cost from £1 per cow (ordinary feeding) to £2 each (high feeding).

Cotton cake given in summer on the grass : 3 lbs. per day for six months = (nearly) 5 cwts. per cow, and at £6 per ton, costs 30s. per cow.

Root and forage crops for all the year round are already given on pages 122 and 123.

Rent and Taxes amount to, say, from 3s. to 5s. per acre.

Implements.—Total cost per acre, £1 on a farm half arable and half pasture, up to 30s. if it is all arable, or even £2 per acre if many new and expensive implements be bought, or when the holding is small. A 500-acre farm might thus have £500 to £750 or £1000 of capital sunk in implements.

Capital required for an ordinary farm = £5, £8, or £10 per acre: in high farming it may mount up to more.

Example No. 1

Is given as an answer to the first three questions set in the Examination for the Diploma of the Royal Agricultural Society of England in 1884.

Question (1.)—"What capital is required for a farm of 500 acres—half arable and half pasture—the arable being turnip and sheep land, the grass, 50 acres good feeding land, the rest suited for young stock?"

Question (2.)—"What proportion of capital would you apply to—

"1. Cattle. 2. Sheep. 3. Horses. 4. Implements and machines. 5. Tillages, etc.?"

Question (3.)—"State the most suitable course of cropping."

N.B.—In all arable farm calculations the rotation is the first point to settle.

Ans. to Question (3.)—Rotation for 250 Acres Arable.

A Five-course Shift.

1. Wheat, 50 acres.
2. Oats, 50 acres (better straw for fodder than barley). [Catch crops following more or less; as rye, trifolium, vetches, rape, etc., for sheep food in spring.]
3. Roots, 50 acres, mostly eaten on the land by sheep; part carted to the yard for cattle.
4. Barley, 50 acres (part might be oats instead).
5. "Seeds," 50 acres, all cut once for hay and the after- or latter-math eaten by sheep.

Ans. to Question (2.)—To find the numbers, and affix the prices, of the Horses, Cattle, and Sheep, that the foregoing 250 acres of arable and 250 acres of grass-land will keep.

Cattle.

250	acres,	total of grass.
50	„	(the best) keep 50 fatting bullocks.
200	„	left.
75	„	keep 50 bullocks one year younger.
125	„	left.
16	„	(second quality) to graze 8 horses.
109	„	left.
34	„	cut for hay.
75	„	left for sheep.

Horses.

Being light land, the number of horses required would be 3 per 100 acres cultivated = 8 horses. At £30 to £40 each, say = £320.

Sheep.

75 acres of grass left for sheep.
2 sheep per acre with their lambs.

150 ewes at £4 each = £600 total capital in ewes.

One hundred and fifty ewes get 1½ ton of roots per day on grass for four months or 120 days = 180 tons ÷ 15 (average crop in tons per acre) = 12 acres turnips required for the ewe flock.

Tegs, 200 eating 16 lbs. turnips per day consume 18 acres in six months or twenty-six weeks.

Turnips.

12 acres set aside for ewes.
18 „ „ tegs.

30 „ total for sheep.
20 „ for 50 cattle = 70 lbs. (fully) each per day for six months.

50 „ total turnips disposed of.

Fodder.

(1.) *Straw.*

150 acres of grain crops at 1¼ ton straw per acre.
× 1¼

187 tons straw (50 bullocks eat and trample down 3½ tons each).
175 „ for cattle.

12 „ for horse litter; to go to the cattle-yard afterwards.
Some of the straw given to the cattle for litter would first be used for thatching, which would not spoil it for its ultimate purpose.

(2.) *Hay.*

50 acres "seeds" at 1½ ton of hay per acre.
× 1½

75 tons total "seeds" hay.
34 „ cut from the 34 acres of natural meadow—rather a light crop.

109 „ total hay.
18 „ for 8 horses = 2¼ tons each.

91 „ left.
30 „ allowance of 1 ton per acre of turnips for sheep.

61 „ left to be sold, or a little more given to the sheep and a small foddering per day to the bullocks.

Where a good market for hay cannot be got, it might pay better to pasture half of the "seeds" land instead of cutting it.

Capital = Spring Valuation of Stock, etc.

Cattle.		
50 bullocks at £20 each,	£1000	
50 „ at £13 „	650	
		£1650
Sheep.		
150 ewes, with lambs, at £4 each,	£600	
200 tegs at 60s. each—a high price,	600	
		1200
Horses.—8 at £40 each,		320
Implements.—£1 per acre all over,		500
Tillages.		
50 acres wheat at 50s.,	£125	
100 „ oats and barley at £2,	200	
50 „ "seeds" at £1,	50	
50 „ turnip land (including catch crops and manures for the same) at £3,	150	
		525
Half-year's Rent, Tithe, and Taxes at 28s. per acre per annum		350
Cash in hand to pay wages and expenses,		455
Total capital,		£5000

Ans. to Question (1.)

Capital required per acre = £10

At current rates the above prices might be adjusted so that the capital required might be reduced by £3 or £4 per acre.

EXAMPLE NO. 2.

The following calculation will show the rotation which might be adopted on a 300-acre farm in the south of England, consisting of two-thirds arable suitable for sheep, and the rest pasture for grazing or dairy purposes; it gives also the stock kept, and the amount of capital required per acre, apportioning the amount for horses, cattle, sheep, implements, etc. Besides this will be found the number of labourers required, their different duties, and the amount necessary per annum for wages; together with a Michaelmas valuation and a statement of receipts and expenses for a year.

A four-course rotation adopted for the arable land.

50 acres wheat—or part oats to produce better fodder.
50 „ roots, mostly swedes; average, 15 tons per acre—5 acres of mangel, 20 to 25 tons per acre, would keep up the above average, and allow 2 or 3 acres to grow potatoes.
50 „ oats.
50 „ clover or "seeds" all cut once for hay.

200 acres, the given amount of arable.

Pasture.

100 acres grass.

75 „ pasture should carry 150 ewes and their lambs (say 200) in summer.

25 „ left.

10 „ keep 6 or 7 horses.

15 „ left for 10 cows' pasture = 1½ acre each.

Or 5 cows might be kept, and their calves reared each year; the heifers coming into milk at two years off, and the bullocks of the same age put up to finish in the autumn following.

Roots.

50 acres, average 15 tons.

12 „ for 150 ewes = 1½ ton per day for 4 months during winter while on grass: by giving half quantity for 2 months at first, before lambing, the turnips may be spread over 5 months.

38 „ left.

1 „ for 10 cows = 30 lbs. each per day for 4 months in winter, including the time they are dry.

37 „ left.

20 „ for 200 tegs: 18 acres are consumed in 6 months by 200 tegs going on as lambs in September = 16 lbs. per day, being rather little for large breeds.

17 „ left.

½ „ for 7 horses.

16½ „ left.

5½ „ for 50 tegs, bought in autumn, to feed.

11 „ left for bullocks: 7 tons are consumed by a fattening bullock in 6 months at ¾ cwt. per day, leaving 1 ton per acre over, after feeding 2 bullocks per acre, which would make up the possible total to 24 bullocks.

Fodder.

(1.) *Straw.*

100 acres grain crops at 1¼ ton straw per acre: this is a low average, but it is off light land.

× 1¼ ton.

125 tons straw.

20 „ for horses: half for litter, and the remainder for fodder being sufficient with 1 ton of seeds hay for each horse.

105 „ left.

10 „ as part of the cow-fodder: 1 ton per cow.

95 „ left.

10 „ for cows' litter, which could be done without if necessary.

85 „ for 24 bullocks = 3½ tons each, to supply fodder and litter. The litter is supplemented by the rough stable cleanings being thrown into the open yard.

(2.) *Hay.*

50 acres of "seeds" hay.
× 1½ the average number of tons per acre.

75 tons total of hay.
40 „ given to the sheep—a little over 1 ton per acre of roots consumed (37 ac.), or something more than 1 lb. per sheep per day.

35 „ left.
10 „ for 10 cows, which with 10 tons of straw allowed provides the necessary 25 lbs. each per day for 6 months.

25 „ left.
7 „ for 7 horses also getting part straw.

18 „ left; and might be sold at market or sale value—£4 per ton, more or less.

If there is no market, which is usually the case when a farm is situated away from a large town or railway station, 10 tons given to the sheep would supply ¼ lb. more for each per day, and a foddering might go daily to the bullocks.

Michaelmas Valuation—29th September.

150 ewes at £3 each,	£450
200 home-bred tegs, 50 bought do. at 40s. each,	500
7 horses at £35 each,	245
10 cows at £20 each,	200
8 pigs at 30s.—fed on refuse, grain, and potatoes,	12
24 bullocks at £17 each,	408
100 acres grain crops (at £8 to £10), say at £9 per acre,	900
50 acres roots at £5, 10s.—nearly 7s. 6d. per ton,	275
75 tons hay at £2—consuming-value taken at half sale-value,	150
Implements at £1, 10s. per acre,	450
	£3590
Petty cash,	10
Total capital required,	£3600

£3600 ÷ 300 (the number of acres) = £12 capital per acre.
Now depreciated (1893) at least 35 per cent.

Expenses and Purchases other than of stock bought to fill up the places of those sold that appeared in the first valuation.

Rent, Taxes, and Labour.

Rent, 300 acres at 30s.,		£450 0 0
Taxes, 4s. per acre,		60 0 0
Labour, 35s. per acre, arable,	£350 0 0	
Labour, 10s. per acre, grass,	50 0 0	
		400 0 0
		£910 0 0

Purchased Cakes and Feeding Stuffs.

For cows (at £1 each),	£10 0 0	
For 24 bullocks, 12 tons at £7, 7s.	88 4 0	
For 250 sheep, 5 tons at £7, 7s.,	36 15 0	
		134 19 0

Seed.

Rye-grass, home-grown; clover, 10s. per acre,	£25 0 0	
With wheat 5s., and oats 3s. per bushel, 225 bush. averaging 4s. =	45 0 0	
		70 0 0

Manure.

Super, 3 cwts. per acre for turnips = 150 cwts. at 3s. 6d.,	£26 5 0	
Nitrate of soda and sulphate of ammonia for grain crops and potatoes, 2 tons at £10 (average),	20 0 0	
		46 5 0
Shoeing (30s. per horse) *plus sundry bills* for repair of harness, implements, etc. = £5 each		35 0 0
Coal, etc., for the engine—a fixture belonging to the farm,		16 0 0
Interest on £3600 capital at 4 per cent. =		144 0 0
Total expenditure for the year (carried to page 709),		£1356 4 0

Receipts from Sales of Farm Produce for a year, leaving the numbers and value of stock as is found in the valuation at last Michaelmas.

From Sheep Stock—

Receipts for wool, and death and depreciation neutralise each other as follows :—

Sale of wool (6 lbs.) at 5s. each on 150 ewes,		£37 10 0
Death, 3 or 4 per 100, and difference in price of old ewes sold and about 50 tegs bought,		37 10 0

200 lambs (produce of 150 ewes) at £2 each,		£400	0 0
250 tegs sold at 60s. each, profit £1 each,		250	0 0
On horses there should be no loss if young ones are broken in and others sold at their best.			
From Cattle—			
10 cows (produce 600 gals. milk at 7d. = £17, 10s. each) =		175	0 0
10 calves at 50s. each,	£25 0 0		
Less loss through sale and repurchase of 3 cows to prevent depreciation of the stock,	15 0 0		
		10	0 0
24 bullocks at 35s. per month of increase (for six months) =		252	0 0
8 pigs yield a profit of £2 each, food supplied by the farm =		16	0 0
From Sale of Grain—			
100 acres grain crops.			
14 „ off for horses.			
86 „ at £7, 10s. per acre —after paying market expenses,		645	0 0
From Poultry—			
50 hens and 20 ducks at a profit of 2s. 6d. each =		8	15 0
Return from produce in the year,		£1756	15 0
Total expenditure for the year (brought from page 708),		1356	4 0
Total profit,		£400	11 0

The loss from death is assumed to be allowed for in stating the prices obtained. Should grain rise, say 10s. per quarter on wheat, the profit on the above farm, due to this item alone, would be increased by £200 a year.

The foregoing do not pretend to be more than two of many methods which may be adopted of arranging the stock and crops on such farms.

