Sheep and goats / by G. Mayall.

SHEEP & GOATS

By *G. Mayall*

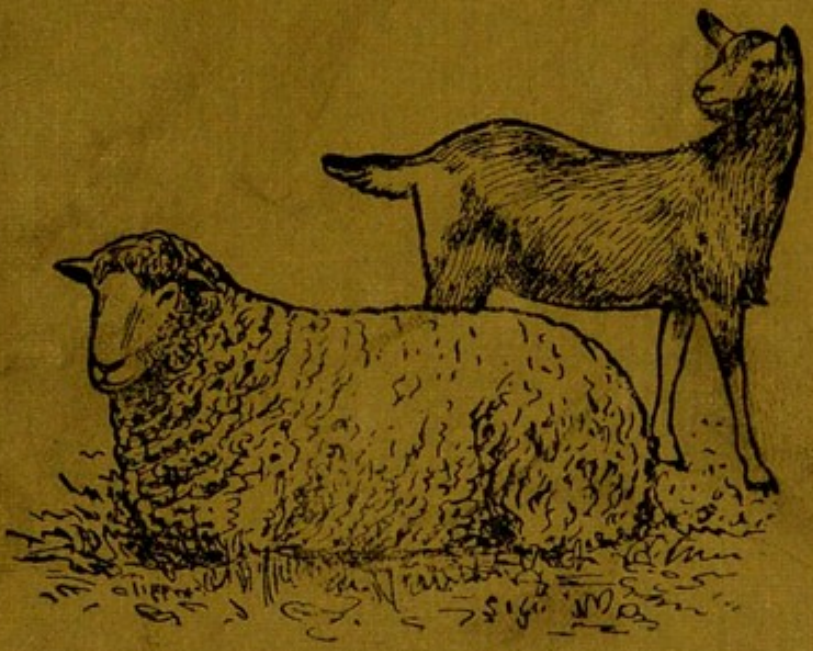

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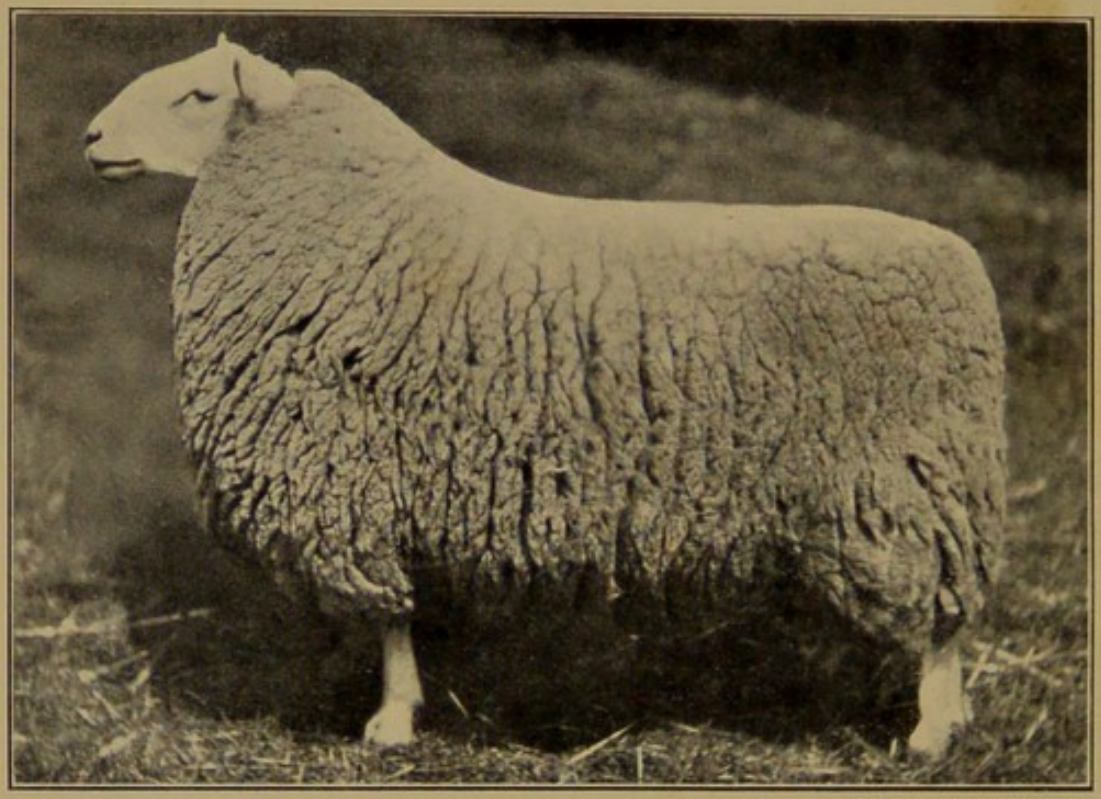
PLATE I.



Photo, G. H. Parsons.

CHEVIOT RAM.

Owned by Mr. Robson. First, Royal Show, 1911.

PLATE II.

Photo, G. H. Parsons.

BORDER LEICESTER RAM.

Owned by Mr. D. P. Elliot. First and Champion, Royal Show, 1911.

Frontispiece.

SHEEP AND GOATS

BY

G. MAYALL, M.R.C.V.S.

AUTHOR OF

"COWS, COW-HOUSES, AND MILK," AND "PIGS, PIGSTIES, AND PORK"

LONDON

BAILLIÈRE, TINDALL AND COX

8, HENRIETTA STREET, COVENT GARDEN

1912

PREFACE

This little handbook forms a companion volume to those that have already appeared on Cows and Pigs. It is hoped that it will be appreciated by and helpful to the small farmer and small-holder. The letters that the author has received in connection with his other two books indicate that there is a growing desire on the part of many people on the land, and going on to it, to know all that is beneficial in regard to the stock they own, and to be well informed concerning them. In Australia, Canada, and America there is room for guiding animal manuals written in simple language, even although they originate from this country.

I am indebted to Mr. S. Holmes Pegler (the secretary of the British Goat Society) for the chapter on "The Goat-House and Stalls." A piece of writing by the author of "The Book of the Goat," on a subject of which he is a master, should be of special interest.

G. M.

St. George's Road,
Bolton.
November, 1911.

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SHEEP AND GOATS

PART I.—SHEEP

I

INTRODUCTION

The origin of our domesticated sheep is still a matter of doubt. Wherever the human family has travelled or migrated in large numbers, it has been accompanied by ovine flocks and herds. That sheep existed in the Stone Age is proved by the fact that their skeletons have been found near most of the old Roman forts—notably those in Essex and the Thames Valley. The Soay sheep of almost pure breed is said by a recent writer and investigator to be an undoubted descendant of the Asiatic Mouflon.

Some naturalists consider that the race arose from the European Mouflon, or wild sheep, which still flourishes in the islands of Corsica and Sardinia. We know that these animals can be easily tamed, and what more natural than that the Romans, who were no mean agriculturists, should have brought some of them with them when they established themselves in our land.

This Mouflon formerly lived in the Balearic Isles, Greece, and Spain, but now it exists only in the islands above mentioned.

At breeding-time these wild sheep divide into small families, each headed by a male that has vanquished his fellows in combat. At the rutting period the rams fight fiercely, and deliver tremendous drives at each other with their long, powerful horns; the weaker brother receives little quarter, and if killed, is precipitated into the abyss below. Usually timid and fearful at the approach of man or dog, the animal is agile, nimble, and adroit, but is apt to soon tire when chased. In December and January the clash of the horns of the male combatants may be heard on the mountains, and in April or May the mother brings forth two youngsters strong enough to run after her, which in a few days climb the most difficult paths and soon equal her in hardihood and agility.

When close pressed by an enemy, the Mouflon urinates through fear, and, according to some observers, will water its enemies—the wolf and the lynx—with its urine; high up in the mountain fastnesses the eagle and the vulture sometimes kill and eat a young wild lamb.

Mouflons are not difficult to tame, and in the villages of Sardinia and Corsica they roam at liberty; in the houses they run into corners, upset everything, and cause all sorts of damage. The old rams sometimes exhibit wicked propensities, losing all fear of man, and fighting not only to defend themselves, but for love of the thing.

Mouflons easily cross with other sheep, and give fertile hybrids, but crossing with the goat does not succeed. The coat of this race is hairy, short, flat, and thick, and

in winter the animals are clothed with a short, thick woolly down. In the domesticated breeds this down by selection has been increased so much as to eliminate the hair and become known as wool. Other investigators of origin believe that the ovine race, as we know it, is descended from the Mouflon Argali, a wild sheep prevalent in Kamschatka, Tibet, and Mongolia. This animal is of large stature, prefers as its home ranges of mountains of high altitude with wooded slopes, and separated by large valleys. In the summer it feeds on the plants in the valleys, but in winter lives on mosses, lichens, and herbs. It runs quickly across dangerous gaps in the mountains, and can obtain a footing where man cannot tread. Its flesh and skin are obtained in Siberia by setting up an imitation man at the spot it frequents, and while gazing curiously at the dummy, it is approached and killed by the hunter from the other side. An Argali never seeks to defend its life, but flees before both dogs and men. Excellent meat is furnished by it; the skin supplies good winter clothing and coverings, and the horns are made into goblets, spoons, and other household utensils.

The animals live in troops of eight or ten, led by the most vigorous male member of the herd. In the breeding season the rams fight violently, and if the beaten animal does not seek safety in flight the conqueror precipitates him into the ravine.

Wild sheep are creatures of the mountains, inhabiting ranges even 20,000 feet high. They move about in small herds, feeding on herbs in the forests, but less often amidst rocks and ravines beloved by the goat tribe. The wild sheep is lively, agile, and courageous; it loves fighting, and knows how to recognize and avoid

danger. The race can be easily tamed, taught to obey the call of an attendant, recognize him, and evince pleasure when being caressed. Mixed with domesticated animals the wild members can be sent to pasture without seeking to regain their liberty. All parts of their body may be used by man, but the meat and wool are the most valuable. A short tail is characteristic of all wild sheep; curved or spiral horns also distinguish them.

A third class of writers maintains that the ancestors of the domestic sheep were several distinct aboriginal species with long tails: "The sheep of England are indigenous, and the varieties are owing to habitat and natural selection" (Professor Sheldon). The Mouflon of America or Canada, the Ruffled Mouflon of Arabia, which is capable of going without water for many days, and the Mouflon of Persia, Baluchistan, and Afghanistan, are other varieties of wild sheep. The heights they inhabit; the glaciers, ravines, caves, and clefts by which they wander; their far-sightedness and keen sense of smell; their sure-footedness, strength, and agility, enable wild sheep to retain their existence as a species, and cause them to furnish sport for the hunter and excitement to the chase. Many of them love places where they can obtain salty herbage or efflorescences, or where sodium chloride is washed down by the rain, and lodges in the holes or gaps in the rocks. This liking for salt is a feature also of domesticated sheep.

However the domestic sheep originated, it differs much in appearance from its supposed ancestors, being inferior to them in grace, nimbleness, and courage, for the Mouflons exhibit great love for their little ones, and defend them courageously. Domestication has reduced the race to a utilitarian state alone, without will,

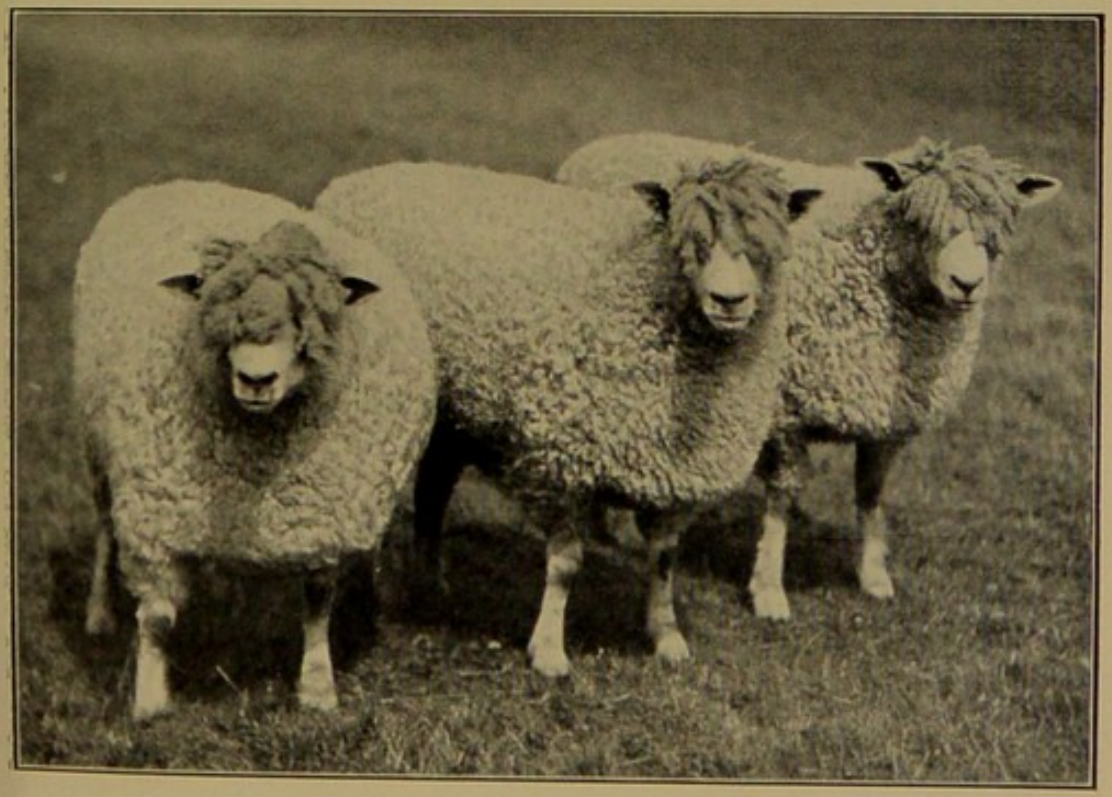
Plate III.

Photo, G. H. Parsons.

LINCOLN LONGWOOL EWE HOGGS.

Owned by Mr. W. B. Swallow. First, Royal Show; First, Lincs Show, 1911.

Plate IV.



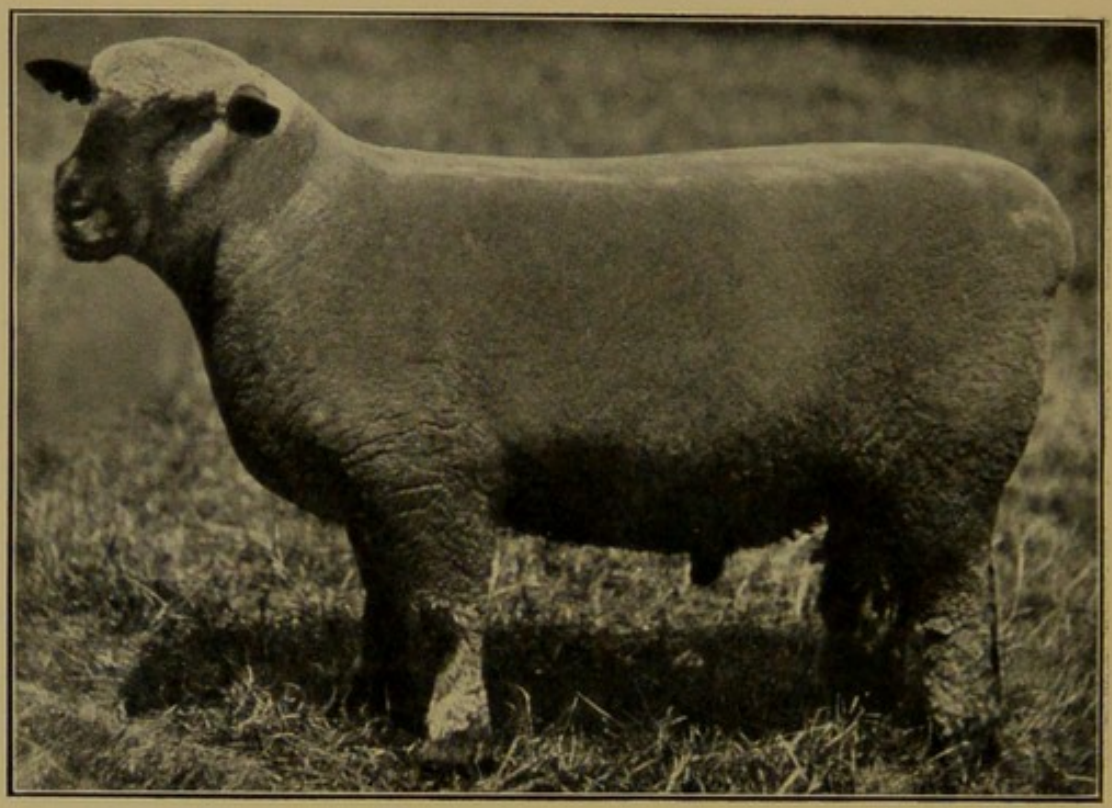
Photo, G. H. Parsons.

COTSWOLD EWES.

Owned by Mr. Hulton. First, Royal Show, 1911.

To face page 4.

Plate V.



Photo, G. H. Parsons.

HAMPSHIRE DOWN SHEARLING.

Owned by the Hon. Mrs. D. P. Bouverie. First, Royal and Bath and West Shows, 1911.

Plate VI.

Photo, G. H. Parsons.

SHROPSHIRE SHEARLING EWES.

Owned by Sir R. P. Cooper. First, Royal Show, 1911.

To face page 5.

intelligence, or even maternal love. Yet in India and Persia their usefulness has been added to, for there they convey borax, assafœtida, and other commodities to the markets, the materials being carried in hair-bags on the backs of the sheep. The only record of the race as a sporting animal is in the towns of the plains, where a Mohammedan swell may be seen parading with his fighting ram, usually clipped, with dyed tufts, and large collar of blue beads and hawk-bells.

Turning now to some of the **domesticated breeds of other lands,** mention must be made of the Merino sheep. This animal is one of the most widespread and valuable of the ovine race. Owing to the revenue it has produced, the wants it has supplied, and its desirability to early agriculturists, much of its history is well known. Stock introduced into Spain by the Carthaginians and their Roman successors in the twelfth century founded the far-famed race mentioned by Pliny, Columella, Ovid, and Virgil. When the Roman Empire decayed and crumbled, Spain fell into a state of decadence for three centuries, but her new masters, the Arabs, raised her prosperity to a level never surpassed. The wool industry took a huge stride, cloths, serges, and textures of all kinds being exported into Europe, Africa, and the Levant.

With the end of the Moorish domination the prosperity of Spain again began to decline. The expulsion of the Mussulmans hastened this, and an ovine population once estimated at seven millions, declined to three millions under Philip IV.

"The natural consequence of this situation was a growth in the exportation of animal wool, which no longer found in the country a sufficient and assured

market. And a curious thing, which shows the state of deep decadence into which Spain fell, was that she who had formerly furnished wool textures to the whole of Europe, was obliged now to take from the foreigner a considerable part of the cloth necessary for her own consumption, manufactured from her own wool. Finally, in the eighteenth century, Merino sheep themselves, which hitherto had been protected by law against exportation, crossed the Spanish frontiers, and went to enrich at her expense the agriculture and manufactures of foreign countries" (Louis Léouzon).

In the second half of the eighteenth century herds of Merinos passed into Prussia, Germany, Austria, and France. In these countries the Merino sheep remains to-day, as it did in its early days in Spain, an animal remarkable for the production of the largest amount of fine quality wool, but a creature of bad conformation from a fattening point of view. With flat sides, wool close-set, spiral, and short, the creature is small, long-legged, with face, ears, and legs dark coloured, and skin about the throat loose. The Merino sheep has not thriven in this country owing to the damp climate, but in the vast and splendid sheep pasture-lands of Australia it has increased and multiplied greatly since its introduction by Captain McArthur in 1791. Fine-woolled Merinos chiefly flourish in Tasmania and Victoria, and the Queensland agriculturists import their best stock from there. In this country, as in Spain, the sheep are out in the open air all day long, and folded at a place called a station at night. Shearing is performed by travelling operators, who easily shear fifty to eighty sheep a day. The wool is sent down in bullock-waggons to the coast, where much of it finds its way to the

London market, and thence into Yorkshire. The great dryness, heavy rains and floods of Australia cause much mortality in the flocks and fluctuations in quantity and price of the wool.

The sheep of **France** are (1) the Charmois, or Kent-Berrichons. These ovines owe their present good position to a prudent agriculturist called Malingié, who bred them at Charmoise, near Pontlevoy (Loir et Cher). The pure-bred Charmois was improved by him through crossing with Kent sheep bought from Mr. Cook, near Ashford, and imported into France in the spring of 1837. About this time the French Government also introduced some Kent sheep. The Kent-Berrichon now thrives in France, and combines the rusticity and easy feeding of the Berrichons with the perfection of form and precocity of the Kent.

The head of the sheep is fine, without frontal wool, ears small, and directed horizontally. The fleece, white, without any spots, only covers the body. The race flourishes both on rich and poor pasture, thanks to the qualities derived from two pure breeds. The Charmois provides excellent meat, the legs of mutton being small, and chops delicate and tender, but there is a danger of the race being reduced too much in size, for the type produced by Malingié was a good-sized animal (about 1 foot 9 inches high). Malingié said that "the fat sheep, two years old, weighed, on an average, net carcass, 90 lbs., representing a live weight of 154 to 176 lbs."

(2) The Larzac sheep, inhabiting a vast calcareous plateau in the departments of Aveyron and Lozére, is famous for its milking qualities, which are taken advantage of in the production of Roquefort cheese. The height of the Larzac is about 1 foot 7 inches, and its

length from 3¼ to 4 feet. The chest is narrow, the loins and croup are well developed; the neck is short and thick, and the head without horns. The flocks consist almost entirely of ewes, the male lambs being sold to the butcher soon after birth, and their skins used to make French kid gloves. The value of this sheep, depending much on its aptitude as a milker, necessitates a knowledge of milking qualities in its selection. The head will be fine, with a gentle expression in the eye; the eyelids of a yellowish colour, the lips and alæ of the nostrils showing the same tinge; the ear will be covered with fine skin. The lumbar region large; the thighs, wide apart, are noticeable features. Good milkers generally have little wool on the body and under the belly (Tayon).

Herds of 500 to 600 sheep are common in Larzac; milking takes place twice a day—in the morning before the flock goes out, and in the evening after it has been in an hour. It takes about eight people to perform the milking operation on a flock of 200 sheep. The animals are milked into tins, great care being exercised to completely empty the bag and obtain the last supply, so rich in fat contents. The cans are furnished with metallic sieves that arrest all impurities; care is taken to prevent a greasy odour in the fluid, the tail and neighbouring parts of the animal being shaved before the commencement of the milking season (P. Diffloth). During six months of milking, from February 1 to August 1, the supply amounts to from 1,200 to 1,800 gallons of milk per 100 sheep, and with intensive feeding 2,000 gallons per 100 head may be obtained. It takes about 4 litres (7 pints) of milk to make a kilogramme (2⅕ lbs.) of cheese. The production of Larzacs

is profitable; a sheep valued at 20 to 25 francs can furnish an annual revenue:

Lamb	...	...	...	8 to 15 francs.
Wool	...	...	...	2 to 3 „
Cheese	...	...	...	15 to 18 „

i.e., from 25 to 36 francs (20s. to 30s.), without counting the value of the manure, whilst the fattened animal can be sold at a remunerative price (Diffloth).

(3) The Lauraguais sheep is bred on the plain of Lauraguais, between Toulouse and Castelnaudry. It is a tall, long sheep without horns, ears of average length, and pendant; the wool is short and wavy, of moderate fineness, and without pointed locks. The weight of a ewe is from 88 to 120 lbs., and of a ram from 132 to 176 lbs. The Lauraguais is strong, quiet, easy to keep, and stands its long journeys to find food well. One hundred ewes give on an average 110 to 120 lambs. The lambs and milk are the chief products of the race, and both are sold profitably in the large towns. After separation of the lamb, the ewe is milked twice a day, until the last month of the following gestation. The milk is sold in a natural state, curded, or made into small cheeses. The conformation of the Lauraguais is defective, but it has been improved by crossing with Merinos, Kents, and Southdowns.

(4) The Berrichonne (Berry race) inhabits the departments of L'Indre and Le Cher, in a country described by George Sand as "the home of calm and sangfroid—men and plants being all tranquil, patient, and slow to mature." The pastures of these departments are vast, and the provinces have been for all time the first in

sheep production. The town of Bourges has taken for its coat-of-arms "three silver sheep on an azure field, with a shepherd boy and girl for supports" (Léouzon).

The Berry presents three varieties, each inhabiting different districts of the provinces. The best variety, the Crevant, is naturally in the most fertile part of the province; the Champagne is the next best; the one inhabiting De la Brenne district has a bad conformation and coarse wool.

Berrichonne ewes have been crossed favourably with Southdown rams.

A few common French races of sheep, such as the Flemish, Breton, Picard, and Poitevin, etc., are of no special value or importance.

The sheep of **Germany** are chiefly found in Westphalia, Bavaria, Wurtemburg, and Alsace-Lorraine. They are tall animals with lean bodies. The Westphalian sheep is the most improved specimen of Germany. Selection and intensive feeding have caused an all-round improvement in the form and live weight of the animal.

Just one other sheep that has become noted deserves mention here—viz., the Karakul or **Astrakhan sheep** of Bokhara, which furnishes astrahkan fur. The tail of this sheep grows to a large size by deposition of fat during spring and summer, but the supply is used up to nourish the animal's body during the time of scarcity in winter. The fur is the coat of the lamb taken from it a few hours after birth in order to avoid straightening of the natural curl, so much desired in good astrakhan. The life of a Karakul sheep is about eight or nine years, and during this time she furnishes seven or

eight lambs. A herd of 500 head give as annual revenue:

		Roubles.
Wool	100 lbs. at 4r. 20 =	420
Fur	400 lbs. at 7r. 5 =	3,000
		3,420

Or about £363.

(P. Diffloth.)

II

THE SHEEP OF THE BRITISH ISLES

Ovines are divided into three classes, and according to the length of their wool are denominated long, middle, and short-woolled breeds. There are no truly short-fleeced races in our country. The long-woolled race of these isles is wholly white in colour, with long smooth coat, and the middle one has a fleece more or less curly, with black, or blackish, head and legs. Inasmuch as the land they frequent, and the climate they are subject to have much to do with the size and external appearances of the animals, it is convenient to describe our sheep under the four headings of Lowland, Down, Upland, and Mountain breeds.

Lowland Sheep.

1. First among the heavy breeds of sheep is the **Leicester,** owing its present good repute to Mr. Robert Bakewell, of Dishley Grange, near Loughborough, who for over forty years (1755-1795) devoted all his energy, knowledge, and acumen to the improvement of the breed. Truly, as a French author, M. Léouzon, observes: "God created the animal, and Bakewell perfected it." A strong and hardy race, they thrive on most sound soil, but prefer grass to arable land,

although doing fairly well when folded. The mutton is fat, and rather deficient in flavour, and the fleece is inferior in weight and quality to that of other white-faced breeds, for Bakewell bred for meat, and not wool, one of his followers declaring that if he could find a sheep without wool he would adopt it. They are only moderately prolific, and not easily kept confined except by stone walls. Many of them may be found in Derbyshire. A typical Leicester will have a fine, narrow, hornless head, with a woolly top. The fleece will be curly and medium length (3 to 4 inches), the skin fine and elastic, legs neat and short, the bony skeleton light and fine, chest wide and deep, back straight, and hind-quarters large and square. The whole appearance of the body of the animal will be cylindrical. The Leicester has been advantageously crossed with the Southdown, Cotswold, Lincoln, Kent, etc., and many rams have been exported to improve the sheep of Canada and the North of France.

2. The **Cotswold** breed is one of great antiquity, and was famous in the days of Henry VI., when the King of Portugal asked permission to export sixty sacks of wool, so that a special cloth of gold might be manufactured at Florence for his use. Cloth-making from the wool of Cotswold sheep is stated to have been carried on in Gloucester in the Saxon period. Edward VI., in 1464, sent a lot of these sheep as a present to Henry of Castille, although in 1425 he forbade further exportation of the breed. A well-fattened Cotswold will weigh 176 to 220 lbs., and the fleece 11 to 13 lbs.

Crossing with the Leicester has improved this race, making wool with a pronounced open curl, adding strength to the constitution, and increasing the proli-

ficacy of the ewes. The Cotswold is remarkable for its conformation, symmetry, and precocity.

The head will be hornless, standing high, with the wool forming a tuft over the forehead; the body long, wide, and deep, with well-formed hind-quarters and fine bone; the fleece will be white. The breed has a majestic appearance and beautiful carriage. From the Cotswold and Hampshire Down sheep the Oxford Down has been produced. This sheep has been exported to America, Canada, Sweden, and Australia.

3. The **Lincoln** is the largest in size of any sheep in the British Isles. The race has been much improved by crossing with the Leicester. It is a sheep of noble appearance, having a symmetrical, well-developed body, fine in bone, and easy to fatten. A good tuft of hair on the forehead (full forelock), a white, good quality fleece 6 to 10 inches long, and the prolificacy of the ewes, which give 130 to 140 lambs per 100 head, are other characteristics of the breed. Many rams have been exported into Australia, Africa, and the Argentine.

4. **Kent,** or **Romney Marsh, sheep** are inhabitants of the marsh of this name, which stretches over a big area in Kent and Sussex. They are robust, hardy sheep, standing heat and cold well, and thriving on scant pasture even when bleak and icy winds blow over it. For a long time the Kent breeders resisted any importation of Leicester blood, but finally crosses were made, and with advantage to the Romney breed. To-day the race is of good conformation, sufficiently light in bone and precocious enough. The fleece of lambs and yearlings weighs 6 to 8 lbs., and that of two-year-olds 8 to 11 lbs., and is fine in quality, with a good lustre.

The head is large, face broad, with tuft of wool on

forehead; legs long and white; long body, wide loins, and large thighs. The mutton is of fine texture and savoury flavour.

5. The **Border Leicester** is descended from the original Dishley stock, these rams having been hired and used on the sheep of the Border by both English and Scottish breeders. In Durham, Northumberland, and round about Carlisle the race is very prevalent. The Border Leicester is noted for its vigour, perfection of form, and weight and quality of wool. It differs from the Leicester, as its head is white and free from a tuft of wool, ears erect, and nose aquiline. This sheep is frequently crossed with Cheviots and Black-faced mountain breeds.

6. The **Wensleydale** is found chiefly in Yorkshire and the lowlands of Scotland. It is a big, up-standing sheep, with a bluish tinge in the skin of the face, ears, and shanks. The dark colour is cultivated and prized, as through it, by crossing the rams with Black-faced mountain ewes, dark-faced lambs are produced, which peculiarity breeders esteem. The wool is long and silky, with open locks. The flesh is of excellent quality.

7. The **Devon Long-Wool**, found in Devon and Somerset, somewhat resembles the Lincoln. It has been produced by crossing Leicesters with the old Devonshire stock of Bampton. The Devon South Hams are a variety of this breed found in the Vale of Honiton. The breed is hornless, with white face and legs, tuft of wool on the forehead, and long wool on the body.

