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WARD·LOCK·&·CO'S

POULTRY BOOK

BY

DR·HARRY·ROBERTS

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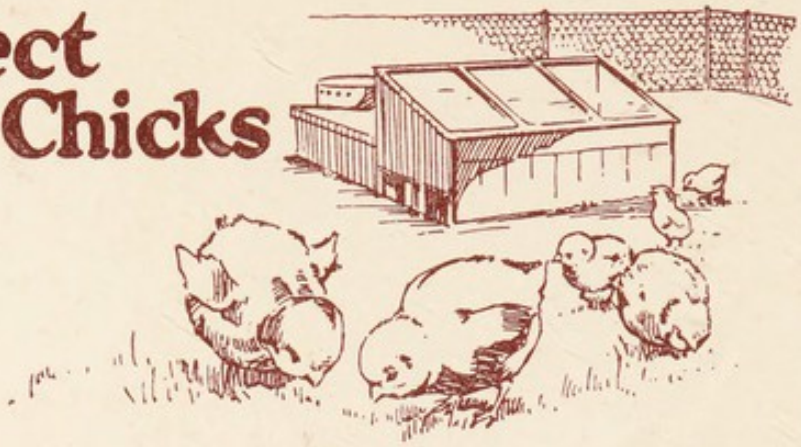

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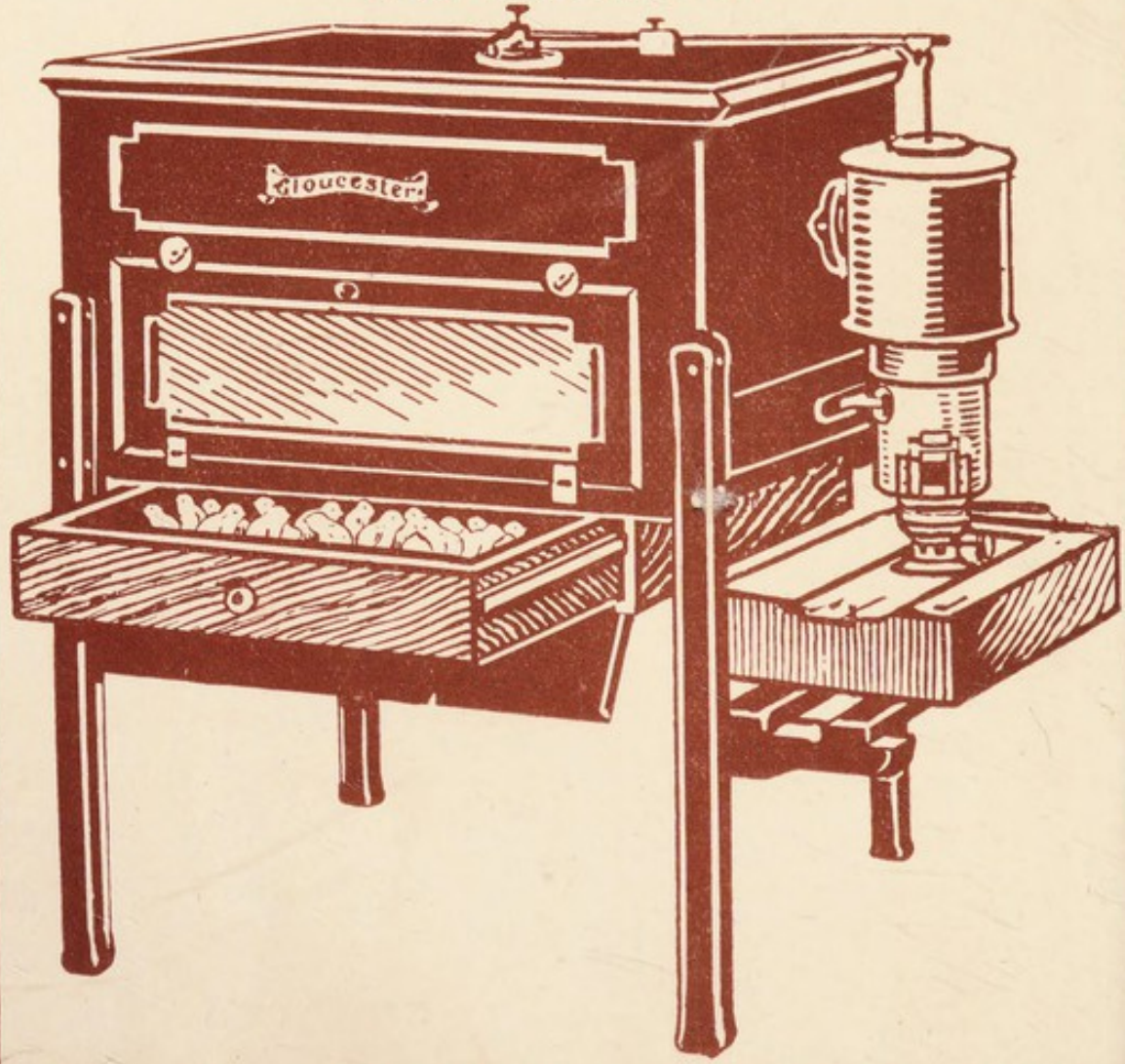

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WARD, LOCK & CO.'S
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POULTRY BOOK