The following Balance-Sheet and Revenue and Expenditure Account will enable the reader to follow more exactly the figures in the foregoing example (No. 2), and to verify the results. The accounts are framed on the footing of a tenant entering into possession of his farm at Michaelmas of an assumed year, with stock, etc., as on page 707, carrying on one year's transactions, as on pages 705 to 709, and striking a balance at the Michaelmas succeeding his entry, with stock, etc., then in number and value the same as at entry. In the Revenue and Expenditure Account, the value of grain, roots, and hay consumed is stated on each side, as well as the other receipts and expenditure described on pp. 705 to 709.

[1] Wheat, 4¼ qrs. per ac. at 35s. = £7, 8s. 9d. Oats, 7½ qrs. per ac. at 20s. = £7, 10s.

Dr. BALANCE-

	As at Michaelmas 1898.			As at Michaelmas 1899.		
	£	s.	d.	£	s.	d.
To Ewes	450	0	0	450	0	0
„ Tegs	500	0	0	500	0	0
„ Horses	245	0	0	245	0	0
„ Cows	200	0	0	200	0	0
„ Pigs	12	0	0	12	0	0
„ Bullocks	408	0	0	408	0	0
„ Grain Crops	900	0	0	900	0	0
„ Roots	275	0	0	275	0	0
„ Hay	150	0	0	150	0	0
„ Implements	450	0	0	450	0	0
„ Cash in hand or bank	10	0	0	410	11	0
	3600	0	0	4000	11	0

Dr. REVENUE AND EXPENDITURE ACCOUNT

EXPENDITURE.

	£	s.	d.
To Ewes, Expenditure on their account	238	10	0
„ Tegs, ditto	233	0	0
„ Cows, ditto	82	0	0
„ Ditto, Loss through Sales to prevent Depreciation	15	0	0
„ Bullocks, Expenditure on their account	250	14	0
„ Horses, ditto	160	15	0
„ Rent, Taxes, and Labour	760	0	0
This after crediting pasture rent, £150, debited above under proper heads—Ewes, Horses, Cows.			
„ Seed	70	0	0
„ Manure purchased	46	5	0
„ Shoeing, etc.	35	0	0
„ Coals, etc.	16	0	0
„ Interest on Capital	144	0	0
„ Balance or Profit	400	11	0
	2451	15	0

SHEET. *Cr.*

	As at Michaelmas 1898.			As at Michaelmas 1899.		
	£	s.	d.	£	s.	d.
By Capital	3600	0	0	3600	0	0
„ Revenue Account for Profit, 1898-1899	...	...	...	400	11	0
	3600	0	0	4000	11	0

FOR YEAR ASSUMED, SAY 1898 TO 1899. *Cr.*

REVENUE.	£	s.	d.
By Grain Crop, sold or used	900	0	0
If understated, so far as used on Farm, *per contra* correspondingly understated, so result not affected. Same applies to Roots and Hay.			
„ Roots, used	275	0	0
„ Hay, ditto	150	0	0
„ Ewes, for Lamb Crop, 200 at 40s.	400	0	0
„ Tegs, disposed of at profit (subject to Expenditure *per contra*) of	250	0	0
„ Cows, for profit (ditto) Calves and Milk	200	0	0
„ Bullocks, disposed of, profit (ditto) .	252	0	0
„ Pigs, ditto, ditto	16	0	0
„ Cash, for Poultry sold	8	15	0
	2451	15	0

The following Labour Note shows the particulars of the £400 stated as expense of labour on page 705.

Labour—		
3 carters.		
1 cowman.		
2 shepherds.		
4 labourers.		
10 at 13s. per week, average,	£338	0 0
1 bailiff at £1 per week,	52	0 0
11 men,	£390	0 0
3 extra hands at harvest for three weeks at 24s. per week,	10	16 0
Total labour,	£400	16 0

The bailiff, carters, head shepherd, and cowman are all supposed to have cottage and garden accommodation in addition to the above money wages.

In some districts wages are higher, while in others they are lower. The above may be taken as an average which may be raised or lowered to suit the times.

APPENDIX C

Dairy Diploma Questions, with Answers

By Primrose M'Connell, North Wyeke, Southminster

Question 1.—State what acreage of a Dairy Farm you would prefer to have, with the proportion of pasture and arable land, breeding your own stock? Give numbers of stock of different ages, also amount of capital required.

Answer 1.—Take a farm of about 300 acres—200 acres being pasture and 100 acres arable.

This should carry 90 cows with 15 calves and 15 two-year olds.

90 cows.	150 grazing.	200
15 calves.	50 meadow hay.	
15 two-year olds.	25 roots.	
4 horses.	50 straw.	
	25 ac. clover, lucerne, maize.	

Capital, £2500.

90 cows at £17,	£1530 0 0
15 calves at £1, 10s.,	22 10 0
15 two-year olds at £7, 10s.,	112 10 0
4 horses at £30,	120 0 0
Implements,	150 0 0
Valuations, Wages, etc.,	200 0 0
Cash margin,	365 0 0
	£2500 0 0

Question 2.—State the cost of keeping a dairy cow per annum, and the financial results from—

(*a*) Buttermaking.
(*b*) Cheesemaking.
(*c*) Milk selling,

where the herd averages 600 gallons per head.

Answer 2.—Cost of keeping a dairy cow per annum :—

(1) The cow calving in spring (about March).

Grass, 1½ ac. at 25s.,		£1 17 6
2 cwts. undecorticated cotton cake, fed on grass,		0 12 6
¼ ac. green crop and roots at £8 per ac.,		2 0 0
Hay for winter, 1½ loads at 40s.,		3 0 0
Mixed cakes, fed during winter, 4 lbs. daily,		2 5 0
Food,		£9 15 0
Vet. and risk,		1 5 0
Depreciation,		2 0 0
Labour,		2 0 0
Year's keep,		£15 0 0

(2) The cow calving in autumn (September or October).

October to April, feeding 1s. per day, 16 lbs. hay, 16 lbs. oat straw (litter) 200 days = 10 lbs. chaff, 50 lbs. roots, 10 lbs. concentrated food,		£10 0 0
Turned out for 23½ weeks (2 months dry).		
Grass, 1s. 6d. per week,	£1 15 6	
Cake,	0 15 6	
Labour,	2 10 0	
Vet. and risk,	1 5 0	
Depreciation,	2 10 0	
		8 16 0
Total,		£18 16 0

(*a*) *Buttermaking.*

600 gals. give 240 lbs. butter at 1s.,	£12	0	0
527 gals. sep. milk at 1d.,	2	3	11
43 gals. butter milk at 1d.,	0	3	7
Cow gives calf, value at birth,	1	10	0
	£15	17	6

(*b*) *Cheesemaking.*

600 gals.—			
550 lbs. cheese at 60s. per 120 lbs.	£13	15	0
400 gals. whey at ½d. gal.,	0	16	8
50 lbs. whey butter at 6d.,	1	5	0
100 gals. milk—			
90 gals. sep. milk at 1d.,	0	7	6
10 gals. cream = 40 lbs. butter at 1s.,	2	0	0
Calf at birth,	1	10	0
	£19	14	2

(*c*) *New milk trade.*

375 gals. at 6½d. summer price,	£10	3	1½
225 gals. at 8½d. winter price,	7	19	4½
Calf,	1	10	0
	£19	12	6

Estimate for Dairy Plant for a Ninety-Cow Dairy.[1]

1 Vertical Boiler, 5 ft. by 2 ft. 6 in.,	£27	0	0
1 "Alfa-laval" Turbine Separator, 150 gals. per hour,	44	10	0
1 No. 7 Champion Churn,	6	10	0
1 No. 2 "Cunningham" Butter-worker,	2	10	0
1 8-Bottle "Gerber" Tester, complete,	5	0	0
1 Lawrence Milk Cooler,	7	0	0
1 Sandringham Dairy Herd Recorder, complete,	2	2	6
24 Pails, assorted,	6	0	0
1 New Milk Tank for separator,	4	0	0
10 Drums for separated milk,	8	0	0
4 Water and washing tanks,	10	10	0
1 Cream Ripening Vat,	7	10	0
1 Cheese Vat,	9	10	0
1 Double Cheese Press,	7	0	0
12 Chissets,	8	10	0
Butter Tub, Boards, Scotch Hands, Thermometers, Brushes, Milk Strainers, Squeegees, etc., etc.,	6	10	0
	£162	2	6

[1] By W. Smith, Dairy Supply Co., Edinburgh.

Complete Testing Plant for Milk Record Scheme.[1]

1 16-Bottle "Gerber" Tester, complete, with crank handle,	£8	0	0
1 Special Case for 16-Bottle "Gerber" Tester, with inside fittings,	1	10	0
1 Special Case for 45 sampling bottles,	0	14	6
1 Special Case for 20 sampling bottles,	0	8	0
1 Special Case for Test Tubes,	0	3	6
1 Special Case for Automatic Measure with sliding lid, and an inside case with hinged lid,	0	16	6
5 Dozen sampling bottles,	0	12	6
3 Extra Pipettes,	0	4	0
1 Automatic Acid Measure with stand,	1	0	0
3 Padlocks with 6 keys,	0	3	0
1 Sandringham Dairy Herd Recorder, complete with tripod and pail,	2	0	0
1 Dipper, 1s.; 4 extra tubes, 9s.; 2 doz. extra corks, 4s.,	0	14	0
2 doz. corks for sampling bottles,	0	0	6
1 Oil can, 1 glass filler, 1 bradawl, 1 screw-driver,	0	3	0
2 Thermometers,	0	2	0
	£16	11	6

APPENDIX D

Live Stock Societies, Pedigree Records, etc.

With the dates of their formation or the issue of the first volumes of their publications.

General and International.

AGRICULTURAL SOCIETIES.

American Breeders' Association (1903).—*Sec.*, W. M. Hays, Washington, D.C., U.S. America.

Bath and West and Southern Counties Society (1777).—T. F. Plowman, 3 Pierrepont Street, Bath.

British Dairy Farmers' Association (1876).—W. C. Young, 12 Hanover Square, London, W.

Farmers' Club (1843).—H. Trustram Eve, 2 Whitehall Court, London, S.W.

Highland and Agricultural Society of Scotland (first form, 1784).—Jas. Macdonald, 3 George IV. Bridge, Edinburgh.

International Horse Show Association (1907).—Frank Euren, 12 Hanover Square, London, W.

Royal Agricultural Society of England (1838).—Thomas McRow, 16 Bedford Square, London.

Royal Counties Agricultural Society (1861). — Franklin Simmons, Basingstoke.

[1] By W. Smith, Dairy Supply Co., Edinburgh.

Royal Dublin Society (1841).—R. J. Moss, F.C.S., F.I.C. *Agricultural Superintendent*, Robert Bruce, Leinster House, Dublin.

Smithfield Club (*Incorporated* 1798).—E. J. Powell, 12 Hanover Square, London, W.

Welsh National Agricultural Society (1904).—L. T. Loveden Pryse, Cambrian Chambers, Aberystwyth.

HORSES.

Cleveland Bay Horse Society of Great Britain and Ireland (1884).—*Sec.*, Thos. Curry, jun., Morton Carr, Nunthorpe R.S.O., Yorkshire.

Clydesdale Horse Society of Great Britain and Ireland (1877).—*Sec.*, Arch. MacNeilage, 93 Hope Street, Glasgow.

Hackney Horse Society (1883).—*Sec.*, Frank F. Euren, 12 Hanover Square, London, W. Tel. 595 Mayfair.

Hunters Improvement Society (1885).—*Sec.*, A. B. Charlton, 12 Hanover Square, London, W. Tel. 596 Mayfair.

London Cart-Horse Parade Society.—*Sec.*, Frank F. Euren, 12 Hanover Square, London, W.

New Forest Pony Association.—*Sec.*, H. St Barbe, 72 High Street, Lymington, Hants.

Polo and Riding Pony Society (1894).—*Sec.*, A. B. Charlton, 12 Hanover Square, London, W. Tel. 596 Mayfair.

Royal Commission on Horse Breeding (1887).—*Sec.*, J. Herbert Taylor, 12 Hanover Square, W.