8. **Roscommon sheep** are a large breed of ovines found in Ireland. They are well-made animals, with white faces and long wool of good quality. The native sheep have been much improved by crossing with

Leicesters; the soil and climate of Ireland are suitable to the best development of the race. The origin of the Roscommon is from a cross between the old Connaught and Leicester breeds.

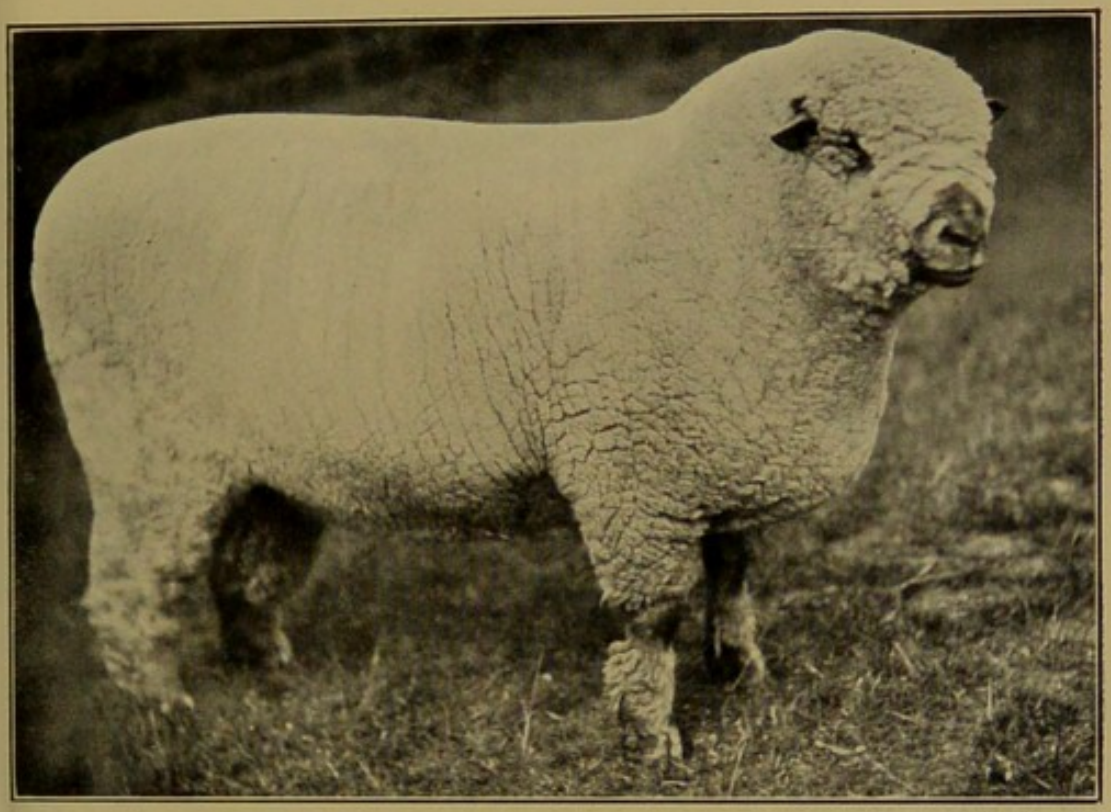
Upland and Mountain Sheep.

1. **Cheviot sheep** have occupied the neighbourhood of the Cheviot Hills, which separate England from Scotland, from time immemorial. On the hill pastures and in the fertile valleys they thrive well, notwithstanding the extreme rigour of the winter climate, which many another breed would be unable to survive. Mr. Robson, of Bedford, improved the race of Cheviots in 1707 by bringing home some Lincoln rams. The influence of these tups grew and spread, so that Scotland and England now have Cheviots. The sheep of to-day is active, hardy, and of excellent conformation. It is hornless; the neck and throat are covered with wool, but the head is only furnished with short hair. The face and medium-length legs are white, body long, chest and back wide, sides nicely curved, and fleshy parts of the limbs well developed. The wool is fine, soft, medium length, a fleece weighing about 4¼ lbs. The ewes are prolific and good mothers. The meat is of excellent quality, much esteemed, and the live weight of a year-old Cheviot will be about 120 to 145 lbs., and two- to three-year-old sheep about 165 to 180 lbs.

Rams of larger breeds are often put to Cheviot ewes, and these with their lambs are fed off for the butcher on farms where "flying flocks" are the rule.

2. The **Black-faced sheep** is one with a black or mottled face, black legs, and large curved horns turning backwards, which inhabits many of the mountain-sides

PLATE VII.

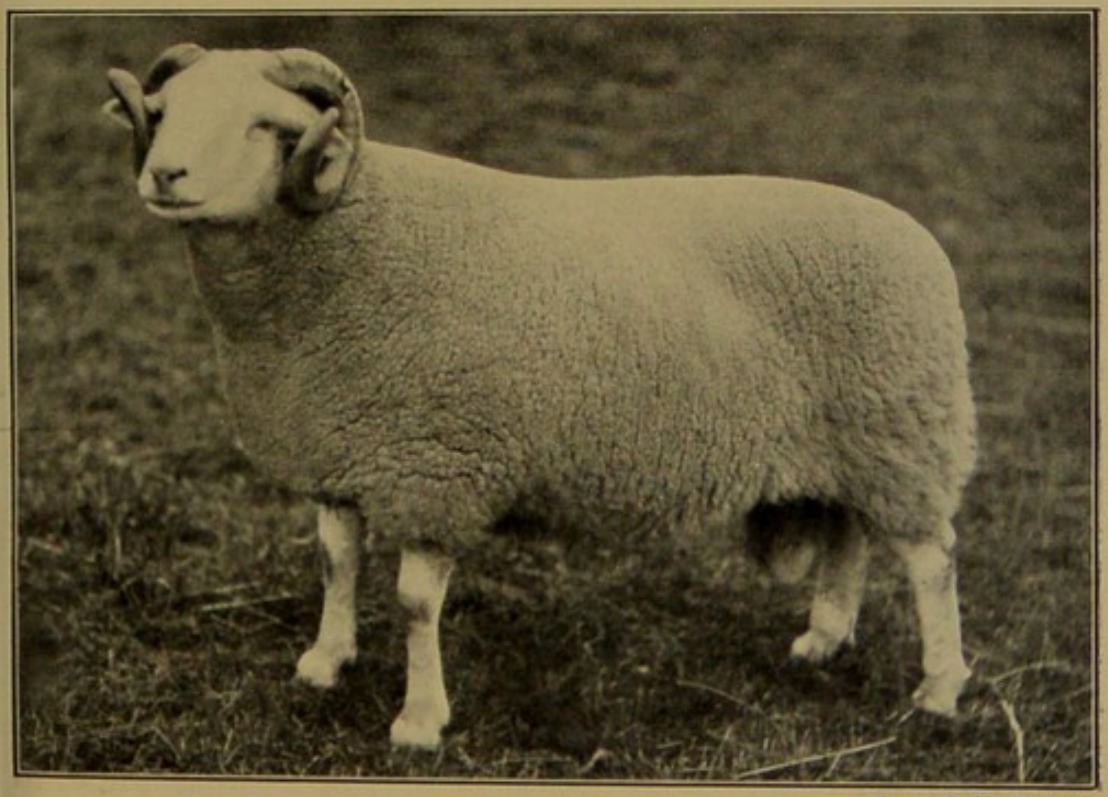


Photo, G. H. Parsons.

SHROPSHIRE TWO-SHEAR RAM.

Owned by Mr. T. S. Minton. First, Royal Show, 1911.

PLATE VIII.



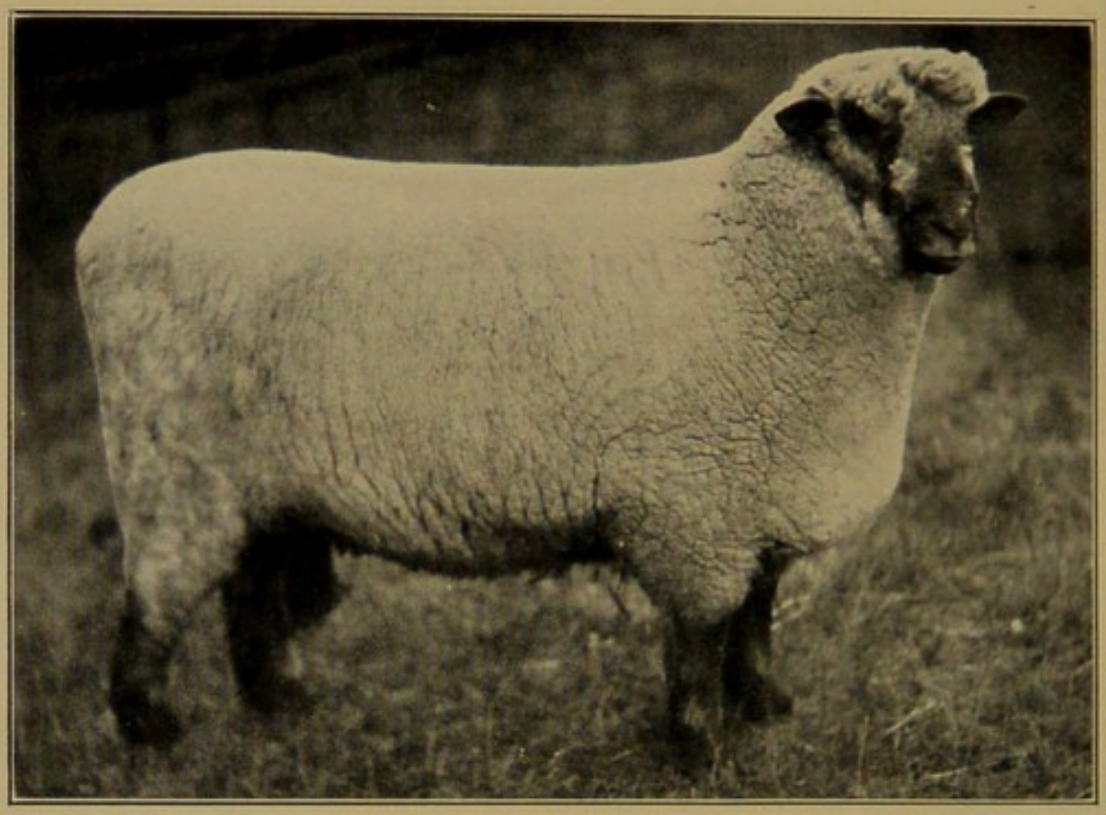
Photo, G. H. Parsons.

WELSH RAM.

Owned by Mrs. Wynn Finch. First, Royal Show, 1911.

To face page 16.

Plate IX.

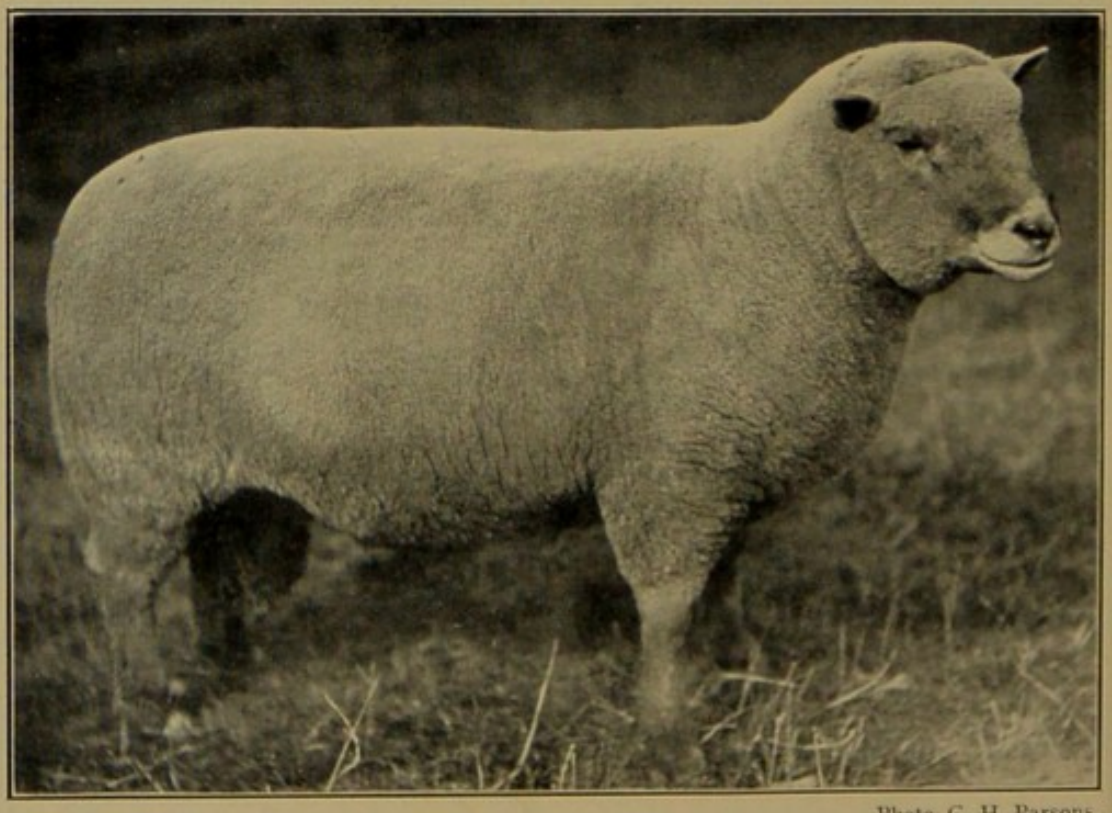


Photo, G. H. Parsons.

OXFORD DOWN RAM.

Owned by Mr. J. Horlick. First, Royal Show, 1911.

Plate X.



Photo, G. H. Parsons.

SOUTHDOWN TWO-SHEAR RAM.

Owned by Mr. C. Adene. First, Royal Show, 1911.

To face page 17.

of Scotland and the northern counties of England. It is an agile, hardy animal, living on pasture poor in nutriment, often begrimed, befogged, and snow-clad. Rich owners sometimes put their sheep out to the Lowland farmers for two months in the winter. The advantage of this is in the regular growth and feeding of the stock, and by so doing they do not come from the time of winter and great meagreness to the period of springing herbage and plenty too suddenly. The wool is not of much value, being coarse and slow-growing, but the mutton is of excellent flavour, and in a three-year-old sheep is as savoury as venison. This sheep is a great roamer, disliking confinement and restriction.

Professor Sheldon writes of these animals that "in some localities they have been more carefully bred, and are therefore of an improved type; in others no care whatever has been taken, and the sheep are unimproved. But, however this may be, they everywhere fill a position of usefulness, living where rabbits hardly would live, and nursing their lambs with a self-denying fidelity unequalled by other sheep."

3. The **Dorset Horn,** or horned sheep of Dorsetshire, has a white face, with locks of wool on the forehead and short fleece. It feeds well on rough pasture, and the ewes are exceedingly prolific, yielding two crops of lambs a year if required, thus having progeny ready for sale at Christmas-time. Being an exceedingly profitable breed both on account of meat and wool, they are desirable acquisitions for the small man with a bit of medium land. They are small in bone, their mutton is of good quality, and the wool of average value.

4. The **Dartmoor** is a big, long-woolled, hornless

sheep with a white face. The present race resulted from the crossing of old Dartmoor sheep with Leicesters and Lincolns. They are hardy sheep, standing cold weather well, and are found chiefly in Somerset and Devon.

5. The **Exmoor** of the present day has been produced by crossing the old breed with Leicesters. It is a horned sheep, with white face, fine quality wool, active and hardy, and furnishing excellent mutton.

6. **Welsh sheep** are found on the hills and mountains of North and South Wales. This is a breed adapting itself to different soils and climates somewhat easily. It is the smallest breed of sheep in this country, furnishing a rather close fleece of about 2 lbs. in weight, but its mutton cannot be beaten. It may have a white, brown, black, or mottled face. Radnor sheep are the best of the breed. The ewes are prolific, good mothers, and are often bought to breed fat lambs from Shropshire and Leicestershire rams.

7. **Herdwick sheep** live in the Lake District of Westmorland and Cumberland. They have existed since the time of the Spanish Armada, when forty of them were saved from the wreck of a galleon. They have good constitutions, and take care of themselves in a snowstorm by selecting places where they will not become endrifted. The ewes are prolific, good mothers. Rams are either horned or hornless. The breed has been kept pure, the lambs having black legs and heads, which colour gradually changes, to become grey or white at three years of age.

8. The **Lonk** is a sheep inhabiting the hillsides of North-East Lancashire, West Yorkshire, and Derbyshire. It likes low-lying, damp, mossy pasture. It is a horned

sheep, large in size, with white or mottled face and mottled legs, having a good-quality fleece of fair length. A special variety of this sheep exists round about Saddleworth.

9. **Crag sheep** live on the moorlands of East Lancashire and West Yorkshire, and are a horned race, thriving well on dry, high-lying moorland. A white face and legs, with medium-length fleece, is characteristic of the breed.

Down Breeds.

1. The **Hampshire Down sheep** of Wiltshire and Hampshire have long, wide, deep, and symmetrical bodies. The neck is thick, muscular, and long enough for the head to be carried high ; the ears are of medium length, delicate, and mobile ; the forehead is covered with wool ; the face is black and Roman-nosed, and the legs are black ; the wool is close and fine, a fleece weighing about 5 or 6 lbs. One of the most favourable points of the Hampshire is its precocity, the lambs at the age of six months often weighing about 135 lbs., and three months later reaching about 180 to 200 lbs. The ewes are often crossed with Lincoln and Cotswold rams.

Mr. J. H. Dibben, writing in the *Farmer and Stock-breeder Year-Book*, 1911, says of this breed : "Being able to bring out their lambs fit to kill in a very short space of time—in fact, shorter than other breeds—and being used as sires when only six or seven months old, and not kept as shearlings before using, like most other breeds, are strong points in their favour."

These sheep have been exported to America, France, Germany, Austria, Russia, and Australia.

2. The **Oxford Down** is the most noble-looking and modern breed of Down sheep. It arose from crossing Hampshire Downs with the grey-faced Cotswold. The head is well covered with wool, with a pendant tuft on the forehead, due to Cotswold influence. The face and legs are black, and fleece of good quality and heavy. These sheep are generally sold fat at twelve to fifteen months, and at these ages may weigh about 175 and 190 lbs.

3. **Shropshire sheep** have a robust, vigorous constitution, a graceful and aristocratic appearance, and are very prolific. The head is large, covered with wool, and face dark; the legs are short, loins wide, and quarters well developed. The whole body gives the impression of depth, width, and symmetry. The wool is of good quality, a fleece weighing from 6 to 8 lbs. Under good conditions a Shropshire sheep will weigh 155 to 175 lbs. at the age of twelve to fifteen months, and 240 to 265 lbs. at the age of eighteen months to two years.

These sheep have been exported to America, Australia, New Zealand, and most of the European countries.

4. The **Southdown** comes first in the United Kingdom as a producer of wool and mutton, the former being fine and close and the latter of prime quality and superior flavour. They are an active, energetic breed, able to roam far in search of food, but can adapt themselves to enclosed areas and intensive feeding, which cause them to increase in size. They fatten easily, and have a hardy and robust constitution. The wool is short, curly, and fine, a clip weighing 3 or 4 lbs. The Southdown has contributed very largely to the betterment of most of the other breeds of sheep in the kingdom. The face should be full, not too long, and mouse colour, with no sign of a

black poll; ribs arched, back level and wide, tail level with the chine, and thighs well developed; the skin fine and pink, and the appearance and gait of the sheep showing breed and quality, are other noticeable features.

5. **Suffolk Downs** are descended from the old horned sheep of Norfolk and Suffolk and the Southdown. The many good qualities of this sheep are bringing it to the fore in the favour of the sheep-loving public. The quality of the mutton is first rate, and, just as Welsh mutton is so highly appreciated by visitors to the watering-places of the Principality, so the meat of this breed is greatly relished by sojourners at the East Coast watering-places. The fat lambs sell well and mature early.

The face and legs of this sheep are black and head hornless, chest wide, back long and level, ribs well sprung, and hind-quarters well developed. The fleece is short, and wool of a close, fine fibre.

In Norfolk, Suffolk, and Essex the breed reigns supreme.

Suffolk rams have been advantageously crossed with Dorset ewes, and Scotland and Wales have patronized the breed. Rams have been exported to France, Germany, Spain, Russia, America, Canada, and Australia.

III

THE AGE OF SHEEP AND GOATS

Sheep and goats have thirty-two teeth : eight incisors in the lower jaw, called from within to without centrals, middles, laterals, and corners, the last named terminating the dental arch on each side. They have twelve molars on each side, six in the upper and six in the lower jaw. A dental pad, hard and fibrous, occupies the front of the upper jaw, being in apposition to the incisors, and enabling the animal to graze, the tongue taking less part in the act than in the case of the cow ; hence these small ruminants cut and, by a sharp lifting up of the head, pull off the herbage more closely than the bovine.

At birth, or shortly after, the lamb and the kid have two or four incisors, sometimes only recognizable as hard raised surfaces beneath the gums. On the fifteenth to seventeenth day the others are showing, and by the end of the fourth week all the temporary incisor teeth, as well as three temporary molars on each side of the upper and lower jaw, are well up.

These milk-teeth are whiter and smaller than the permanent ones that replace them. The slow growth of the corner incisors only gives roundness and fulness to the arch of the lower jaw at three months.

At three months the first permanent molar, the fourth in position, appears, at nine months the second per-

manent molar (fifth in situation) is coming up, and at eighteen months the third, whilst at about this time the first, second, and third temporary molars are being shed to make room for the permanent ones.

With regard to the permanent incisors, the centrals appear at from fifteen to eighteen months, the middles at two years, the laterals at three years, and the corners at four years.

At about five years of age there may be spaces between the permanent incisors.

In order to examine the teeth of sheep or goats, the animal is held between the legs, the right hand seizes the upper jaw, and the left hand the lower; thus the subject's mouth is opened, whilst with the thumb of the left hand the lower lip is pushed aside and the teeth brought into view.

Precocity hastens the evolution of the teeth; slow growth and common breeding retard it.

The examination of the mouths of ewes is important in good flock management, because broken and defective teeth or abnormal jaws lead to incapacity in feeding and "bad doing," and it is best to discard such animals. In horned breeds the development and size of the horns will give some indication as to age. In Merino wether lambs the horns from mere buttons develop 12 to 15 inches in length the first year, 3 to 5 inches the second year, 2 to 2½ inches the third year, and 1½ to 2 inches the fourth year, and the weight of a fully developed horn may be about 1½ lbs. (Diffloth). The striæ on the surface of the horns often simulate the disposition of the fibre of the wool; those in the Merino are serrated like the zigzags in the fleece.

There is a disposition here to breed hornless sheep

as much as possible. Horns are useless, except for the rams to fight or defend themselves with, and the wolf has ceased to exist in these isles. Moreover, horns draw away important nourishment (azote) from the rest of the body, and increase the size and weight of the profitless sheep's head.

The names given to sheep, according to sex, age, and clipping, in various parts of the country, are a puzzle to the uninitiated. The following table will be found useful:

Age and Clipping.	Males.	Females.
Until weaned.	Tup or wether lamb; heeder or pur lamb.	Ewe lamb or chilver.
After weaning until shearing.	Wether tegg; hogg or hogget (if castrated); or tup or tup hogget.	Ewe tegg; or ewe hogg, or ewe hogget.
First to second shearing.	Two-shear ram; shearling wether or dinmont.	Gimmer; theave; shearling ewe.
Second to third shearing.	—	Two-shear ewe; twinter and maiden ewe.
After ceasing to breed.	—	A draft ewe.

IV

SELECTION OF REPRODUCERS

In this country mutton and wool are the most valuable commodities obtained from the sheep. To produce plenty of the former of a good marketable quality, and as much as possible of the latter of first-class fibre, is the aim of the judicious breeder. To combine the two ends desired in the one animal will not be so successful in some cases as in others, because breed, climate, and soil have all to be taken into consideration, but to do the best one can with the material at hand is ever the wish of the intelligent and advancing sheep-owner.

A badly shaped cheap ram, chosen without much care, even though a good stock-getter, never begets progeny of a profitable and desirable kind; and if all the males are chosen without thought, just because they can be bought cheaply, an unequal and heterogeneous lot of expensively fattened lambs will be the result. Well-formed progeny do better on their food and fatten more quickly and economically than badly shaped youngsters.

The man who goes in largely for ram-breeding is not likely to produce inferior specimens from his stock for sale or use, for he will endeavour to put into practice all his acumen and judgment in order to keep up his reputation in the profitable business. A ram in stock-

getting condition should be neither too fat nor thin, but well fleshed, showing symmetry and quality, the most perfect type of the race to which he belongs. A small head, broad forehead, wide nostrils, thin ears, and strong neck, wide at the base, describe his anterior end. A wide chest, broad, level back, wide loins and croup, with a well-placed tail, braced up and not pendant abdomen, carried on straight, short, well-muscled and large-jointed limbs, make up the picture of his body. The wool must be as abundant and of as good quality as any in the best of his race, equally grown all over the body, soft, mellow, and elastic. A fortnight before being put with the ewes the male may be given some oats, barley or peas as fortifying food. This concentrated food is useful, because rams in the serving season often eat but little. Rams in perfect health must, of course, be employed—good eaters, vigorous and agile, with clear eyes, no visual or nasal discharge, with rose-tinted skin, breathing free and unrestrained. The above description will, perhaps, be most helpful to the buyer of rams, but the rearer must start using his judgment early, and before castrating-time is usually the period when a few more ram lambs than the necessities of the flock require are picked out. I write a few more than required because the early specimens do not always mature to what might be expected, but a sufficient number will doubtless attain to the flock-master's ideal. The others must be castrated with clams. The producer of large numbers of ram lambs makes his castrating-time at about three months from birth, in order to better judge of desirable attributes in his males. Great discernment and experience are required here, for the breeder has to carry in his mind's eye the best form

and shape that his early choices may be expected to attain in future days. Well-formed, broad-chested, wide-backed and loined lambs, with light heads, fine bone, vigorous and energetic, are to be picked out for future sires.

Wool is usually judgable at the nineteenth or twentieth day from birth. It should be soft and mellow; no coarse hairs should be present on the face, head, ears, or thighs of a good reproducer. Small folds in the skin distributed over the surface of the body of a lamb, indicate a good future crop of wool. Good feeding is essential to the improvement of wool, producing strength, nerve, and elasticity of staple, whilst faulty nourishment affects it adversely. The value of reproducers does not altogether depend on their conformation and appearance; part of the attributes descend from the ancestors—hence the importance of pedigree breeding.

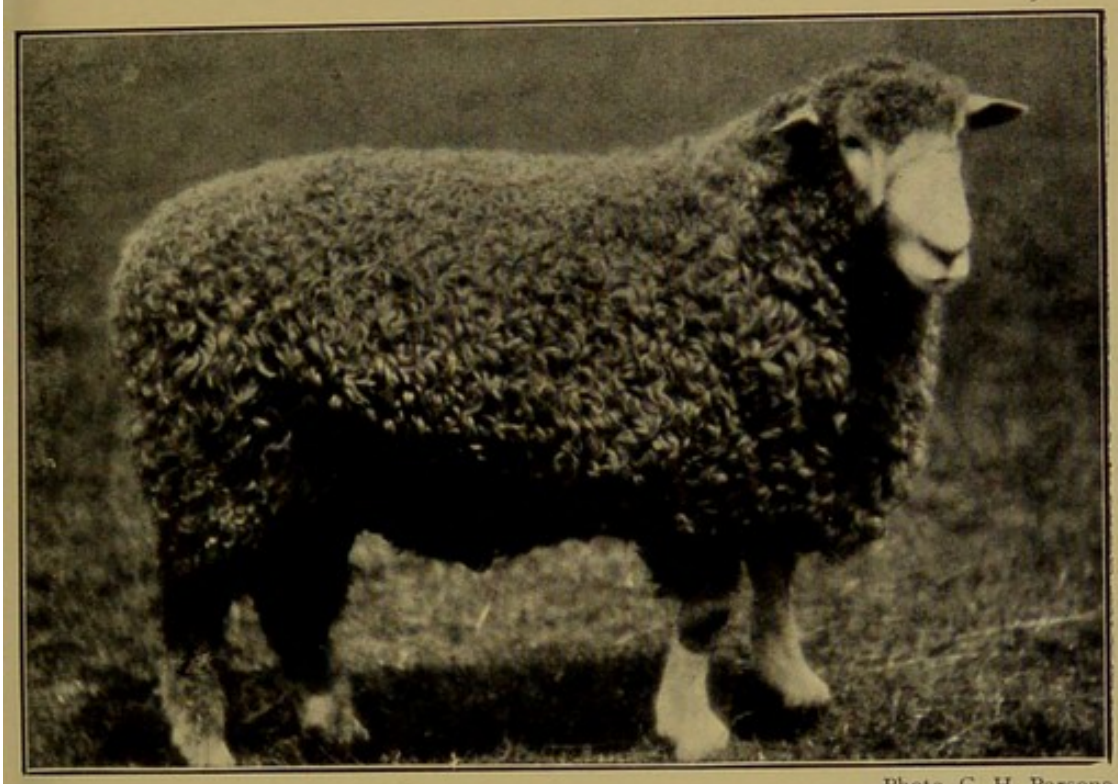
The genital organs of a ram must be normally developed, testicles large and elongated, and purse, in well-bred specimens, covered with hair. In ewes the udder should be of good size, supple, and with well-formed folds at the back, supernumerary or extra teatlets being considered advantageous. The production of twins is often an hereditary quality that may be kept in mind. Bought rams must show no signs of lameness. A male used should be no relation to the ewes, for inbreeding brings nothing but trouble in its train.

V

BREEDING, OR REPRODUCTION

Mating of rams and ewes only occurs, as in other animals, at the time of heat, or rutting. This takes place in the ewe lambs at about the tenth month, but fifteen months is usually the age at which they are put to the tup. The sexual capacity of the male is at its best from fifteen months to four years of age. The signs of œstrumare not so pronounced in ovines, nor yet so plainly visible as in other quadrupeds, but when the male is present they seek him out, follow him, bleat peculiarly, and let him cover them without resistance. A certain amount of unrest, lack of appetite, plaintive bleating, congestion of the mucous lining of the vagina, and the discharge of a secretion with a distinct smell, which attracts the ram, are noticeable features in the ewe at rutting-time. Œstrum occurs every fifteen to twenty-four days, and lasts twenty-four to thirty-six hours, disappearing, however, if the ewe has conceived. The heat usually reoccurs about four months after parturition, when the mother ceases suckling her progeny. About fifty ewes to one ram is the judicious proportion where flocks roam free. Some breeders allow below this number and others above, but an overworked ram may break down and leave a lot of unproductive ewes. Allowing one ewe a day to a first-

Plate XI.