A GUIDE

For Small or Big Poultry Keepers,
Beginners and Farmers

By

HARRY ROBERTS

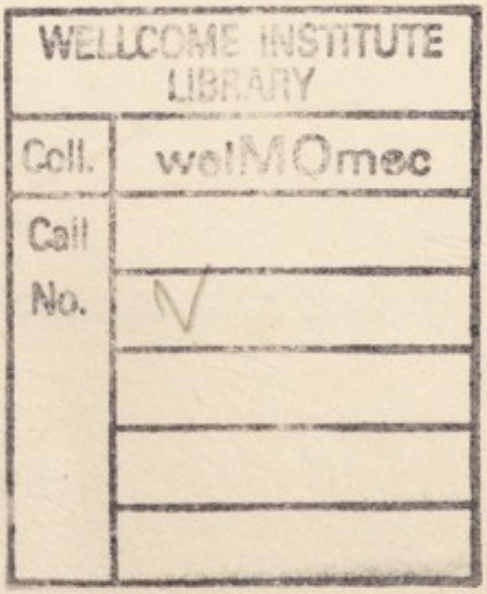
Editor of "The Country Handbooks," etc., etc.

FULLY ILLUSTRATED

WARD, LOCK & CO., LIMITED

LONDON AND MELBOURNE

[ca. 1924]



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For Year Ending November, 1923.

Eight Birds in each Pen.

(Only eggs 2 ozs. and over counted in test score.)

The following test was held to show the difference between the capacity of a hen in its first laying season and that during its second season. This difference was shown to be considerable, the average production in the first year being 193·69 eggs, while during the second year the average production fell to 108·79 eggs. The test, therefore, shows that only the best layers are profitable in their second season, while only exceptional layers will be worth keeping through their third laying season, except as stock birds.

1.	White Leghorns	1,226 Eggs.
2.	Black Leghorns	1,071 „
3.	White Leghorns	1,068 „
4.	White Wyandottes	1,027 „
5.	White Leghorns	1,024 „
6.	White Leghorns	1,017 „
7.	White Leghorns	987 „
8.	Black Leghorns	985 „
9.	White Leghorns	983 „
10.	White Wyandottes	974 „
11.	White Leghorns	972 „
12.	White Leghorns	968 „
13.	White Leghorns	966 „
14.	White Wyandottes	951 „
14.	White Leghorns	951 „
16.	White Leghorns	949 „
17.	Black Leghorns	948 „
18.	White Leghorns	943 „
18.	White Leghorns	943 „
20.	White Leghorns	939 „
21.	White Leghorns	937 „
22.	White Leghorns	935 „
23.	Anconas	931 „

CHAPTER I

THE BEGINNER

A GREAT number of poultry experts are of opinion that the novice, fresh from books, or clerical labours, the Stock Exchange, or public speaking, should leave poultry farming alone and attend to his business. This is too sweeping an indictment. The idea that unless you are born amongst poultry you will never make a success of poultry keeping is as open to argument as the other no less popular, and no less mistaken, notion that any one can make poultry pay. It does not follow that because a man is town bred he has no interests far removed from his particular profession or trade or immediate household. And it need not be assumed that he cannot acquire a working knowledge of poultry keeping as of any other interest or hobby calling for a certain amount of application, self-sacrifice and energy. It is equally certain, however, that success will be dependent upon the knowledge gained and experience acquired in conducting what is a complex business.

The qualities which make a man successful in any trade or profession are in all probability the qualities that will make him successful at poultry farming. The failures among poultry keepers—and there are not a few—generally belong to the class who would not make a success of anything, plus those who have attempted operations in excess of their experience or capital. The poultry keeper does not need to be inspired by genius, but he does need those

qualities without which even inspiration and genius produce only disaster. Energy, regularity, method, clear-headedness, ability to make use of experience and rapidly to acquire a knowledge of his subject, and a freedom from slackness, laziness, and self-indulgence, are the characteris tics he must possess. He must be up and about early in the morning—every morning—with all his wits about him, quick to take advantage of sunshine and warm weather. He must keep up a living interest in his work, giving personal attention to his charges, watching their development, noting their condition, their state of health, and their habitations. He must train himself quickly to detect signs of ill-health or deterioration in the birds and to track down the cause. He must also be prepared to recognize that poultry keeping is a business like any other, in so far as the keeping of detailed and scrupulous accounts is concerned. Every penny received and expended must be accounted for, as it is only in this way that he will have the slightest knowledge of whether he is running at a profit or a loss. He must have the capacity to act quickly and to take no end of trouble to secure the end he is aiming at.