Shetland Pony Stud Book Society (1891).—*Sec.*, G. Hendry, 43 Carlton Place, Aberdeen.

Shire Horse Society (1878).—*Sec.*, J. Sloughgrove, 12 Hanover Square, London, W.

Suffolk Horse Society (1877).—*Sec.*, Fred. Smith, Woodbridge, Suffolk.

Thoroughbred Racehorses, General Stud Book (1793). — Publishers, Weatherby & Sons, 6 Old Burlington Street, London, W.

Welsh Pony and Cob Society (1901).—*Sec.*, James Hamer, Greenfield, Penybont, Radnorshire.

Yorkshire Coach Horse Society (1886).—*Sec.*, Frederick Walker, 3 Blake Street, York.

CATTLE.

Aberdeen-Angus Cattle Association (*English*) (1862).—*Sec.*, Albert Pulling, Beddington, near Croydon, Surrey.

Aberdeen-Angus Polled Cattle Society (1862).—*Sec.*, Alex. Ramsay, LL.D., 9 Old Market Place, Banff, N.B.

American Bison Society.—*Sec.*, Ernest Harold Baynes, "Somerset Bridge," Meriden, N.H., U.S. America.

Ayrshire Cattle Herd Book Society of Great Britain (1878).—*Sec.*, John Howie, 58 Alloway Street, Ayr.

Dairy Shorthorn (*Coates Herd Book*) *Association* (1905).—*Sec.*, F. N. Webb, Babraham, Cambridge.

Devon Cattle Breeders' Society (1851).—*Sec.*, John Risdon, jun., Wiveliscombe, Somerset.

Devon (*South*) *Herd Book Society* (1890).—*Sec.*, Alfred Michelmore, Gate House, Totnes, Devon.

Galloway Cattle Society (1862).—*Sec.*, Very Rev. John Gillespie, LL.D., Mouswald Manse, Ruthwell, N.B.

Guernsey Cattle Society (English) (1895).—*Sec.*, E. H. Young, 12 Hanover Square, W.

Guernsey (Royal) Agricultural and Horticultural Society (1842).—*Hon. Sec.*, Chas. Domaille, La Villette, Guernsey.

Hereford Herd Book Society (1846).—*Sec.*, G. C. Britten. Offices, 20 East Street, Hereford.

Highland Cattle Society of Scotland (1885).—*Sec.*, Duncan Shaw, W.S., 15 High Street, Inverness.

Jersey Cattle Society (English) (1879).—*Sec.*, John Thornton; *Assistant Secs.*, T. W. Hammond and L. J. Craufurd, 7 Princes Street, Hanover Square, London, W. [Helier, Jersey.

Jersey Herd Book (1866).—*Sec.*, John A. Perree, 8 Church Street, St

Kerry and Dexter Cattle Society (English) (1892).—*Sec.*, F. A Hordern, 12 Hanover Square, London, W.

Kerry and Dexter Herd Book (1890).—*Registrar*, Richard J. Moss, Royal Dublin Society, Leinster House, Dublin.

Lincolnshire Red Shorthorn Association (1895).—*Sec.*, William Frankish, St Benedict's Square, Lincoln.

Longhorned Cattle Society (1880).—*Sec.*, Thomas Harrison Weetman, Atherstone, Warwickshire.

National Cattle Breeders' Association (1906).—*Sec.*, W. W. Chapman, 4 Mowbray House, Norfolk Street, Strand, London, W.C.

Red Polled Society of Great Britain and Ireland (1877).—*Sec.*, Albert D. Euren, *Mercury* Office, Norwich.

Shorthorn Society of Great Britain and Ireland (1822).—*Sec.*, E. J. Powell, 12 Hanover Square, London, W.

Sussex Herd Book Society (1874).—*Sec.*, W. C. Young, 12 Hanover Square, London, W.

Welsh Black Cattle Society (1883).—*Secs.*, J. Thomas & Son, 9 Victoria Place, Haverfordwest.

SHEEP.

Blackface Sheep Breeders' Association (1901).—*Sec.*, R. Macmillan, Woodlea, Moniaive, Scotland.

Border Leicester Sheep Breeders' Society (1899).—*Sec.*, R. Wood, Admiral Street, Carnoustie, N.B. [Northumberland.

Cheviot Sheep Society (1893).—*Sec.*, John Robson, Newton, Bellingham,

Cotswold Sheep Society (1892).—*Sec.*, James W. Taylor, Cold Aston, Cheltenham. [Bakewell.

Derbyshire Gritstone Sheep Breeders' Society (1906).—*Sec.*, W. J. Clark,

Devon Longwool Sheep Breeders' Society (1900).—*Sec.*, John Risdon, jun., Wiveliscombe, Somerset.

Dorset Down Sheep Breeders' Association (1892).—*Sec.*, E. B. Duke, 47 South Street, Dorchester.

Dorset Horn Sheep Breeders' Association (1891).—*Sec.*, Thos. H. Ensor, Bank Chambers, Dorchester, Dorset.

Exmoor Horn Sheep Breeders' Society (1906).—*Sec.*, D. T. Tapp, Higher-combe, Dulverton, Somerset.

Hampshire Down Sheep Breeders' Association (1890).—*Sec.*, James E. Rawlence, 49 Canal, Salisbury.

Incorporated Wensleydale Bluefaced Sheep Breeders' Association and Flock Book Society (1890).—*Hon. Sec.*, John A. Willis, Manor House, Carperby S.O., Yorkshire.

Kent or Romney Marsh Sheep Breeders' Association (1894).—*Sec.*, W. W. Chapman, 4 Mowbray House, Norfolk Street, Strand, London, W.C.

Kerry Hill Sheep Breeders' Association and Flock Book Society (1893).—*Secs.*, Morris, Marshall, & Poole, Chirbury, Shropshire.

Leicester Sheep Breeders' Association (1893).—*Sec.*, W. A. Brown, Elms Villa, Driffield, E. Yorkshire.

Lincoln Longwool Sheep Breeders' Association (1891).—*Sec.*, William Frankish, St Benedict's Square, Lincoln.

Lonk Sheep Breeders' Association and Flock Book Society (1905).—*Sec.*, Mr J. C. Ashworth, Overtown, Claviger, Burnley.

National Sheep Breeders' Association (1892-3).—*Sec.*, W. W. Chapman, 4 Mowbray House, Norfolk Street, Strand, London, W.C.

Oxford Down Sheep Breeders' Association (1889). — *Sec.*, Howard Sammons, 11 Queen Street, Oxford.

Roscommon Sheep Breeders' Association (1895).—*Sec.*, Matthew Flanagan, Tomona Tulsk, co. Roscommon.

Ryeland Sheep Breeders' Association and Flock Book Society.—*Sec.*, John T. Pinches, Stoneleigh, Ryelands, Hereford.

Shepherds' Society (1807), for the registration of marks and the return of lost sheep.—*Sec.*, Metcalf Sedgwick, Snailsden, Dunford Bridge, near Sheffield.

Shropshire Sheep Breeders' Association and Flock Book Society (1883).—*Secs.*, Alfred Mansell & Co., College Hill, Shrewsbury.

South Devon Flock Book Association (1904).—*Sec.*, W. W. Chapman, 4 Mowbray House, Norfolk Street, Strand, London, W.C.

Southdown Sheep Society (1891).—*Sec.*, W. J. Wickison, 12 Hanover Square, London, W.

Suffolk Sheep Society (1886).—*Sec.*, Ernest Prentice, 64 Oxford Street, Ipswich.

Welsh Mountain Sheep Breeders' Association and Flock Book Society (1906).—*Sec.*, W. Ellis Upjohn, Llwyn, Llanfyllin S.O., Mon.

Wensleydale Longwool Sheep Breeders' Association (1890).—*Sec.*, T. F. King, Wynbury, Leyburn, Yorkshire.

SWINE.

British Berkshire Society (1885). — *Sec.*, Edgar Humfrey, Shippon, Abingdon, Berks.

Incorporated Tamworth Pig Breeders' Association.—*Sec.*, James G. Kerr, Quarley Down Farm, Cholderton, near Salisbury.

Large Black Pig Society (1899).—*Sec.*, Ernest Prentice, 64 Orford Street, Ipswich.

Lincoln Curly-Coated White Pig Society (1907). — *Sec*, Charles E. Williams, Thornhayes, Sleaford.

National Pig Breeders' Association (1885).—*Sec.*, John Parr, Ruddington, Nottingham.

GOATS.

British Goat Society (1879).—*Hon. Sec.*, H. S. Holmes Pegler, Allerton House, Kingston-on-Thames.

DOGS.

Collie Club (1881).—*Sec.*, J. H. Jacques, Niton, Loughton, Essex.

Deerhound Club.—*Sec.*, Edwin G. Salter, 7 Tufnell Park Road, London, N.

APPENDIX E

(*Refer to page* 56.)

A Statement of the Breeds and Ages of the Cattle which have won the Gold Medals, Silver Cups, and Champion Plates offered by the Smithfield Club for the best Steer or Ox, and prior to 1845 *the best Cow or Heifer also, together with the names of the Exhibitors and Breeders.*

CATTLE (EXTRA PRIZE, £10)

FOR BEST OX OR STEER IN THE FIRST SIX CLASSES

	To Exhibitor.	Breeder.	Breed.	yrs.	ms.	dys.
1807	William Flowers	James Walwyn	Hereford Ox, no age named	0	0	0
1808	Samuel Chandler	William Walker	Hereford Ox	6	0	0
1809 to 1829	Discontinued					

BEAST (BEST IN ANY OF THE CLASSES)

GOLD MEDALS

	To Breeder.	Exhibitor.	Breed.	yrs.	ms.	dys.
1830[1]	Marquis of Exeter	Self	Durham Steer	3	10	0
1831	Earl Brownlow	Self	Durham Ox	4	7	0
1832	J. B. Topham	Self	Durham Ox	5	7	0
1833	William Townsend	Henry Townsend	Durham Heifer	4	9	0
1834	Earl Spencer	Self	Durham Ox	4	6	0
1835	John Dent	George Peach	Durham Heifer	4	11	0
1836	Marquis of Tavistock	John Verney	Hereford Steer	3	10	0
1837	R. W. Baker	Self	Shorthorn Heifer	3	5	0
1838	Executors of late Mr Talbot	C. Hillyard	North Devon Ox	4	8	0
1839	R. Hill	Earl of Warwick	Hereford Ox	4	11	14

[1] The Gold Medal in 1830 was offered by Mr Kiteles.

BEAST (BEST IN ANY OF THE CLASSES)—GOLD MEDALS—*continued.*

	To Breeder.	Exhibitor.	Breed.	yrs.	ms.	dys.
1840	Earl Spencer	Self	Durham Ox	5	0	7
1841	R. Wright	Self	Durham Cow	5	2	0
1842	Sir Charles Tempest, Bart.	Mr Maxwell	Shorthorn Cow	6	8	0

After this year (1842) the Gold Medals were awarded to the Exhibitors instead of the Breeders.

	To Exhibitor.	Breeder.	Breed.	yrs.	ms.	dys.
1843	Sir Charles Tempest, Bart.	Self	Shorthorn Heifer	4	9	0
1844	Henry Brown	Self	Durham Heifer	4	0	0

N.B.—After this year (1844) two Gold Medals were given—one for the best Steer or Ox, and one for the best Heifer or Cow.

STEER OR OX (BEST IN THE CLASSES)

GOLD MEDALS

	To Exhibitor.	Breeder.	Breed.	yrs.	ms.	dys.
1845	R. M. Layton	P. Prosser	Hereford Ox	4	8	0
1846	Earl of Warwick	John Thomas	Hereford Ox	5	0	17
1847	W. D. Manning	Self	Shorthorn Ox	4	4	0
1848	Earl of Leicester	Self	North Devon Steer	3	8	0
1849	Richard Jones	James Cartwright	Hereford Ox	4	10	0
1850	William Heath	James Bill	Hereford Steer	2	10	0
1851	Edward Longmore	Self	Hereford Steer	3	8	0
1852	Richard Stratton	Self	Shorthorn Ox	4	10	0
1853	Richard Stratton	Self	Shorthorn Steer	3	9	5
1854	Duke of Rutland	Self	Shorthorn Ox	4	4	0
1855	Marquis of Exeter	Self	Shorthorn Steer	3	10	0
1856	William Heath	John Passmore	Devon Ox	4	5	0
1857	Edward Wortley	Self	Shorthorn Steer	3	10	6
1858	Richard Stratton	Self	Shorthorn Steer	2	8	21
1859	Richard Shirley	Self	Hereford Steer	2	6	27
1860	R. W. Baker	Self	Shorthorn Steer	3	8	0
1861	George Taylor	Christopher Clark	Shorthorn Steer	2	11	7

After this year (1861) a Silver Cup, value £40, was substituted for the Gold Medal.