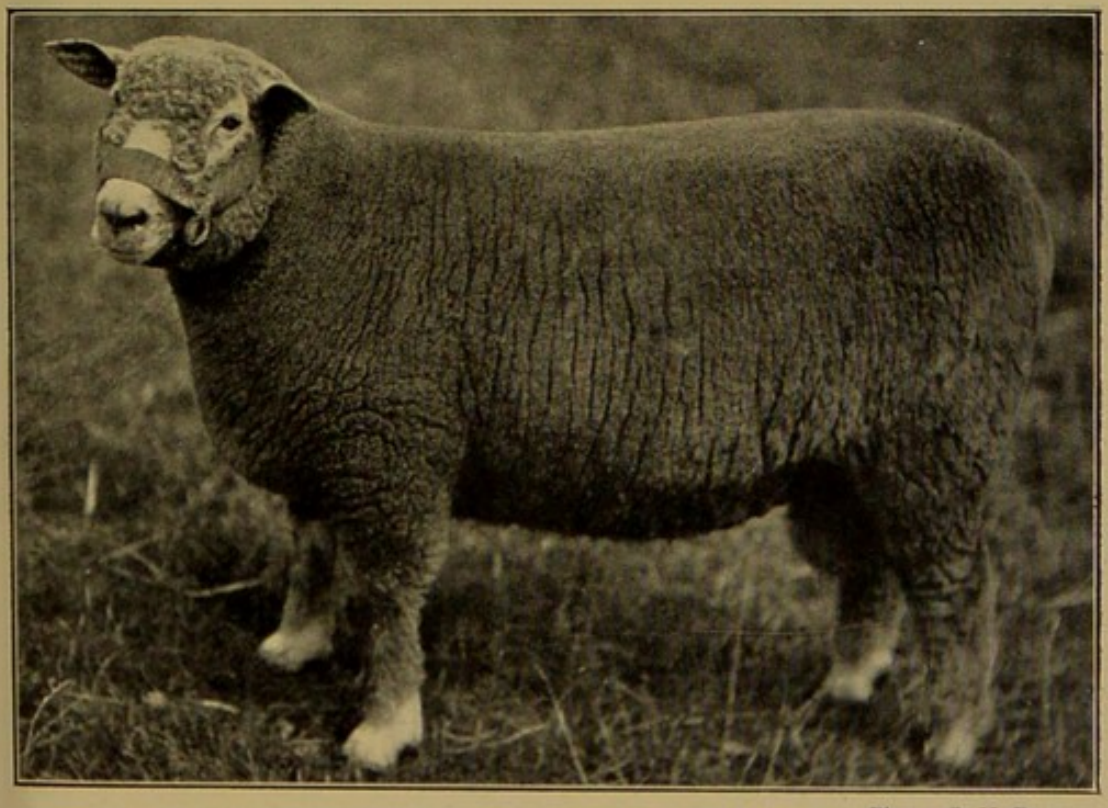


Photo, G. H. Parsons.

SOUTH DEVON RAM.

Owned by Mr. J. Stooke. First, Royal Show, 1910.

Plate XII.



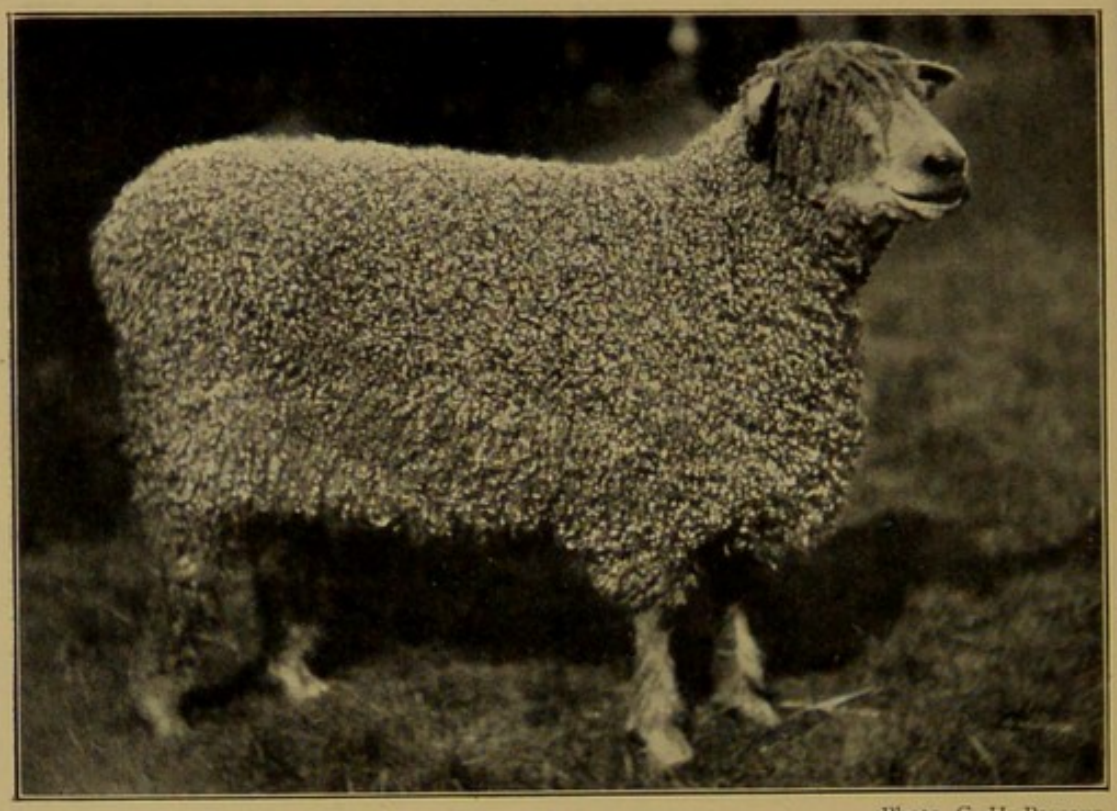
Photo, G. H. Parsons.

RYELAND SHEARLING RAM.

Owned by Mr. Hugh A. Christy. First, Royal Show, 1911.

To face page 28.

Plate XIII.

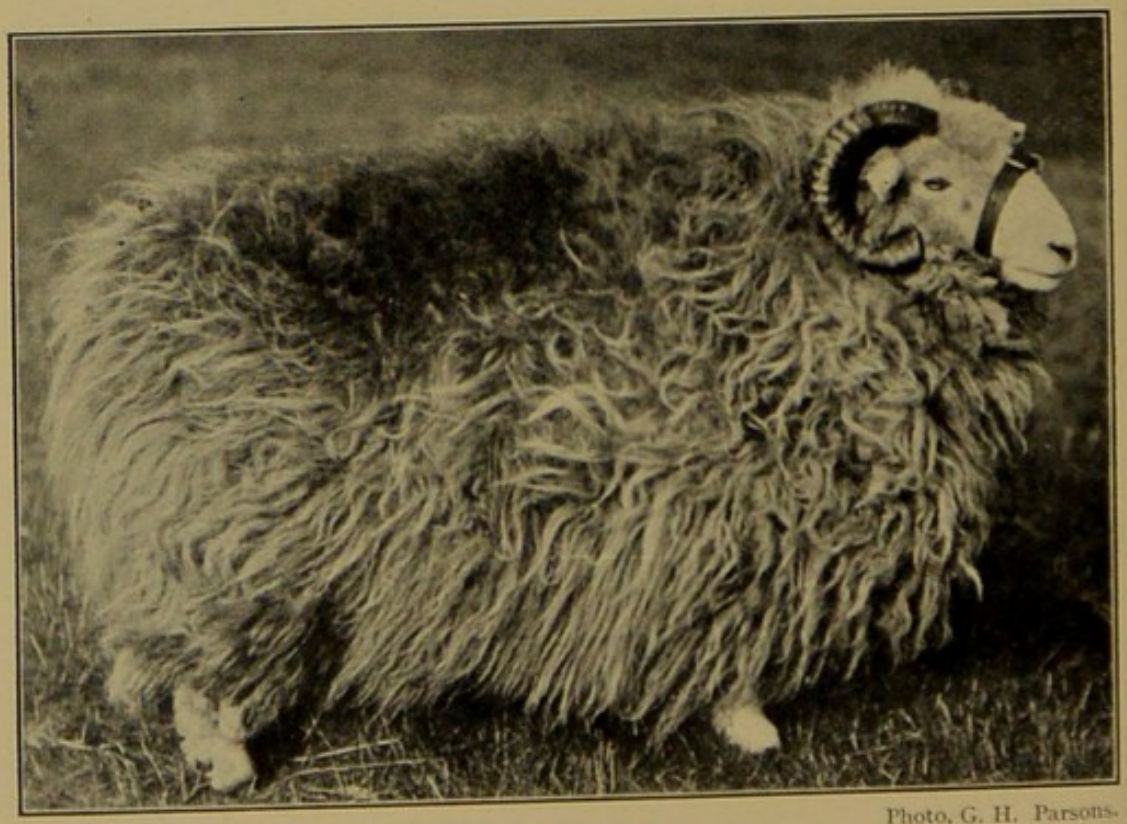


Photo, G. H. Parsons.

WENSLEYDALE RAM.

Owned by Mr. Proctor. First, Royal Show, 1909-10-11.

Plate XIV.



Photo, G. H. Parsons.

HERDWICK RAM.

Owned by Mr. Ireland. First, Royal Show, 1911.

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time ram is sufficient, but in later years he may cover two or three a day. The period a ram is active is generally six weeks to three months, but it may extend to four months, although this last period is not recommended. A short service-time is desirable, so that the youngsters may all come close together and be of equal size and strength. February, March, and April are the months when lambs generally arrive in our country. The duration of pregnancy in the ewe is about twenty-one weeks, and September and October the months when mating takes place.

Dorset Horns are coupled in June, so as to bring lambs for the Christmas market. The advantages of spring lambing are manifest. The autumn stubbles furnish just the nutriment to make fruitfulness likely, and the lambs are born in time for the springing herbage and increasing sunshine.

Ewes should be well nourished during gestation and after suckling, when they are low in condition, and need helping on with roots. The choice of the time of lambing will vary slightly according to the type of produce culture, the abundance of feed, and the conditions under which the sheep exist. Upland and mountain lambs will never be wanted very early. The land on which mated sheep graze should always be nutritious enough, not too damp and low-lying, and of moderate dimensions. A ram that has to travel too far and ewes that are poorly fed do not fructify quickly or satisfactorily. Good condition in the ewes at breeding-time brings best results. If they are thin and poor, there will be few twin lambs and a number of sterile subjects. Forcing nourishment given at the time of œstrum is not to be advocated. Both parents must be brought to the best

breeding state by gradual and sustained conditioning. A ram of little value put amongst slow-rutting ewes as a wakener-up helps them to come in season for more valuable males, and stirs up mative inclinations. A few handfuls of oats or rape-seed may be given to ewes that do not come on heat properly, or an onion may be cut up and mixed with two handfuls of bran and a tablespoonful of salt.

In order to record the service of a ewe, it is customary to smear the ram's breast with some colouring mixture, such as red or blue ochre, which is imprinted on the rumps of the ewes after being jumped. If the date of the first appearance of the mark in the ewe is recorded, lambing-time may be reckoned therefrom. The serving period greatly tests the rams, and a few grains—preferably oats—may be given to them to maintain their ardour and vigour. About 3 or 4 lbs. daily may be taken to them. A good shepherd will know to a certain extent the capabilities of his rams—how many he will want for his ewes, and which one will do the most work. Where two tups are equal in strength and ardour, they may fight with each other and neglect the ewes; and if one is weaker than his fellow, he may be left with the most females to attend to. At night-time the best work is done, as the males pay attention to the business in hand, and cannot see each other.

In pure-bred flocks the ewes are parcelled out to each ram. Faults of conformation or colour may then be corrected in the progeny. A judicious and experienced selector will pick out the best rams to be mated with equally well-chosen ewes. "Give the ewe to the ram that is best on the points where she is defective, marking

her with the same mark given to the chosen ram" (L. Léouzon).

Tups at the end of the breeding season, being usually out of condition, must be fattened up a bit, and old males sold. Weed out of the flock ewes that have not been covered or that remain sterile.

Cross-breeding is much practised by sheep-owners. The crossing of established breeds has produced the best class of half-bred sheep, and from the north to the south of Great Britain many crosses exist which are highly valued by breeders, butchers, and farmers, and much esteemed locally. Constitution may be improved and valuable points gained, especially in the direction of better mutton, by judicious crossing. By continued crossing bad conformation, undesirable and unprofitable features, may be transformed into good and acceptable qualities in a new and improved breed. The betterment is brought about by using rams of a pure race with strong points on common ewes, the best of their kind; the results of these unions are again mated with the rams, their progeny, the second cross, being again covered, and so on, until, after a few generations, the race has all the qualities of the father combined with the best of those of the mother. In many cases, after this procedure, a new breed has been formed, whose members intermate and keep true to type. By such methods native races have been improved and their progeny acclimatized, even in foreign lands. The eighth or tenth generation, if the rams have been well chosen, will exhibit few of the deficiencies of the first mothers. The existence of an affinity between races that are crossed is necessary, and the feeding should be rational and well thought out, according to the end desired.

Good judgment must be brought into play, and a seeing eye exercised as to which couples mate the best.

M. Léouzon, in his work on "Sheep," writes: "In all crossing it is necessary to use the most perfect rams of the improving breed, having the best and most pure influence that can be procured. They outline and impress with most certainty the seal of merit on their progeny. People who think that all rams are good to cross with common breeds, and who do not scruple to give a male of pure and illustrious blood to the females of their flock, commit a grave error and make a badly attempted economy. With such procedure non-success is the rule."

VI

THE EWE IN-LAMB

A. Gestation—Care of the Pregnant Ewe.

The duration of pregnancy in sheep is about five months, or 150 days. The shortest time observed has been 139 days, and the longest 159, but the greatest number of births generally occur between the 147th and 151st day. Male lambs are frequently carried a day or two longer than female ones, and in precocious races the period of gestation is shorter than in backward ones. In-lamb ewes must be protected from all causes of abortion—such as blows, chasing by dogs, jumping hedges or ditches, pushing and crowding each other through narrow gaps. The sheep-dog must not exercise over-vigour with them, and may perhaps be dispensed with altogether. Quietness; guarding from objects which frighten them—such as packs of hounds, etc.; slow movement, so that all the flock travel together, all tend to the production of the best results at lambing-time. Watch for ewes heavy in lamb getting on their backs, and help them up again. If they cannot get up and are not lifted up, they may die from exhaustion.

Pregnant sheep need good sound pasturage, plentiful and nutritious, helping the growth of the mother and the young in the womb. Badly nourished ewes breed

poor, weakly lambs, and come to parturition-time with little and low-quality milk. Good nutriment in reasonable quantity is better than excess of supply. Neither too fat nor too lean, neither too old nor too young subjects furnish the best lambs. In-lamb ewes must not be put on to damp or frost-covered grass. Good hay, roots, and cabbages make the best supplementary food when pasture is poor. A little grain or cake helps at times. Mouldy or frozen food and excess of turnips are to be avoided.

B. Parturition, or Lambing.

In the early months of the year, when the weather is bad, lambing is generally conducted in the folds, which are best made of straw-thatched hurdles put up in a sheltered spot. Sweet, clean, dry ground is of primary importance, and all straw litter in the covered folds must be fresh, dry, and sweet. Cleanliness of the fold and of the hands of the attendant who may have to assist the lambs into the world is of great moment, as upon due observance of this cardinal rule much avoidance of loss will depend. Carbolized oil and a weak solution of Jeyes' fluid will be handy to anoint the hands or cleanse away any dirt or soiling.

A sheep near her time of delivery has a voluminous abdomen, the flanks fall in, milk comes to the udder, the muscles and ligaments at the base of the tail relax, a discharge flows from the vagina, she walks with difficulty, labour pains come on, she lies down and gets up, and presently a conical mass appears at the vulva, which is generally formed by the membranes, feet, and muzzle of the soon to be born youngster. Such appearances

denote that the subject should be immediately withdrawn from the flock and brought in to the peace and quietness of the lambing-fold. A natural presentation in a well-formed, healthy ewe only requires time to come to a conclusion; but if the birth is slow and difficult, a little gentle traction on the forelegs of the lamb at the same time as the mother strains may be of benefit. If the ewe is in a plethoric state, with cold ears, straining without making progress, a little warm linseed tea may be given her, whilst if the throes are weak, a stimulant—such as two teaspoonfuls of sal volatile in a little water—may be administered. A mother labouring without making headway, producing no result, needs exploring with the washed and oiled hand, and any wrong position of the fœtus remedying. Sometimes, owing to faulty conformation, lack of room, and so on, the life of the mother must be sacrificed. To push the lamb back and get up the legs, and to see that the nose is in a straight line with them, is the chief matter. The head may be to one side, or the umbilical cord twisted round the fœtus, both cases needing help in delivery. Eversion of the uterus occurs at times, and the organ requires cleaning, oiling, and putting back. By reason of difficult births, large size of the fœtus, etc., the lips of the vulva may swell greatly after parturition; in such cases fomenting with antiseptic and oiling will be needed, and if the passage has been lacerated or bruised, it may be dressed with carbolized oil or smeared with antiseptic ointment. Lard is handy to grease a tight vagina with. To put back an inverted womb, place the ewe on her back, and with the hind end lifted, replace the organ with a clean and disinfected hand. Keep the posterior parts of the animal

raised for half an hour. In case of after-straining, a teaspoonful of chloral hydrate crystals may be given dissolved in warm water. It is good to let ewes have access to water after lambing. A shepherd who has to be on the watch night and day needs help, and a day and night attendant will be wanted. The ewe generally licks her lamb just born, and she may be encouraged to do so by rubbing the new arrival with a little bran or salt. The first milk, or colostrum, helps the first movement of the lamb's bowels. A copious milk-supply of the mother, continued for a long time, must be aimed at, for this puts the lamb well on the way to a very profitable state. To secure this, good feeding of the mother is essential. Turnips, mangolds pulped and mixed with chaff, vetches, and rye-grass, come in useful. Oats and oilcake help condition and milk. Milk-supply may be short in the case of twins sucking at one mother, when the transference of a youngster to a foster-mother or bringing up on the artificial teat is indicated. A lamb that has lost its mother may be cared for by a cottager's dame, who will be glad of it for a trifle. Such an acquisition may be of benefit to the receiver and to the lamb, and of little moment to the disposer.

All loose wool round the udders of the ewes needs clipping off, for a common accident after lambing where this is not done is for the progeny to get choked by loose tags of wool. Put ewes on to good sound pasture after lambing. When the lambs start feeding, give them a pen into which they can creep and have food given them. The separation helps the ewes to pick up condition, and lambs having both milk and grain food thrive apace. Crushed oats, pea-meal, and linseed cake, are suitable food for weaners.

VII

WEANING AND FATTENING LAMBS—FATTENING EWES

At the age of about one month lambs begin to nibble. Separation from the mother is best performed progressively; lamb-creeps may be put up at this time, through which the youngsters may go and eat some linseed cake, broken peas, and a few oats, set in troughs for them. A good mixture is 1 part of linseed cake, 1 part of peas, and 2 parts of crushed oats. Half a pound to a pound per day per head may be given of this ration. At first, when the mother's milk-supply is plentiful, and their own inclination and aptitude for solid food just beginning, they will eat little; but gradually they come well to their feeding, and soon derive as much nourishment from their grain food as the ewe's milk. As they grow, the amount of the solid food is proportionately increased, and a regular distribution may be given them morning, noon, and night. The best time to give food to lambs is before giving a feed to the mothers, so that the latter may eat quietly, and not be robbed of any of their nutriment. When through the creeps, the youngsters may be shut off from the ewes for a time, if desired.

To admit the weakly and badly grown lambs to the mothers first after the temporary separation is good

practice, as thereby the weak ones may be greatly benefited and a level growth of the flock obtained. Later, hay, turnips, oats, milk, and a run on good sound pasture for two or three hours in the middle of the day, help the youngsters on. Fodder composed of white clover, trefoil, and Italian rye-grass, makes excellent rations for lambs. Cake, mangolds, and vetches in the summer-time, are eaten with relish and profit by them. When youngsters commence to eat, they must be separated at first one or two hours a day, and the time gradually increased until they remain away all day from their mothers. Between four and five months one may separate them entirely; at this time they may suck once a day for two or three days, then isolate them for a couple of days, and finally let them suck once for the last time. Lambs ought to be periodically separated from the ewes at least two or three weeks before they are completely taken away. Pastures, when used chiefly for lambs, are best as far away as possible from where the mothers feed. The best prices for lambs and ewes are obtained in the early part of the season or in the summer months. The breed of the district is generally the most profitable one to be acquired by the small-holder. Shropshires, Hampshires, Cheviots, Scotch Black-faced, and Welsh crosses, are all suitable for the production of lambs for fattening.

Half fat or unfinished lambs never sell well or bring in a profit, and if they cannot be fattened properly, it is best to run them on and sell as strong stores, to be fed on roots.

To buy ewes in autumn and keep them until July, when they are sold fat with their lambs, is profitable procedure for the small occupier of land.

About 35s. to 45s. per ewe, and a ram at three guineas, is a paying price to obtain stock at in autumn. On fair pasture, and with additional food, a ewe ought not to cost more than 6d. a week to keep the year round, and a lamb from birth to weaning-time at four months about 3d. a week.

Ewe fattening makes most progress at the time the lambs begin sucking less and eating more. Broad clover, rye-grass, linseed cake, and, the last months of fattening, half a pint of beans a day, will bring mothers along to a good saleable state. When ewes are fed well during the suckling period, the lambs share in their welfare by reason of the extra quality given to the milk, and they themselves are much more easily brought to a fat condition.

The albuminoid ratio for sheep fattening may be taken at 1 : 5, although it may vary with adult sheep to 1 : 11. Feeding should be at regular intervals, diversified enough to prevent satiety, excite appetite, and favour digestion. The following are sample rations for a lamb weighing about 33 lbs. :

1. Sainfoin	1 lb.
Beetroot	2 lbs.
Carrots	2 „
Fine straw	½ lb.
Grey peas	1 lb.
	(Diffloth.)
2. Linseed cake	6 ozs.
Crushed beans	9 „
Hay	18 „
	(Diffloth.)

3.	Meadow hay	2 ozs.
	Lucerne	½ lb.
	Beetroot	12 ozs.
	Oat straw	7 „
	Crushed beans	9 „
	Wheat bran	3½ „

(Diffloth.)

For sheep per head and day:

Barley meal	6 ozs.
Oilcake	1½ „
Beetroot	2 lbs.
Dried sainfoin	9 ozs.
Oat straw	9 „

(Diffloth.)

VIII

FEEDING

Sheep are pastoral animals. Wherever cultivation of the ground is largely indulged in, the ovines lessen in number or disappear.

For their feeding and bringing up, the moor, the fallow land, and the stubble, furnish necessary quarters. In the summer months they usually roam free in the pastures. These should be sound, dry, and nutritious.

Good grass and green crops help them on. They improve the land on which they graze, furnishing rich manure to it. If kept to fatten in yards, six sheep will tread down as much straw and make it into as good manure as one bullock. It is not very profitable to keep less than a score of them, but small farmers with the right class of land will derive a good profit from sheep. They crop the herbage closely, and can find nourishment on ground which appears almost naked.

Damp, low-lying pastures are not profitable feeding-grounds; fluke and other parasites abound there, and produce in time many losses. Where pasture has a tendency to dampness, sheep should previously have some salt in their rations, and until the grass has had wind and sun over it and dried somewhat it is wise to keep them up. Scanty pasture needs wide roaming, whilst luscious herbage is used up economically, and not

spoiled by grouping the animals on a limited extent of it. Eating the herbage on one zone before passing to another is evidence of good shepherding.

In the heat of the midday sun the sheep will cease feeding, and then may be conducted to the shade of a tree or hedge.

Pastures becoming bare need rest for a time, and the flock directing to a fresh bite. If the shepherd judges that a right and sufficient advance is not being made in the growth and weight of his sheep, dry feeding must supplement the grazing. Sheep drink little when on grass, but a running brook or other good water-supply enables them to quench their thirst once or twice daily, and aids digestion. Pure water helps to produce excellent mutton, wool, and milk. We have seen how wild sheep like salt, and for domesticated sheep it is also very desirable. Big lumps of rock salt may be placed for them here and there on the pasture. Land that has been salted is eagerly grazed by sheep.

Close folding on clover, rape, or cabbage, may be alternated with grass feeding, and this plan has its advantages, as thereby the pasture gets a rest and a fresh bite is regularly present. Ewes and lambs may be folded on rye, vetches, trifolium or sainfoin, and lamb-creeps enable the youngsters to graze in front of their mothers, secure the best herbage, and return to suckle. With milk and green meat they thrive apace.

The small-holder may turn a sheep or two out with his cows and geese to graze. They will use up the pasture uncropped by the bovines; but as everything above the ground will thus be consumed, it is unnecessary to state that it will become sick to stock early, and that in time it must be ploughed and dug up and used

for the production of roots, oats, or market-garden fare.

Fifteen sheep may be fed on 20 acres of good land if they be the only grazers. Summer pasturing must not follow too abruptly on winter keep and housing, and giving some early green forage with the concentrated food should precede the turning out.

Similarly, a change from green forage to dry must be made gradually, and the quantity of the latter increased progressively. Folding on roots and kale may be alternated with grass feeding. When folding on artificial crops, such as clover or lucerne, the sheep should have been fed with some dry forage before eating; they should only be allowed a little, and be taken off before filling their stomachs. To let them indulge too freely means deaths from hoven.

Good grass land supports ewes until near lambing-time, and turnips brought to them where the pasture is dry is economical feeding. When grass becomes scanty, 10 lbs. of turnips may be given to each ewe, gradually increasing the quantity until 15 lbs. are given before lambing-time. After lambing, 20 lbs. a day may be fed.

Adequate shelter should be provided for the flock during the severe weather. To fold sheep on roots or artificial pasture is more expensive feeding than to bring the fodder to them in the fields.

This last method will be generally adopted by the small-holder. Turnips taken to the sheep twice a day will be eaten clean up if the quantity is right. In bad weather, when feed is scarce, hay may be advantageously given with roots. It prevents overgorging with the latter, and from $\frac{1}{2}$ lb. to 1 lb. of hay a day is the right quantity. A common five-year distribution of crops for

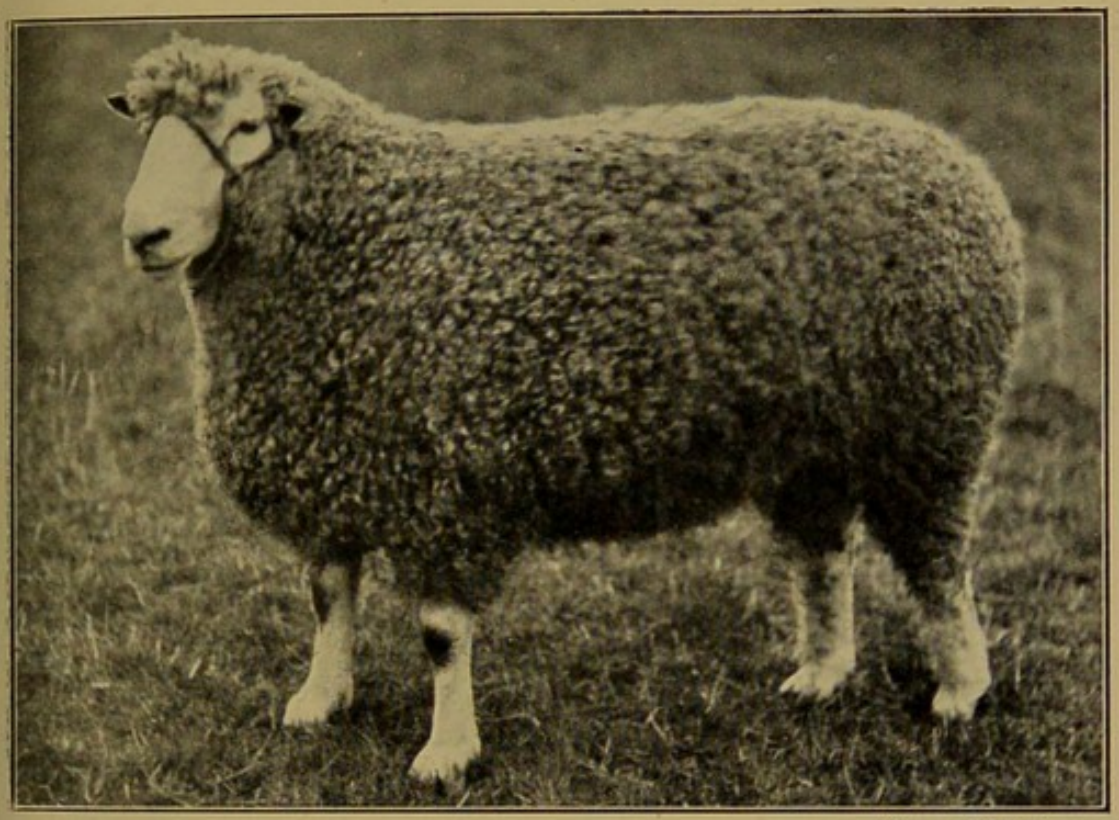
sheep in this country is roots, barley, cut forage, artificial pasture, rye and oats. Crushed oats, pulped roots, fodder and chaff in December, help the hill sheep at tupping-time.

In times of scarcity of hay and roots, straw (either oat or barley, but preferably the former) may be used for sheep. Layers of cut straw are successively watered with boiling water in which cake or meal has been placed. The mass is mixed, the straw softens, and a feed is obtained which is well eaten up by sheep. Green forage, such as rye or vetches, may be cut up and well mixed with cut straw in the proportion of about a hundredweight to a ton of straw. This is left to ferment, causing the straw to become more soluble and digestible. If a little decorticated cotton cake is added to the mixture, the nutritive ratio of the feed may be increased.

Lambs should never be fed sparingly. When the time of lambing permits of it, and the grass is good and of high nutritive value, little supplementary feeding will be necessary. If poor, green forage, bran, beans and cake, will furnish a variety that may be drawn on. It is usual to give the concentrated food morning and evening.

A growing lamb, a pregnant ewe, or a fattening sheep, should be fed liberally. Half rations depreciate the value of the wool, mutton, and manure. If a sufficient ration is not given, wool is produced at the expense of the welfare of the body. Good sheep-breeders consider that a ration bearing a proportion of 3 to 4 per cent. of the live weight of the animal is sufficient for a pregnant ewe, to nourish a ewe with lamb, and to preserve the qualities of their wool.

PLATE XV.