Now, all these qualities, whether he knows it or not, are common to the successful man of business, and most of them—anyway on the mental plane—to the successful man in any profession. Those persons who have grown accustomed to taking orders and acting on instructions without accepting full responsibility for their acts should examine their mental and physical outfit very closely and honestly before embarking on a career that is going to make considerable demands on them. They must not be misled by enthusiasm. Enthusiasm will suggest the existence of all sorts of admirable qualities—superabundance of energy, quick-wittedness and the rest—which will vanish when the novelty has gone and the industry has taken on the nature of work instead of play or experiment ; when crises have to be met, difficulties dealt with, and disap-

pointments philosophically accepted. Persons who go in for poultry keeping do so for a variety of reasons. There may be a desire to live an open-air life in the country, to get away from town life, offices, books, trade and monotony. The idea of poultry keeping is seized as a means to this end. Now it is this class of person—to whom the idea appeals as only secondary to that of getting away from town—who is most likely to take a too optimistic view of its difficulties. A proper estimation of them, and of the demands on labour, time and thought which poultry keeping entails, might cause him to reconsider his plans before it is too late. But the novice who proposes to start poultry keeping as an alternative to some other trade or profession, that is, with a determination to raise poultry on a paying scale, will, anyway, start with a clear view of what he is undertaking. He will also be quite clear on the point that no business or industry is ever built up without a steady application of labour, brains and money. These remarks do not so much apply to those people who are going to try their hand at poultry keeping without making any drastic changes in their regime, that is to say, who are not going to make a business of it. They are addressed particularly to those who are intending a definite change from one way of earning a living to another; or to those, whether it means earning a living or not, who mean to attack it from that standpoint, and with the proviso that it must be made to pay.

Here may be stated that some of the most successful poultry breeders commenced their operations in a small way, gradually extending as they learnt the business and found it profitable. As a rule, these continued the work on which their living depended, until such time as they were justified in giving up one for the other. To that stage the poultry were supplemental. Not only so, but large numbers of poultry keepers maintain their operations on that basis, thus securing an addition to their ordinary

income. Such is the case, also, with farmers as a class, whether the number kept be large or small. On farms poultry form part of the live stock kept, in accordance with the scheme of cultivation.

The Novice

The novice, with no practical experience whatever, who has decided to experiment in poultry keeping, may make a start in one of several ways. Of course, if he is going to get his first practical experience in someone else's poultry yard, or by going as a pupil to one of the many poultry farms that take pupils, the question of how to begin will be, to a large extent, solved for him. But I am thinking more particularly of the beginner who proposes to make his first practical acquaintance with the subject on his own ground and by the application of his own intelligence. In the first place, then, I cannot too strongly impress upon him, no matter now large or ambitious may be his scheme for the future, to experiment on the very smallest scale during the first season. Just as much can be learnt, at any rate at first, by the keeping of a dozen fowls as by keeping a hundred.

Unless he is dogged by unprecedented luck, there are certain to be losses in the first year. Losses through faults in incubating, mortality among young chickens, devastation by rats and other enemies. Wastage by unsuitable or uneconomical feeding, errors in the treatment of stock birds, too much attention paid to well-meaning but mistaken advice from other people, and many other wastages that, even with the most detailed theoretical knowledge, it is impossible for him to foresee. Let him, therefore, reduce the possibilities of loss to the minimum. And in poultry keeping this does not so much imply a reduction of possible gains as a similar proceeding would do in most other businesses.

Large Scale or Small Scale

Poultry keeping, unlike most industries, does not increase its profits in ratio to its extension. It has been demonstrated how poultry keepers who have started in a small way and made a success of their enterprise have often attempted to increase their businesses and enlarge their activities, in many cases only to meet with failure. So-called backyard poultry keeping is always a highly profitable work because the proportion of expense and trouble to the number of eggs produced is infinitesimal. It is a most dangerous fallacy to regard the profitableness of household poultry keeping as a guide to poultry keeping on a business scale. There is a very obvious explanation of this. Directly the work assumes something more of the nature of an industry it becomes increasingly difficult to keep down expenses. House scraps, which are sufficient to feed a small flock housed in the garden or yard, are not going to be available to the tune of a hundred or so birds. The food bill then is a consideration which, hardly entering into the concerns of the household owner of half a dozen fowls, is of the greatest importance in determining the profitable running of the poultry farm. There is the question of plant. Incubators, foster mothers, and other apparatus must be secured. Houses and sheds must be erected. Extra assistance will be found necessary, especially if chicken raising and table birds are going to form part of the scheme. There is the matter of securing land. A fair acreage of good soil cannot be dispensed with. The produce has to be marketed. Packing and sending off eggs, preparing and dispatching table birds, are matters which have to be systematically dealt with, and, if necessary, extra labour must be employed for the purpose. A large and continuous supply of goods to the market must be kept up if profits are to be maintained.

The disappointments following the almost inevitable mistakes of the beginner are naturally much less where a smaller number of birds is concerned. The whole business is apt to seem so simple, as in a sense it is, that the optimist, who has read a book or two on the subject, is often inclined to plunge into large-scale poultry farming rather than waste a season as it seems to him in learning what is so obvious. But nine times out of ten he will prove to have been wrong. The very simplicity of poultry keeping is its danger. Many essential facts are so simple and apparently obvious that the writers of handbooks are apt to take them for granted. It is true of poultry keeping, and of almost every other practical work, that much of it can be learnt only by doing, and many things can be learnt only by making mistakes.

Having decided, then, to start on a small scale, what are the alternative methods? There are quite a number of alternatives, and there is something to be said for each of them. We may buy half a dozen young hens and a cockerel of the breed and strain most suited to our programme. By this method we may hope to get eggs almost immediately, some of which we may begin to hatch as soon as one of our hens becomes broody, and so make a start at building up a stock entirely of our own raising. Or we may buy in the spring a broody hen and a sitting of eggs; or a broody hen and a dozen day-old incubator-hatched chicks. Or we may start with half a dozen young pullets just starting to lay, postponing until the following year any attempt at raising fresh stock of our own.