SILVER CUPS

	To Exhibitor.	Breeder.	Breed.	yrs.	ms.	dys.
1862	John Overman	Self	Devon and Shorthorn Steer	3	4	0
1863	William Heath	Thomas Lockley Meire	Hereford Ox	4	0	0
1864	John Walesby Kirkham	Luke Harrison	Shorthorn Steer	2	5	20
	After this year (1864) a Gold Medal to the Breeder was substituted for the Silver Medal hitherto given.					
1865	Duke of Sutherland	Dr M'Gillivray	Scotch-horn Ox	5	8	0
1866	Richard Heath Harris	Alexander Cowie	Shorthorn and Scotch Polled Ox	4	8	0
1867	William M'Combie	Self	Scotch Polled Ox	4	8	0
1868	William Heath	Late Thos. Elesmere	Hereford Ox	4	3	0
1869	Earl of Aylesford	Self	Shorthorn Steer	3	2	8
1870	William Taylor	R. Stranger	Devon Ox	4	6	0
1871	Joseph Stratton	The late Richard Stratton	Shorthorn Ox	4	3	0
1872	James Bruce	John M'Pherson	Aberdeen-Angus Steer	3	8	11
1873	J. S. Bult	Self	Shorthorn Ox	4	2	0
	After this year (1873) the value of the Silver Cup was increased to £50.					
1874	J. S. Bult	Self	Shorthorn Steer	3	2	3
1875	G. Sowerby	Self	Shorthorn Ox	4	2	0
1876	Samuel Kidner	Self	Devon Ox	4	1	1
1877	H.R.H. the Prince of Wales	William Shapland	Devon Steer	3	2	0
1878	James S. Bult	Self	Shorthorn Steer	3	11	0
1879	Henry D. Adamson	James Bruce	Shorthorn Steer	2	5	3
1880	J. J. Colman, M.P.	James Durno	Shorthorn and Aberdeen-Angus Steer	3	7	16
1881	Sir W. G. Gordon-Cumming, Bart.	G. Williamson	Scotch Polled Steer	2	8	6
1882	Lewis Lloyd	Self	Hereford Steer	2	11	23
1883	H.M. the Queen	F. Platt	Hereford Steer	3	8	4
1884	Robert Wortley	Late Charles Doe	Hereford and Shorthorn Steer	3	6	14
1885	Robert Wortley	Hugh Gorringe	Shorthorn Steer	2	11	12
1886	Frederick Platt	Late T. Oliver	Hereford Steer	3	6	3
1887	Sir W. G. Gordon-Cumming, Bart.	Self	Aberdeen-Angus Steer	2	11	0
1888	John Wortley	Richard Bickle	Devon Steer	2	11	28
1889	H.M. the Queen	James Bruce	Shorthorn Steer	3	7	20
1890	John Cridlan	Crichton and Horn	Shorthorn Steer	2	11	6
1891	John Wortley	T. H. Risdon	Devon Steer	2	7	14
1892	Sir John Swinburne, Bart.	J. H. Harrison	Shorthorn and Galloway Steer	3	5	5

STEER OR OX (BEST IN THE CLASSES)—SILVER CUPS—*continued*

	To Exhibitor.	Breeder.	Breed.	yrs.	ms.	dys.
1893	H.M. the Queen	Her Majesty	Shorthorn Steer	3	6	14
1894	H.M. the Queen	Her Majesty	Shorthorn Steer	2	11	26
1895	John Wortley	William Barneby	Hereford Steer	2	9	11
1896	W. E. Learner	John Ross	Shorthorn and Aberdeen-Angus Steer	2	8	17
1897	John Wortley	W. Parkin-Moore	Galloway and Shorthorn Steer	2	10	3
1898	Executors of J. J. Colman	John Ross	Shorthorn and Aberdeen-Angus Steer	2	11	25
1899	H.M. The Queen	Her Majesty	Hereford Steer	2	11	21
1900	John Wortley	H. F. Russell	Hereford Steer	2	6	24
1901	J. J. Cridlan	John Hunter	Aberdeen-Angus Steer	2	10	25
1902	R. W. Hudson	John Ross	Aberdeen-Angus and Shorthorn Steer	2	10	4
1903	J. J. Cridlan	J. H. Bridges	Aberdeen-Angus Steer	2	11	24
1904	H.M. the King	His Majesty	Devon Steer	2	11	0

HEIFER OR COW (BEST IN THE CLASSES)

GOLD MEDALS

	To Exhibitor.	Breeder.	Breed.	yrs.	ms.	dys.
1845	William Trinder	Lord Sherborne	Durham Heifer	3	10	0
1846	John Booth	Self	Durham Cow	9	10	0
1847	Earl of Radnor	Self	Hereford and Longhorn Cross Heifer	2	8	0
1848	John Mann	Self	Durham Cow	9	0	0
1849	Samuel Wiley	Self	Shorthorn Cow	7	2	0
1850	Stephen Gooch	Nathaniel Cartwright	Shorthorn Cow	5	3	0
1851	Samuel Druce	Self	Shorthorn and Hereford Cross Heifer	3	4	14
1852	J. D. Cook	Self	Hereford Cow	6	11	0
1853	Henry Smith	William Smith	Shorthorn Cow	5	8	9
1854	Charles Towneley	Alexander Bannermann	Shorthorn Cow	6	8	0
1855	Henry Ambler	Late W. D. Manning	Shorthorn Cow	7	11	16
1856	Richard Stratton	Self	Shorthorn Cow	5	8	9
1857	Lieut.-Col. Towneley	Self	Shorthorn Cow	4	1	0

1858	J. W. Brown	Self	Shorthorn Heifer	3	10	21
1859	Lieut.-Col. Towneley	Self	Shorthorn Heifer	3	7	2
1860	Richard Hill	Self	Hereford Cow	5	2	0
1861	John Faulkner	Sir J. Harper Crewe, Bart.	Shorthorn Cow	5	10	0

After this year (1861) a Silver Cup, value £40, was substituted for the Gold Medal.

SILVER CUPS

1862	Robert Tennant	Self	Shorthorn Heifer	3	6	10
1863	Charles Swaisland	Lady Lubbock	Shorthorn Heifer	3	10	0
1864	Richard Taylor	Self	Shorthorn Heifer	3	8	21

After this year (1864) a Gold Medal to the Breeder was substituted for the Silver Medal hitherto given.

1865	Earl of Radnor	Self	Shorthorn Heifer	3	3	0
1866	Richard Stratton	Self	Shorthorn Cow	4	10	14
1867	Henry Bettridge	E. Tanner	Hereford Heifer	3	6	0
1868	Earl of Hardwicke	Self	Shorthorn Heifer	3	5	21
1869	Sir W. C. Trevelyan, Bart.	Self	Shorthorn Cow	5	3	21
1870	Trevor L. Senior	Late Chas. Gibbs	Devon Heifer	2	6	0
1871	James Bruce	Alexander Paterson	Scotch Polled Heifer	3	8	14
1872	Trevor L. Senior	Walter Farthing	Devon Heifer	3	4	3
1873	John Walter, M.P.	Harry Micklem	Shorthorn Heifer	3	2	0

After this year (1873) the value of the Silver Cup was increased to £50.

1874	Richard Stratton	Self	Shorthorn Heifer	2	9	0
1875	William Fox Beaven	Self	Shorthorn Heifer	3	9	0
1876	Joseph Stratton	Self	Shorthorn Heifer	3	11	0
1877	N. Catchpole	Self	Shorthorn Heifer	3	7	0
1878	Richard Stratton	Self	Shorthorn Heifer	3	10	14
1879	Richard Stratton	Self	Shorthorn Heifer	3	7	19
1880	Charles Thos. Lucas	Self	Shorthorn Heifer	3	6	0
1881	Sir W. G. Gordon-Cumming, Bart.	Self	Scotch Polled Heifer	2	8	0
1882	Richard Stratton	Self	Shorthorn Heifer	3	10	27
1883	H.M. the Queen	George Turner	Shorthorn Heifer	2	8	17
1884	John Strachan	Self	Scotch Polled Heifer	2	10	5
1885	Clement Stephenson	Self	Aberdeen-Angus Heifer	2	8	4
1886	J. J. Colman, M.P.	Joseph Stratton	Shorthorn Heifer	2	8	14
1887	Clement Stephenson	G. S. Grant	Aberdeen-Angus Cow	5	7	15

HEIFER OR COW (BEST IN THE CLASSES)—SILVER CUPS—*continued*

	To Exhibitor.	Breeder.	Breed.	yrs.	ms.	dys.
1888	J. G. Macgregor	Self	Aberdeen-Angus and Shorthorn Cross	1	8	12
1889	Clement Stephenson	Self	Aberdeen-Angus Heifer	2	11	27
1890	H.M. the Queen	William Duthie	Shorthorn Heifer	2	9	10
1891	H.M. the Queen	Her Majesty	Shorthorn Heifer	2	9	14
1892	Robert Copland	George Fraser	Cross-bred Heifer	2	10	14
1893	J. D. Fletcher	Self	Aberdeen-Angus Heifer	2	11	13
1894	Clement Stephenson	Self	Aberdeen-Angus Heifer	2	11	20
1895	H.M. the Queen	Her Majesty	Shorthorn Heifer	2	10	17
1896	Earl of Strathmore	Self	Aberdeen-Angus Heifer	2	11	21
1897	Earl of Rosebery, K.G.	James Lawson	Aberdeen-Angus Heifer	2	8	28
1898	Earl of Strathmore	Self	Aberdeen-Angus Heifer	2	10	12
1899	W. E. Learner	John Ross	Shorthorn and Polled Cross Heifer	2	9	7
1900	W. E. Learner	John Ross	Shorthorn and Polled Cross Heifer	2	9	29
1901	Earl of Strathmore	Self	Aberdeen-Angus Heifer	2	9	9
1902	Earl of Strathmore	Self	Aberdeen-Angus Heifer	2	10	0
1903	R. L. Batchelor	William Charles	Shorthorn and Aberdeen-Angus Cross Heifer	2	10	22
1904	Earl of Rosebery, K.G.	John Ross	Shorthorn Heifer	2	8	27

BEST BEAST (NOT EXCEEDING TWO YEARS OLD)

SILVER CUP (VALUE £25)

	To Exhibitor.	Breeder.	Breed	yrs.	ms.	dys.
1899	Miss A. de Rothschild	Baron F. J. de Rothschild	Aberdeen-Angus and Shorthorn Steer	1	11	15
1900	John Ross	Self	Polled and Shorthorn Cross Heifer	1	11	11
1901	H.M. the King	His Majesty	Shorthorn Steer	1	8	15
1902	H.M. the King	Her late Majesty the Queen	Hereford Steer	1	11	14
1903	R. W. Hudson	Self	Shorthorn and Aberdeen-Angus Cross Heifer	1	10	16
1904	John Ross	Self	Shorthorn and Aberdeen-Angus Cross Heifer	1	9	1

N.B.—The reader is referred to the *History of the Smithfield Club from* 1798 *to* 1900, by E. J. Powell, Secretary, published by the Club in 1902.

APPENDIX F

(*Refer to page* 83.)