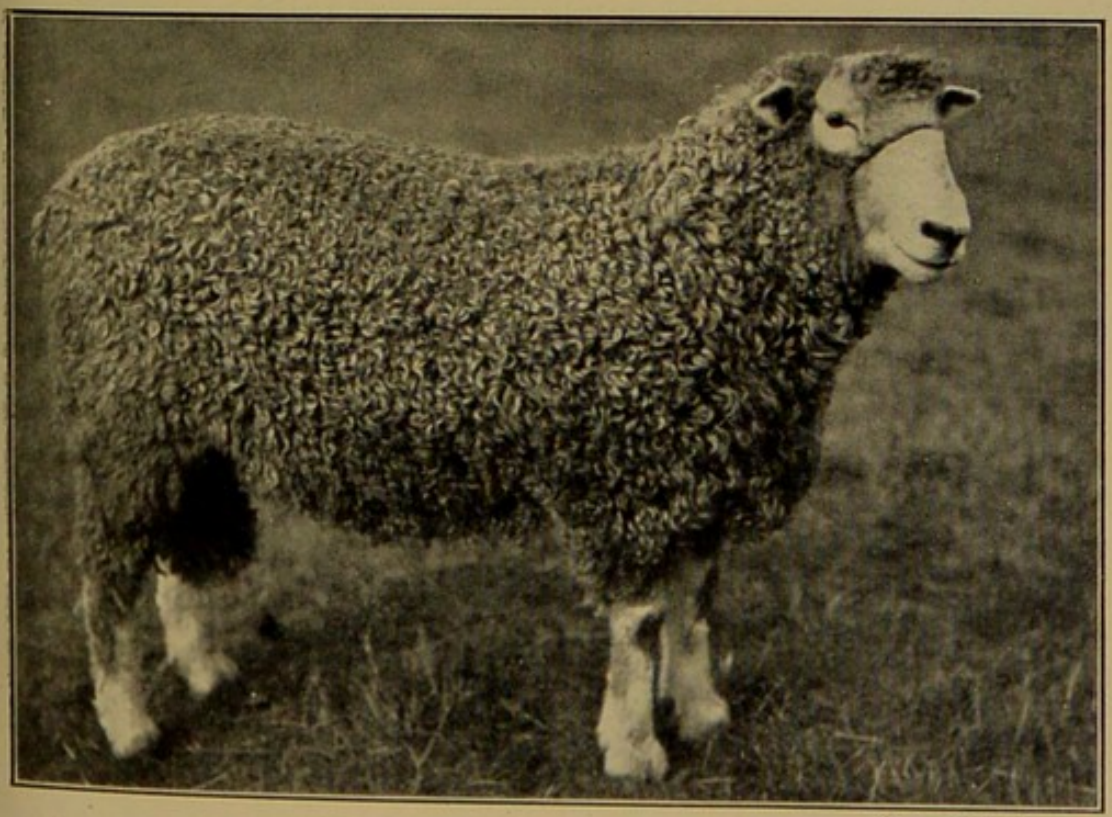


Photo, G. H. Parsons.

LEICESTER RAM.

Owned by Mr. G. Hamson. First, Royal Show, 1911.

PLATE XVI.



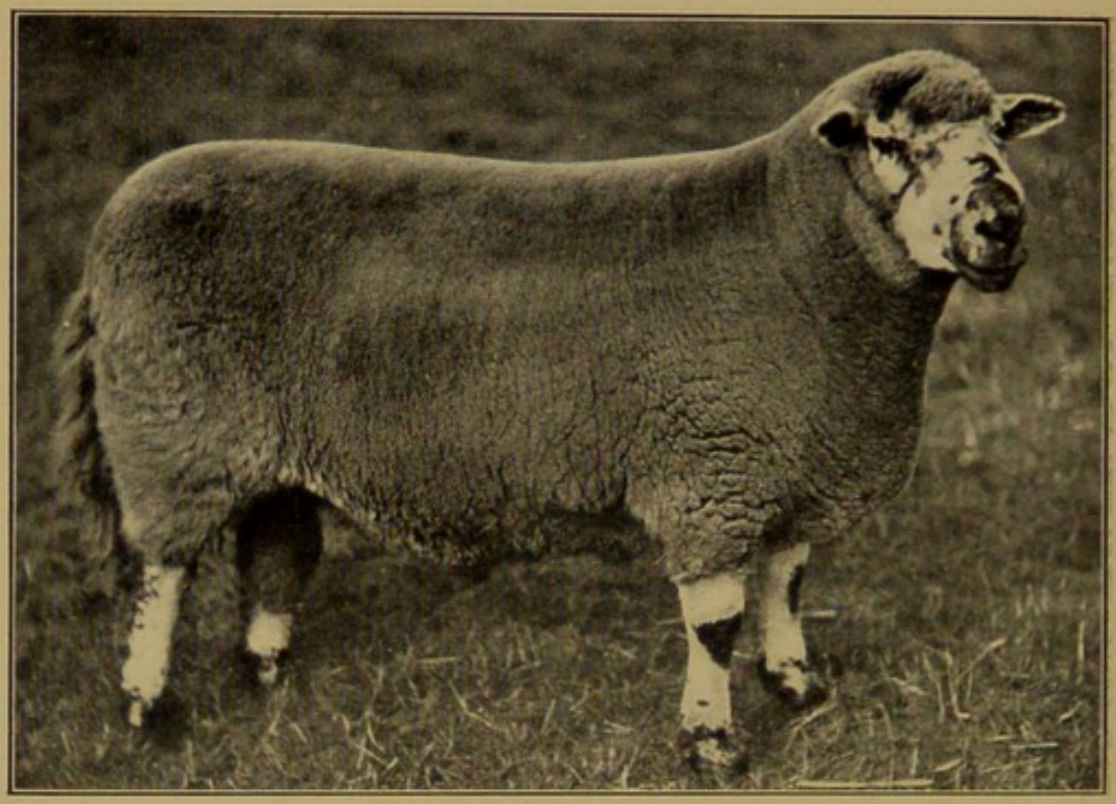
Photo, G. H. Parsons.

DARTMOOR RAM.

Owned by Mr. Luscombe. First, Royal Show, 1911.

To face page 44.

Plate XVII.



Photo, G. H. Parsons.

KERRY HILL RAM: PENTRENANT DIAMOND.

Owned by Mr. W. Alderson. First, Royal Show, 1910-11.

Plate XVIII.

Photo, G. H. Parsons.

LONK RAM: COUNTY COUNCILLOR.

Owned by Mr. David Hague. First, Royal Show, 1911.

To face page 45.

A Frenchman, Magné, considers that for lambs of 30 to 35 kilogrammes (66 to 77 lbs.) about $2\frac{1}{5}$ lbs. of hay and 3 lbs. of beetroot is a good ration.

For the production of strong rams he increases the ration to 5 or 6 per cent. of their weight, and for male lambs of 55 kilogrammes (121 lbs.) he gives aftermath $2\frac{1}{2}$ lbs., beetroot $2\frac{1}{2}$ lbs., and oats $1\frac{1}{4}$ lbs.

A nutritive ratio of 1 to 5 is right for fattening. A store sheep may be well fattened in sixty days by giving along with the ordinary feed 1 lb. of maize or oilcake per day, and increasing it to $1\frac{1}{4}$ lbs. during the last twenty days of the fattening period.

IX

WOOL—WASHING—CLIPPING AND DIPPING

Domesticity has changed the coarse hair growing in the skin of the wild sheep, into a supple and soft covering in the tame animal, so that the best wool has these characteristics to a degree. The lamb is generally born with a somewhat coarse fleece, with varied length of staple, pointed and undulating locks, the fatty matter known as yolk being sparsely present. Wool commences to improve in a subject about seven months old, and attains its real and maximum weight after the third shearing. It grows continuously, and is not shed annually, like hair. The yolk, or greasy matter in the coat, giving it softness and elasticity, is partly soluble in cold water; hence fleeces lose about 15 per cent. or more in weight after washing. Washing, however, increases the market value of the wool. The fleece is not of equal quality all over. The best wool is on the shoulders, base of the neck, back, flank, and upper part of the sides, and the worst on the lower part of the legs, belly, tail, head, and buttocks. In ailing sheep wool frequently falls out in tufts, and in badly nourished ones the fleece becomes matted and felted. The feeding that produces good carcasses, furnishes also excellent wool, and corn and cake in winter help both along. The qualities sought for in wool are fineness, softness, tenacity, and

elasticity. The strength or nerve of wool is a desirable point given to it by good feeding. The extensibility and elasticity of the staple are the chief features in its quality, and enable it to be felted, milled, and woven into the most valued cloth. Softness is discerned by feeling a big lock in the folded hand, and suppleness, due much to the fineness of the staple, is found oftenest in subjects neither too fat nor lean, with moist skins and plenty of yolk secretion. Clean wool fetches the best price, but dirty wool weighs the most, yet the advantages of **washing sheep** are to-day well recognized. In early times men used to stand in the water to wash the sheep, but now it is customary for the washers to operate without entering the water. A dry, fine, warm day should always be chosen, and the work commenced in the morning, so that the animals will have time to dry. Ewes must not be washed until a few weeks after lambing. There are several ways of washing. In some cases running water is used, and a cleansing-place made or chosen, through which the sheep swim against the stream ; in other cases ponds or pits are utilized. Still water is considered to be the best by many good judges, but it is important to have it clean and unsoiled by drainage or dejections. In such reservoirs the yolk of the wool, dissolving in the water, forms a natural soap of oil and potash, which has a good effect in cleaning and bleaching the wool. Spouts of running water conducted on the backs of sheep help materially in the cleansing operations. A pond is divided by a floating bar into two divisions ; the animals are dropped into deep water at one end as they enter, then swim to the bar, are pushed under it, the water, in suitable spouts with not too heavy a flow, brought into play on their backs,

well washing them, and they emerge from their bath up an inclined gangway or path at the other end of the wash-pit. Two pools may be used, one in which washing is conducted, and another in which the sheep are rinsed in clean water. On some farms, where ponds or running water is scarce, tubs or movable zinc baths are used, with taps at the bottom. As the water gets dirty, it is run off and renewed.

The sheep are immersed in these baths hind end first. If well water is used, it should have the chill taken off, otherwise being too hard and cold. After washing, pure air, sun, and clean turf, in close proximity to the bathing-place, help the wool to dry, and lessen fatigue from travelling too far with an overweighted fleece. Gradually the yolk, which has been lost in the washing, begins again to show itself in the wool, and a little salt given in the feed aids the process at this time. If cold weather prevails, the sheep should be housed and well littered at night. After about ten to fifteen days from washing it is considered that the full amount of yolk has been regained by the wool and the unctuousness of the skin renewed, so that shearing may be commenced.

Clipping is usually undertaken in June, but may be done in May or even as early as April. To clip when the wool is clean and dry after washing seems most desirable. The object of the act is to relieve the animal of the great weight and warmth of its coat and to acquire profit from the sale of the wool. Hand-clipping is done by means of special scissors called shears. These have two strong blades united by a bow-shaped spring. Two pairs are kept by the best men: one short in the blade, and used chiefly to cut dirty, matted wool away, which would spoil the edge on the best shears, and

the other for clipping proper. The blades must be well set and sharpened, so as to cut right up to their points. The sheep are penned, caught, and set upon the rump in a clean, level place, and shearing commenced by taking the wool from the forehead and cheeks, then the neck, breast, shoulders, belly, and sides, up to above the hips. The sheep are then turned over, laid and kept down by the operator placing his left knee on the neck. Where a man can use both hands almost equally well, one side up to the backbone is then sheared with the left hand, and the right hand finishes the work levelly along the backbone on the other side. Where the right hand only is used, the left turns the wool back and keeps the skin tense during the procedure. Most good clippers are, however, ambidextrous. The fleece is then spread out on a table, white side uppermost, any dirt removed, and folded up both longways, beginning at the tail and finishing at the neck, and being tied with a long band of wool.

Fat sheep are more easily clipped than lean ones. Raised wooden platforms are sometimes used, upon which the sheep are lifted and the shearers work. A good man will do fifty medium-sized sheep a day, but twenty or thirty of the larger breeds is a sufficient number. Where wool is stored, it should be in dry, clean rooms out of the heat of the sun, and it needs to be dry before rolling up. Any wounds on the sheep made by the shears when clipping require careful dressing with antiseptic oils or ointment before the animal is set free.

Clipping is now largely done by means of manual machines. The first one exhibited publicly was at the Royal Society's Show at Chester in 1893, and since then

the machines have been extensively used. By this method ten sheep were shorn in little over an hour by a clever operator. At the present time 175 to 200 sheep may be operated on in a day. The advantages of manual-machine shearing have been declared by M. Léouzon to be—

"1. It is more economical than clipping with shears.

"2. It is more quickly done.

"3. Clipping is performed with less risk of making wounds in the skin.

"4. Fatigue to the operator is reduced.

"5. A more regular clip is effected and a better appearance given to the finished sheep.

"6. Nomadic shearers are dispensed with, and the flock-owner is not left to their mercy."

Dipping generally follows about a month after shearing, and is done to kill any skin parasites or to keep them away. It may be carried out as often as is considered necessary, but on suspected sheep must be done at least twice after an interval of ten to fourteen days, and may be three or four times a year. Under the Sheep Dipping Orders all sheep must be dipped between January 1 and August 31, and again between September 1 and November 12 in Scotland and the North of England; in Mid and South England one dipping must be given between July 14 and September 1; in Ireland two dippings are required between June 15 and August 31, and again between September 1 and November 15.

Lowering the sheep into the dip in wire cages drawn up and down by means of a rope over a pulley is one method of dipping adopted, whilst swimming the animals in a miniature long bath or trough filled with the vermin-

killer is another. About 6 yards long, 4½ feet deep, and 18 to 20 inches wide, are good dimensions for a bath or trough. In-lamb ewes should be dipped three or four weeks before lambing, so that they may be in a clean state to associate with their offspring when they arrive. In some cases tubs are used for dipping, but swim-baths are the best.

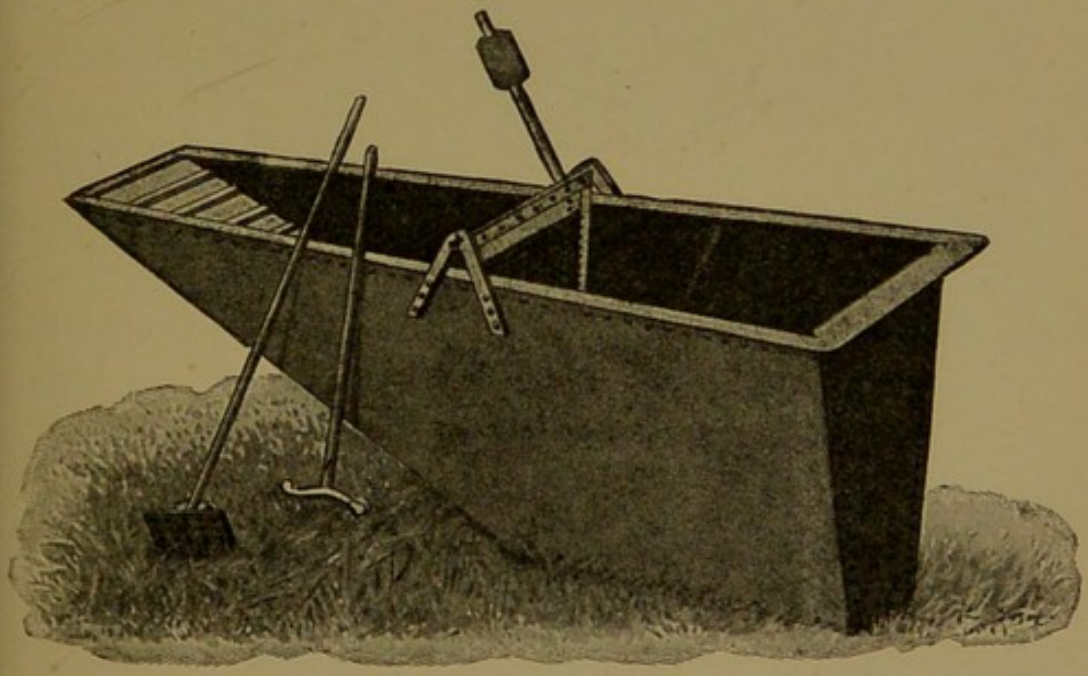


FIG. 1.—A SWIM-BATH MADE BY MESSRS. COOPER AND NEPHEWS, BERKHAMPSTEAD.

The tank is sunk into the ground. The sheep is put in at the deep end and kept in by the gate. After dipping, it walks out up the slope to a draining-floor.

The Board of Agriculture leaflet on "Sheep Scab" says that the advantages of the bath are—"(1) The sheep, being in a natural position, may be completely immersed, even in a poisonous solution, with comparatively little danger; (2) sheep in-lamb may be dipped with less risk; (3) the motion of swimming allows no portion of the fleece to escape contact with the solution; (4) the

work is more easily, and therefore more effectively, performed; (5) a larger number of sheep may be dipped in a given time and with fewer hands."

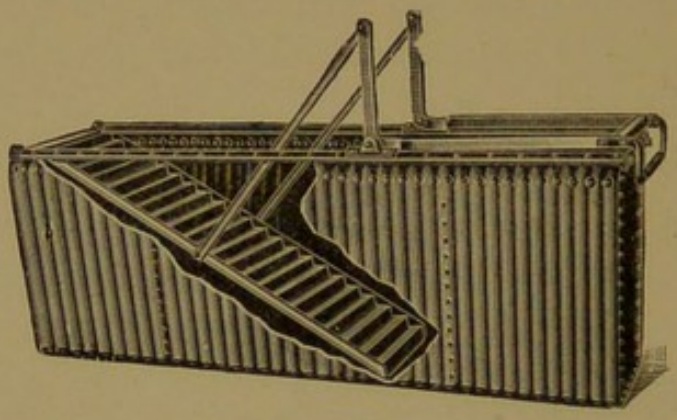


FIG. 2.—A SWIM-BATH OBTAINABLE FROM MR. THOMAS BIGG, 11½, GREAT DOVER STREET, LONDON, S.E.

In this illustration the ladder, being jointed in the centre, is raised by a lever for the sheep to walk out.

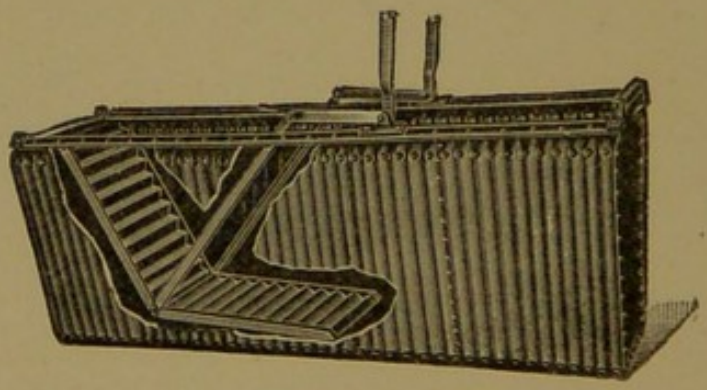


FIG. 3.

In this illustration of Mr. Bigg's bath the ladder is shown down, and the dimensions of the bath allow the sheep to swim in it.

Good sheep-dips are those of MacDougall, Cooper, Morris and Little, Maltby, etc.

Others which may be used are those made of—

White arsenic	6 ozs.
Exsiccated sodium carbonate	6 „
Sulphur	4 „
Soft soap	6 „

First mix the dry powders; then boil them with enough water to dissolve the arsenic; and, lastly, add enough water to make the whole quantity up to 16 gallons (Leeney).

A dip recommended by the Board of Agriculture is: Sulphur, 25 lbs.; quicklime, 12½ lbs. Triturate until free from lumps, boil with 20 gallons of water until dark red in colour, and add water up to 20 gallons to allow for loss by steam. When cool, decant and make up to 100 gallons.

All sheep should be drained of the dip before being released, and drainers in connection with baths are common, from which the liquid runs back into the tank after the sheep have stood for a few minutes. When the liquid becomes dirty or fouled with droppings, it must be renewed.

Some time should elapse before turning dipped sheep on to grass land.

Sheep with open wounds on the skin must not be dipped. Due care as regards warmth and feeding must be exercised after dipping.

As precautions after the operation, the late Mr. Finlay Dun wrote: "Yards into which freshly dipped sheep are to be turned should previously be cleared of all green food, hay, and even fresh litter; if perfectly empty, they are still safer. When the dipping is finished, they should be cleaned, washed, and swept, and any of the unused dipping solution at once poured down the drains. Obviously, however, no such poison should be run into drains emptying into pools or streams accessible to live-stock. Dipped sheep should remain, if possible, in an airy, exposed place, as on a dry road or in a large open yard. Overcrowding should be avoided, and every facility

given for rapid drying, which is greatly expedited by selecting for the operation fine, clear, sunny weather. On no account should sheep be returned to their grazings until they are dry and there is no risk of their poisoning the pastures." Not a few fatalities have occurred from poisoning after sheep-dipping; hence the importance of the above directions.

Branding is done by means of an iron stamp dipped in tar pressed on the shorn animal. The marking is placed over the ribs or loins, and ewe and wether lambs marked on opposite sides. It enables the sheep to be at once identified by their owners.

X

DISEASES OF SHEEP

Abortion, Warping, or **Slinking**, may be non-contagious and accidental when it is due to debility, too rich or too poor food, injuries caused by leaping obstacles when heavy in lamb, chasing by dogs, long journeys, and fatigue. In very wet weather the proportion of abortions is sometimes rather high.

Aborting ewes should be put by themselves, and if it appears that one has picked her lamb in the field, search should be made for the fœtus, and it should be burnt, and the ground on which it has lain dug up and disinfected. Much harm may be done in a flock by dead and decomposing flesh or membranes lying about.

The **infectious abortion** has at times caused severe loss to sheep breeders, and spreads with great rapidity. It is due to an organism called the "abortion bacillus," which may be taken up directly through the vagina to the uterus, or be spread by food, ground, or water soiled by the discharges of the ailing animals. The ram, too, may cause the disease by carrying the complaint on his genitals from diseased to healthy ewes. Ewes generally warp during the fourth month of gestation. Evidence of the complaint will be seen by swelling of the shape, and a dirty slimy discharge from it. One abortion will

be quickly followed by others, until a large percentage of the animals have cast their young.

Mr. A. Levie, F.R.C.V.S., considers that nine-tenths of the cases of infectious abortion in cattle are due to entrance of the bacillus by means of the mouth into the digestive system. If this be so in cattle, it may very well be likewise in ewes, and indicates the importance of preventing food and water contamination.

In a large outbreak of abortion in France in 1899, George Fleming, F.R.C.V.S., in his "Veterinary Obstetrics," states that the following measures were adopted with success:

"1. Evacuating the sheepfold.

"2. Separating the pregnant ewes from those which had aborted.

"3. Placing the pregnant ewes in a clean, well-ventilated place.

"4. Every week removing the dung, and cleaning the floors, walls, and racks with boiling potash water.

"5. Every ewe aborting to be immediately removed from the healthy to the second group (those which had already aborted), and complete delivery if incomplete; replace soiled litter, the fœtus and membranes to be covered with lime, and then burned in an out-of-the-way place.

"6. Every morning thoroughly sponge the back part and tail of the ewes with a germicide, such as a solution of corrosive sublimate, 1 part; salt, 40 parts; and rain water 4,000: or 1 in 5,000 mercuric iodide solution.

"7. Feed on good food, and avoid chills."

Only four abortions occurred after these measures had been adopted, and the treatment was continued for eighteen days.

Abscesses.—Clip off the wool. Foment or blister the swelling according as it is quick or slow in coming to a head. When it points open with a sharp knife, squeeze out the contents, and inject with antiseptic, and keep clean.

After-Pains show themselves a day or two after lambing, and are often due to infection of the womb and passages at the time of lambing by dirty methods or external soiling. The sick animal leaves her companions, fever is present, her vulva is hot, red, and discharges dark red bad-smelling fluid. Urine is passed with pain. She has an arched back, and is constantly straining.

Treatment.—Isolate the ewe, and put in a warm, dry place. Adopt all cleanly measures. Inject an antiseptic into the uterus, such as 4 tablespoonfuls of a solution of chinosol (4 grains to 1 pint of water), or 1 in 5,000 mercuric iodide solution. Oil the back passage with antiseptic oils (carbolic acid, 1 part; olive oil, 12 parts). Internally give 2 teaspoonfuls of sweet spirits of nitre and ½ to 1 teaspoonful of chloral hydrate crystals (according to the size and age of the ewe) in ¼ pint of milk or linseed mucilage every four hours until the patient improves. The attendant must carefully wash his hands, and boil and disinfect his frock before going among healthy animals. One frock kept for use when attending the sick is best.

Actinomycosis is sometimes seen in sheep, when it attacks the tongue, and occasionally the lips and underjaw. There is dribbling of saliva from the mouth, a swollen tongue, lumps appear at the angle of the jaw, which burst and discharge or remain hard. Affected sheep must be caught, isolated, and dosed with 20 to 60

grains of potassium iodide in solution two or three times daily. Feed on sloppy nutritious diet.

Alopecia, causing loss of hair in patches, sometimes occurs in ewes at the end of pregnancy or lactation, where the animals have got out of condition through poor food and much drain on the system. Feed well, and rub lanoline on the bare places.

Anæmia, or **Bloodlessness**, is seen most frequently in pregnant ewes, from insufficient or poor food. The membranes of the eyes will be blanched, abdomen distended. Diarrhœa and constipation are shown in turn, and swellings appear beneath the jaw.

Treatment.—Give good food and water, and plenty of fresh air, and a drench of saccharated carbonate of iron, 2 teaspoonfuls; powdered gentian, 1 teaspoonful; and salt, ½ teaspoonful in 2 wineglassfuls of linseed mucilage daily for a time. Powder composed of equal parts of carbonate of iron, gentian, and powdered locust bean, 1 tablespoonful once or twice daily to each sheep, may be given in the food if drenching cannot conveniently be done.

Anthrax is a blood disease, due to the *Bacillus anthracis*, a sheep attacked generally dying in one to four hours. An animal affected steps short, ceases to eat and ruminate, pants and trembles. Urine passed is highly coloured, and excrement tinged with blood; the sheep suddenly falls, and blood-tinged foam appears at the mouth and nostrils, the back passages also discharging blood.

Post-mortem Appearances.—Dark red, tarry blood, spleen enlarged and engorged with blood, flesh dark red, stomachs congested and blood-spotted, and food in the intestinal tract tinged with blood. Yellowish pulpy

exudates are found under the skin in the mucous membranes of the intestine and under the pleuræ and peritoneum. Subjects affected must be isolated, disinfect the locality, burn litter and forage; places where carcasses have lain should be disinfected; burn the carcass. Land on which anthrax frequently occurs should be ploughed up and well drained. This is a notifiable disease.

Apoplexy may occur in sheep before or after parturition. It is shown by unconsciousness, loss of motion and sensation. Appetite and rumination are lost. Give a saline aperient, such as 4 to 8 tablespoonfuls of Epsom or Glauber's salts; or an oleaginous one, such as 5 drops of croton oil in 8 tablespoonfuls of linseed oil; enemas and cold swabs to the head. Draw a little milk away from the udder daily if the ewe has no lamb.

Arthritis, or **Joint Ill,** in lambs is due to infection of the navel at birth or shortly after, and is aided by stinting the ewes of good food before and after conception. To avoid it dirty lambing-pens and dirty attendants must be non-existent.

Affected lambs become dull and stiff, and the joints enlarge. Abscesses may form about the throat, and inside the forearm and thighs. There is fever, panting, diarrhœa, and great prostration. Everything should be done to strengthen weakly mothers and improve the quality of their milk. Give salt and sulphate of iron in the food. Sick lambs must be caught and have their navels dressed with tincture of iodine or carbolic acid. The dressing must be repeated for three to six days. Ailing subjects must be confined along with their mothers, and the bowels regulated with castor oil

or astringents, such as prepared chalk or lime water.

Mr. R. M. Malloch, M.R.C.V.S., has successfully cured joint evil in foals by injections of acetozone, and where valuable lambs are affected this treatment might be tried.

Barrenness.—Fatten and slaughter. Non-conception may be due to rams being overworked, or too few for the number of ewes. If the ewes are healthy and strong, but do not conceive with three rams to 100 ewes, increase the rams to six per hundred ewes, and have one or two youthful males among them. If ewes are debilitated, give tonics and good food. If too fat, lower the diet, and give plenty of freedom.

Braxy is a disease usually occurring in the late autumn or winter, and is due to an organism which attacks the maw, or true stomach, and small bowel, and produces intense inflammation. Yearlings and two-year-olds are chiefly affected, and well-nourished animals seem most prone to the disease.

The illness develops quickly, and animals may die in a few hours; great weakness may be followed by loss of consciousness, panting, and grinding of the teeth. Colicky appearances may occur, foaming at the mouth, and swelling of the throat and tongue.

Post-mortem shows severe changes in the intestinal tract. The maw and the bowel leading out of it are distended and swollen, covered with blood-spots, or occasionally mortified. There may be patches of blood and fluid under the skin and in the abdomen. The organism is found present in great numbers in the sodden tissues, and sometimes in the blood. Change of pasture or fold is indicated in this disease, and thorough disinfection as far as possible. Burn the carcass.

In the Faroe Islands in 1906 the mortality among sheep suffering from this disease was checked by protective inoculation. Careful dieting of the flock and draining of infected pasture are indicated.

Black Quarter, or **Black Leg**, declares itself by suddenly causing a stiff gait, weakness of the loins, moderate tympany, foaming at the mouth, and high fever in sheep affected. On the front parts of the body, about the neck, and under the chest, the wool is lifted at places, and swellings arise as big as one's hand. If pressed on, a crackling noise may be heard in the swollen region. Usually a sheep soon dies from this disease, but mild cases may extend over a day or two, and occasionally recover with sloughing of the skin. In a sheep found dead, which is generally the first thing noticed, the connective tissue under the skin and in between the muscles will be blown up with gas and blood-soaked, and the surrounding muscular tissue, dirty brown or black in colour, mortified and rank smelling. The spleen is not swollen, and blood shows no changes. The pasture should be changed, and sheep given a saline laxative, followed by a tonic. The carcasses of all animals dying or slaughtered require to be buried or burnt. There is a danger of infected sheep reinfecting sound land by their droppings.

In some outbreaks in America lambs have been separated from their mothers at birth, save at suckling-time, and thereafter pastured on sound land that has been reserved for them.

Blue Tongue, or **Catarrhal Fever of Sheep**, is a disease seen in sheep and goats in South Africa. There is lack of appetite, exhaustion and fever, severe inflammation of the mouth, and casting off of scales from the

mucous membrane, swelling of the fore part of the head and the throat (at the first soft, and later hard), and a blue or cyanotic coloured tongue.

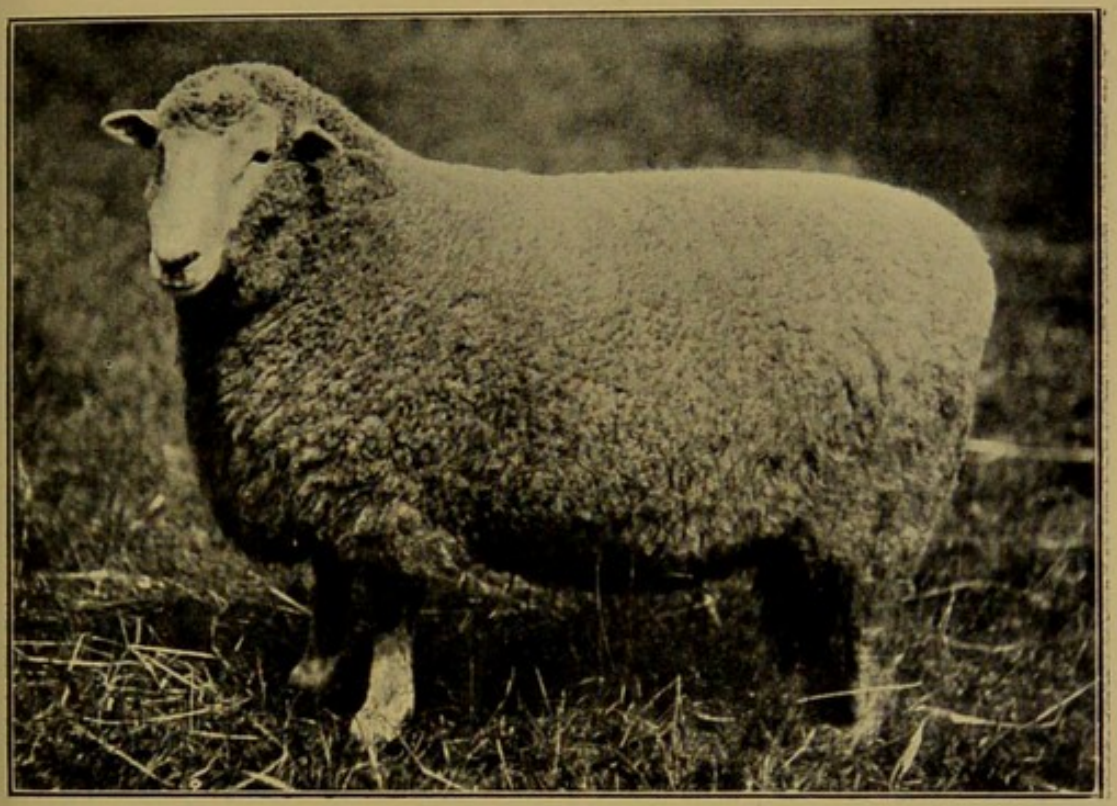
Inflammation of the eyes, diarrhœa, and jaundice, are followed by death. The complaint may take four days to develop. In mild cases recovery may occur after three weeks' illness. The administration of chinosol and calomel and scarification of the tongue give good results.