If the object is to treat the first year as an education period, then I strongly advise that the first of these alternative courses be followed. It has the great advantage of carrying the beginner gradually and by easy stages through all the ordinary processes of poultry keeping, beginning with those which call for the least skill. It calls,

however, for a little larger initial expenditure than does the method of beginning with a broody hen and a sitting of eggs ; but, as against this, it has the economic advantage of yielding an almost immediate return.

Selection of Good Layers

Great activity and eagerness for food are characteristics of the good layer. The tail is carried high and the eye should be bright, should stand out boldly and should not appear sunken between the brows.

Most good layers have a prominent but fine comb, which should never have a coarse meaty appearance.

The condition of the plumage is a sign generally to be relied upon, the feathers must lie compactly, should feel firm and hard when handled and must possess a fine sheen.

The legs and beak in a young pullet should be of a good colour, if insipid the bird is in poor condition.

The Age of Fowls

In the young pullet the skin of the legs and feet is supple and the scales are fine and lustrous ; as the bird becomes older the scales become hard, thick and coarse and the toe nails, which in the young bird are sharp and polished, become rough and worn. The face of an old bird has a shrivelled appearance, these wrinkles increase with age. Under the wing of the pullet will be found long downy hairs, and fine pink veins show on the surface of the skin ; after the bird is a year old, the surface of the skin shows a clear veinless white, and the hairs disappear.

CHAPTER II

BREEDS AND STRAINS

IT is important to call attention to the need for selecting breeds which are suited to the particular branch of work it is intended to develop. Having decided whether to go in for egg-production, or table poultry, or a combination of both, the next step is to secure a breed which will be most likely to give the desired results and which is also suited to the soil and to the general environment.

Rather than to start by experimenting with breeds, it is better to choose such as are known and recommended by experienced poultry keepers, always with an eye on any differences in prevailing conditions. Do not start by having several breeds. Choose one or two and develop these. The wisest course is to find out the breed most popular in the district it is proposed to work in, and to begin with this one, concentrating on the development of first-class *strains*, rather than to speculate in races whose habits and characteristics are less likely to be suitable to the locality. Other breeds can be introduced later for the purposes of experiment if it is wished, but not until the business is firmly established and there is room for experiment. The principle of keeping to one or two breeds is a good one commercially, inasmuch as the produce marketed will have some general quality in common with the other produce in the same district, which will go towards recommending the district as a whole, and giving it some sort of reputation.