The highest prices ever paid before 1900 *for Bulls and also for Cows of the Shorthorn breed, as stated by the "Breeders' Gazette" in the Thirteenth Biennial Report of the Kansas State Board of Agriculture.*

Name of Animal, Seller, and Purchaser.	Date of Sale.	Age at Sale.	Place of Sale.	Price.	Sex.
"Duke of Connaught," sold by Earl Dunmore to Lord Fitzhardinge	Aug. 25, 1875	2 years	Dunmore, Scotland	$26,904	Bull
"14th Duke of Thorndale," sold by George M. Bedford to Levi Goff	Aug. 10, 1876	8 years	Paris, Ky.	$17,900	Bull
"2nd Duke of Oneida," sold by Walcott & Campbell to T. J. Megibben	Sept. 10, 1873	3 years	New York Mills	$12,000	Bull
"8th Duchess of Geneva," sold by Walcott & Campbell to R. Pavin Davies . . .	Sept. 10, 1873	7 years	New York Mills	$40,600	Cow
"10th Duchess of Geneva," sold by Walcott & Campbell to Earl Bective	Sept. 10, 1873	7 years	New York Mills	$35,000	Cow
"1st Duchess of Oneida," sold by Walcott & Campbell to Lord Skelmersdale . . .	Sept. 10, 1873	2 years	New York Mills	$30,600	Cow

APPENDIX G

(*Refer to page* 117.)

Official Weights at the National Hereford Shorthorn Show, at Kansas City, October 22-26, 1900, *from the Thirteenth Kansas State Board of Agriculture Report.*

	Herefords.	Shorthorns.
	lbs.	lbs.
Bulls three years old or over—		
Eight prize-winners averaged	2196	2298
Entire section averaged	2201	2285
Bulls two years and under three—		
Eight prize-winners averaged	1943	1899
Entire section averaged	1943	1877
Bulls one year and under two—		
Eight prize-winners averaged	1616	1467
Entire section averaged	1537	1386
Bulls six months and under one year—		
Eight prize-winners averaged	995	966
Entire section averaged	929	919
Bulls under six months—		
Eight prize-winners averaged	720	588
Entire section averaged	705	656
Cows three years old or over—		
Eight prize-winners averaged	1800	1806
Entire section averaged	1635	1621
Heifers two years and under three—		
Eight prize-winners averaged	1553	1436
Entire section averaged	1537	1336
Heifers eighteen months and under two years—		
Eight prize-winners averaged	1373	1270
Entire section averaged	1240	1235
Heifers one year and under eighteen months—		
Eight prize-winners averaged	1226	1067
Entire section averaged	1128	1016
Heifers six months and under one year—		
Eight prize-winners averaged	803	810
Entire section averaged	780	761
Heifers under six months—		
Eight prize-winners averaged	631	571
Entire section averaged	483	482

APPENDIX H

(*Refer to page* 140.)

WELSH CATTLE AND THEIR RELATIVES

By W. B. WALE, Pembroke, 1905.

There are three well-known breeds of cattle which are credited with descent from the ancient British animal known as *Bos primigenius*. They are classed as Devons, Sussex, and Welsh. The first two are red in colour, and the Welsh breed is black. Careful selection over a prolonged period has rendered the Devons the most perfect as a distinct variety, and having had more patrons, they are the most numerous and best known of the three. The ancestors of these breeds are thought to be represented by the Wild Park Cattle, which are white with black or brown muzzles, etc. Many points are noticeable which tend to confirm this view and to link up these varieties as one family descended from a common ancestor. The general similarity in build, temperament, habits, qualities, and the colour of the sports among their offspring are obvious to observers who interest themselves in the subject. It is known that the cows of the so-called wild herds throw occasional black or red calves; so, also, the Devon and Sussex cows throw black calves; Welsh cows throw red calves, and sometime calves which are more or less white with dark muzzles. In the course of time the different breeds, as at present known, have been established—the Devon and Sussex by the selection of red, and the Welsh by the selection of black calves. It seems probable that the original white cows brought forth black more often than red calves, and as a consequence it required more careful and prolonged selection to establish the red breeds; from which would seem to have resulted the more definite separation of the red breeds from the parent stock than appears to be the case with the black breed. This conjecture is somewhat confirmed by the readiness of the black breed to revert to the parent type, as shown by the production of white calves with dark points. At different times patrons of the Welsh breed have selected their white calves for rearing, and formed herds of white cattle. About forty years ago Mr Tebbitt, a gentleman farmer living at Castle Cenlas, in North Pem-

brokeshire, had a nice dairy of white cattle; and at the present time Charles Mathias, Esq. of Lamphey Court, near Pembroke, has an extensive herd which has been established by rearing the white calves. Welsh cattle have been known as North and South Welsh, not because of any difference in type, but simply to indicate territorial distinction. It appears, however, to be quite correct that some years ago a Shorthorn cross got mixed up with some of the North Welsh and gave a more compact and squared-up appearance to the progeny.

These three breeds, Devon, Sussex, and Welsh, have more or less in common a natural hardiness, resourcefulness, and aptitude, suiting them for localities where they have sometimes to make the best of indifferent food and climate and attention. These qualities are doubtless inherited from their wild ancestors, and mark a wide difference between them and the Shorthorn and Hereford breeds, which are, comparatively speaking, artificial productions. Welsh cattle are slow feeders, but generally weigh well and make excellent butchers' meat, the fat having been deposited evenly about the body. Their milking qualities are average, and with a little judicious mating and feeding become good. As stock for feeding purposes on the rich pastures of Mid-England, they have been in favour with purchasers for many years, and appear to give excellent results.

APPENDIX I

(*Refer to page* 155.)

The **Fieldra** breed, or Mountain Cattle, and the **Gotland** are the only two recognised pure Swedish breeds of cattle. The latter is nearly extinct. The Fieldra is a very hardy breed. It is a polled race, rather larger than a modern Kerry, with a black or brown speckled face and ears, and a white, more or less spotted body; fine legs; thin, neatly laid-in shoulders; rather wide pins; long, thin, black teats; and a black or brown nose and eyelids. The bull has a somewhat thick, coarse neck, loins a trifle weak, and rather light-fleshed thighs. The cows give about 2600 to 2700 kilos. of milk per annum, with a fat percentage of from 4 to 5·9.—EDRED WALKER.

APPENDIX J

(*Refer to page 227.*)

Food Consumed during ten days at the Great Dairy Test at the World's Fair at St Louis, 1904

	October.	Milk—lbs.	Lucerne Hay.	Cut Lucerne.	Maize Silage.	Hominy.	Maize Meal.	Gluten Feed.	Oil Meal.	Cotton-seed Meal.	Distiller's Grains.	Union Grains.	Corn Hearts.	Bran.	Ground Oats.	Green Cow Peas.	Green Maize Stalks.
Swiss Herd of 5 Cows. Average weight, 1289 lbs.	4	192·7	36	..	..	14	..	4	4	3	..	75	..	3	..	..	215
	5	195·7	39	..	..	19·5	..	2·5	3·5	3	..	75	..	3	..	..	220
	6	200·6	36	..	..	19·5	..	2·5	2	5	..	75	..	3	..	..	220
	7	197·7	38	..	..	19·5	..	2·5	2	5	..	75	..	3	..	..	225
	8	199·0	40	..	..	15	..	6	2	4	..	75	..	3	..	..	220
	9	192·1	40	..	..	17	..	7	2	4	..	75	..	3	..	..	215
	10	199·0	38	..	..	15·5	..	7·5	2	4	..	75	..	3	..	..	200
	11	189·0	37	..	..	14	..	6	2	3	..	70	..	3	..	..	180
	12	192·4	37	..	..	20	..	2	2	..	..	75	..	3	..	..	215
	13	197·5	37	..	..	12	..	..	..	..	..	60	..	3	..	..	140
Dutch Herd of 15 Cows. Average weight, 1240 lbs.	4	735·4	169	73	..	30	11·5	..	6	28	..	193·0	..	25	..	450	220
	5	752·3	172	75	..	31	10·5	2	4	26	..	192·5	..	26	..	419	256
	6	762·5	166	75	..	29	14	2	4	26·5	..	193·5	..	28	..	450	150
	7	759·9	156	75	..	29	22	6	2	29	..	192·0	..	27	..	450	150
	8	759·9	167	78	..	30	26	4	1	29	..	189·0	..	29	..	435	150
	9	779·8	167	75	..	30	27	5	3	28	..	180	..	25	..	450	150
	10	768·4	172·5	75	..	29	13	16	3	18	..	190	..	28	..	450	150
	11	740·0	163	75	..	29	..	23	2	6	..	204	..	29	..	675	..
	12	737·9	150	73	..	30	..	25	2	7	..	201·0	..	29	..	580	20
	13	728·0	164	75	..	30	..	..	1	..	..	161	..	29	..	675	..
Jersey Herd of 25 Cows, Average weight, 912·4 lbs.	4	886·6	323	144	348	48	9	117·5	46·0	..	..	..	..	61·0	113·5	..	..
	5	918·5	331	150	370	52	7	128·5	48·5	..	..	..	..	55·0	108·5	..	..
	6	915·5	344	144	376	57·5	..	132·5	50·0	..	..	..	..	66·5	114·5	..	..
	7	930·0	385·5	150	372	50·5	..	127	50·0	..	29·5	..	..	53·3	101	..	..
	8	958·4	413	150	356	47	..	129	50·0	..	21	..	..	52·5	113	..	..
	9	967·1	387	144	348	47	..	128	50·0	..	20	..	..	52·5	113	..	..
	10	962·4	388	150	347	47	..	129	50·0	..	21	..	..	52·5	113	..	..
	11	948·3	399	150	353	45	..	126	50·0	..	21	..	..	52·5	113	..	..
	12	961·9	407	150	354	47	..	130	50·0	..	21	..	..	52·5	113	..	..
	13	939·3	373	146	355	47	..	129	50·0	..	20	..	..	52·5	113	..	..
Shorthorn Herd of 29 Cows. Average weight, 1189 lbs.	4	820·6	305	..	477	70	..	100	44·0	42·0	..	..	58·0	119	85	..	..
	5	823·3	315	..	481	70	..	101	45·0	42·5	..	..	60·0	120	86	..	..
	6	810·3	306	..	469	70	..	105	45·0	38	..	..	60·0	120	88	..	..
	7	809·6	307	..	476	67	..	77	43·5	37	82	..	53·0	92	58	..	..
	8	852·0	299	..	486	67	..	77	43·5	37	82	..	52·0	92	58	..	..
	9	851·9	314	..	486	70	..	78	44·5	37	85	..	53·0	95	60	..	..
	10	937·4	316	..	487	69	..	78	44·5	38	87	..	53·0	97	60	..	..
	11	859·0	312	..	489	71	..	80	45·0	38·5	112	..	27·0	96	60	..	..
	12	827·4	315	..	493	92	..	80	45·0	38·5	114	..	26·0	94	60	..	..
	13	849·3	210	..	313	47	..	54	29·5	29	83	..	21·0	54	32	..	..

APPENDIX K

(*Refer to page* 227.)