Theiler's vaccine has been very effective as a preventative against the disease in South Africa, as for every one sheep that died during inoculation twenty-seven non-vaccinated sheep perished. The Government veterinary surgeons in the Transvaal supply the vaccine at a penny a dose.

Bronchitis occurs chiefly in spring and autumn. There is a painful frequent cough and difficult breathing. An ounce of solution of acetate of ammonia, 2 drachms of tincture of belladonna, may be given three times daily in ¼ pint of linseed mucilage. House affected sheep, and feed liberally.

Bronchitis, Verminous, Husk, or **Hoose**, is caused by three round worms called *Strongylus filaria*, *rufescens*, and *capillaris*. These worms are swallowed as larvæ in the food and drinking water, especially where a flock is pastured on low-lying damp land, over which water flows or rests during rainy weather. After being taken up and passing into the stomach, the larvæ come up the gullet into the throat, go down the windpipe, and, getting to the bronchial tubes and into the spaces of the lungs, develop there considerably. They take about eight weeks to become mature worms. By their movements, number, size, and quantity, they occasion

Plate XIX.

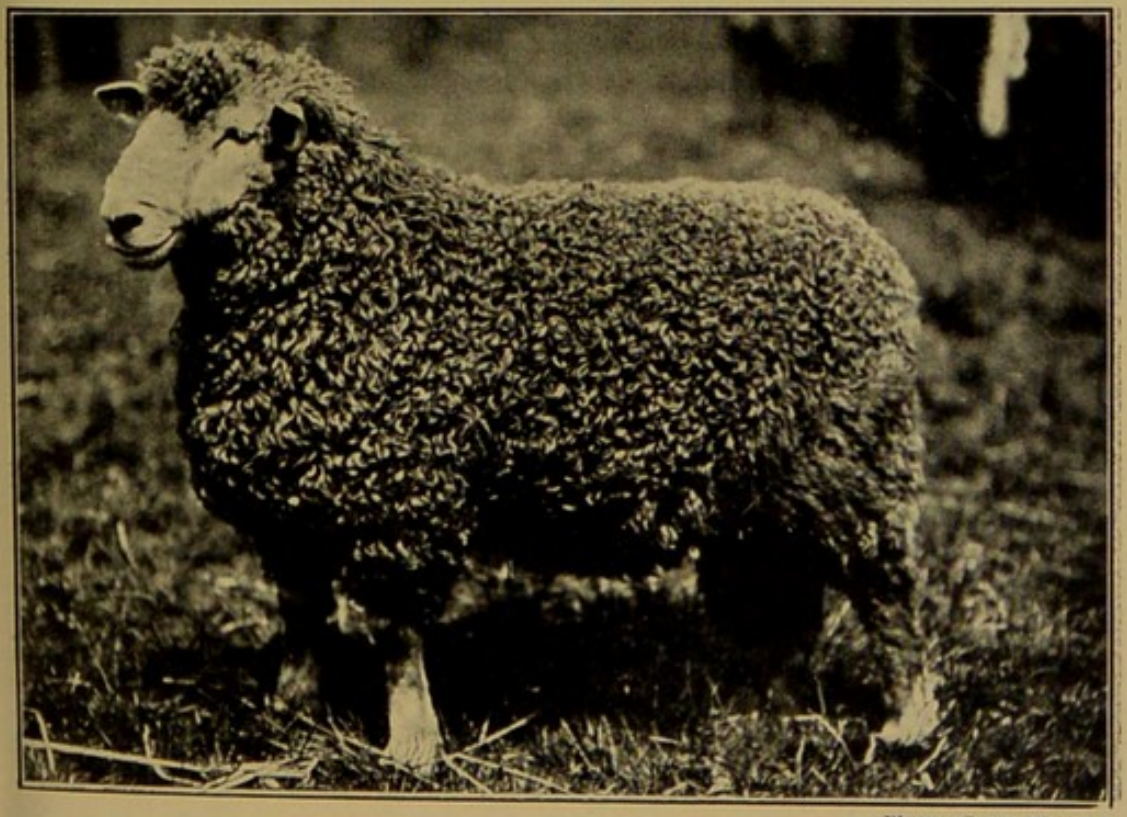


Photo, G. H. Parsons.

KENT TWO-SHEAR RAM.

Owned by Mr. Chas. File. First, Royal Show, 1911 ; Champion, Bath and West, 1911.

Plate XX.



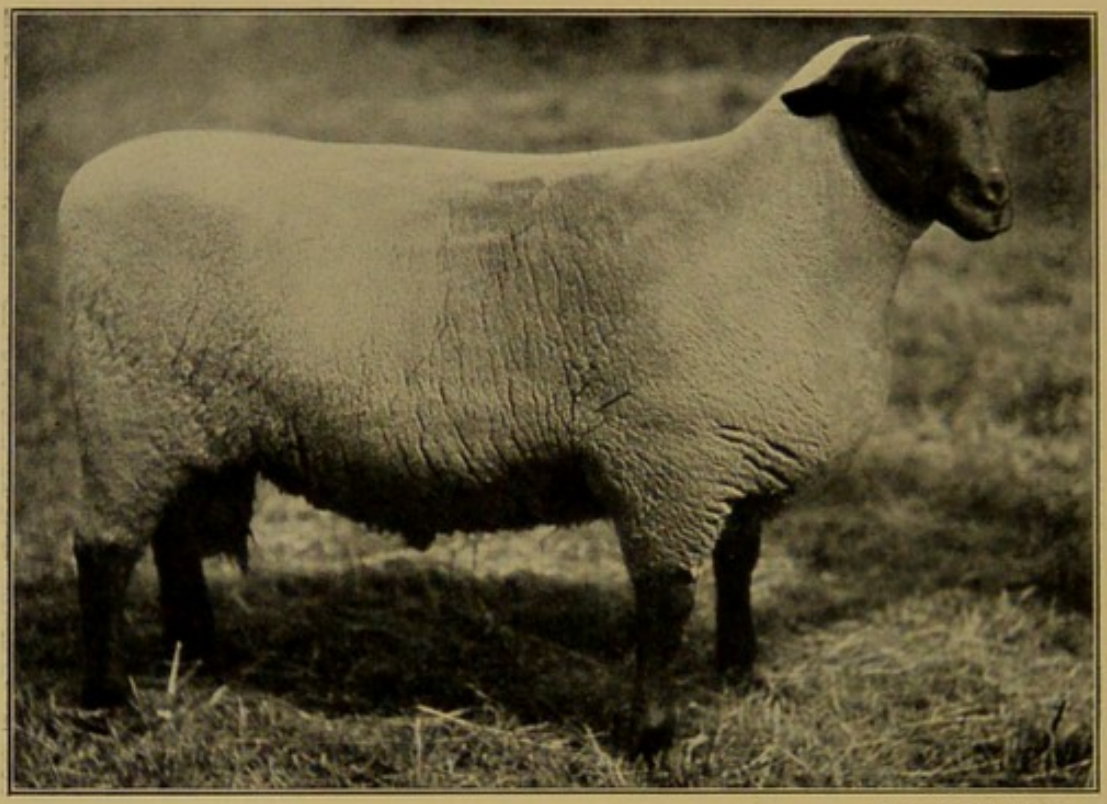
Photo, G. H. Parsons.

DEVON LONGWOOL RAM.

Owned by Mr. White. First, Royal Show, 1911.

To face page 62.

Plate XXI.

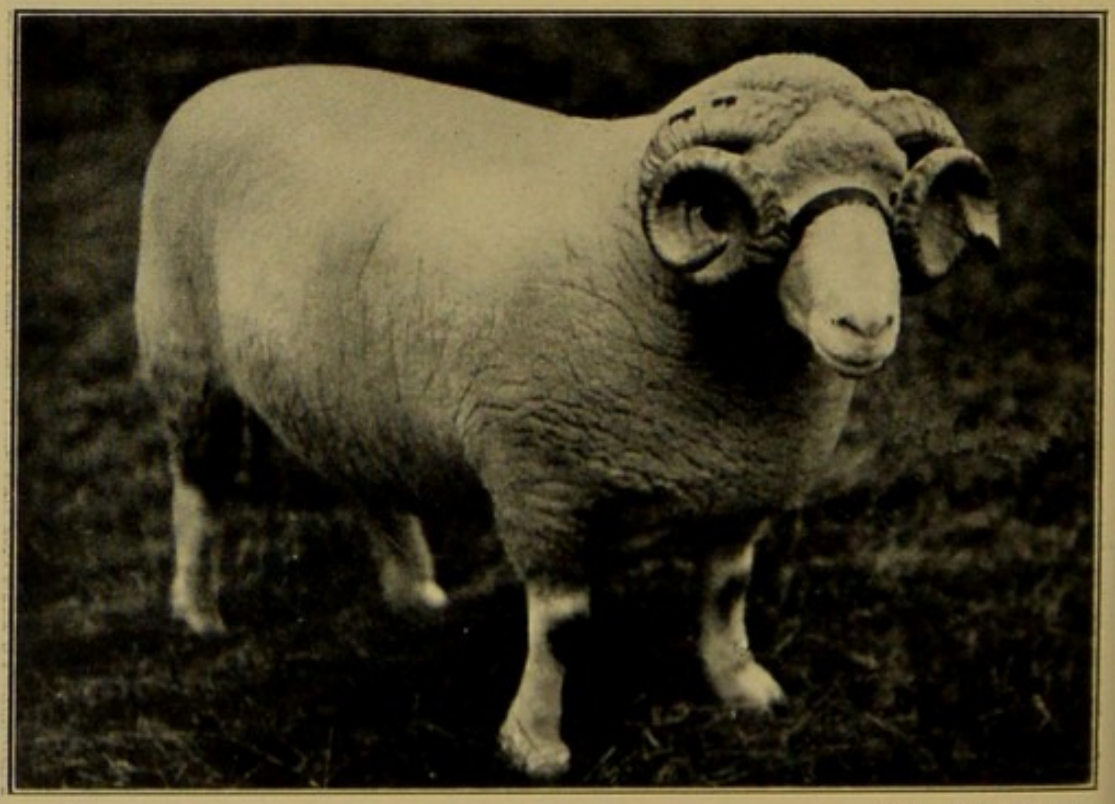


Photo, G. H. Parsons.

SUFFOLK TWO-SHEAR RAM.

Owned by Mr. H. E. Smith. First, Royal Show, 1911.

Plate XXII.



Photo, G. H. Parsons.

DORSET HORN RAM.

Owned by Mr. W. R. Flower. First, Royal Show, 1911.

To face page 63.

inflammation of the lung tissue (*Strongylus rufescens*) or bronchi (*Strongylus filaria*). As worms, they may be coughed up and out on to the pasture or remain in the throat, be swallowed again, and pass out in the droppings.

Symptoms.—A frequent cough; slimy discharge from the nose; rubbing of the nose on the ground; paroxysms of coughing; laboured breathing; falling away to a thin state; paleness of the mucous membranes; and swelling of the throat, eyelids, lips, chest, and limbs; and then death.

Treatment.—Remove the animals to a higher and dryer pasture. Inhalations of chlorine gas or sulphur vapour may be given them before turning out on non-infected pasture. Intratracheal injections may be used instead of the inhalations. One hundred parts of rectified oil of turpentine, 100 parts of olive oil, and 10 parts of pure creolin, may be injected in drachm doses after well shaking up. Another good injection is a 1 per cent. carbolic acid solution in drachm doses.

Clip the wool close off over the windpipe, and inject direct into it. If the ailing sheep are housed, feed on nutritious food, give pure water, and keep them warm. Infected land should be well drained and dressed with gas-lime, quick-lime, or salt and soot.

Bronchial Croup.—There is great difficulty in breathing, the bronchial tubes being filled with fibrinous threads. Membranes of a cylindrical form may be coughed up, and there will be rattling, whistling, or harsh sounds heard over the chest walls.

Medicated inhalations of salt and water or benzoic acid may be given, and internally half-teaspoonful doses of ipecacuanha wine three or four times daily. Conti-

nental men have had success by blowing tannic acid down the throat or giving intratracheal injections of ½ per cent. aloes solution or 1 per cent. morphia hydrochlorate solution in 30 to 40 minim doses.

Calculi, Urinary.—Gravel and stones may block up the urethra or form on the prepuce of rams, causing discomfort and inflammation. Bicarbonate of potash is the best drug in these cases, followed by benzoate of ammonia. Make affected sheep walk a short distance to cause them to make water. Catch the sheep, and work out the stuff in the prepuce and urethra.

Catarrh may appear as a simple affection due to cold. There is a watery discharge from eyes and nose, which gradually becomes thicker, and is accompanied by coughing. A large number of the flock may be affected in cold, wet weather. Steam the nostrils and drench with stimulants in linseed mucilage. Give linseed cake in the feed (see Influenza).

Cud-Dropping.—Usually a form of indigestion, or may be due to soreness of the mouth, brought on by over-acrid food. The aliment is brought up from the stomach in rumination, but, instead of being chewed and swallowed again, is thrown out.

Treatment.—Alter the food to soft, easily masticated diet, and, if the mouth is sore, dress with boracic acid and honey, and give an aperient.

Conjunctivitis, or Inflammation of the Eyes.—Tears flow from the orbits, there is tenderness and pain, and the sheep retracts the orbits and objects to examination. Cold, wet weather in autumn and spring causes the disease to attack a number of sheep. Confine afflicted members of the flock to a dark abode, and dress the eyes daily with boracic lotion, and put a drop or two of castor oil

between the lids. Give a dose of medicine composed of salts 4 ounces, ginger ½ ounce, and sulphur ½ ounce, in ½ pint of linseed mucilage, to a large adult sheep.

Diarrhœa due to indigestible, too rich, or tainted food. Give a dose of castor oil, and follow up with a dose of a mixture of prepared chalk 1 ounce, catechu 4 drachms, powdered ginger 2 drachms, opium ½ drachm, peppermint water ½ pint — 2 or 3 tablespoonfuls morning and night.

Dysentery in Lambs occurs during the first few days of life, and is a contagious and infectious disease, soon leading to exhaustion from profuse diarrhœa. Improper feeding of the mothers, whereby the composition of the milk is faulty, aids an attack by one or several virulent bacilli which inhabit the intestine.

Contaminated ground on which lambs are born infects the vagina and udder of the ewes, and the lambs take up the organism whilst sucking, or they may be infected through the unhealed navel. Sick animals infect the ground or litter with their water or droppings, and newborn subjects become all the more prone to attack. Separating the lambs from their mothers and giving them boiled milk somewhat checks the course of the disease.

As medicinal measures, give each lamb a dessertspoonful and a half of castor oil, and follow it up with a teaspoonful dose of a powder composed of powdered rhubarb 6 parts, magnesium carbonate 1 part, and opium ¼ part, in a wineglassful of camomile tea or dilute brandy.

Ecthyma.—Isolated papules and pustules appearing on the thin skin inside the forearm and thighs. Give saline laxatives, followed by liquor arsenicalis 1 ounce,

linseed oil 7 ounces — 2 tablespoonfuls in the food morning and night. Wash the pustules with boracic-acid lotion, and dress with zinc ointment. This disease is sometimes mistaken for sheep-pox.

Eczema may occur in sheep, the subjects of anæmia and cachexia, from chronic illnesses such as hoose and fluke. There is scaling of the dry and inelastic skin. A similar affection may arise from bad management and feeding. Sheep getting constantly wet through, when the weather is also bitterly cold, may suffer from eczema along the back, especially if scantily clad with wool. Through long-continued wetness, the horny layer of the skin becomes loosened, and acute inflammation arises, and red surfaces discharging fluid which forms scabs; the wool falls out at these places. When dry weather comes, or if the sheep are housed and kept warm, dry, and the skin dressed with a simple ointment, they soon recover. An eczema arising in very hot weather after shearing is sometimes noticed. It affects the neck, back, and sides chiefly. The space between the claws may be affected with little vesicles, inflammation, and raw surfaces from travelling over stony grounds, or on streets covered with animal dejections.

Erysipelas, commonly so called, but really **malignant œdema,** may arise from wounds to the skin in shearing. It causes inflammation of the whole substance of the skin; there is fever, and abscesses may form when the inflammation spreads to the deeper tissues. The importance of dressing all cuts at shearing-time with an antiseptic ointment is indicated in order to prevent the disease arising. When it does occur, give a purgative, followed by a few febrifuge doses of acetate of ammonia, 1 ounce, and tincture of belladonna, 2 drachms, in linseed

mucilage. Dress the affected surfaces with ichthyol or creolin ointment.

Favus, or **Honeycomb Ringworm**, may attack the head of the sheep, especially about the lips, nose, and inside the ears. The disease, which is parasitic, is characterized by large scales or encrustations, and the parts of the skin affected are moist and reddened. Dress the spots with tincture of iodine, or formalin paste or ointment.

Flies and Fly-Blown.—Sheep kept near trees are often attacked by fly which deposit eggs in soiled parts, such as those under the tail, maggots forming, causing damage and discomfort. A sharp lookout must be kept for this complaint, and sheep shaking their tails examined. Old shepherds generally carry a mercury stone with which they rub the maggoty area, and the pests soon curl up. Clip all the dirty wool away under the tail, and use some sheep-dip liquid to cleanse the spot with. A dressing of 1 part of oil of turpentine and 3 of olive oil answers the same purpose. Leeney's fly-powder consists of white lead 2 lbs., red lead 1 lb., sulphur 1½ lbs., spirit of tar 4 ounces. This is mixed, dried, and powdered on the fleece with a flour-dredger, and prevents all attacks of fly. Sores resulting from maggots may be dressed with an ointment composed of carbolic acid ½ ounce, carbonate of zinc ½ ounce, and lard ½ lb.

Nostril Fly. See Nasal Parasites.

Fluke. See Worms.

Foot Rot. See Ulceration of Lips and Legs.

Foot and Mouth Disease is a contagious disease of an eczematous type characterized by the formation of blebs inside the lips and tongue, and sometimes on the

teats and udder, and around the coronets at the heels. Sheep may not show any vesicles in and about the mouth, but the feet are always attacked. Raw bleeding surfaces are left when the vesicles burst, seen frequently at the heels. Stiffness of gait is about the earliest symptom. Foot and mouth disease is very contagious, and is *a notifiable disease*. It usually originates in cattle and spreads to sheep. It may be distinguished from foot rot by the great fever present, loss of flesh, sudden appearance of the disease, and marked lameness, and by the fact that the coronet and heels show most of the sores.

Garget, or Mammitis.—Great pain and heat in the udder, swelling and checking of milk flow. One part of the gland may be affected or the whole of it. Ewes with a good milk-supply are most prone to the disease.

Treatment.—Give a dose of salts (Epsom salts 2 ounces), bathe the udder with warm water, and afterwards rub with camphorated oil, or a liniment composed of rape oil 4 ounces, carbonate of potash 1 drachm, subacetate of lead 2 drachms, and water to 8 ounces. Affected ewes should be penned. If abscesses form, they must be opened and syringed out. Clip all dirty and damp wool away from round the udder and fold in clean dry litter or ground.

Gid, or **Sturdy.** See Worms.

Heart Water.—This is an illness of sheep and goats seen in South Africa. It is so called because the heart sac on post-mortem is found to be filled with a colourless or yellow fluid.

It is conveyed and spread from affected animals, such as cattle, sheep, or goats, to healthy animals by means of a blood-sucking tick, called the "bont tick." The

appearances of illness arise in five to fifteen days after infection. There is high fever, dulness, nervous symptoms and continual movement of the tongue and jaw.

The disease has been known for forty years in South Africa, and occurs chiefly in the summer-time on high-lying pasture. The indigenous fat-tailed sheep and the Persian sheep are said to be proof against the disease. Up to now no practical means of protection of flocks has been discovered.

Hoven, or Blown.—The rumen, or first compartment of the stomach, is blown up with gas produced by the fermentation of food. It is common when sheep get on pasture damp with dew or coarse grass of late autumn which has had fog lying over it for a time. An aperient, such as 2 to 4 drachms of hyposulphite of soda, may be given, followed up by ½-ounce doses of sal volatile every four hours. The trocar and canula may be inserted in the left flank (after clipping off the wool) and the gas let out. Feed on digestible concentrated food and take up from pasture.

Husk, or **Hoose.** See Bronchitis, Verminous.

Influenza, Catarrhal Fever, Malignant Catarrh of Sheep, is due to an organism called *Bacillus ovisepticus*. This disease causes much loss among lambs, but seldom attacks older animals, although it may assume a chronic form in them.

It usually arises in low-lying damp neighbourhoods, and is occasioned by infected food, drinking water, meadows, or folds; infected dejections of sick animals help to spread the disease, and where many animals are quartered in a small space the complaint spreads rapidly. Bad and unseasonable weather predisposes to it, as do also worms in the stomachs and intestines.

Symptoms. — High fever, loss of appetite, dulness, thirst, laboured breath, and trembling of the muscles usher in an attack. In some cases there is bad appetite, falling away in condition, purulent discharge from eyes and nose, pleurisy and pneumonia, or inflammation of the bowels. Many of the weakly animals die, and the strong ones that recover are affected with chronic lung trouble or become bad doers (cachectic).

Animals having the disease in the chronic form should be killed. Give a wide extensive pasture to the apparently healthy ones. Isolate immediately all lambs falling sick in winter-time, and frequently purify and disinfect their abodes. A protective inoculation of lambs has been employed successfully in the Argentine.

Jaundice, or overflow of bile, is seen in over-feeding and irregular feeding. It sometimes proves fatal in fat lambs and indicates a change of feed to that of a laxative nature. Do not turn lambs out to pasture until the dew is off the grass. It is a symptom of several of the parasitic diseases to which the liver of the sheep is liable. Give a dose of 2 to 4 ounces of Epsom salts along with ½ ounce of ginger and 20 grains of calomel.

Leucorrhœa, or **the Whites,** is occasionally seen after parturition. The discharge, at first thin and colourless, soon becomes thick and white. Syringe out the vagina and uterus with a solution of potassium bicarbonate, and follow up with 1 in 5,000 mercuric iodide solution. Observe all cleanliness and give iron tonics internally.

Lice are bloodsucking insects that chiefly attack badly nourished and cachectic sheep, causing intense itching when present in large numbers. Affected subjects rub and bite themselves. Paraffin and rape oil, 1 to 7, kill the insects. Two or three dressings are necessary, one

to kill the lice and the other the eggs. Dipping also destroys these pests.

Louping Ill, or Trembling.—The certain cause of this illness is unknown. It has been ascribed to a tick, to meningitis, and to infected pasture. There is great timidity and nervousness shown, and if approached by a person or animal, affected subjects stand trembling in one place; whilst if chased by a dog, sick sheep will fall down and have epileptic spasms, shown by kicking of all four legs and staring eyes. On warm summer days the ovines may be seen trembling, with their ears hanging down and their heads nodding. After one or two months from the commencement of the disease, loss of power in the hind-quarters is seen. In some cases there seems to be itching and irritability of the skin. Loss of condition and anæmia arise, and finally the animals become paralyzed, and remain lying on the ground. Treatment is useless, and sick animals must be slaughtered. Affected pasture should be salted, and new purchases carefully admitted to the flock.

Remove the animals to high pasture. Rational breeding and avoidance of over-coddling is also indicated.

Metritis, or **Inflammation of the Womb,** is caused at lambing-time by entrance of septic germs into the womb, often introduced by unclean hands or instruments. There is loss of appetite, paddling with the hind-feet, suppression of milk, discoloration of the vagina, and passage of bad-smelling coffee-coloured liquid.

Syringe the uterus out with chinosol, or 1 in 5,000 mercuric iodide solution; then dress with carbolized oil, 1 in 20.

Give nourishing diet and febrifuge medicine. Linseed

mucilage or gruel, eggs and milk, soothe the irritable passage and support strength.

Nasal Parasites: The Nostril-Fly (*Œstrus ovis*) (Fig. 4).—The larvæ of this fly, deposited as eggs on the inner margin of sheep's nostrils, cause great discomfort when crawling up the nasal passages to the frontal cavities of the head. The winged insect that deposits these eggs (according to Miss Eleanor Ormerod, to whom agriculturists and naturalists are greatly indebted for the life-history of many flies) is larger than the house-fly and of an ashy colour, spotted with black. The larvæ are similar to horse-bots, only smaller, and possess two mouth-hooks or tentacles to hold on with. Young larvæ are white, and older ones yellowish-white, whilst the anterior part of them is narrower than the hind-end. In warm countries these flies swarm from the middle of May to the end of October, but here they attack sheep in May, June, and July, as a rule. Sheep show great unrest at the approach of the flies, and hold their heads on the ground or put their noses between their feet. After the bots have got up the nose to their lodging-place the sneezing and discomfort occasioned by their movement ceases, and the host remains quiet for about nine months, when the pupæ come down the nostrils again and cause renewed disturbance.

Fig. 4.—Œstrus Ovis. (After Neumann.)

Acute nasal catarrh may be seen then, in spring and early summer, combined with great flow of tears and tossing of the head, as if making an attempt to shake the pests out of the nose. Occasionally a sheep may die from the pain and nervous disturbance occasioned by the bots. The illness may be distinguished from husk

by the fact that there is no coughing, and from sturdy because there is catarrh and only occasionally nervous disturbance, when the larvæ are situated high up in the nasal cavities.

When through violent sneezing the larvæ appear in the nasal discharge, and are seen, there can be no mistake about the nature of the disease. The only rational treatment is opening the cavities surgically and syringing them out with germicides, but a layman can hardly undertake this. Snuff or powdered hellebore-root blown up the nostrils may occasion dislodgment of the larvæ by causing violent sneezing. Smearing the nostrils with whale oil mixed with powdered sulphur may prevent the female flies settling to lay their eggs.

Fig. 5.—Pentastoma Tænoides. (After Neumann.)

Another Parasite (*Pentastoma tænoides*) (Fig. 5) sometimes affects the nostrils of sheep. It is a lanceolate-shaped larva, whose external skin is surrounded by about ninety rings or grooves, and whose body measures about $\frac{1}{5}$ inch in length. This pest is an inhabitant of the internal organs of herbivorous animals, and from thence is taken up into the nostrils of dogs when eating infested flesh or entrails. The female discharges her eggs in dogs' nostrils, and they sneeze them over the pasture, and, becoming adherent thereto, they are taken up into the nostrils or stomachs of grazing sheep. The number of the parasites in these cavities is small, usually from

one to eleven. Nasal catarrh, loss of the sense of smell, restlessness, and occasionally impairment of sight and difficult breathing, may result. The parasites may remain in the nostrils for about fifteen months. Inhalation of chloroform or injection of oil of turpentine into the nose are good remedies.

Necro-Bacillosis, or **Ulceration of the Lips and Legs**, is due to the bacillus of necrosis, or mortification. It is a contagious and infectious disease, attacking the lips and legs of sheep and lambs. The parts deprived of wool are the oftenest affected, because inoculation there is easy and frequent. The first symptoms consist in an acute inflammation of the skin of the lips; pustules form which dry and produce greyish-black scabs running into each other. The gums, cheeks, and eyelids may show similar changes, and feeding becomes difficult.

Sores of the same kind develop on the legs, on the coronets at the fetlock, and between the claws.

Breaches in the skin enable the organism to find a home, hence the disease often occurs in winter, when the legs are chafed and cracked through the hard snow; from surgical wounds, such as those of castration and docking, the ailment may be contracted; and a ram affected on his genitals may transmit the complaint to the ewes. In very dry seasons the disease may spread rapidly. Affected lambs may give the disease to the udders of their mothers, and ewes suffering similarly in their bags may give it to their youngsters. It is a disease causing considerable trouble, and a loss amounting to 10 per cent. in some flocks.

Treatment.—The diseased subjects must be separated from the healthy; watch those that have been exposed

to contagion; cleanse and disinfect the folds or pens; quarantine newly bought animals for a month; avoid infected pasture for a year; treat the sores after cleansing with an antiseptic ointment (5 parts of creolin, 10 parts of sublimed sulphur, and 100 parts of vaseline or lard).

For sores on the vagina or penis and sheath, 2 per cent. permanganate of potash, or 75 per cent. hydrogen peroxide, may be used.

The Germans use a mixture of 1 per cent. of creosote in 50 per cent. of cod-liver, linseed, or castor oil, and internally give 2 tablespoonfuls of the same mixture. Big or bad-healing ulcers may be dressed with a solution of 10 per cent. chloride of zinc.

Where the legs of a flock are chiefly affected, and the number of diseased animals large, passing through a 5 per cent. creolin bath three times a week will do good.

When cured, dip the whole flock.

Pneumonia, or **Inflammation of the Lungs**, occurs in cold, wet weather; it may follow an attack of catarrh or bronchitis, and is shown by fever, blowing, prostration, coughing, and dejected appearance. House the sheep, dress the chest walls with mustard mixed to the thickness of cream with hot water, and give a draught of liquam acetat. ½ ounce, spirits of nitrous ether ½ ounce, and mag. sulph. 2 drachms, well shaken up in ½ pint of water, two or three times daily.

Pneumonia, Septic, sometimes occurs and spreads with great rapidity in lambs. Youngsters a few weeks old are seen to lose their liveliness, cease sucking or nibbling, and have a feverish temperature. There is extended head and neck, coughing, and discharge of slimy or purulent matter from the nostrils. When

mildly attacked, there is coughing when getting up, lying down, or when moving about. There may be loss of condition, and visible sickliness, lasting for a few weeks.

Treatment.—Medicine is of little avail. Change the pasture or fold to fresh, clean ground; separate or slaughter diseased animals; disinfect abodes; plough up infected land; put no diseased youngsters among young animals of any other race, such as calves, goats, or swine.

Pseudo-Tuberculosis.—Sheep are almost entirely free from attacks of tuberculosis, due either to immunity or the outdoor life they lead. Another disease resembling consumption in its lung appearances, however, attacks them, and is known as pseudo, or false, tuberculosis. It is due to an organism called the *Bacillus pseudo-tuberculosis ovis*, which may be taken up by the mouth or through the nostrils; also by means of wounds such as castrating and docking, or by the unhealed navel.