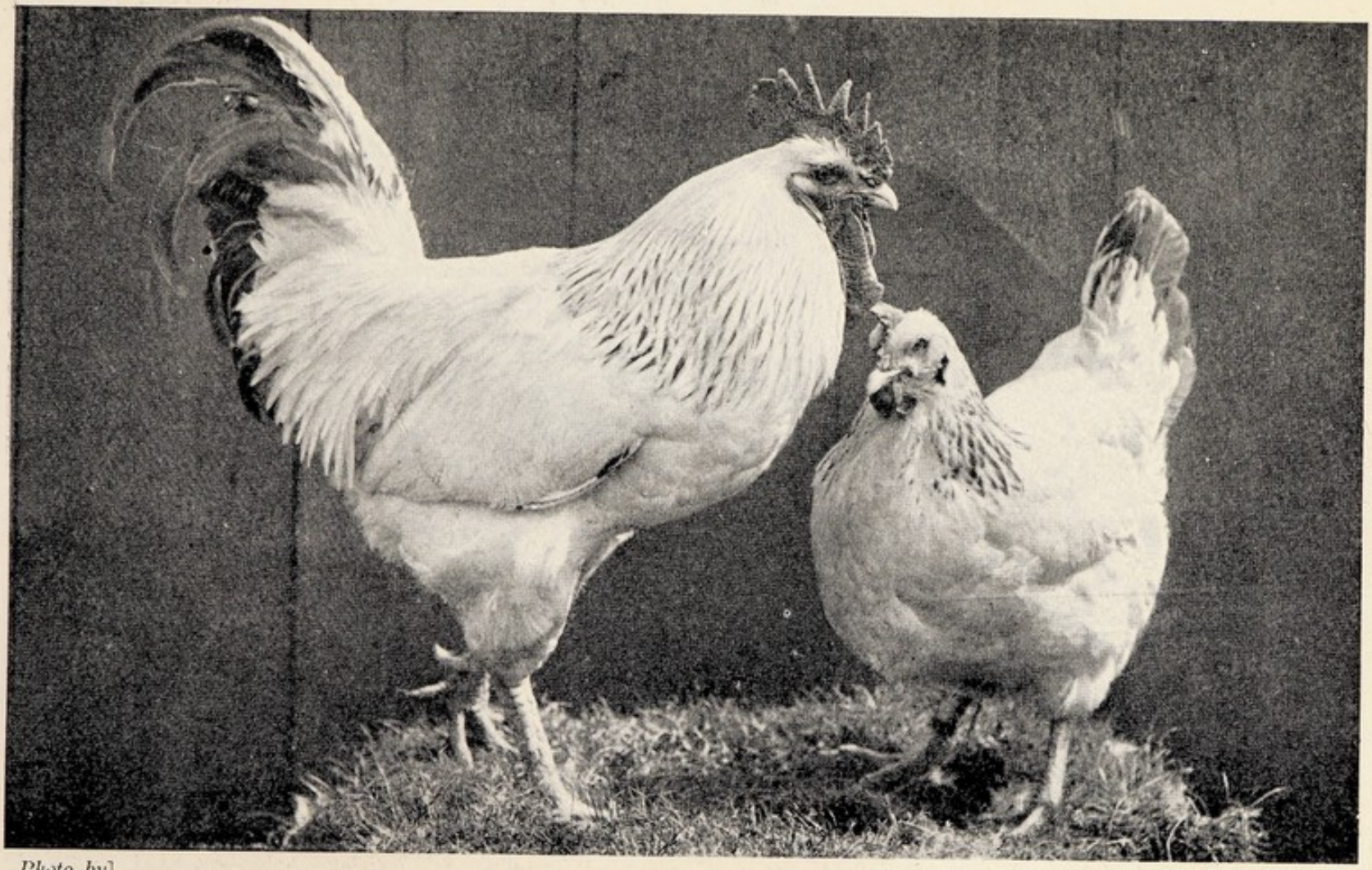


Photo by] [*C. Reid, Wishaw.*

LIGHT SUSSEX.

Photo by] [*C. Reid, Wishaw.*

BUFF ORPINGTONS.

No matter how much we may supplement or alter the environment to suit the needs of a certain breed, we shall find that some individuals will prosper in a much greater degree than others. The egg- and flesh-producing capacity of different birds of the same breed will vary as much as the intelligences of human individuals of the same race. But whereas human people have different vocations for which their degrees of intelligence fit them, poultry have no such choice. They are wanted for one or two purposes, i.e., egg-producing or flesh-producing. Therefore, an important work of the poultry keeper is to develop the strains showing the greatest propensity towards the required end, and gradually to eliminate those individuals not conforming to the standard.

To develop a strain the best individuals of a flock are selected for breeding, and of the second generation a careful selection is again made, and so on. The combination of pairs of birds, each having some highly-developed quality, is designed to produce a higher average in the flock.

But danger arises in the possibility of the strain becoming exhausted and deteriorating, and external and other signs of decadence have to be watched for. Undesirable characteristics inherited from earlier ancestors may spring up in a later generation. In all attempts to mate birds in order to develop some desirable characteristic, it must be borne in mind that there are always some unknown natural factors which may have the effect of upsetting the best calculations, and that in any interference with natural selection we must be prepared for disappointments. A due amount of caution will, therefore, be used in contriving the matings, and in watching the results. Cross-breeding for the purpose of combining a good characteristic common to birds of different breeds, or for the production of a new characteristic in one or other of them, is carried out with very good results. But the value of the cross-

breeding is lost after the first generation and a constant crossing of pure-bred birds is advised, and not a perpetuation of the resulting cross, except that hens may be so used mated with pure-bred males. Breeds with violently contrasting characteristics should never be crossed. Fanciers, of course, adopt most elaborate systems of matings, which it is not the purpose of this book to discuss, the object here being to give as much valuable information as is possible from a strictly utilitarian point of view.

Breeds Suitable for Egg-producing

The best layers are usually of the non-sitting breeds. That is to say, the maternal instinct is either undeveloped or suspended. There are naturally individual exceptions to this rule, but for all practical purposes it may be assumed to apply to most of the egg-laying races. Birds of the recognized egg-laying breeds should be discouraged if they show signs of wanting to sit. The general characteristics of laying birds are smallness, lightness and compactness. They are generally hardy and active, and mature early. The breeds selected will depend to some extent on the nature of the soil in the locality.

The best breeds for use on a heavy soil are Leghorns and Anconas, who will also achieve quite excellent results in an exposed or cold situation. These two breeds also resemble each other in externals, each being small-bodied, hardy, and active. They both lay excellent eggs in large quantities. Leghorns are small eaters and excellent foragers, thus producing at the least cost.

For medium soils the Campine and Braekel are each excellent layers of good average-sized eggs; the Minorca, which lays very large eggs, but requires specially favourable conditions of climate and soil; the Scotch Grey, good for hilly districts, a prolific layer of good-sized eggs;

the Houdan, which prefers a light soil, is a slightly heavier and not so active a bird as the above.

All the above varieties will do well on any soil. Of these light breeds the Leghorn easily takes the first place as a capital layer, and of the varieties the White is the most highly recommended.

In recent laying competitions, however, the White Wyandotte and the Rhode Island Red, although heavy breeds, have proved themselves quite the equal of the best of the light varieties.

As a rule the number of eggs produced is at the maximum during the pullet period, declining by about 20 per cent. during the second and third years, when the declension becomes more evident. It is found, however, that the heaviest layers in the first year usually fall off to a greater extent afterwards, whereas the medium layer as a pullet generally maintains the average to a greater degree. What should be aimed for is that a bird in three years should lay about 350 to 400 eggs. Involved in this question is that of profit. Where all feed has to be provided, from fifty to seventy eggs per annum, dependent upon the season when laid, are required to pay the cost of food. Whatever number of eggs is in excess provides for other expenses and profit. It must, however, not be supposed that the value of a hen's output is determined alone by the number of eggs she lays annually. The market value of eggs depends on the time of year they are produced. Winter eggs are often worth double, and sometimes more than double, those produced in the spring and summer. Therefore a bird laying an average number of eggs in the spring and a larger number in the winter is worth more than one laying prolifically in the spring and falling off as the cold weather approaches.