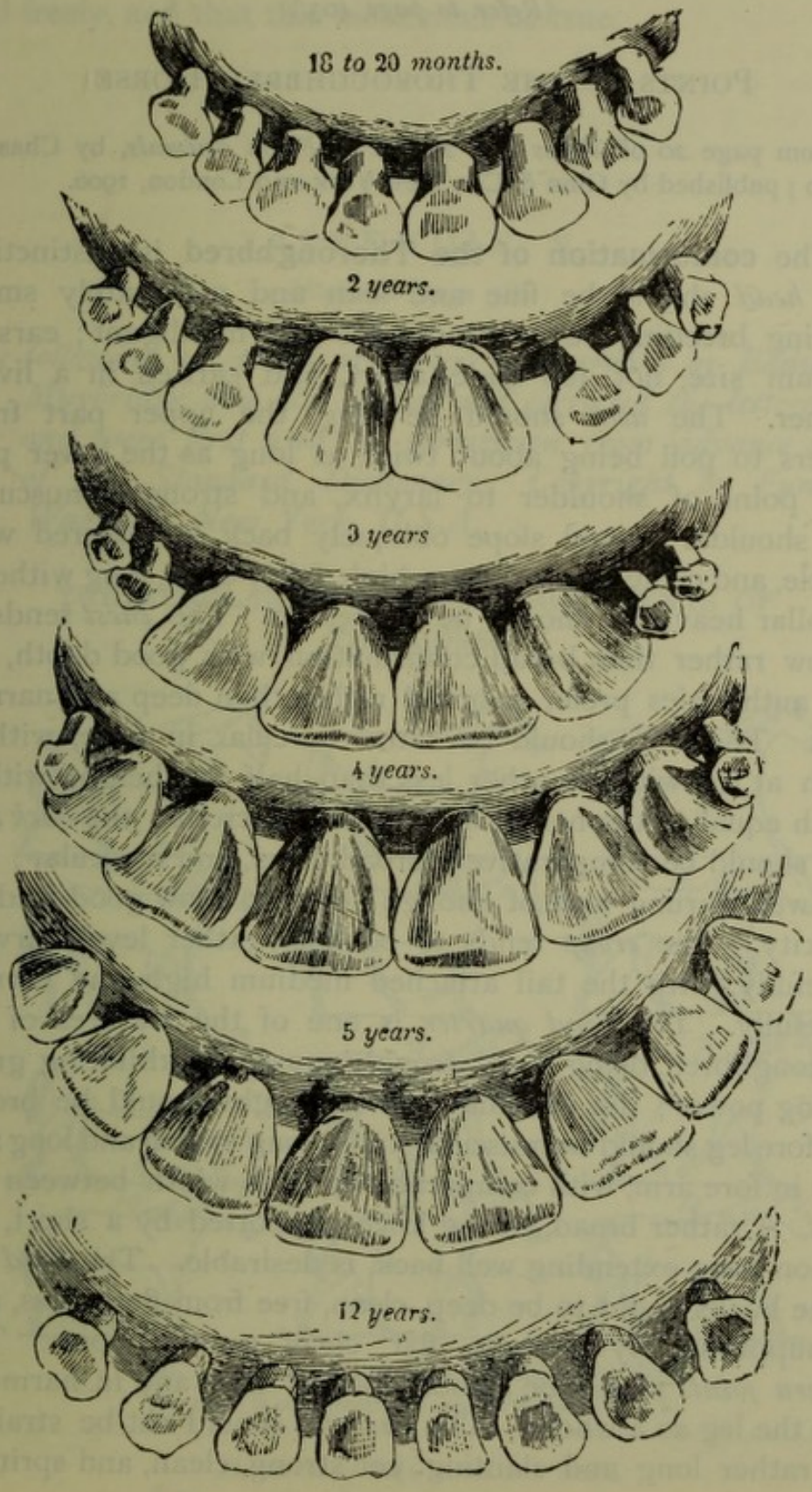
Analysis of the Foods used in the Dairy Tests at the World's Fair, St Louis, in 1904, *by the Bureau of Chemistry, U.S.A. Department of Agriculture, Washington.*

	Water.	Ash.	Ether Extract.	Albuminoids.	Crude Fibre.	Nitrogen Free Extract.
BRAN—						
Jersey	13.04	6.17	4.07	14.76	9.76	52.20
Shorthorn	12.86	6.44	5.32	14.07	9.26	52.05
Swiss	16.59	6.47	2.83	13.41	11.48	49.22
HOMINY—						
Shorthorn	9.25	2.77	8.02	10.23	4.48	65.25
Swiss	10.16	3.67	9.10	9.86	5.04	62.17
GROUND OATS—						
Dutch	15.48	3.86	3.58	10.54	12.79	53.75
Shorthorn	14.44	3.89	4.79	9.53	10.12	57.23
CORN HEARTS—						
Dutch	10.68	3.73	11.68	11.45	14.60	47.86
Jersey	9.59	1.85	8.57	21.62	9.59	48.78
Shorthorn	10.76	2.01	9.02	21.41	9.84	46.96
GLUTEN FEED—						
Swiss	10.08	2.16	4.41	20.79	6.94	55.62
Jersey	10.54	2.00	4.42	23.69	8.73	50.62
Dutch	9.91	2.24	4.55	20.18	7.07	56.05
Shorthorn	9.71	1.86	3.20	25.62	6.19	53.42
DISTILLERS' GRAINS—						
Jersey	8.52	1.75	12.37	27.19	12.86	37.29
UNION GRAINS—						
Dutch	10.84	3.98	7.80	26.23	10.61	40.54
MALT SPROUTS—						
Swiss	16.02	8.26	.95	20.29	12.51	41.97
MAIZE MEAL—						
Jersey	13.91	1.05	1.89	7.57	1.31	74.27
OIL MEAL—						
Shorthorn	10.37	5.32	7.77	34.89	7.45	34.20
Dutch	11.69	5.64	8.64	32.00	7.37	34.66
Jersey	12.55	5.25	6.62	33.49	7.88	34.21
Swiss	11.94	5.63	6.19	32.68	7.91	35.65
COTTON-SEED MEAL—						
Swiss	10.18	6.77	8.14	37.43	7.73	29.75
Shorthorn	9.81	6.69	9.49	40.82	7.29	25.90
Jersey	9.34	5.62	9.38	42.10	8.25	25.31

APPENDIX L

(*Refer to page* 245.)

FIG. 60.—CATTLE DENTITION



APPENDIX M

(*Refer to page* 403.)

Points of the Thoroughbred Horse

From page 20 of *Types and Breeds of Farm Animals*, by Chas. S. Plumb ; published by Ginn & Co., New York and London, 1906.

The **conformation of the Thoroughbred** is distinctive. The *head* should be fine and lean and moderately small, showing breeding; eyes prominent and intelligent; ears of medium size, not too wide apart, and carried in a lively manner. The *neck* should be long, the upper part from withers to poll being about twice as long as the lower part from point of shoulder to larynx, and strongly muscular. The shoulder should slope obliquely back, be covered with muscle, and come back to form high, fairly close, long withers ; no collar heaviness should be noticeable. The *chest* tends to narrow rather than broad confirmation, with good depth, yet able authorities prefer a broad rather than deep and narrow chest. The *body* should be rather circular in type, with a depth at the withers rather less than half the height, with a length equal to the height at withers and croup ; the *back* and *loins* should be comparatively broad, level, and muscular ; the ribs well sprung and of enough depth to show good feeding capacity. The *croup* tends to be long, rather level, curving gracefully, with the tail attached medium high and carried gracefully. The *hind quarter* is one of the features of the Thoroughbred, being long, strongly muscled, exhibiting great driving power; the gaskins or lower thighs should be broad. The fore leg should be muscular and strong in arm and long and wide in fore arm, with comparatively little width between the legs. A rather broad, strong knee, supported by a short, flat cannon bone extending well back, is desirable. The *hind leg* at the hocks ought to be deep, clean, free from fleshiness, and be supported by a short, flat, clean cannon bone. The *pastern joints* should be smooth, placed true, and in harmony with the leg as a whole. The *pasterns* should not be straight but rather long and slanting, yet strong, clean, and springy,

being carried at an angle of about 45 degrees. The *feet* should be of medium size, wide and high at the heel, concave below, and be carried straight and true. In order to secure speed it is essential that the knees and hocks move smoothly and freely, and that this movement be true.

APPENDIX N

(*Refer to page* 388.)

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THE REGULAR PROGRESSIVE MOVEMENTS OF THE HORSE

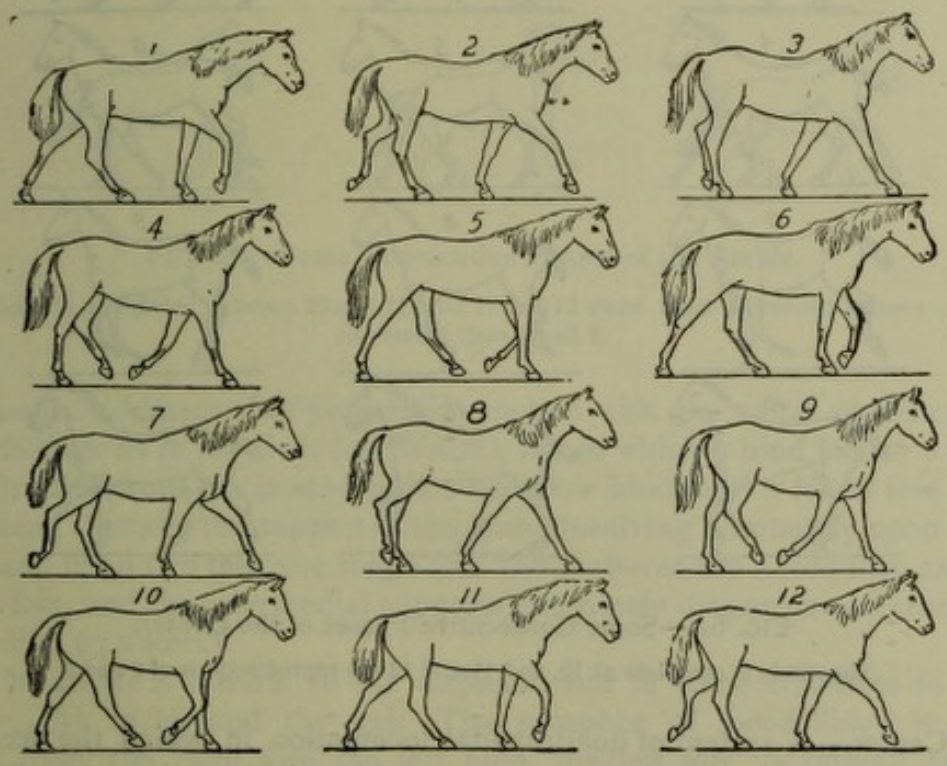

FIG. 61.—Some Consecutive Phases of the Walk.
The stride is completed at 11, and 12 is the same as 2.

[1] Of the third edition of this work.

Walk.—A method of progression, common to nearly all the terrestrial vertebrates, which is effected by a regulated succession of limb-movements, as described below.

If, in the quadrupedal walk, the notation begins with the landing of a right hind foot, the consecutive foot fallings will be the right fore foot, the left hind foot, the left fore foot, followed by its diagonal hind, with which the record began. The time intervals of foot-fallings vary with different species of animals, but their sequence is invariably the same with all—the apes alone excepted, with which the landing of a hind foot is usually preceded by that of its lateral fore foot. During a single stride of a quadruped in an ordinary walk it is supported in eight different ways: twice upon the laterals; twice upon the diagonals; twice upon two hind feet and one fore foot; and twice upon two fore feet and one hind foot.

"It is thus seen that when a horse during a *walk* is on two feet, and the other two feet are suspended between the supporting legs, the suspended feet are laterals. On the other hand, when the suspended feet are severally in advance of and behind the supporting legs, they are diagonals. These invariable rules seem to be neglected or entirely ignored by many of the most eminent animal-painters of modern times."—EADWEARD MUYBRIDGE, *On the Science of Animal Locomotion*, p. 8 [R. I. GT. BRIT.].

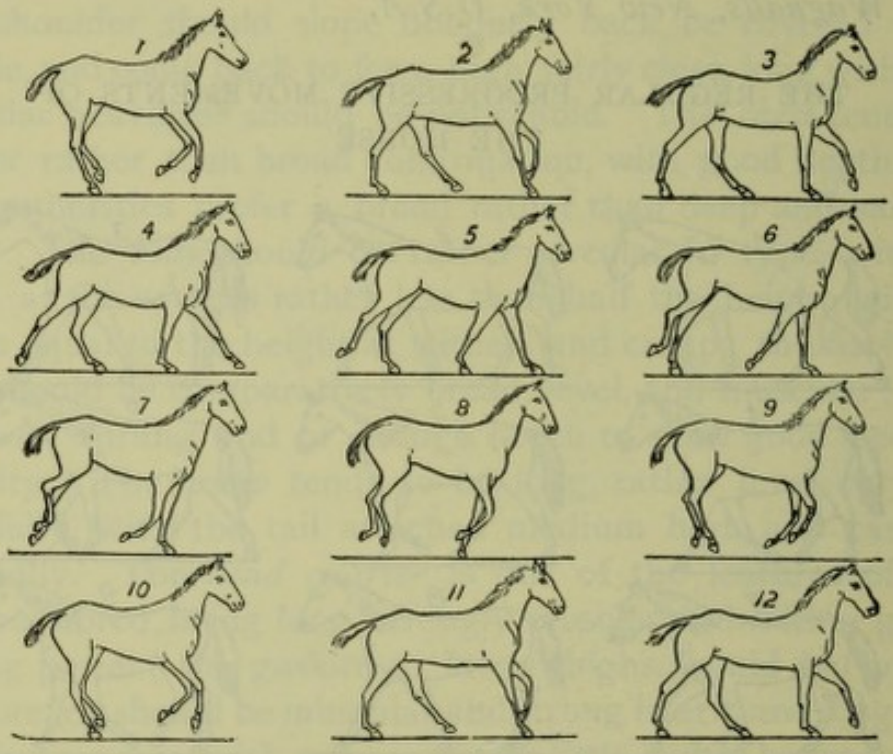

FIG. 62.—Some Consecutive Phases of the Canter.