The disease is spread by the dejections of sick sheep.

The complaint is often only recognized when the animal has been slaughtered and opened. Occasionally falling away in condition, and enlarged glands at the shoulder and stifle, coughing and difficult breathing (broncho-pneumonia) call attention to the disease during life.

In a carcass the glands inside the chest will be found greenish-yellow, gluey, or cheesy. Little grey or greyish-green lumps or nodules will be found scattered through the lung substance. The lungs may be stuck to the chest wall (pleurisy). There may occasionally be nodules in the large intestine, liver, spleen, and kidneys.

Treatment.—The disease is spread through the droppings, litter, and ground; hence, good hygiene and dietary, separation of diseased from healthy subjects, and avoidance of infection through unhealed wounds, is recommended. Dress the navels of lambs with Lugol's solution, and afterwards apply iodoform collodion. Unhealed tails may be treated with tincture of iodine.

Redwater is due to an organism called *Piroplasma ovis*, which when present in the blood produces fever and symptoms of general illness in eight to ten days in sheep attacked. Then follow laboured breathing, plaintive bleating, anæmia, jaundice, and weakness of the loins. There may be diarrhœa, blood in the fæces, or red-coloured urine. A large number of subjects attacked recover, and once having suffered from the illness sheep seem exempt from further attacks for a long time.

The German treatment for this disease is 10 grains of sulphate of quinine twice daily, and a dose of Glauber's salts (2 to 8 drachms). Plenty of linseed mucilage as a drink aids recovery.

As the organism prevails most on damp, low-lying land or such as is frequently under water, avoidance of such pasture is indicated.

Rheumatism may suddenly attack many members of a flock, especially when turned out of warm folds or paddocks to damp, swampy land. The joints are affected and the sheep move stiffly, or become lame, first in one limb, and then another.

Ewes lambing in this condition seem to transmit the complaint to their offspring.

Treatment.—Put the animals in higher land, and give them ½ to 1 drachm of acetyl salicylic acid (aspirin) three or four times daily. Feed nutritiously.

Rickets, due to deficiency of lime in the bones, and occurs on sandy and poor soils where the feed is deficient in essential salts. Lambs born of ewes on such pastures are weak, with bent and deformed bones.

Remove the ewes to fertile soils, and feed them well with grain and meal to improve the quality of their milk. Cod-liver oil and lime water may be given to the mothers, and a wide extent of pasture where healthy breezes blow aids recovery.

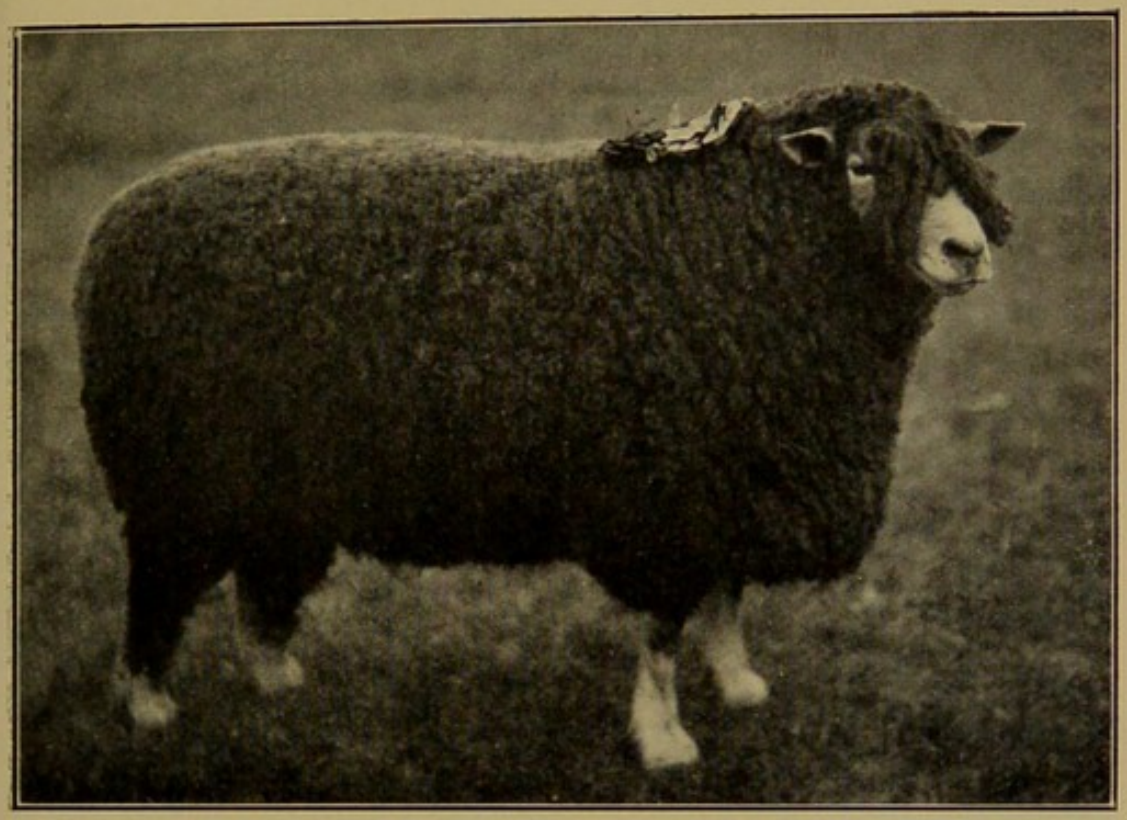
Ringworm commences with the sudden appearance of circular spots on the back, chest, shoulders, and neck. The skin is red in these places, and often coloured brownish in the centre. Adherent scales and scabs then form, accompanied in the early stages by great itching followed by spread of the complaint, and bare places at the region affected. This disease is rare in sheep. When it occurs, the ringworms may be dressed with an ointment of lard 1 ounce, oil of tar 2 drachms, sulphur 2 drachms, and carbonate of potash ½ drachm; or the ordinary sheep-dip may be used to dress the places with daily.

Rot or **Fluke.** See Worms.

Scab, or **Mange**, is due chiefly to two acari, or mites. One, called *Sarcoptes ovis*, burrows under the skin and commences its attack on the parts of the sheep unclothed by wool, such as the lips, angles of the mouth, edges of the nostrils, round about the edges of the ears, behind the knees, and in front of the hocks.

It causes violent itching, and big scales may form round the eyes, interfering with sight, and round the mouth, where the lips may swell so that feeding is difficult. The disease spreads quickly in a flock. The *second*

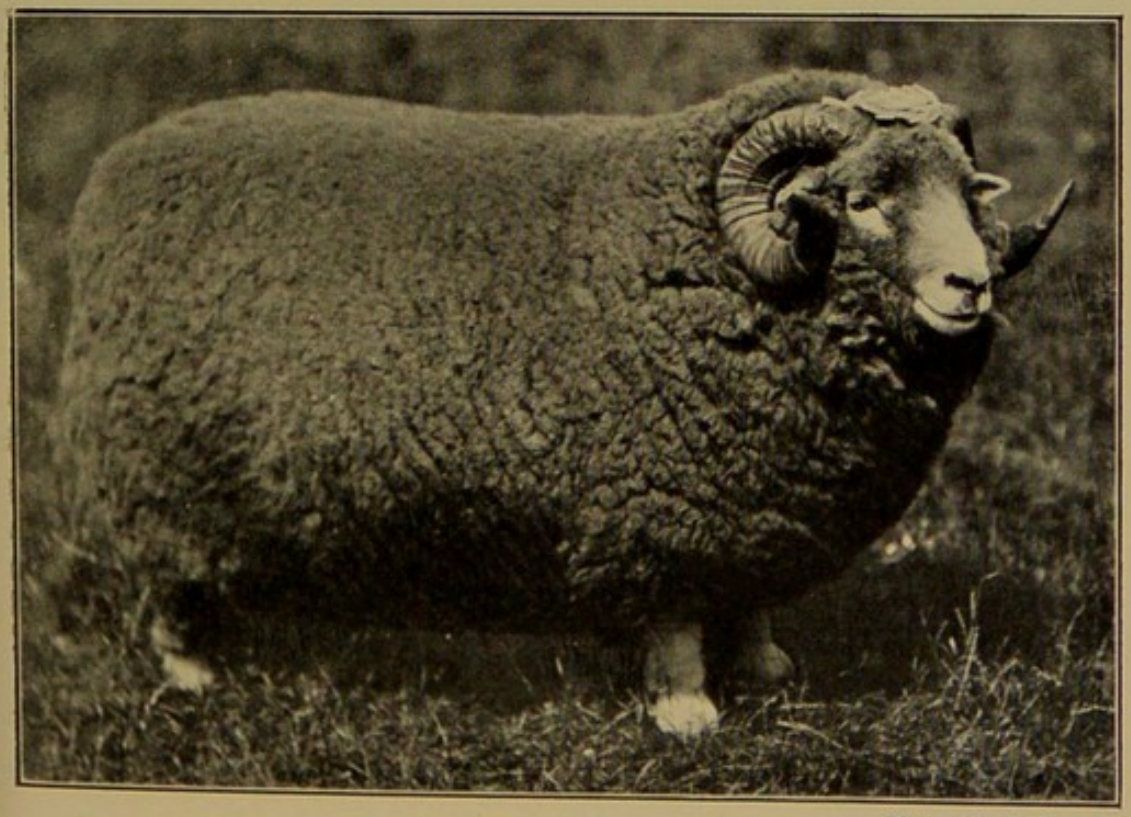
Plate XXIII



Photo, G. H. Parsons.

LINCOLN LONGWOOL RAM: POINTON CRACKER IV.
Owned by Mr. T. Casswell. First and Champion, Royal Show, 1911.

Plate XXIV.



Photo, G. H. Parsons.

EXMOOR HORNED RAM: BROFORD MODEL.
Owned by Mr. P. Smyth. First, Royal Show, 1911.

To face page 78.

PLATE XXV.

Photo, G. H. Parsons.

BLACK-FACED SHEARLING RAM.

Owned by Mr. Robson. First, Royal Show, 1910.

To face page 70.

mite, called *Dermatocoptes ovis*, bites and holds on by the skin and attacks those parts covered with thick wool, causing it to become loose and fall out. It generally commences on the loins and back, and quickly spreads down the sides. There is intense itching, and the sheep gnaws itself at the irritable places. Scales and scabs appear, and the wool falls out. If rubbed on the itchy places, the animal appears gratified and smacks its lips. This disease is exceedingly contagious.

A *third mite*, the *symbiotic*, or *dermatophagus*, is rarely seen, and then attacks the hind-legs, which the animals bite. The parasites only live quite superficially on the skin of the legs, and may ascend to the udder or scrotum, but are not very contagious or serious in their effects.

Diagnosis.—Wool must be pulled out at a freshly infected spot, where it has recently fallen out, and carefully examined under a high-power magnifying glass or the microscope. Finding the mite declares the character of the disease.

Treatment.—Separate the visibly diseased from the healthy. The disease is notifiable, and all the flock should be dipped after shearing. The sarcoptic and symbiotic mites are killed, and the places healed by removal of the scabs and dressing with antiparasitic ointment and liniments. Woodwork, railings, or posts on which sheep have rubbed must be relieved of bits of wool and washed with disinfectant, and the walls of abodes and troughs scrubbed with a hot alkaline solution and washed with disinfectant, and the ground soaked with the latter. Two or three applications of dressings are necessary, and affected flocks should be watched for about eight weeks after the last dipping to

see if itching reappears. Sheep affected with scab ought to be well fed while being treated.

Sheep-Pox (**Variola Ovina**).—Pimples followed by vesicles or blisters, which develop into pustules, appear on the inside of the thighs and forearms. It is a highly contagious complaint, sometimes killing 20 per cent. of a flock. The disease is notifiable, and infected and in-contact subjects are slaughtered, and all preventive and hygienic measures adopted. Natural infection is said to take place through breathing infected air, and the contagion carried to the lungs reaches the blood-stream and comes to the surface of the body in the regions heretofore mentioned. From eight to ten days after infection the pocks appear. There is fever, discharge from the nose and eyes, and a peculiar bad smell arises from the animal. An eruption of a similar nature to that on the skin arises on the mucous membranes, and the tongue and mouth exhibit the lesions. Fortunately this is a rare disease in these isles.

Tetanus, or **Lock-Jaw,** is due to an attack of the *tetanus bacillus*, which enters by a breach in the skin or digestive tract. Seen occasionally after docking, castrating, or soon after birth, from infection through an unhealed navel. The animals become stiff, turn their heads to the side and backwards, seem as if glued to the ground, and are often affected with diarrhœa and inflammation of the bowels. If many lambs are attacked, dress all external wounds antiseptically, keep warm and dry, and give sloppy, nutritious food. Inasmuch as the bacillus of tetanus lives in certain soils (near manure heaps and in garden mould), due precautions must be taken and suspected quarters changed.

Ticks (**Keb** in Scotland) are parasites dwelling on the

skin for a time, which bore into the integument with their mouths and suck blood. They may be found about the jaws, belly, thighs, and under the tail. The eggs of the tick are laid among damp vegetation, and the larvæ hatching, attach themselves to the body of the sheep. Those that attack sheep are called *Ixodes ricinus* and *Ixodes reduvius*. The origin and spread of redwater has been attributed to ticks, so that, apart from the discomfort they cause, these pests ought to be destroyed when present. Arsenical dips kill them, as does also petroleum oil. Cutting them in two with scissors is one way of destroying them. *Melophagus ovinus* (Fig. 6) is a false tick living in the wool of sheep. Dipping for killing ticks is recommended in April and May or October and November.

Fig. 6. — Melophagus Ovinus (Keb of Sheep). (After Neumann.)

Tsetse Illness is a disease of Central and South Africa, spread among horses, cattle, sheep, goats, and dogs by a biting fly called the *tsetse-fly*. This fly inoculates the blood with a parasite called a trypanosome. It sucks the blood of a diseased animal, and takes up the parasite in its own body, and places it in that of a hitherto healthy animal when it bites. There is emaciation, anæmia, and swelling of the space between the branches of the lower jaw. Microscopic examination of the blood may show a few parasites. Cattle and sheep attacked recover oftener than horses.

Wool-Eating, though not a disease, is a bad habit sometimes seen among lambs and yearlings. It is supposed to be due to the tedium and boredom of being

confined after free roaming, and its spread in a flock arises from the faculty of imitation. No doubt, however, insufficiency or poorness of food may cause it. Lambs gnaw their mothers' coats, and later nibble the wool of other sheep. Occasionally single lambs die, because wool-balls have formed in, and stopped up, the opening of the stomach or the bore of the intestine. Isolation of the wool-eaters, and also the nibbled animals, is indicated. Give the rest of the flock as much freedom as possible, and food containing a sufficiency of nourishing salts. If ewes are giving little milk, their supply should be helped by cows' milk.

Worms cause great mortality of sheep and lambs, especially on low-lying, marshy lands, and in wet seasons of the year. The eggs, or larvæ, of most of the species are taken up by the sheep when drinking or grazing, and develop, in certain of the internal organs, into mature worms. One of the commonest inhabitants of the fourth stomach of sheep and goats is a round worm called—

(*a*) *Strongylus contortus.* It is thread-like in appearance, of a reddish colour, and $\frac{1}{4}$ to $\frac{3}{4}$ inch long. Another round worm called *Strongylus filicollis* may be found in the same situation. Taken up by the sheep in the vegetation or drinking water, the strongyli bore into the mucous membrane of the true stomach, sucking blood therefrom, and excreting poisonous matter into the vital fluid, causing it to be injuriously affected in formation and composition. The stomach becomes subject to an acute or chronic catarrh, and its contents may be coloured red. The worms may be seen on mixing the contents of the maw with water, or by the use of the microscope.

Symptoms.—They cause visible poorness of condition, emaciation, and weakness, followed by dark-coloured diarrhœa, the eggs of the strongyli sometimes being found in the droppings.

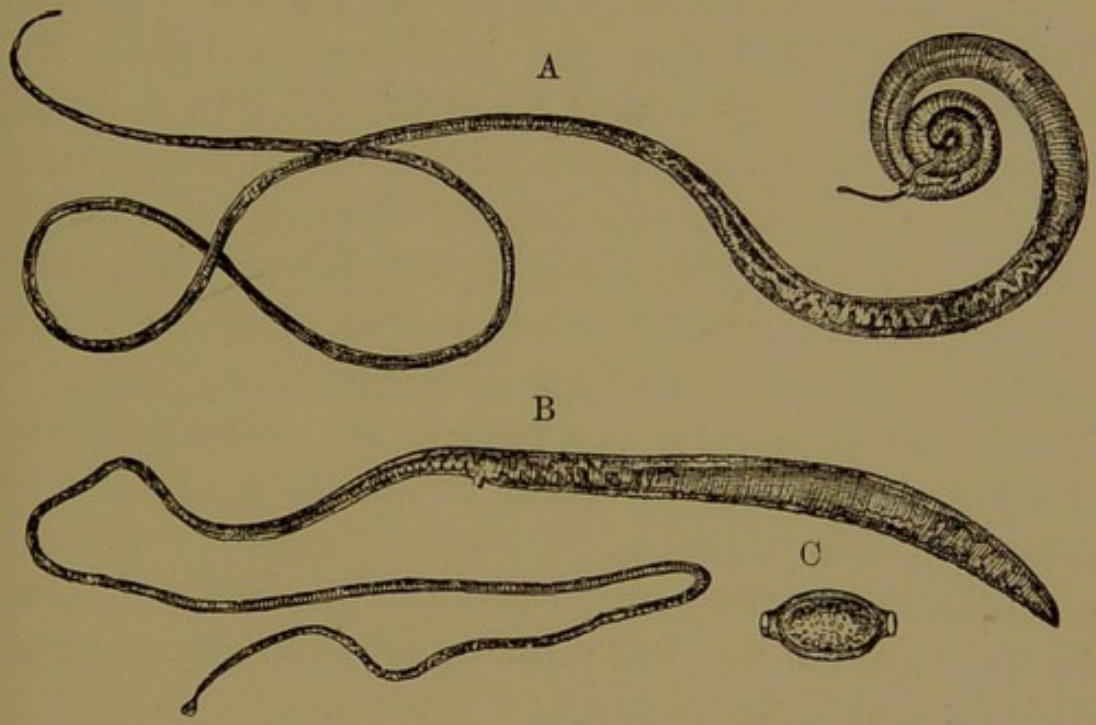


Fig. 7.—Tricocephalus Affinis. (After Neumann.)
A. Male. B. Female. C. Egg (greatly magnified).

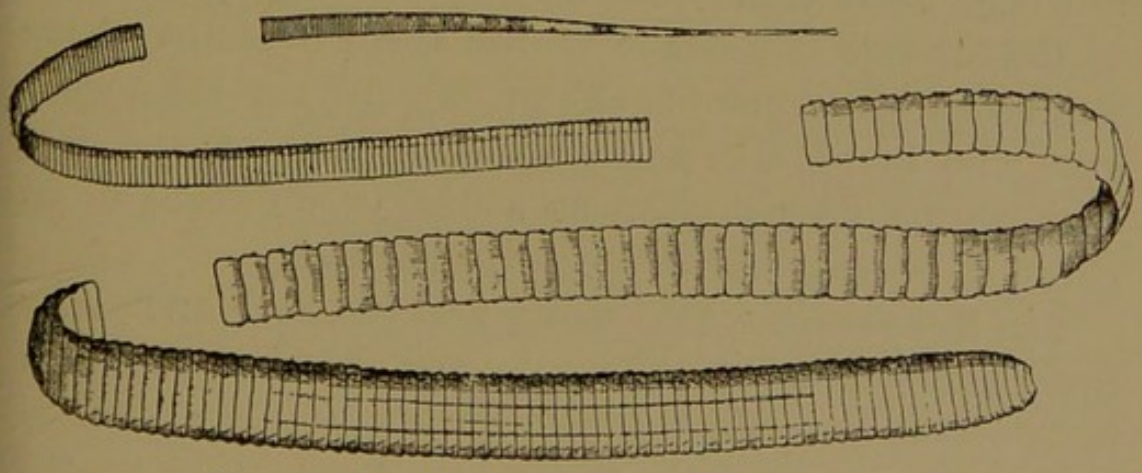


Fig. 8.—Tænia Expansa. (After Neumann.)

(*b*) *Tricocephalus affinis* (Fig. 7), or the hair-necked worm, lives in the large and blind gut of sheep and goats.

This worm lays eggs in the alimentary canal of its host, and these, developing somewhat, are passed out on to the pasture and taken up by a fresh host, in whose intestine the eggs hatch and become again adult worms.

(*c*) *Tænia expansa* (Fig. 8) and *alba* are two tape or flat worms inhabiting the intestine of lambs and yearlings. They may cause death by balling in the small bowel, and occasion colic, constipation, and diarrhœa.

(*d*) A nodular disease of the intestine of sheep is caused by a worm (having no mouth but merely a gullet opening) which is called *œsophagostome*. Infection occurs in damp, swampy meadows in August and September. The knots or nodules produced in the intestine hinder the functions of the bowel, and form ports of entry for other injurious organisms.

These worms frequently cause the death of their hosts in two to three months, with progressive symptoms of diarrhœa, anæmia, cachexia, and coma.

(*e*) Roundish, or oval cystic forms, called *coccidiæ*, are found in the small intestine of sheep and goats, causing anæmia, emaciation, and diarrhœa. An examination of the mucous membrane of the small intestine shows numerous white points. There is generally some wise-acre who in his day and generation rises up and says that worms do not exist as stated, or do no harm to sheep or horses, and do not cause death.

The fact remains that many flock-masters and veterinary surgeons know differently, and the above recorded facts may help to dispel the illusion as regards the ovine.

Treatment.—Recently the tablet form of treatment for worms in sheep has come much into vogue, and results with it are reported to be gratifying. The animals are fasted for twelve or sixteen hours, and dosed with

the tablet dropped on the back of the tongue, while the head is held up. Lambs are not dosed until eight weeks old, and only given one tablet, whilst full-grown sheep take two. In-lamb ewes may be dosed with safety. Messrs. William Cooper and Nephews, Berkhampstead, and Messrs. W. Stevens and Co., Westminster Bridge Road, London, furnish the tablets at very reasonable prices.

The tenacity of life of many of the larvæ of worms is quite surprising, and to the layman may seem almost

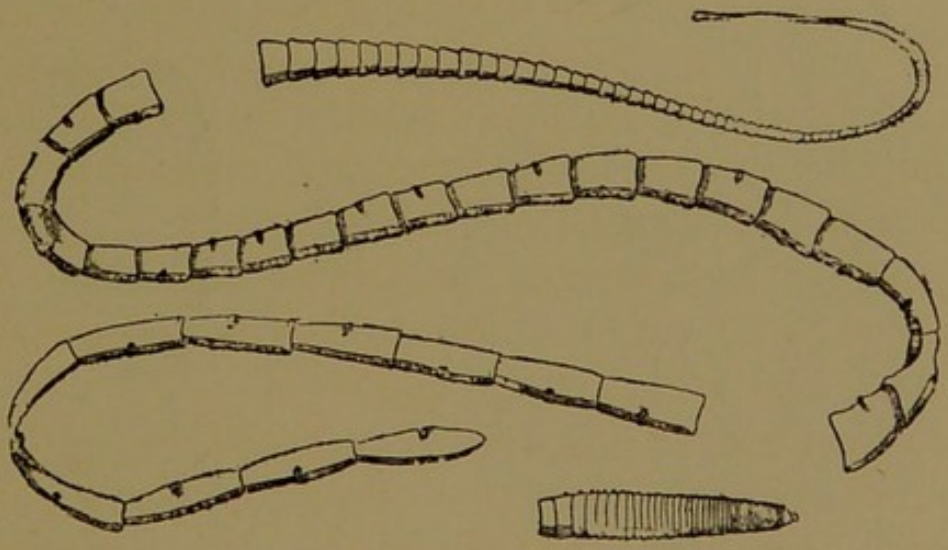


Fig. 9.—Tænia Cœnurus. (After Neumann.)

astounding. This fact accounts no less for the difficulty in overcoming their ravages than the character of the pasture in many parts of the country. As an example, the larvæ of *Strongylus contortus* will not dry up for five weeks; they can live for a month in deep water, and on meadows for seven or eight months, and are not injured by the extreme cold of winter. Any medicinal treatment that will *kill* the pests as well as *expel* them from the sheep's body will be a great boon to flock-masters.

Sturdy, or **Gid**, is caused by the encysted larvæ of a

tapeworm of the dog, *Tænia cœnurus* (Figs. 9 and 10). The egg is taken up by the sheep in the food or water, reaches the stomach, and is carried from thence into the blood-stream, and so to the brain, where it forms a cyst, or cavity bounded by a wall, and fixes itself on the covering of the brain by a hook from its wall. Sheep affected walk with their heads to one side or raised up, and there is softening of the bone of the skull. Making a hole through the skull and removing the cyst is the

Fig. 10. — Hooks of Tænia Cœnurus. (After Neumann.)

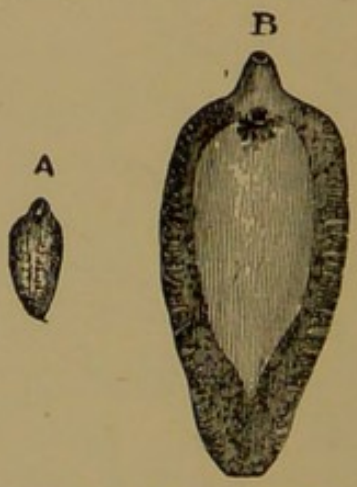


Fig. 11.—Distoma Hepaticum, Young and Adult. (After Neumann.) Natural size.

radical operation for the disease. Dogs should be habitually treated for worms before turning out with sheep, and sheep's heads affected with the cysts should not be given to dogs.

Fluke, Rot, or **Dropsy of the Liver,** is due to parasites, *Distoma hepaticum* (Fig. 11) generally, and *Distoma lanceolatum* (Fig. 12) occasionally, which gain access to the liver of sheep by being taken up in a soft mollusc, or snail, called *Limnæa truncatula* (Fig. 13). The juices of the stomach dissolve the body of the

mollusc and liberate the fluke, which gains access to the liver and deposits its eggs, which are passed out by the sheep to go their life-history round again. The eggs are carried to the water by wind, rain, insects, feet of animals. They develop tails when they get to the

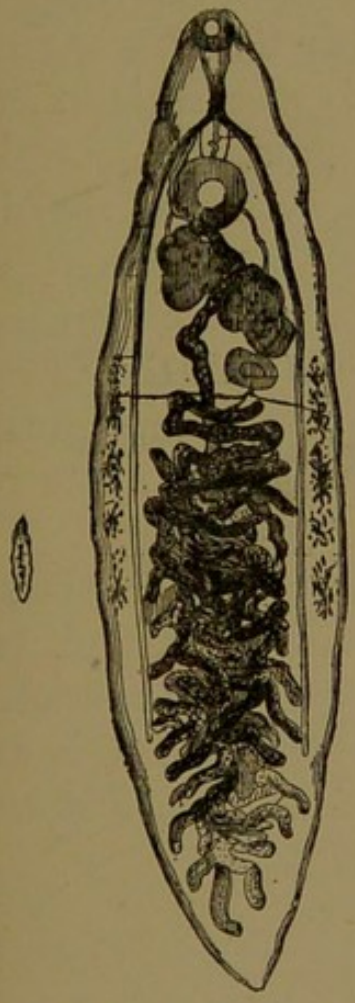


FIG. 12.—DISTOMA LANCEOLATUM. (After Neumann.) Natural size and magnified.

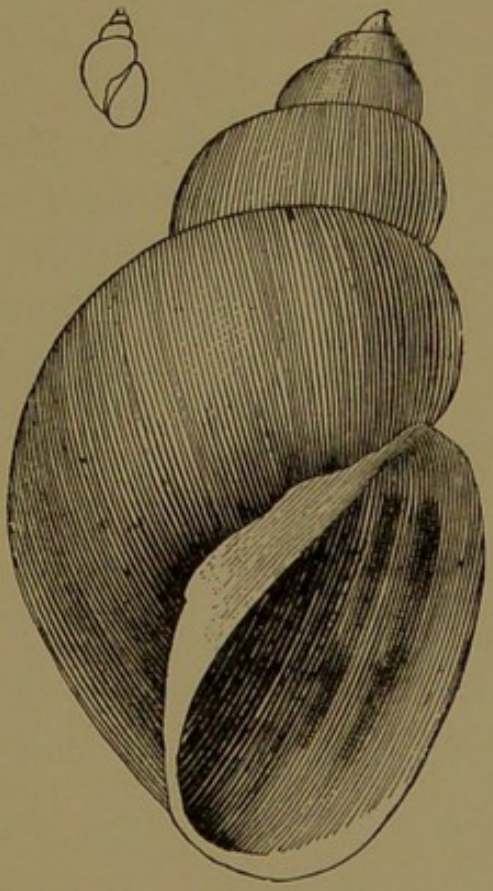


FIG. 13. — LIMNÆA TRUNCATULA. (After Neumann.) Natural size and magnified.

water, swim about, and then, entering the body of a mollusc or snail, encyst themselves there until they are taken up by the sheep from the cercaria on the pasture or in the water.

Symptoms.—Sheep affected show a yellowish tinge in

the eye, become " pot-bellied," or dropsical and anæmic ; there is thirst, diarrhœa, and great weakness.

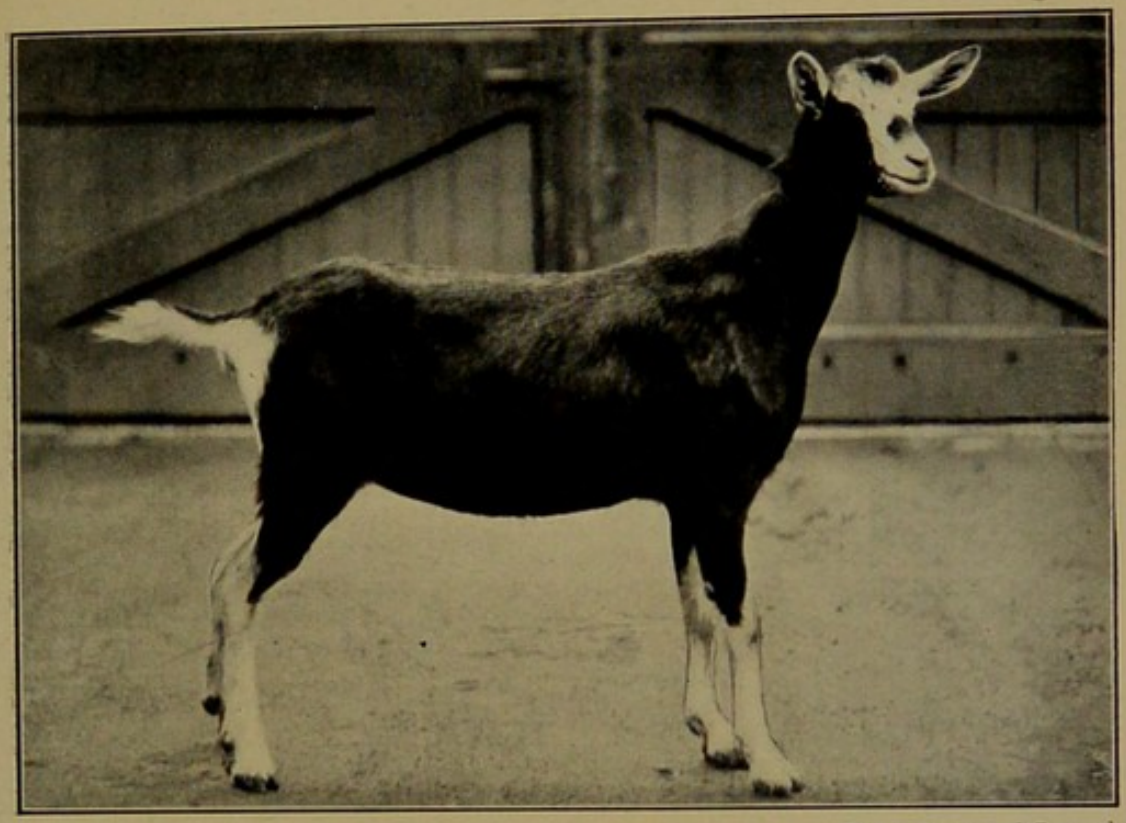
In a dead sheep's liver the flukes, which are like tiny flat-fish, may be found in the gall-ducts in great numbers, up to 1,000.