Large eggs are always preferred to small ones. At the same time a small tinted egg will, in some districts, command a higher price than a larger white one. All layers

of tinted eggs are, however, sitters, and where there is a great demand for tinted or coloured eggs choice of breed may be regulated accordingly.

Sitters *versus* Non-sitters

While the non-sitting breeds are the best for spring and summer laying, another problem presents itself if the production of winter eggs is going to be at all seriously considered. Winter egg-production is becoming an increasingly profitable branch of general poultry keeping, and it is not very probable that anybody undertaking egg-production at all will not devote himself to a branch of the industry which is of so much economic importance. A separate chapter is devoted to the discussion of winter egg-production, but it is not out of place here to remind the reader that in the absence of special selection, the best winter layers are of the sitting breeds, e.g., Wyandottes, Rhode Island Reds, Orpingtons, Langshans, Buff Rocks, and other of the heavier varieties. These birds are useful for hatching during the spring months, especially where incubators are not in general use. They are also more saleable than the non-sitters as table birds after their egg-laying service is over.

Breeds suitable for Table Poultry

Most of the best flesh-producing breeds are of the sitting varieties. The main characteristics of these birds are early maturing, weight, large breast development, lightness of bone. For the production of the best class of table birds it has been found that judicious crossing of certain breeds yields better results than can be obtained from the breeds kept pure, although there are several pure breeds which take first places as flesh-producing breeds, both for quality and colour. But in nearly all cases of crossing there is an importation of fresh vitality and power, the danger in all pure breeding being of the loss of vigour and stamina in the stock. But in all crosses the birds used should be pure-bred stock and not the offspring of a previous cross.

The most valuable table breed in this country is the Sussex, of which there are several varieties, the Light, Speckled and Red being the most in favour. This is an old south country breed, medium in size of body, with great capacity for fattening. The flesh is very abundant, chiefly on the breast; is fine in texture, beautifully white, as are the legs and skin. On medium soils with sufficient range, it is hardy, quick in growth and a fair layer.

The Bresse is a breed much in favour in France, where it holds the first place among table birds. The flesh is abundant, white and delicate, and the bird responds well to the fattening process. It is hardy, especially when permitted to range in the open. It is also a good layer of average size white eggs.

The Malines, a modern Belgian breed, carries a good amount of flesh of a creamy whiteness; is rather inactive in habit, but hardy; is somewhat slow in growth and most suited to producing what are known as winter fowls; fattens well, and is useful in producing large winter eggs.

The Dorking, Game and Indian Game are most valuable when used for crossing.

The Game and the Dorking are the oldest English breeds. The Dorking lays large eggs, but only in moderate quantities. Crossed with an Indian Game cockerel it produces an excellent table bird of a large size.

The Indian (Cornish) Game is a hardy breed, having a full breast, but the flesh is inclined to hardness and is very yellow in skin. It provides a useful cross mated to fowls of the soft-fleshed variety, such as Dorking, White Orpington, or Speckled Sussex. It is not very valuable in egg-production, the eggs being small and not very numerous. Another object in crossing is to produce a rapidly maturing chicken for early killing. A Faverolle cockerel mated with an Orpington hen—Buff or White—or with a Speckled Sussex, gives this result, but for this cross a warm soil is desirable

Soils have a marked influence on the flesh of table poultry. A heavy soil is deleterious to the best types, particularly those remarkable for whiteness and delicacy of flesh. Plymouth Rocks, Wyandottes and Rhode Island Reds are breeds suited to a clay soil, though these are rather general purposes than specialized table breeds. Bresse and Malines do well on a medium soil, and for light and gravelly textures the Sussex, Orpington, Faverolle and Dorking breeds are best.

General Utility Breeds

These breeds are favoured by those people who have no desire to specialize either in eggs or table birds. Most of the breeds summarized under this heading produce a moderate result in both directions, their output of eggs being medium to good, and the flesh being not of highest quality, but better than that of birds bred specially for laying. They are the most useful from the point of view of the farmer and small poultry keeper, inasmuch as they combine a good many of the qualities for the specialization of which separate breeds would have to be kept. They are, for the most part, sitters, and therefore may be looked to for a winter egg supply ; and they are also good mothers —a useful point in the absence of incubators.

Wyandottes, Rhode Island Reds, Orpingtons and Faverolles are the best all-round birds for general purposes. Their egg-production is good, and well above the average.

Of all general purpose breeds, Wyandottes, especially whites, have attained the greatest popularity, mainly by reason of their productiveness as layers, winter and spring. The eggs, however, are rather small. Wyandottes are hardy, and chickens grow and fatten well. The skin and flesh are creamy, and when fattened lose much of that tint.

The Rhode Island Red—a native of America, where it is in high favour and has a growing popularity—is a

rapidly maturing type, lays large, well-coloured eggs in very good quantities; flesh is yellow, but abundant. A very hardy breed.

Plymouth Rocks are also American. This breed fattens well, and produces good sitters and mothers. They are good winter layers. The flesh and skin are yellow. These birds are very hardy and suited to most soils.

Langshans are notable for the rich, dark tint of the eggs and for their winter laying propensities. The flesh is good, greyish and well distributed. They require warm, sheltered situations.