The stride is complete at 10, and 11 and 12 are reproductions of 2 and 3.

Canter.—A system of quadrupedal locomotion in which the feet are landed on the ground in the same consecutive order as in the walk, but not with the same comparative intervals of time. (*See* WALK.)

Assuming that in the canter the notation is begun after a propulsion through the air with a final thrust by the left fore foot, the landing will

take place on the right hind foot, followed in order by the right fore, the left hind, and the left fore, from which a succeeding thrust off the ground will be effected. The consecutive supporting feet are :—(1) the right hind foot ; (2) the right hind and right fore feet ; (3) both hind and the right fore foot ; (4) the left hind and right fore foot ; (5) the left hind and both fore feet ; (6) the left hind and left fore feet ; (7) the left fore foot alone, from which the animal leaves the ground.

"The *canter* is usually regarded as a slow gallop, probably from the facility with which a change from one gait to the other can be effected; an important difference will, however, be observed."—E. M.

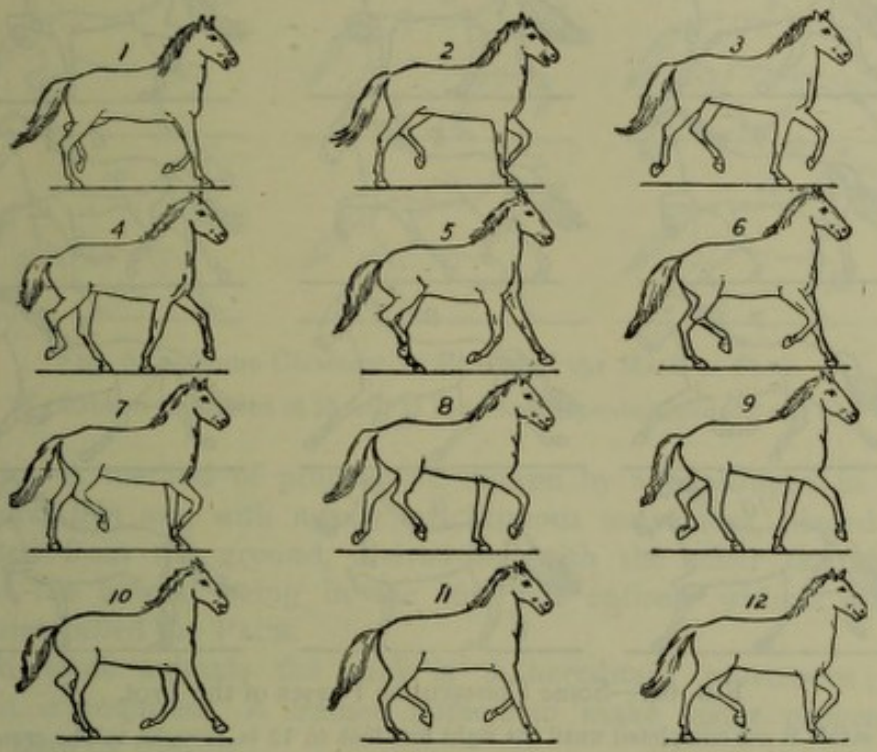

FIG. 63.—Some Consecutive Phases of the Amble.

The stride is completed between 10 and 11, and 11 and 12 show more advanced phases of the movement than 1 and 2.

Amble.—A method of progressive motion with the same sequence of foot-fallings as in the walk (*see* WALK), but in which a hind foot or a fore foot is lifted from the ground before its fellow hind foot or fellow fore foot is placed thereon, the support of the body devolving alternately upon one foot and upon two feet, the single foot being alternately a fore foot and a hind foot, and the intermedial supports alternately diagonals and laterals. (*See* Fig. 63 above.)

The amble is natural to the elephant, and in some countries to the horse, the mule, and the ass. The sequence of foot-fallings is the right hind, the right fore, the left hind, the left fore, beginning again with the right hind foot. At no time during the stride is the body of the animal unsupported. The amble has been erroneously confused with the rack or pace ; it is the most gentle and agreeable to the

rider of all methods of locomotion of the horse, whereas the rack is probably the most disagreeable and ungraceful.

"Out of the old hackney-pace to a fine easy *amble*."
BEN JONSON, *Every Man in his Humour*, Act iii., sc. 2.

"The grey mare . . . breaking from her sober *amble* into a gentle trot."—DICKENS, *Barnaby Rudge*, pt. i., ch. 14, p. 167 [H. & H. '71].

"The *amble* and the walk are the only regular progressive movements of the horse wherein the body is never without the support of one or more legs; in all others the weight is entirely off the ground for a longer or shorter period."—E. M.

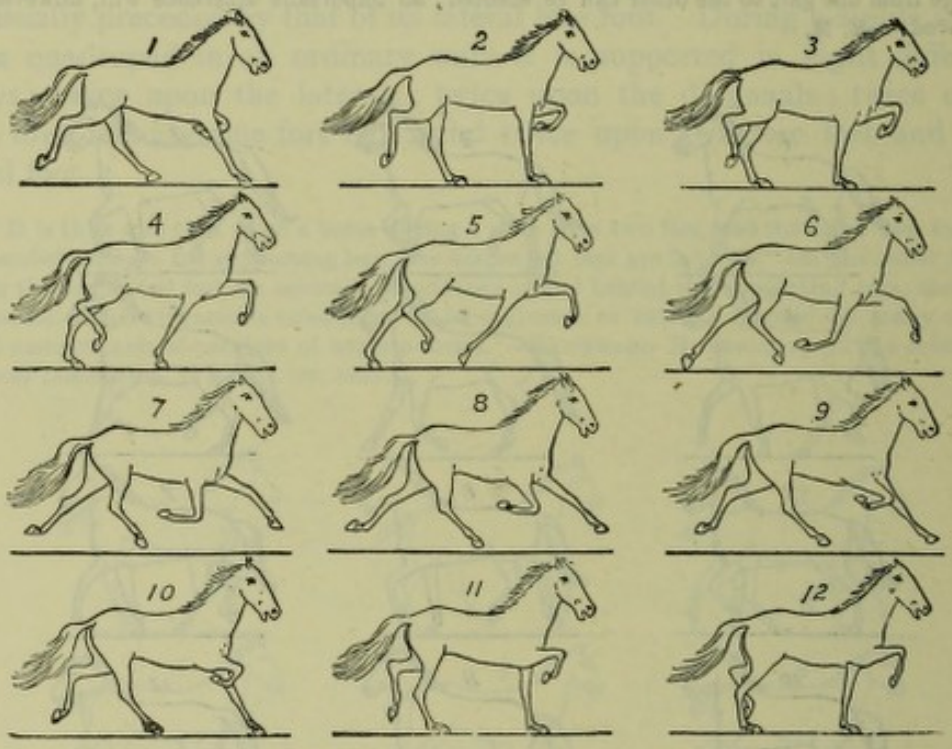

FIG. 64.—Some Consecutive Phases of the Trot.

The full stride is not completed until the right fore foot in 12 is brought to the ground as in position 1.

Trot.—A more or less rapid progressive movement of a quadruped in which the diagonal limbs act nearly simultaneously, and during which the body is entirely without support for varying intervals of time and distance.

When a horse is trotting at a high rate of speed, the fore foot usually precedes its diagonal hind foot in being lifted from and placed upon the ground, and the body will be entirely without support for about one-half of the total length of the stride. Beginning the notation with the landing of the right fore foot, the order of the supporting feet will be:—(1) the right fore foot; (2) the left hind and right fore feet; the left hind foot; (4) without support; (5) the left fore foot; (6) the right hand and left fore feet; (7) the right hind foot; (8) without support. The time during which one foot alone is on the ground is very brief.

"It appears somewhat remarkable that until quite recently many experienced horsemen were of opinion that during the action of the *trot* one foot of a horse was always in contact with the ground."—E. M.

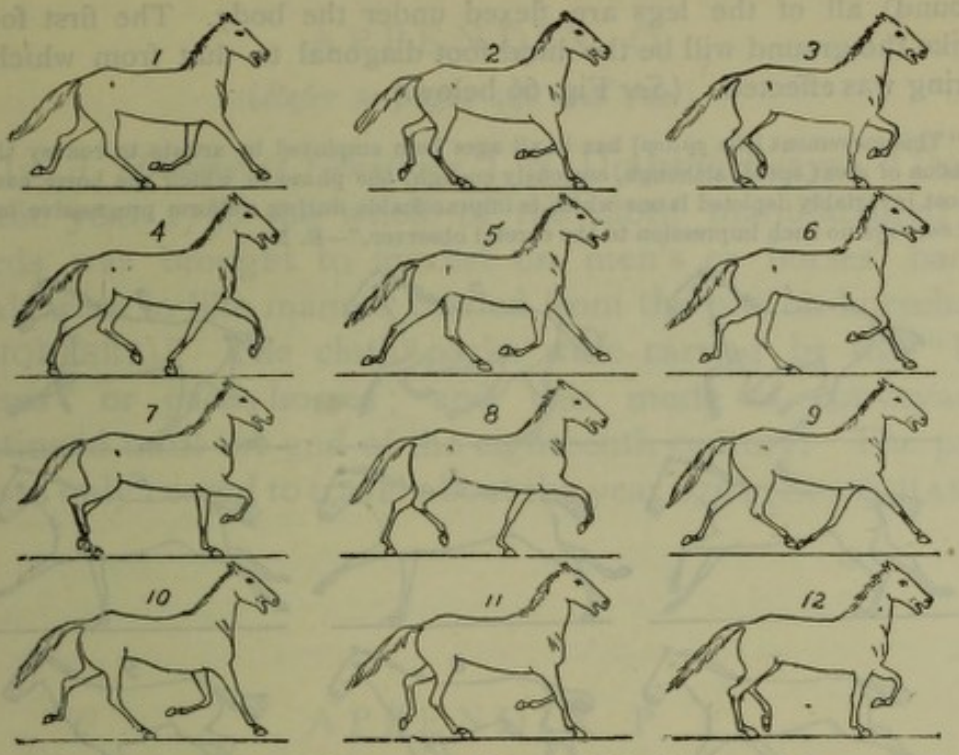

FIG. 65.—Some Consecutive Phases of the Rack or Pace.

The stride is completed at 10, and 11 and 12 are reproductions of 2 and 3.

Rack.—A method of progressive motion by a quadruped in which two lateral feet are, with nearly synchronous movement, placed upon and lifted from the ground, alternating with the other laterals, the body of the animal being in the intervals entirely without support. Sometimes called the PACE.

With some animals the rack is a hereditary movement; with others it is acquired. A trained horse can make faster progress by racking than by trotting.

"The *rack* differs from the trot in the nearly synchronous action of the laterals instead of the diagonals."—E. M.

Gallop.—The most rapid method of progressive quadrupedal motion (sometimes erroneously called the *run*), in which the animal springs into the air from a fore foot and lands upon the diagonal hind foot.

If the notation of a stride by the horse during a gallop begins with the landing of a hind foot upon the ground, as, for example, the left hind foot, the right hind will next strike the ground and at a considerable distance forward; then follow in succession the left fore foot and the right fore foot, at a distance from each other sometimes equal to the height of the animal. The consecutive foundations of support (beginning the notation as above) are:—(1) the left hind foot; (2) both hind feet; (3) the right hind foot; (4) the right hind and the left fore feet; (5) the left fore foot; (6) both fore feet; (7) the right fore foot, from which the animal will spring into the air, in which phase (the only one of the gallop when the animal is entirely off the

ground) all of the legs are flexed under the body. The first foot to strike the ground will be the hind foot diagonal to that from which the spring was effected. (*See* Fig. 66 below.)