Treatment.—Recent investigations by members of the French veterinary profession for their Government have shown that the best remedy in this disease is etherial extract of male shield fern. One gramme (15¾ grains) for each 11 lbs. of the animal's weight is the dose stated as likely to be effectual.

As preventive treatment salt, sulphate of iron, creosote, and oil are recommended. Quick-lime kills the *Limnæa truncatula.* The abandonment of rearing and grazing on low and marshy pasture, and its giving up to root or grain culture, will pay best.

Wounds.—May be clean cut, lacerated, or bruised. Clip the wool off and bathe with antiseptic, such as a solution of Jeyes or chinosol. Cut off any dead or hanging pieces of skin. Open cavities filled with fluid and syringe out with antiseptic. Keep clean and dress with carbolized oil or healing ointment.

Plate XXVI.

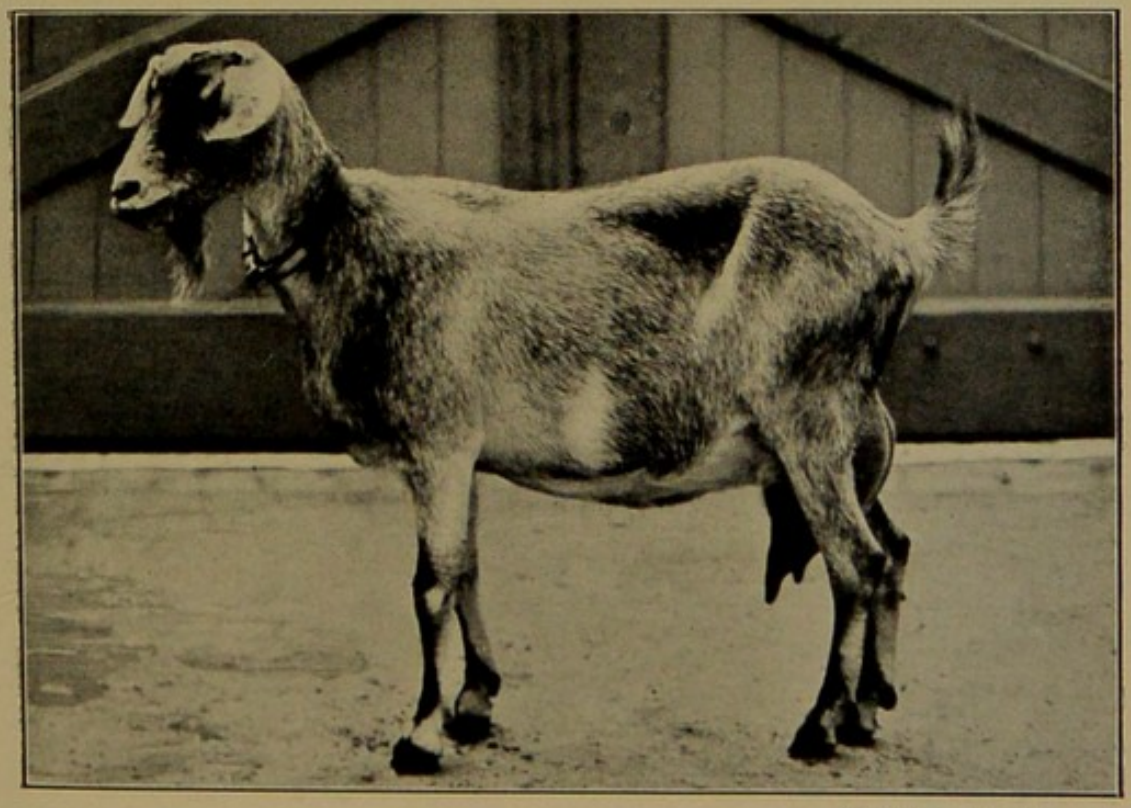


Photo, Sport and General.

SWISS GOATLING : SEDGEMERE CRAVATE.

Owned by Mr. Sam Woodiwiss. Dairy Show. Sold for 35 guineas.

Plate XXVII.



Photo, Sport and General.

ANGLO-NUBIAN GOAT : COPTHORNE PLUM.

Owned by Mrs. Handley Spicer. First, Dairy Show.

To face page 88.

Plate XXVIII.

Photo, Sport and General.

ANGLO-NUBIAN GOAT: BRICKET LOUISA, SHOWING PURE NUBIAN TYPE.
Owned by Mr. B. Ravenscroft. First prize, Dairy Show.

Plate XXIX.

Photo, Sport and General.

MRS. HANDLEY SPICER'S GOATS IN THE PADDOCK.

To face page 89.

PART II.—GOATS

I

INTRODUCTION

Wild goats inhabit high mountain-ranges in Persia, Russia, Armenia, Afghanistan, Beluchistan, Palestine, and the Island of Crete.

They are quick and agile in their movements, travel perilous paths with ease, jump from crag to crag, saving themselves by their horns if they slip, and climb steep slopes admirably.

Sight and smell are very acute, and warn them of approaching danger. They live on the leaves of trees in the day-time, and take refuge in the forests at night.

Goats differ from sheep in that their horns rise upwards and curve backwards; their forehead is narrower and nasal bones longer; they possess a beard, and have a short raised tail, naked beneath; no muzzle at the end of the nose; the females have large udders with conical quarters. The incisor teeth of goats are narrower and longer than those of sheep.

Domesticated goats have been bred in large herds in many continental countries. There are about 22,000,000 goats in Europe, of which Spain possesses over 4,000,000, Germany about 3,000,000, Greece 2,000,000, Italy

2,300,000, Austria 2,100,000, France, Bulgaria, and Russia, about 1,500,000 each, Switzerland, Hungary, Sweden and Norway, about 400,000 each, and Denmark about 31,000. In Algeria there are 5,000,000 goats. There are 4 goats to every 100 inhabitants in France, 6 to every 100 in Germany, 8 to every 100 in Italy, 14 to every 100 in Switzerland, 18 to every 100 in Sweden and Norway, 23 to every 100 in Spain, 100 to every 100 in Algeria, and 119 to every 100 in Greece (Crepin).

The products derived from caprines are milk, meat, and wool.

In Europe the inhabitants of many countries have learnt the value of goats' milk and the cheese made therefrom.

In the Mont D'Or District of France goats fed largely on oatmeal porridge, well salted, will furnish ten times their own weight of milk in a year. They have splendid health, and never suffer from tuberculosis. Toggenburg goats of Switzerland are the premier milking animals. They remain in profit ten months in the year, and give 110 to 120 gallons of milk annually.

The meat of the goat is eaten largely in Italy, Spain, and the South of France. The flesh of the Angora goat is highly valued as meat, and has an agreeable flavour. Castration at an early age and feeding animals to sell fat at six months would perhaps increase the popular taste for the flesh, and get rid of any objectionable smell or flavour attached to the meat. In the manufacture of sausages much of the flesh might very well be used.

The Cashmere and Angora goat are Asiatic breeds.

The Cashmere goat furnishes the fine down under its long-haired coat from which Cashmere shawls are made.

It is said that the wool of ten goats is required to manufacture one shawl.

The soft undergrowth is collected by careful combing.

From the fleece of the Angora goat Utrecht velvet is manufactured, also lustrings, camelots, dolls' hair, and Turkish thread. It easily takes up any dye.

The Angora goat has been imported to the United States, South Africa, New Zealand, Australia, and California. The skin of the goat is used in the manufacture of gloves, boots, morocco leather, purses, upholstering, and saddlery. Tallow may be furnished in quantity by a fat subject, as much as 25 lbs. being obtained from a carcass.

The droppings of the goat are of great value as manure, and may be very advantageously used by the small cultivator. A goat passes on an average about 12 to 15 cwt. of dung annually, which is admirably adapted for garden and vegetable culture, being heating, nourishing, and quickly effective. It should be carried to a heap and covered with earth, and kept somewhat damp.

Goats have been the companions of man and the playmates of children for long years. They are mischievous, comical, and vivacious. As drawers of small carriages they are familiar sights at our seaside resorts. In many places on the Continent they have replaced dogs as draught animals. They are very intelligent, and soon know if they do wrong, appreciate good and resent bad treatment. Their milk fails somewhat if they are used for work, but they may dispense with the keep of a donkey, and so pay for themselves. The largest animals bred specially for work will shift a load of 10 cwt., and be useful servants for a decade. At a time when calves

are being slaughtered in large numbers, or being bred but sparsely, and yet cows' milk demanded and desired without the accompanying trouble in rearing being undertaken, there is room for a consideration in this country of all that appertains to the goat, and for a greatly extended breeding of the animal. Under the chapters dealing with "Diseases" and "Milk" we shall see the advantages which the goat possesses over its contemporary, the cow.

The difficulty of procuring a good milk-supply in isolated parts of the country far away from large towns can be overcome by an extended peasant proprietorship of the goat, and many scientific men agree that an extension of milk-drinking among the infantile and youthful population would be productive of much benefit to health and constitution.

We are a long way behind other countries in the cult of the goat, as a glance at what has preceded will indicate. It is doubtful whether our country will ever be suitable for the keeping of large herds, but there is no reason why individual ownership should not be very profitably and far more largely undertaken.

II

THE GOATS OF THE BRITISH ISLES

The best milking goat indigenous to these isles is the **pure-bred English goat.** The formation of the British Goat Society in 1879 has contributed largely to the numerical growth of the breed, and has done much to improve the milking qualities of the animal. It is by selection with the definite aim of improvement in milk-supply that the usefulness and value of this breed will be kept up to standard, and being acclimatized is a point in its favour.

Specimens of the breed are large in size, with a long, wide, and deep body; coat black to white, fawn, or variously marked, close and longish in texture, with plenty of fine undergrowth; strong and sturdy legs. Not only is the milk from this goat of excellent quality, but the animal has the reputation of remaining in profit longer than any other breed of native goat.

Scotland, Ireland, and Wales, each have their caprine breed.

The **Scottish animal** may be of Highland or Lowland descent. The Lowland goat is the bigger and better of the two. It is of quiet and docile disposition, often white in colour, and an excellent milker. The pasturage in the plains and the surrounding life usually make an animal larger and more profitable as a producer

than where hill or mountain grazing and roaming prevail.

The **Irish goat** is at present a somewhat profitless animal. It is long in the leg, of heavy and coarse appearance about the head, flat-sided and short in body; coat black and white, tinged red or brown, or grey and white tinged yellow.

There is room for the hand of selection and crossing in dealing with this breed in order to improve it. It is generally a poor milker, with a short lactation period, and is often badly tended, but thrives well on coarse fare, and is hardy in constitution. It has large horns, and is pugnacious in character.

The **Welsh goat** is somewhat like the Irish one, but not so badly formed, neither so flat-sided, nor so coarse about the head. It is a poor and short-time milker, with small teats and udder. Regulation of breeding, selection, careful tending and feeding, would quickly improve this breed.

There are many **mongrel goats** in Great Britain and Ireland of no particular value or use. A large number of them have arisen from crosses of the native breeds with Indian and Maltese goats formerly landed without check on our shores. The acclimatizing trouble, lack of prominent points, and perhaps bad blending have rendered the introduction of the Maltese goat of less value than it otherwise would have been. It is certain that on its own island this goat is esteemed worthily as a milker, and the goatherd (often a female) who brings the animal into the houses and milks it at one's door is a prominent and well-known figure in Malta.

A foreign goat which has done much to improve the milking qualities of our caprines is the **Toggenburg**,

which is bred in the valley of that name in Switzerland, in the east of the country and canton of St. Gall.

The breed is without horns; the coat medium length; the colour a light brown, with two greyish-white bands on each side of the head at the cheeks; the forehead and its tuft are light brown; the coat is fine, silky, and glossy.

The hair of the legs is light grey to above the knee, and the inside surface of the thighs coloured the same; the interior and edges of the ears are grey, and there are two tassels of the same colour in the tail.

The height of a Toggenburg at the withers is about 29 to 31 inches. The conformation of the goat is good, the forehead and nose are large, and ears somewhat heavy. The back is straight, sides rounded, legs of an average length, and well set on, udder well developed, with teats far enough apart. A good goat of this breed may be bought at its home for £3 5s. to £3 15s.

The breed has an excellent reputation as a milker; eight members of the race, kept at a goat-breeding station in the Rhine Valley, remained in milk for an average period of 345 days, and gave 1,581 lbs. of milk, or about 158 gallons each (Dr. G. Wilsdorf).

The **Nubian goat** has been usefully crossed with our breeds. It is an excellent milk goat, of reduced height, with an undershot lower jaw. This and its long wide pendant flat ears enable specimens of the race to be easily distinguished. The female has no horns, but those of the male are widespread, and turned up towards the extremities.

The udder is divided into two well-marked lobes, and the teats are placed laterally. The coat is long and fine, of black or brown hue. The females are very prolific,

producing four or six kids during the year at two births.

The milk is rich in fat, and many goats of this tribe will give 7 pints of lacteal fluid a day for a considerable period. The goaty smell is least present in the milk of this breed. The animal is not easily acclimatized here; very cold weather does not suit it, and it must be housed during the winter months.

It is quiet and docile, and a good doer if fed suitably.

Only a few Nubian goats have been imported into this country. The first one came over in 1883, the last one in 1903, and at present there is not a specimen of the pure breed left in this country (S. Holmes Pegler).

In the Anglo-Nubian goat the type of one or other of the two breeds preponderates, and of course the race can now be bred as a pretty true cross.

III

FEEDING AND CARE

The range of food consumed by goats is a wide one. They thrive well on good hay or clover, and seem to appreciate leaves (notably ash, maple, oak, birch, and lime, but blackberry-leaves are dangerous), and tree-bark almost equally as well.

They will eat heather, fir-twigs, all sorts of garden vegetables, roots, and their leaves, scraps from the house, cabbages, potatoes, sunflowers, and prickly comfrey. Perhaps the chief portion of their nourishment is derived by grazing, but owing to the difficulty of keeping them within bounds, and in order that pasture may be equally and economically used up, it is usual to tether them. A light chain, 12 to 14 feet in length, is a good restrainer. It is not wise to keep them out in the full glare of a midday sun. They do not feed much then, and the great heat and flies trouble them.

About two hours morning and afternoon is sufficient time to consume the food within reach of the length of their chain. They may then be brought into their stalls, and fed on orchard wind-falls and garden waste, together with a pound of oats a day to help on milk quality. Crushed oats are especially desirable for the billy-goat during the mating season, and crushed oats and barley suit milking goats.

All food must be of good quality, not frozen or mouldy. Where grass is cut, and fed in the stall, it should not be gathered in a sack and given direct to the goat from the sack, as thereby death of the animal may occur. The cut grass needs to be spread out, and given in judicious quantity.

Dr. Wilsdorf considers that in summer a caprine will eat on an average 3 lbs. of hay, 3 lbs. of clover, and 10 lbs. of green food. In the winter, 6 lbs. of roots, 2 lbs. of hay, 3 lbs. of clover, and ½ lb. of earth-nutmeal. A change from all green food to winter feeding must be gradually brought about, otherwise the health of the goat and the constituents of the milk will be injuriously affected.

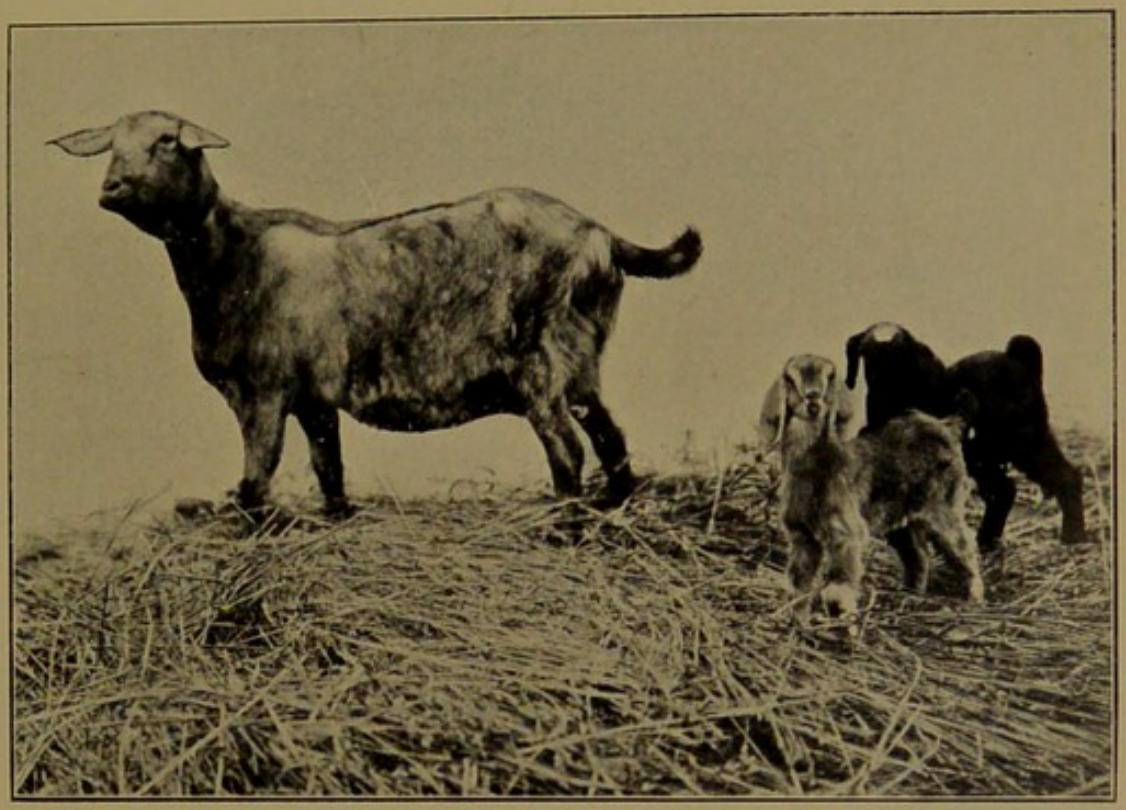
Goats are often apt to drink greedily, and too great quantities of water injure their digestive organs. About 2 to 3 quarts per day in winter is the usual quantity of water drunk. To give them drink half an hour before feeding is good practice. If water is given directly after, or close on feeding, the food goes too quickly through the stomach, and is not properly digested. Good food has its effect on milk-supply.

The better the food, the richer the milk.

A lick at a piece of rock-salt, or a salt roll, aids appetite and digestion. Hay of prime quality helps to bring up first-class goats, both for breeding and milk production.

Hay cut when wanted is better than aftermath as food. In a wet season the hay is poor in nourishing salts, and in a too dry year the lime salts are deficient. Oat straw, chopped with potatoes and green food, makes a suitable mixture for milking goats; 2 to 3 lbs. of potatoes may be given daily, if cut up small, but they

Plate XXX.



Photo, Sport and General.

A MOTHER AND HER CHILDREN.

Plate XXXI.

Photo, Sport and General.

ANGLO-NUBIAN GOAT: KILLERTON OPAL.
Owned by Lady Gertrude Crawford. Dairy Show.

To face page 98.

are better steamed, or cooked and mashed up. They increase the fat in milk, and put on flesh and fat in the subject.

Turnips, carrots, cabbages, or beetroot, in quantities varying from 2 lbs. of the first named to 6 lbs. of the last, furnish variety of root-supply. Roots are especially good for young animals, widening the digestive canal, keeping the dejections in a healthy state, and perhaps none suit the goat better than carrots.

Rape-, linseed-, and cotton-cake may be given, at the rate of $\frac{1}{4}$ to $\frac{1}{2}$ lb. a day, to help the quality of the milk, raise the standard of the manure, and keep the fæces natural. To be feeding all day long is not natural to the goat. Small portions of food given frequently suit the best. The appetite then remains keen, and the stomach is not overloaded. Too great quantities of food given at once cause waste, as the goat seeks out the best, and leaves the worst.

Clean boxes and pails keep away disease, and no food left in the receptacle is a proper state of things before adding a fresh meal. The rations must be given punctually and regularly, morning, noon, and night, or, better still, five times a day, starting at five o'clock and finishing at eight o'clock. Milking may be quietly conducted while a goat is feeding and drinking.

Cleanliness of the goat, the milker, and the stall, must always be the conditions for the production of the best supply of milk.

Grooming produces a healthy action of the skin, and keeps away skin parasites and wanderers. The short-haired goats are kept clean more easily than the long-haired ones. Before milking, the udder should be wiped

with a cloth, or sponged with lukewarm water, and dried with a clean towel.

The claws of caprines need attention where they are constantly housed, and too great dampness or dryness must be avoided in the stalls. Letting goats move about a bit in an enclosed space every day helps to keep the feet in order, and benefits the general health of the goat.

Dirt between the claws must be removed, and overgrown horn pared down. Goat stables require to be regularly whitewashed, as in the case of cowsheds.

Small-holders, whose land is limited, will appreciate the importance of not letting it get stale or sick from goat occupation. Deaths and disease result from this, and the land needs much doctoring before other stock flourish on it.

IV

BREEDING AND REARING

Milk-supply and kid-breeding are intimately associated. In order that a large quantity of the former may be produced, and that a more or less profitable sale of the kids may be effected, mating must be undertaken on right lines.

There is much room for judicious selection, bearing in mind shape, size, and milking qualities, in order to advance and improve the dairy goat.

Goats are capable of reproducing their kind at a very early age. Kids bred in the spring will mate during autumn. At seven to nine months old, œstrum, or "rutting," occurs in the female. The signs of the fact are reddened and swollen vagina, and vulva discharging slimy matter mixed with a little blood, frequent urination, constant waggling of the tail, restlessness, bleating, and jumping companions.

This state lasts for two or three days, and if a female goat is to become pregnant, she must be served at this time. Heat reoccurs about every three weeks, and as mating at seven months usually only produces weakly progeny, and stunts the growth of the mother at a time when she should be developing in flesh and frame, it is customary to put off breeding until nanny is eleven or twelve months old. Very strong and well-grown animals

may be mated earlier. Youth in the he-goat is advantageous, and at twelve months old they can serve profitably and produce good stock.

As a rule, it is best for all young animals to be produced in the spring, but the necessity of keeping up a good milk-supply will mean a production of youngsters at every period of the year. The buck is a very ardent begetter, and can serve as many as fifteen does a day, but too much service soon knocks him out of time, and if one wants him to last a few years, and not only make the females pregnant, but cause them to produce good, strong, healthy youngsters, the number of his jumps must be limited.

In many of the continental goatherds, a he-goat is only allowed about eighty females during the mating season. If signs of rutting occur within three weeks after a she-goat has been served, it is an indication that she has not conceived. Goats that have kidded often come in season again about two weeks after the birth, but in any case "rutting" almost invariably occurs in the early autumn. Where a female does not easily become in-kid, it may be due to poor feeding, bad weather, too violent service by the buck, catarrh of the vagina or womb.

Aids to fruition on the part of the nanny are feeding on good oats, celery roots, rape-seed tea, or a tablespoonful of hemp-seed daily. As medical aids, yohimbin or aphrodine may be tried. Young females that do not come in œstrum despite sufficient age and growth are not profitable to keep, and hermaphrodites are by no means uncommon in the goat tribe.

The presence of a buck will often excite the mating inclination in a doe. At first, when the two sexes are

put together, they often butt and rush at each other as if engaged in mortal combat, but they soon settle down and become friends.

The **duration of pregnancy** in the nanny is about five months or twenty-one weeks. Good and kind treatment during pregnancy always pays, and watchful care is especially important towards the latter end of the time of gestation. All causes of fright or violent running ought to be avoided, and laxative, nutritious, and easily digested food given. Movement and exercise towards the end of pregnancy always mean an easier time for the female.

This may be seen in the case of the human subject, where the woman who takes regular exercise, and even has to make a daily journey morning and evening to and from work, has a less painful time than her more-favoured sister who stops at home and busies herself about the house. Goats that are pregnant should not be sent long railway journeys. This may, and often does, lead to casting of the young. The milk should be dried off about six weeks before kidding is due, and this is helped by giving non-milk-producing food and milking the animal at fewer and longer intervals.

Before the time of birth, and near it, the state of the dejections should be carefully watched, and food of a laxative nature, such as bran mashes and a little linseed-cake, given. If constipation does occur, it may be remedied by ½ ounce of Epsom salts or 2 tablespoonfuls of castor oil.

No great or sudden changes of food must occur during pregnancy, or mishaps will result, but food of a concentrated and nutritive description must be given all the time to sustain the mother and her inside passenger, to

keep her frame in fit condition, and to produce eventually a rich and plentiful supply of milk.

Birth takes place about five months, or 154 days, after mating. It is announced by straining, the vulva swelling and discharging slime, the flanks and quarters falling in, the abdomen dropping, and the udder becoming stretched and swollen, and, perhaps, secreting milk, which must be carefully taken away, or otherwise it may cause much pain and injure the gland.

Restlessness, plaintive bleating, frequent voidance of dung and urine, anxious looking at the abdomen, are followed by the appearance of the water-bag, which bursts, and after an interval of probably one to two hours the fore-legs of the kid appear, followed by the head and body. Kidding usually occurs lying down, and by pressing and straining on the part of the mother the act is accomplished. If a she-goat makes no progress within two hours, she should be gently explored; but this is difficult, owing to the narrowness of the pelvis in caprines, and persons with small, thin hands make the best helpers at this time.

Oily or slimy injections facilitate the passage of the youngster through the vagina. The after-birth, or cleansing, should come away a few hours after parturition. Slimy drinks and irrigating the womb with an antiseptic help a tightly held after-birth to be got rid of. The mouth and nose of a new-born kid must be freed from mucus and membranes so that it can breathe freely, and then leave it for the mother to lick. Let the she-goat rest well after kidding, keep her warm and dry, and give warm slops such as oatmeal-water, bran, hay, or linseed-tea, and a little long hay.

After a few hours the kid may be put to the udder,

and soon learns to suck. If the goatling is not to be reared, it should be taken away from its mother early, and where triplets occur, one should be slaughtered within fourteen days or put to a foster-mother.

At three weeks old the youngsters begin to nibble a bit for themselves, and should be gradually brought on to succulent herbage, mashes, or meals.

At six to eight weeks they should be weaned. A careful watch must be kept on the vessel of a milking goat to see that the bag is emptied, and hand-milking must frequently supplement the kid's attentions. Milk should not be used for human beings until three days after kidding.

If fluid is left in the bag, the milk-giving properties of the goat will suffer, and the vessel may become injuriously affected. Where breeding is carried on, only the best kids from the best mothers should be kept, and those born in February or April make suitable subjects.

Many kids are reared by hand, and may be fed with cows' milk or that of their mother. A bottle with a teat is a serviceable utensil to bring them up on, or bucket-feeding by immersing the hand in milk and letting them suck a finger will accomplish the object. Goat-feeders with movable teats that may be fixed at any height are now sold. Milk must be good, utensils clean, and a pint of milk a day, gradually increasing the quantity until the kid begins to feed, is sufficient.

Remember that four or five drinks a day in the early time is nearest the natural way, best for the youngster's digestive organs, and the milk given must be lukewarm.

V

THE MILCH-GOAT AND HER MILK—MILKING

The man who desires a profitable milch-goat giving a large supply of lacteal fluid of first-rate quality will want to know how he can tell a desirable nanny when he sees one.

If he has a reliable record of the supply furnished to him for a fortnight, he can form a fairly correct judgment of the milking capacity of the animal. Change of surroundings, feeding, and milkers, however, have an effect on the amount of milk given; and because the she-goat does not render her regular supply the first day or two after purchasing, it must not be concluded that a bad bargain has been made.

When she has settled down she will probably give her normal supply. The amount of milk given will depend on the breed of the goat, the care exercised in breeding for milk, the treatment of the udder, feeding, tending, and the age of the animal.

Dr. Wilsdorf considers that the best German and Swiss goats after the first kidding give 650 litres, or about 142 gallons, a year; in the second period 700 litres, or about 152 gallons; and afterwards 175 gallons. Very good goats may give 1,000 litres a year. A goat in this country giving an average of 2 quarts or over a day for ten or eleven months may be said to be a good animal.

Plate XXXII.

Photo, Sport and General.

TALLY-HO-TAFFETA.
A Prize-Winning Goat.

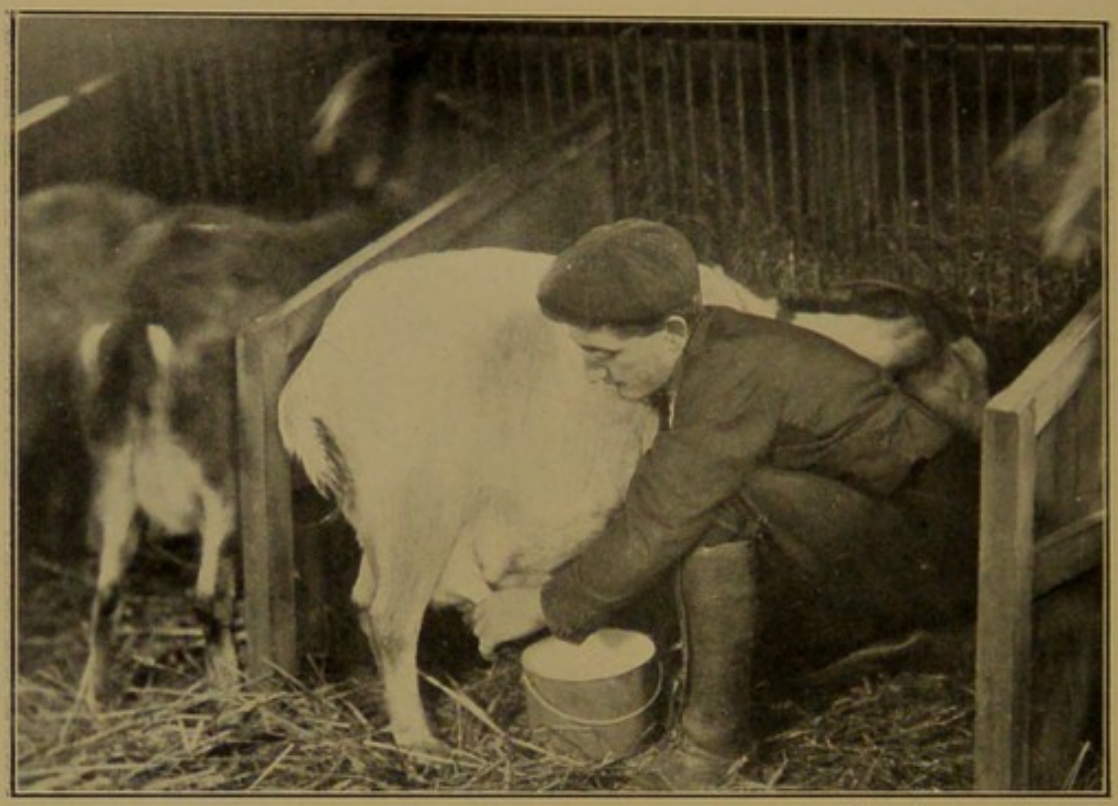
Plate XXXIII.