The Houdan is a useful breed for crossing for table purposes, and when crossed with any of the flesh-producing breeds always improves the table qualities of the progeny.

Further qualities which recommend the general purposes breeds are that the eggs produced are all tinted except those from the Houdan.

Selection and Management of Stock

It is in this branch of poultry keeping that the qualities of intelligence, judgment and observation are so valuable. There is a large field here for patient study and experiment, and the results will amply justify any amount of time spent in this way. The work itself, involving as it does experiments with breeds, conditions and environment, and general scientific knowledge of the matters which influence healthy production, provides a side of poultry keeping to engage the activities of the more scientifically minded. It is obvious that given a strong, vigorous stock a good start is secured; and energy expended on the subsequent hatching and rearing of the chicks will not be wasted, as it so often is in the case of eggs lacking the necessary qualities to begin with. How to acquire and maintain this high degree of healthiness

and efficiency among the stock birds is well worth the serious consideration of every poultry keeper who wishes to keep up a high average of productiveness and quality.

The parent birds must be given every opportunity to acquire that particular state of health and development which leads to the best results both in the fertility of the eggs and in the strength and virility of the progeny. To secure these as natural conditions as possible should be provided. Fat over-fed birds will never produce vigorous chicks, and the eggs may often be infertile. On the other hand, ill-nourished birds have even a worse chance. Feeding and exercise are therefore the important matters to consider when the selections have been decided on.

Infertility of the eggs is a source of trouble which often arises. For this there are many causes. Apart from inherent weakness or debilitation, it has been found that where the male bird has been employed recklessly and without due regard to the strain imposed on him, there has been a large proportion of infertile eggs. It may also be attributed to differences of season—the averages of fertile eggs being higher in the natural mating season, namely, the spring, than in autumn and winter. Climatic changes and the subsequent absence of some element in the food may in some measure be held accountable for this.

If possible, always use birds which are fully matured for breeding. Both the parents should be in their second year, and hens may be used in their third season if they have proved to be good breeders. The results obtained from mating young birds are nearly always disappointing. The only way in which pullets should be used for mating is in conjunction with an old but still vigorous rooster. Similarly, if a cockerel is used for breeding, mate him with adult hens It is not so much a question of egg supply which has to be aimed at as the quality and virtue of the eggs themselves, and the vitality of the germ. A hen laying a large number

of eggs is likely to produce weakly chicks, and is obviously not so suitable for breeding purposes as one whose eggs, though, perhaps, less in number, produce a greater yield of strong, sturdy chicks in the long run. It is commonly acknowledged that, in spite of the many contributory causes which account for it, one of the chief reasons for the large annual number of chicks which, although arriving at maturity within the shell, fail to hatch out, is the want of stamina in the stock, and the consequent feebleness of the germ.

A good deal of discretion must be used in deciding the number of hens to be paired with a male bird. Generally speaking, for a cock bird of average vigour and of the active breeds, the most likely number of hens would be between ten and twenty. Eight would be quite enough in the winter season, and if the birds are kept in confinement or semi-confinement. Where there is plenty of liberty the number of hens may be increased. In warmer weather also a larger number of hens may be tried. Signs that there are insufficient hens are not wanting. There will be obvious uneasiness among them, and they may show a loss of feathers on the back, in which case either the flock should be increased, or the cock bird separated from them part of the time. The individual capacity of the cock will be the final deciding factor, so that careful observation for the first few days is necessary. In the heavy breeds the number of hens to a cock should be about two thirds those of the lighter breeds.

An interval of ten days should elapse after mating before the eggs are used for hatching. From experiments made it has been ascertained that although a certain number of eggs were fertilized on the second day several were not, and that no reliability could be placed on them earlier than the fourth day. After the removal of the cock the ability to fertilize the eggs remains with the hen for quite ten days, or even longer.

See that the cock gets sufficient food. It is natural in a

cock to sacrifice his portion to the female birds, and he will sometimes deprive himself of food, to the extent that his vitality becomes impaired, with disastrous results to the future generation. This only applies where birds are in confinement.

The Trap Nest

In selecting birds to perpetuate a strain for laying fowls some time must be spent in watching the results achieved by individual hens. There are certain qualities denoting a good layer, but it will not do to rely solely on outside signs. The outward attributes of a good layer are activity, good condition—her plumage being well set and glossy—continuous interest in searching for food, and general look of health and well-being. Given these qualities, it is very probable that she will be a good layer, and there are generally means of tracking her down and confirming the belief. Individual birds, however, vary very much, and it is worth while, where the object is to build up a reliable strain, to make things a little more certain by adopting the plan of the trap nest, a contrivance which quite conclusively establishes the output of any bird. In order to reach the nest the hen has to enter through a door which closes behind her and imprisons her. The hens are all previously marked by rings or numbered, and care must be taken that the imprisoned bird is released again. The laying of each hen is thus able to be recorded, and very interesting and valuable indeed have been some of the records taken. The extra trouble entailed in keeping the records and the attention required to let the birds out of the nest after their laying is accomplished are small matters compared with the possibility of being able to recognize the best (and the worst) layers without doubt or hesitation. It remains a matter of opinion whether

it is wise to use the most prolific layers for breeding. A good many people are prepared to accept the principle that the good average laying hen is the most satisfactory in the long run. The objection is based on the possibility of impaired vigour on the part of the hen through excessive laying, that the germs will not have the strength and vitality that at first thought might be expected of them, and the subsequent progeny will not have the capacity to hand on the quality of productiveness. Such questions as these can ultimately only be solved by individual experience.