"This movement [the *gallop*] has in all ages been employed by artists to convey the impression of great speed, although, curiously enough, the phase in which the horse has been almost invariably depicted is one which is impracticable during uniform progressive motion, and conveys no such impression to the careful observer."—E. M.

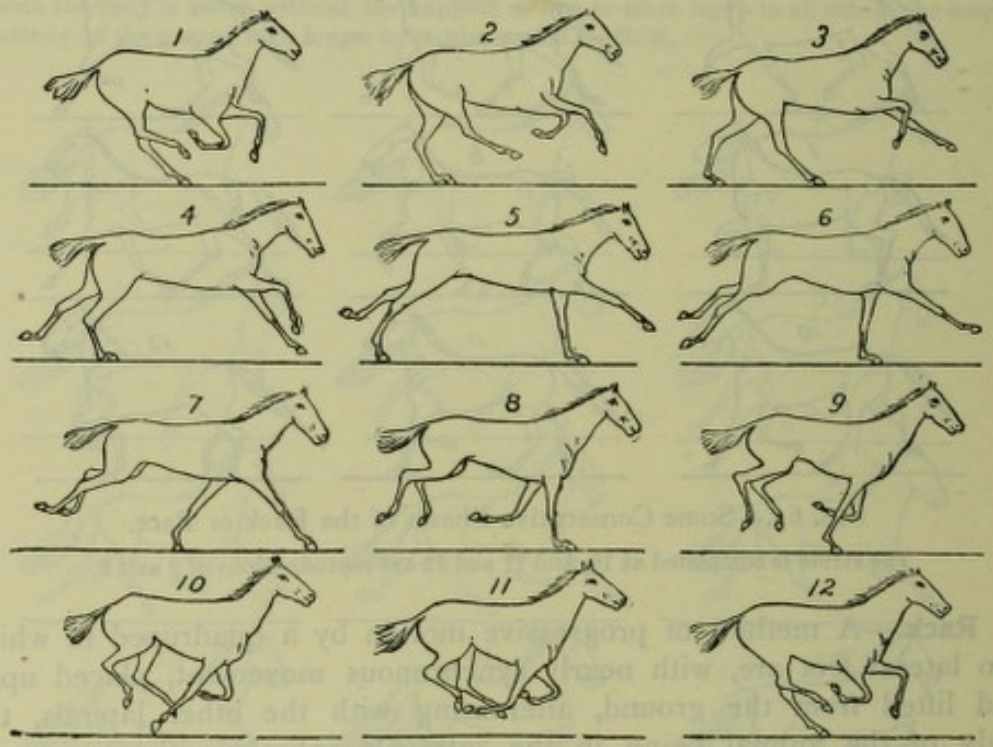

FIG. 66.—Some Consecutive Phases of the Gallop.

The stride is completed at 12.

We call special attention to the following extracts from the definitions of **step** and **stride**, as applied to the progressive movements of man and the lower animals.

Step.—In animal locomotion, an act of progressive motion in which one of a pair of the supporting members of the body is thrust in the direction of the movement, involving the transfer of the support from the one member to the other.

"In the bipedal walk or run a step is one-half of a stride or full round movement. With all quadrupeds, except the kangaroo and other jumpers, four steps are necessary to complete a stride. In the walk these steps take place at approximately regular periods of time. In the trot the diagonals, and in the rack the laterals, make a step almost simultaneously. In the amble, the canter, and the gallop, these steps occur at irregular intervals of time."

Stride.—In animal locomotion, an act of progressive motion, completed when all the feet are returned to the same relative positions they occupied at the beginning of the notation of the movement.

"The normal stride of a biped consists of two uniformly executed steps. The normal stride of a quadruped consists of four steps. These steps may occur at separate and approximately regular periods of time, as in the walk; at separate and irregular periods of time, as in the amble, the canter, and the gallop; or in pairs, as they are effected during the trot with the diagonal, and during the rack with the lateral, members.

APPENDIX O

(*Refer to pages* 448 *and* 740.)

In *A History of Penistone*, J. N. Dransfield says: "Down to the year 1730 the whole of the cloth manufactured at Leeds was brought to market on men's or horses' backs. Coals were in like manner carried from the pits on horseback (THORESBY)." The cloth packs were carried by the "bell horses" or pack horses; and this mode of conveyance continued until the end of the eighteenth century. The pack horses only ceased to travel about the year 1794 (SCATCHARD).

APPENDIX P

(*Refer to page* 492.)

"Strangles, though in the great majority of cases a mild affection, is a very grave disorder indeed on account of the numerous sequelæ that may follow even a mild attack. Roaring and other affections of the respiratory apparatus, heart disease, and maladies connected with many other organs quite frequently can be traced to strangles, and so far nothing in the treatment of the malady or in its prophylaxes has availed to prevent the occurrence of these troubles. A recent French discovery appears to supply this want. A serum has been discovered by Professor Dassmoille of the Pasteur Institute, which, injected into horses (young or old), renders them immune to the malady. A syndicate has been formed in this country to exploit the serum, and doubtless it will be heard of in the near future."—W. R. DAVIS.

APPENDIX Q

(*Refer to page* 518.)

"*Oxyurus curvula* is a round worm which infests the rectum of the horse, causing irritation and consequent rubbing of the

tail. Underneath the tail of affected horses a collection of eggs in a yellow mass will be found.

"*Treatment.*—Give an injection of infusion of quassia, or turpentine and milk 1 oz. to the pint. As a preventative keep the dock and anus well sponged with disinfectant fluid."

"*Strongylus tetracanthus* is a small sucking worm about ½ to 1½ inches long, but with a head especially armed for holding on to the walls of the intestine. It gives rise to colic and diarrhœa, and induces emaciation and anæmia. It is passed out with the fæces, gorged and red with blood.

"*Treatment.*—Give medicines of a vermifuge character: 1 teaspoonful of sulphate of iron; powdered gentian, salt, and flowers of sulphur, each a tablespoonful in the manger food, and at the end of a week a pint of linseed oil with 2 oz. of turpentine."

APPENDIX R

(*Refer to page* 526.)

From J. N. Dransfield's *A History of the Parish of Penistone.* In the Faröe Islands is, or until recently was, a wild race of sheep of great antiquity; they are covered with black, short, curled wool, and their flesh has a peculiarly dark appearance and venison-like flavour. In 1821 Trevelyan visited the island and found the remnants of this wild race in no way dependent on or under the control of man. They are sometimes caught by dogs, but can seldom be obtained except by being shot or intercepted in a narrow space and driven over the cliffs.

APPENDIX S

(*Refer to page* 554.)

John N. Dransfield in *A History of the Parish of Penistone* (printed by J. H. Wood, The Don Press, Penistone, 1906),

writes as follows: "Spooner's *History of Sheep* (1844), says: 'The Penistone is a breed of sheep found on the borders of Yorkshire, Lancashire, and Derbyshire, on a heathy tract of land about twenty-six miles in length by twenty in breadth, and they are called the "Penistone" from the market town of that name, where they are sold. They are described by Mr [Prof.] Low as having wool of a medium length, of a silky appearance, but harsh and wiry, and weighing from 4 lbs. to 5 lbs. the fleece. They have white faces and legs. The rams exceed the size of the ewes and wethers in a universal degree, a peculiarity which is ascribed to their being taken to the lower country to be reared. The rams alone[1] have horns, which are very large, lying close to the head and projecting forward. A distinguishing character of this breed is an extreme coarseness of form, and especially of the extremities. The feet are large, the limbs long, the shoulders heavy, the sides flat, but the most singular characteristic is the length and muscularity of the tail, in which respect the Penistone sheep differ from all others in the country. This enlargement of the tail is merely muscular and long, and not analogous to the growth of fat which takes place in the tails of certain sheep of Eastern countries. The mutton of these sheep is highly valued for its juiciness and flavour.'

"Formerly many parties kept flocks of this breed, as the extract below, from the book containing the orders of the Shepherds' Society, held at Saltersbrook, by the principal sheep keepers in the Liberties of Woodlands, Penistone, Bradfield, Longdendale, Saddleworth, Holmfirth, Glossop, and Kinder, and the marks distinguishing their sheep, printed in 1807, will show:—**Orders.** At a meeting held at the house of Thomas Taylor, at Saltersbrook, on the 20th July 1807, the following conditions were agreed on by those who entered into this Society: I. That two meetings be held at the aforesaid place annually, the first on the 20th of July, and the second on the 5th November, except those days happen on a Sunday, then on the day following. II. Any person bringing strayed sheep to the above meeting, the owner or owners of such sheep shall pay or cause to be paid reasonable expenses for taking up, keeping, and bringing

[1] Not so; both have horns.

them to the said meeting. Lastly, That all pinders who have books of marks, if any sheep come into their hands belonging to any member of this Society, they shall take them to their respective owners, who shall pay them reasonably for their trouble."

The meetings are still held annually at Saltersbrook and at the Snake Inn in the Woodlands, and though the gatherings may not rival those of yore, still old tales and reminiscences are told and

> "Ale and song and healths and merry ways
> Keep up a shadow still of former days."

In the early part of the last century a number of Penistone moorland sheep were sold from Rowlee Farm in the Woodlands and sent into Kent. Three of them did not settle there and started back, and two of them it is recorded actually got back, and the horns of one of them were hung up in Hope Church.

The seal of the Burial Board of the ecclesiastical parish of Penistone is a horned sheep of this breed.

The history of the sheep in this country is coeval with its earliest history, and the first woollen manufactory in the island was established by the Romans at Winchester. Some of the fabrics reached Rome, and they were so highly appreciated that during the continuance of the Roman domination, in the most luxurious era of the Empire, the finest and most expensive robes—those used only in days of festivity and ceremony—were furnished by the British factories. One Roman writer, Dionysius Alexandrinus, uses the following language as quoted by Hollinshed, and strongly expressive of the value of the material: "The wool of Britain is often spun so fine that it is in a manner comparable to the spider's thread." The first Guild of Fullers was chartered at Winchester.

> "To spin with art, in ancient times was seen,
> Thought not beneath the noble dame or queen;
> From that employ our maidens took the name
> Of spinsters, which the moderns never claim."
>
> —*British Farmers' Magazine*, 1830, p. 436.

APPENDIX T

(*Refer to page* 600.)

The Southdown Sheep

The reasons for breeding and keeping sheep are three :— To produce mutton ; to grow wool ; to manure the land.

In wool production, Southdowns compare favourably with other breeds. They do not grow so much wool per sheep as some breeds, but their fleeces are of fine quality, close, thick and heavy in proportion to the size of the sheep; while Southdown wool realises the highest price per pound of any native breed. As a mutton producer—which is much the most important qualification of the three—the Southdown is far ahead of any other breed of sheep. A fat eight-stone Southdown fetches about the same sum as a fat ten-stone sheep of the heavier breeds. Three Southdowns will consume about the same quantity of food as two sheep of the larger and coarser breeds. No breed surpasses the Southdown for quickness of feeding and early maturity. Lambs dropped early in January, near Chichester, are often sold fat to the butcher in April at 45s. to 49s. each.

No single breed has a monopoly of merit ; but if we place all the leading breeds in competition as mutton producers, and judge them by points, taking the most essential qualifications to be : earliness of maturity, thriftiness, ability to thrive well on poor pastures, general adaptability, freedom from lameness, and "profit," as exemplified by their rapid conversion of food into the highest priced mutton—Southdowns come out an easy first.

Reasons why the Southdown is the best Breed of Sheep for "Crossing" or "Grading-up" Purposes.

1. The Southdown is the oldest pure breed of short-woolled sheep, and hence the progeny of a Southdown ram inherits, to a very marked degree, the good qualities of that breed.

2. Southdown mutton has the finest flavour, and realises the highest price in the market.

3. Southdown wool is of all short-woolled breeds the finest in texture and quality, and is the nearest approach to Merino wool in these respects.

4. Southdowns withstand extremes of heat and cold, and are suitable for every climate. During the last few years Southdown rams have been sold for "crossing" on nearly every breed of British sheep, and have also been exported to the following countries, amongst others—Germany, France, Russia, Spain, Sweden, United States, Canada, New Zealand, Argentine Republic, Mexico, Japan, Switzerland, Jamaica, Finland, British Columbia, Australia, Tasmania, Chili, Peru, Norway, and Uruguay. W. J. WICKISON.

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