Photo, Sport and General.

GOAT-HOUSE AT MR. RAVENSCROFT'S STUD FARM, ST. ALBANS.

To face page 106.

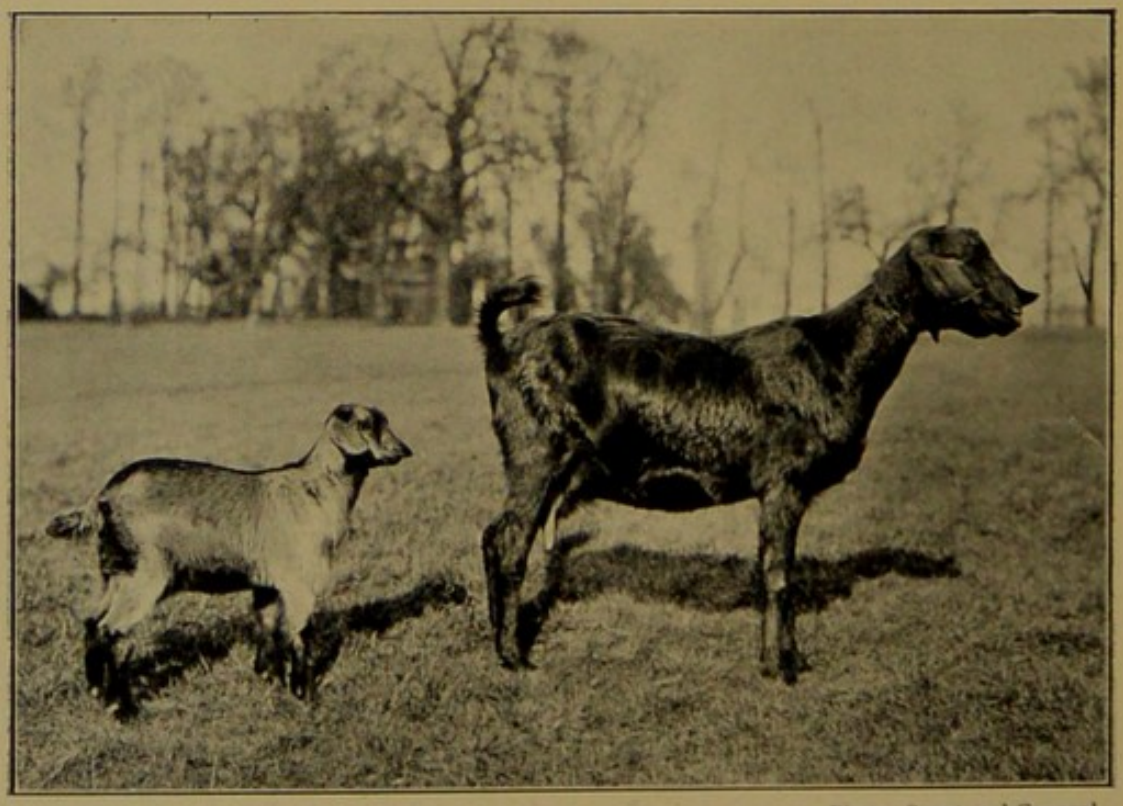
Plate XXXIV.



Photo, Sport and General.

MILKING AT MR. RAVENSCROFT'S FARM.

Plate XXXV.



Photo, Sport and General.

ANGLO-NUBIAN GOAT AND KID.

Owned by the late Baroness Burdett Coutts.

To face page 107.

A good milker will eat and drink enough to make milk, but will not put on too much flesh and fat. The external features of a goat furnish a good guide as to her qualities as a milking animal. She should have a longish body, increasing in size behind and below a deep, broad chest, fine bone, broad loins, rounded ribs and well-developed abdomen, a neck not too long and thick, light, broad head, and good udder.

A well-shaped vessel will be large enough, be equally divided, symmetrical, extend well forwards and backwards, and come up broadly between the hind-legs. A too pendent fleshy udder, with little glandular tissue, or coarse hairs on the skin, is to be avoided. The best bag feels firm and compact at its origin, has a thin white skin, covered with short, fine hairs; and, when not stretched or full of milk, folds and wrinkles may be seen in it. The fine skin can be well seen in the full udder, and the bloodvessels are plainly visible, which is not the case with the fat or fleshy udder.

A good milk-goat should have a fine, thin skin, easily felt by pinching over the rib region, and the integument possess firm, flat, glistening hair.

Hornless goats give the best-tasting milk. Good care and proper feeding keep the supply at its best.

For **age of goat** see Chapter III. in Sheep Section.

The **milk of the goat** is rich in albumin and fat, and in feeding value for children it is almost equal to that of woman. It may be sold cheaper than cows' milk, and if taken raw by infants is not open to the same objections as cows' milk; hence there is less danger of the milk containing the germs of disease.

The nutritious quality of the milk makes it exceedingly

beneficial for weakly, thin children in cases of chlorosis, anæmia, indigestion, and intestinal catarrh.

At first the taste of the milk will probably not be greatly relished, but many of those who begin to drink it soon get a liking for it, and the benefit arising from it quickly becomes apparent. Children that cannot digest cows' milk will take diluted goats' milk well.

Pigs, calves, puppies, and even foals, will thrive on good goats' milk.

The following table shows its composition as compared with that of woman and the cow:

	Goat.	Cow.	Woman.
Water	86·88	87·27	87·58
Albumin	3·76	3·39	2·01
Fat	4·07	3·68	3·74
Sugar	4·44	4·94	6·37
Salts	0·85	0·72	0·30
Solids	13·12	12·73	12·42

The specific gravity of goats' milk is 1·032; cows' 1·031: and woman's, 1·029.

Milking is undertaken on the right side of the goat, and for convenience and comfort, if she can be made to stand on a platform whilst being milked, so much the better.

Before commencing the act udder, utensils, and the milker's hands must be clean. The udder may be wiped with a cloth, or, if dirty, washed and wiped dry.

The base of the teat is seized between the first finger and first part of the thumb, and the milk isolated and pressed out at the teat by closing the fingers successively,

commencing with the middle one and finishing with the little one.

Sometimes the teats of goats are too small for this to be accomplished. When such is the case, use must be made of the thumb and first finger only, which must be closed high up at the base of the teat and slid down to its orifice, thus pressing out the milk.

This action must always complete the act of milking in any case, as thereby the last drops of milk, so rich in fat, are expressed from the udder, and no fluid left in the bag to go wrong and set up disease.

For the rest, regularity in milking, kindness, daily grooming, and cleanliness, are of great importance in producing a good and satisfactory yield.

Goats difficult to milk in early life may be confined in stocks or the guillotine whilst the act is being performed. This consists of two pieces of wood with a hole in for the animal's neck, the top half lifting up and down in order to admit of full control of the head and neck, and keep the subject stationary and harmless.

A good goat can be kept at under a shilling a week, and a small-holder can easily use all her milk advantageously in his household if he has a moderate-sized family.

VI

THE GOAT-HOUSE AND STALLS

A GOAT-STABLE may be anything from a small enclosed shed to an elaborately fitted goat-house. It all depends on the sum of money that the owner is prepared to lay out. To anyone at all handy with carpenter's tools, two

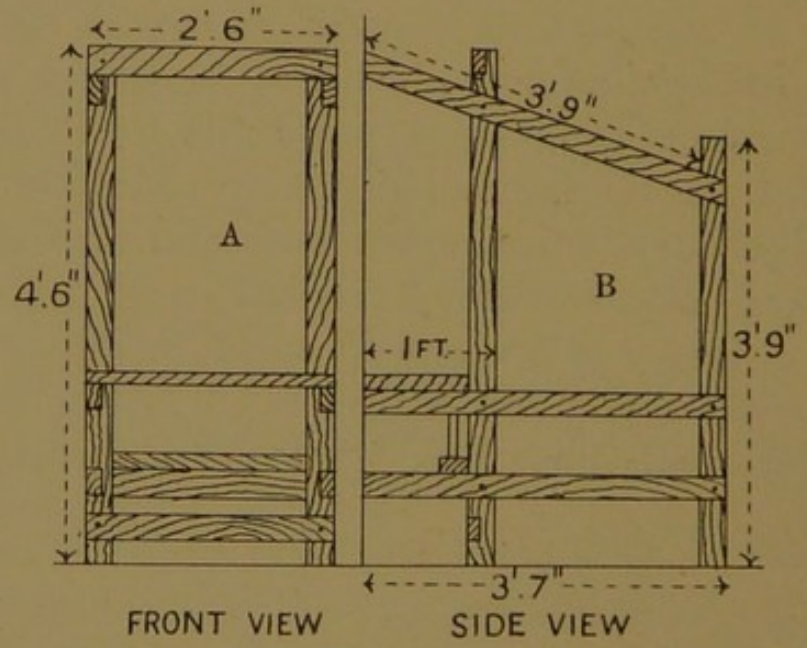


FIG. 14.—STALL.

or three stalls may be fitted in an ordinary outhouse, a tool-shed, or similar structure, at a very slight expense, especially if empty ham-cases are made use of for the purpose. These cases, which can be bought for 10d. or 1s. each, are made of tongued and grooved boards,

1 inch thick, from 4 to 6 inches wide, and about 3 feet 6 inches long—some being longer.

Whether the goat-house is large or small, partitions are very necessary for separating the animals, otherwise the stronger ones annoy and take the food from the weaker. Each partition should be 3 feet 6 inches in length, 4 feet at the highest part in front, and 3 feet

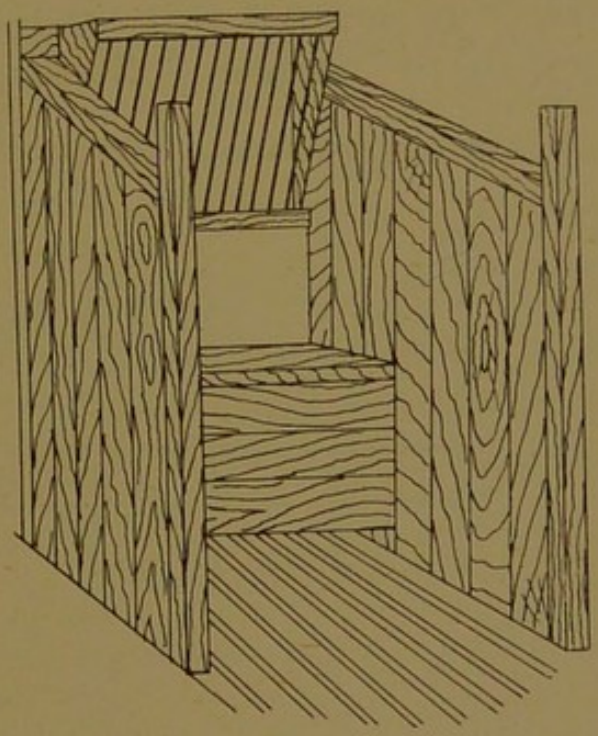


Fig. 15.—Stall.

6 inches at the lowest part, the width between each stall being 2 feet 6 inches.

In the accompanying illustrations Fig. 14 shows the framework of the stall, and Fig. 15 the same boarded in, A being the front and B the side view of the frame. This framework is constructed of slate battens 2 inches wide, and is easily put together. In the front view here given *b* is a board $1\frac{1}{4}$ inches in thickness, which has a circular hole cut in the centre—being sawn on the

bevel—to allow a small pail to be dropped into it nearly up to the rim. This holds the food of the goat better than a manger, as it can be easily emptied each day, and cleaned of any unconsumed contents.

Above the feeding board, and at a convenient distance therefrom, to suit the height of a goat, a hay-rack should be fixed. This consists of a frame made from a 2-inch batten 1 inch thick, having bars of iron inserted 1½ inches apart, or at most not more than 2 inches, the bars being ¼ inch in diameter. Some people prefer

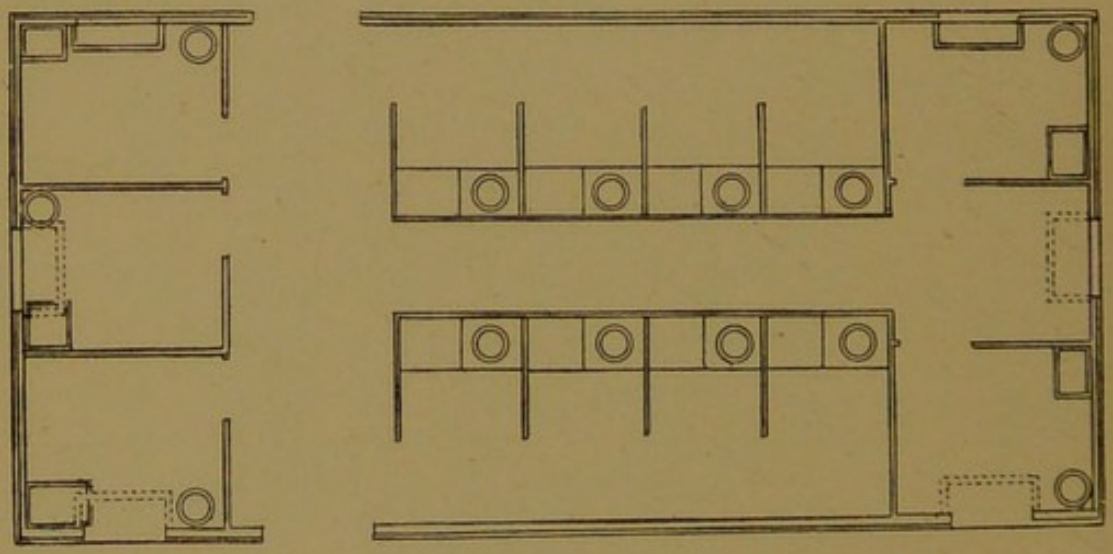


Fig. 16.—Plan of Mrs. Handley Spicer's Goat-House.

thin bamboo canes to iron bars, as the latter rust. In addition to the stalls here described, some loose-boxes should be provided if several goats are kept, but one such box in any case, as it is useful for a goat about to kid, or for the kids themselves when separated from the dam.

In the illustration of the complete stall a movable sparred floor is shown. This may or may not be used. Some goat-keepers employ it in the belief that the animal has thereby a cleaner and drier bed, but as such

floors have to be frequently removed for drying and purifying by exposure to the open air, extra work is entailed, which is an item with people who look after their own goats.

In the erection of a goat-house three things are essential — first, perfect ventilation; second, freedom

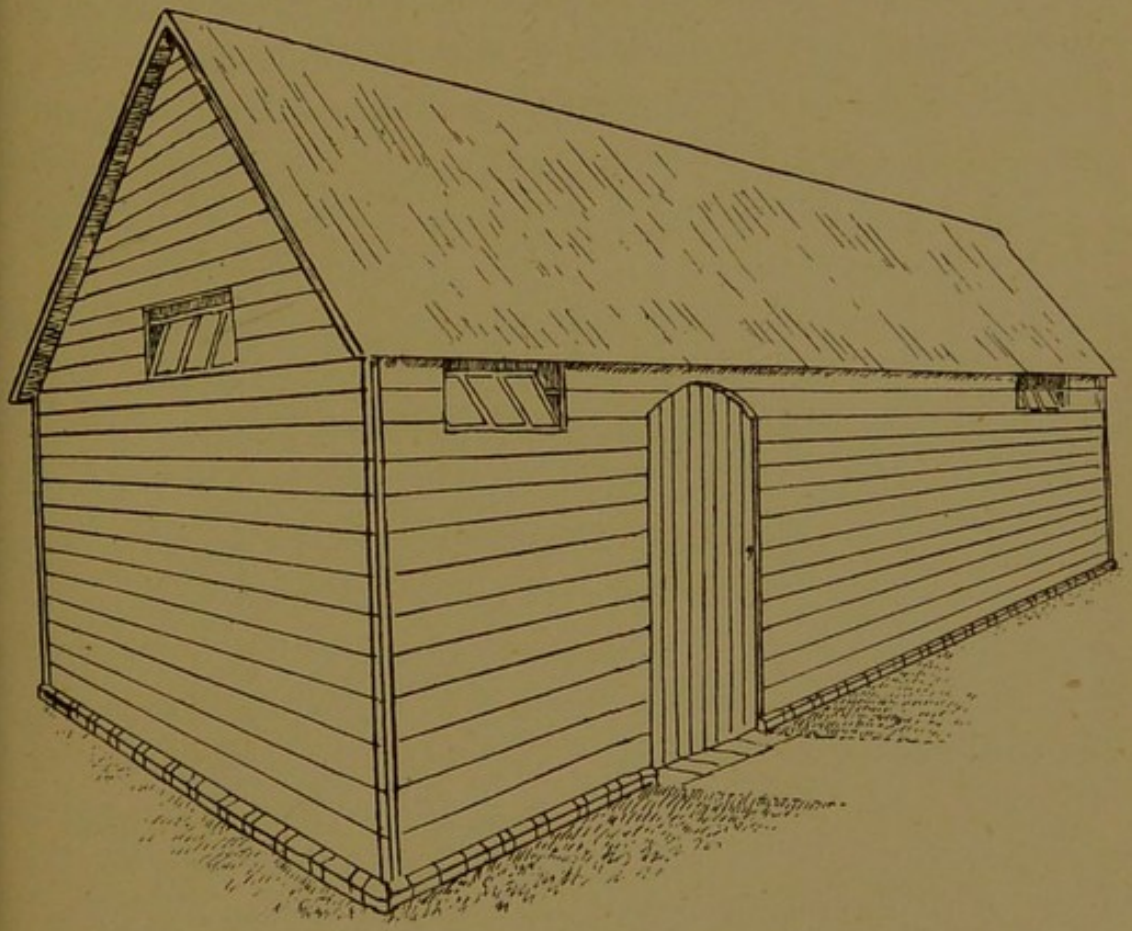


FIG. 17.—GOAT-HOUSE.
Elevation.

from draughts; and third, a dry floor. If space admits, it is better to have the stalls arranged in the middle of the house with a gangway between, so that the attendant can feed the animals from the front instead of from the back. Such an arrangement is shown in the plan of Mrs. Handley Spicer's goat-house (Fig. 16) here given, which provides eight such stalls, four

on each side. It has also three loose-boxes at one end and two at the other end, the milking bench being constructed between the two latter. The dotted lines in the plan show the position of the windows, which are situated as high as possible.

In the house here illustrated (Figs. 17 and 18) the partitions are wider than those described above, the hay-racks being on the left, and the feeding-board on the right, instead of the former being exactly above the latter.

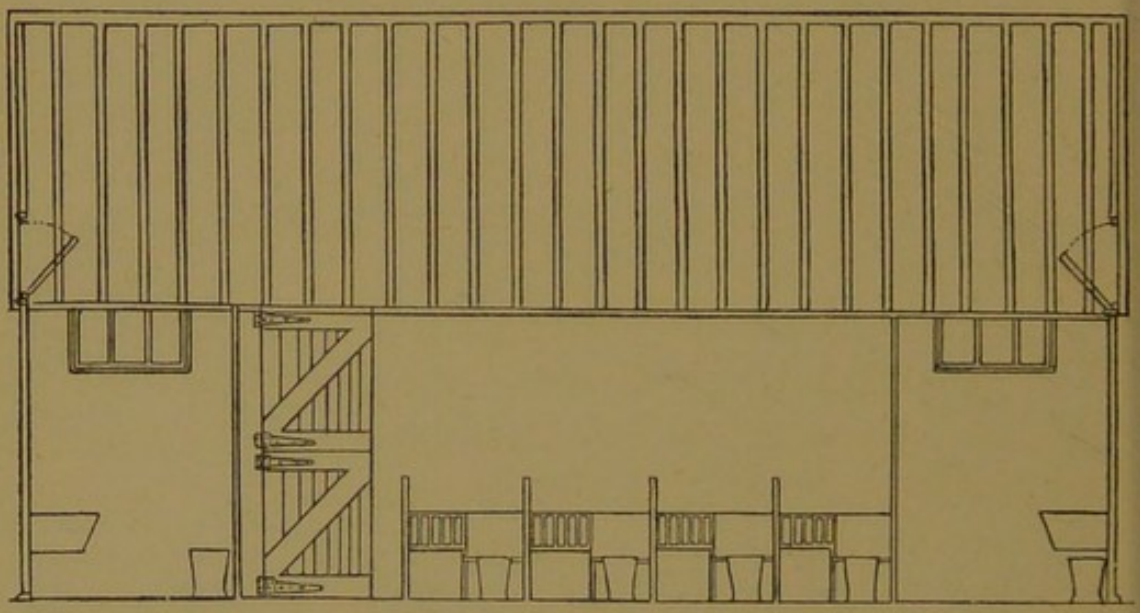


FIG. 18.—PLAN OF GOAT-HOUSE.
View of Interior.

This is a matter of detail, and depends mainly on the space at command, but in case more than 2 feet 6 inches is allowed in width it is very necessary that the chain which fastens the goat should be quite short, otherwise the animal will be able to turn round, and will soil its manger or feeding-pail, and when this happens it has to be thoroughly cleansed before the goat will again eat from it. In the matter of cleanliness in connection with feeding, goats are scrupulously particular, and for the sake of their health and comfort this should be carefully attended to.

In the arrangement of loose-boxes it is a good plan to erect against the wall at the back a slab as a sleeping-bench. This should be about 2 feet wide and 3 or 4 feet long, being raised 18 or 20 inches from the ground. Most goats will give preference to this to lie on, both at night and in the day-time, to a bed of straw, however clean, on the ground.

The height of these loose-boxes should be 5 feet, to prevent the goat from jumping over, but they may be made to slope from back to front like the stalls, the front measurement in that case being 4 feet.

In Lady Gertrude Crawford's goat-house a very good plan is adopted for feeding the goats, though it is somewhat expensive. The food is placed in shallow semi-circular metal feeding-boxes, 2 feet from the ground, hung or hinged in such a manner that they swing outwards to be filled and emptied, and close again flush with the outside of the box, enabling the attendant to feed the animals without entering the stall. There is also a compartment for the storing of hay, corn, and utensils. In the plan given one of the loose-boxes is so arranged as to serve such a purpose.

The floor of the goat-house should preferably be of good cement, sloping to the rear of the stalls, with a channel behind to carry away the drainage. This, again, however, is a somewhat expensive item, and therefore, in a cheap construction, an earth floor beaten hard will answer the purpose for a certain time, but peat moss litter should be used as an absorbent of the liquid manure, otherwise the earth will require rather frequent replenishing.

The roof, if economy is studied, is best made of boards with tarred felt over them, and re-tarred every other

year. Corrugated iron roofing is probably cheaper, but it is objectionable unless felt is placed underneath, being hot in summer and cold in winter, with the further objection that the moisture from the animals' bodies on rising condenses when in contact with the cold iron, and falls back in drops on the goats.

VII

DISEASES OF GOATS

In many cases the remedies suggested in the chapter on Diseases of Sheep will be quite suitable for similar ailments of goats. The goat in the natural state, when given exercise and a fair amount of outdoor life, may be classed as one of the healthiest of animals, but when reduced to a milk-producer, and greatly housed and intensely fed with corn, disease comes more frequently than otherwise.

Abortion in goats is generally due to some external cause, but they can stand a good bit of knocking about, and blows, without coming to much harm. Fright and bad or frosted food may cause it, and exposure to severe weather when heavy in kid.

Treatment.—Isolate the animal. Keep her warm, dry, and quiet. Give nourishing food, egg and milk, and bran mashes made with linseed tea. See that the after-birth is removed, and then wash out the vagina and womb with an antiseptic such as chinosol solution or Jeyes' fluid. If the animal is very restless, give a tea-spoonful of chloral hydrate crystals dissolved in ½ pint of water, and follow up with some powders containing 2 drachms of magnesium sulphate and 15 grains of nitrate of potash in each powder. Dissolve in water, and give two or three times daily as a drink.

Anthrax occurs seldom in goats. It is due to food grown on anthrax-infected ground. The symptoms are convulsive reeling, trembling, and staggering movements, and blood discharges from the orifices of the body (Wilsdorf). The disease is notifiable.

Broken Horns occur from accidents or by butting. Check the bleeding, if any, by antiseptic dressing or compresses. Smear over some Stockholm tar, then put on some tow or cotton-wool, and bind with a bandage. A piece of thin tar-cord wound round the linen and passed to the opposite horn keeps things in place.

Constipation.—The diet that a goat indulges in and the non-giving of laxative food causes a tendency to this complaint. Half an ounce of Epsom salts given twice for one day, or 4 ounces of castor oil, will as a rule set things right. In obstinate constipation enemas of soap and water may also be given. Knead the stomach region.

Coughing and Sneezing.—Protect the animal from cold, and put in a warm, dry habitation by itself, and give an electuary on the tongue of honey, flowers of sulphur and liquorice-powder, and a little chlorate of potash. Rub the throat with a liniment made up of rape oil 4 ounces, liquoris ammoniæ fortis ½ ounce, oil of turpentine ½ ounce, and water to 8 ounces.

Steam the head and give warm sloppy food and linseed tea.

Diarrhœa is brought on by too much green food in rainy weather, by changes from one food to another, or by eating unsound or frozen diet. Give good oats, rye, bran, and long hay. As medicinal measures, 2 drachms of compound rhubarb powder together with 1 drachm of bicarbonate of soda two or three times

daily. In young animals give lime water and milk or a teaspoonful of prepared chalk in milk three times daily.

Foot and Mouth Disease is notifiable. There is reddening and swelling of the claws with the formation of vesicles. Vesicles also appear on the edge of the upper jaw. This disease is very contagious. Disinfect boots of attendant. Burn litter, disinfect stalls, and do everything possible to prevent spread of infection until the officials take charge of the case.

Foot-Rot.—Lameness, heat and swelling, bursting out of pus between the claws. Wash the feet with vinegar and water, and afterwards dress with a lotion of sulphuric acid 80 minims, and solution of aloes 8 ounces. Keep the stall-floor clean, dry, and disinfected.

Garget, or **Mammitis,** is due to draughts, lying on cold, damp floors, incomplete milking out. The udder is hot, hard, swollen, and inflamed. Massage the udder with weak belladonna ointment, after fomenting with warm water, and then suspend it by a broad bandage over the loins, putting some dry cotton-wool inside the bandage over the udder. Internally, give a full dose of Glauber's salt (2 ounces), and repeat in ½-ounce doses two or three times. Do not let the kids suck, and milk clean out all the time the animal is under treatment.

Hoven, or **Blown,** is due to eating too much damp or coarse green herbage, and pasturing on wet land on an empty stomach. This disease may cause death quickly. Puncture the stomach with a trocar and canula, and give 4 ounces of linseed oil to which 2 drachms of turpentine have been added. Two teaspoonfuls of sal volatile may be given two hours afterwards and repeated if necessary. Apply a woollen pack soaked in hot water to the abdomen, and give enemas of soap and warm

water, linseed tea and good crushed oats when the animal begins to feed, and keep off pasture for a time.

Parasitic Bronchitis is due to small round worms (*Strongylus filaria* and *capillaris*) in the bronchial tubes of the animal. Feed on nutritious food, house and treat as in sheep.

Parasites.—Lice and mange mites, the latter causing scab. Wash with tobacco water—½ lb. of tobacco to 1 gallon of water for lice. Scab may be treated by dipping in sheep-dip, or dressing with a liniment of rape oil 2 pints, carbonate of potash 1 ounce, oil of tar ½ pint, and flowers of sulphur 4 ounces. Shake well and apply daily. After a few applications wash the goat with antiseptic soap, such as Wright's coal-tar soap. In many parts of the country mange is a notifiable disease. Litter must be destroyed, stalls cleansed and whitewashed, and floors disinfected. In all cases of parasitic disease good food is indicated, and regular cleaning of the coat helps recovery and keeps the skin in health.

Softening of Bone, and **Fragile Bone,** arise gradually. There is difficulty in getting up and lying down, a stiff gait, and swelling of the joints. It usually occurs in young animals, and is due to poor food deficient in lime-salts. Good nourishing food, rich in phosphates, is recommended, and as medicine, drachm doses of calcium phosphate in the food.

Poisons. — Goats in freedom bring their natural instinct to bear in avoiding poisonous plants. Roaming about the homestead and ever inquisitive, they are apt to pick up mineral poisons, however. Salt, acids, lye, lead, copper, and mercury salts may be accidentally taken.

Dribbling from the mouth, blowing up of the rumen, trembling, cramp, frothy dung mixed with blood, vomiting, all indicate poisoning. Administer an emetic, and follow up with linseed tea; in acid poisoning give lime-water followed by linseed tea; and in phosphorus, mercury, or copper poisoning, milk and then linseed mucilage.

Sore Teats are due to cracking, from being left wet or getting soiled, through being punctured by thorns, or scratched by briar or other prickly shrubs.

Apply an ointment composed of lanoline ½ ounce, vaseline ½ ounce, calomel 15 grains, and pure carbolic acid ½ drachm. Goats with sores on the teats should be milked last, and the ointment applied after each milking.

Takosis is a name given to a disease of the goat causing anæmia, emaciation, diarrhœa, dysentery, and inflammation of the lungs. It is a very fatal ailment, and is due to an organism called the *Micrococcus caprinus*. It has been noticed among Angora goats in the United States, and Mr. Holmes Pegler has seen it in this country. The losses from it are said to amount to from 30 to 80 per cent.

The best results in the treatment of the disease have been obtained by giving calomel in 3-grain doses twice daily for two days, and following up with powders containing arsenious acid 1 grain, ferri carbonate saccharated 9 grains, and sulphate of quinine 3 grains, in each powder. One powder morning and evening.

Tuberculosis.—The goat is not entirely free from this disease; nevertheless, it suffers less from it than any other of the domesticated animals, if we except the sheep.

Professor Robert Ostertag of Berlin, who is the author of the standard German work on "Meat Inspection," writes: "Of sheep, scarcely ¼ per cent. are tuberculous; of goats, about ¾ per cent. (the German figure in cattle is about 23 per cent.); but where goats are constantly stalled they may become as largely affected as cattle."

A goat suspected of being tuberculous should be isolated until a satisfactory diagnosis has been made, and the milk should be excluded from consumption. A consumptive goat throws out the infective organisms in the dung, urine, milk, and mucous secretions, and may soon infect companions.

Cleanse and disinfect the stall fittings, walls, and floor, where an infected caprine has stood, and leave empty for a time, allowing fresh air and sunshine to gain access.

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