When to Hatch for Winter Eggs

For winter laying, heavy breeds should be hatched in March, light breeds in April. If hatched after these months, they rarely come on to lay until the following spring.

Sitters (heavy breeds) take about eight months to develop, non-sitters (light breeds) about six months. A cross between the two varieties matures in about seven months.

CHAPTER III

HOUSES AND APPLIANCES

IT is obvious that there can be no stereotyped form or size applicable to poultry houses in general. Circumstances, aims and requirements differ so enormously in different cases that as much variability is naturally and rightly to be found among poultry houses as among buildings used for more directly human purposes. There can be but little outward resemblance between the house suitable for the little backyard poultry keeper and the buildings needed by the large poultry farmer or fattener. Still, seeing that in spite of these differences, every poultry house has as its primary aim the provision of a suitable and healthy home in which fowls can live and thrive, there are certain conditions and common rules which must be observed by all, and are applicable equally to the humblest and the most elaborate. As with most other forms of animal life, overcrowding must be avoided; protection from the elements must be afforded; yet light and air must not be excluded.

Every poultry house should be adequate in size for the number of fowls that it is intended should occupy it. It should be rain-proof, and its floor should be dry. It should be open to sunshine, especially in winter, yet should be in part shaded in summer. Whether intended to hold few or many head of poultry, it is wise that the building should be well and strongly built. Many of the trumpery, thin wooden houses sold by the dealers are a source of endless

trouble and disappointment. A well-built properly constructed poultry house with well-made and well-fitting doors, with a sound, substantial and weather-proof roof, well lit and well ventilated, dry in all weathers, is a constant joy to its owner, and will do much not only to keep his fowls in health and profit, but, what is little less important, will help to maintain the interest and enthusiasm of the poultry keeper.

To go into a little detail: the walls of the poultry house may be of wood or of brick or stone. All are good, the last two being, of course, much more expensive. Often a building already in existence can be wisely and economically adapted to the needs of the fowls. Some old stable or coach house no longer used for its original purpose often lends itself to the requirements of the poultry keeper. But where buildings have to be specially erected wood will usually be chosen on account of its comparative cheapness. Not less than ¾ inch wood should be used, however, though ½ inch is not necessarily unsatisfactory. Thinner wood than this should never be employed for the walls of the house. Where economy is a serious object the height at the front need not be more than 4 feet 6 inches, at the back 3 feet 6 inches. But where a little more scope is permissible, the comfort and convenience of the poultry house being sufficiently high for a man to stand upright in are very great. Under such conditions one is far more likely to put in time at such necessary work as cleaning, disinfecting and lime-washing the house than when each of these operations involves the fatigue and discomfort of working in a bent-up attitude. The depth of the house from front to back will naturally vary according to the position and space at disposal. In a narrow place, or where but a few fowls are to be kept, 4 or 5 feet is ample. But where more fowls are to occupy it and there is no such limitation of space a depth of 7 or 8 feet is to be preferred. As giving some idea of the ratio

between size of house and number of fowls, it may be laid down that for fifteen fowls a roosting house about 6 feet by 5 feet and a scratching shed 8 feet by 5 feet afford ample floor area.

But clearly it is not only the number of fowls to be kept on which the size of the house depends, but the kind and size of house or houses should vary also with the conditions available. The poultry keeper with but a little back yard at his disposal will need a building or system of buildings in which his poultry can spend their entire lives, and in that case the scratching shed may be 10 feet by 5 feet, or even deeper. Where the circumstances are somewhat more generous and an orchard, paddock or even smaller piece of ground is available, it is probable that a great portion of the fowls' lives will be spent in open runs, and the necessary housing will vary accordingly. The farmer, again, who may wish to take advantage of the masses of animal food exposed by the operations of tillage, may require a mere sleeping-house for his fowls, which can be moved about from field to field as required. But there are certain general conditions which are applicable to every form of poultry house. They should be strongly and durably built, of good material. They should be wind- and rain-proof. They should be well ventilated, without being draughty. Light should have reasonable access to them, and although there should be means for shading them from excessive sun, the aspect chosen should be a sunny one where possible.

Now, as to a few details. Where a special house is being built for poultry, and it is wished to observe reasonable economy, the walls should be built of wood. In the case of fixed houses the wood forming the walls should be not less than $\frac{3}{4}$ inch in thickness—certainly never less than $\frac{1}{2}$ inch. This may be either grooved and tongued, in which case the boards should be arranged vertically, or, as I think better, it may be weather-boarded.

The roof may be made of thinner wood, tongued and

grooved, covered outside with well-tarred felt or waterproof canvas, or, as preferred, galvanized sheets. The outside of all the woodwork should be creosoted, being given two coats. The inside may either be creosoted or whitewashed. Every house should be provided with a door of convenient size, strongly hinged, and able to be securely fastened. Ventilation is best secured by the use of 1 inch mesh galvanized netting of eighteen gauge, of which the front should be formed as stated below.

The floor should generally be of earth raised above the surrounding level, and well beaten, but where it is desirable to use wood, this should be, again, not less than ¾ inch in thickness, resting on joists.

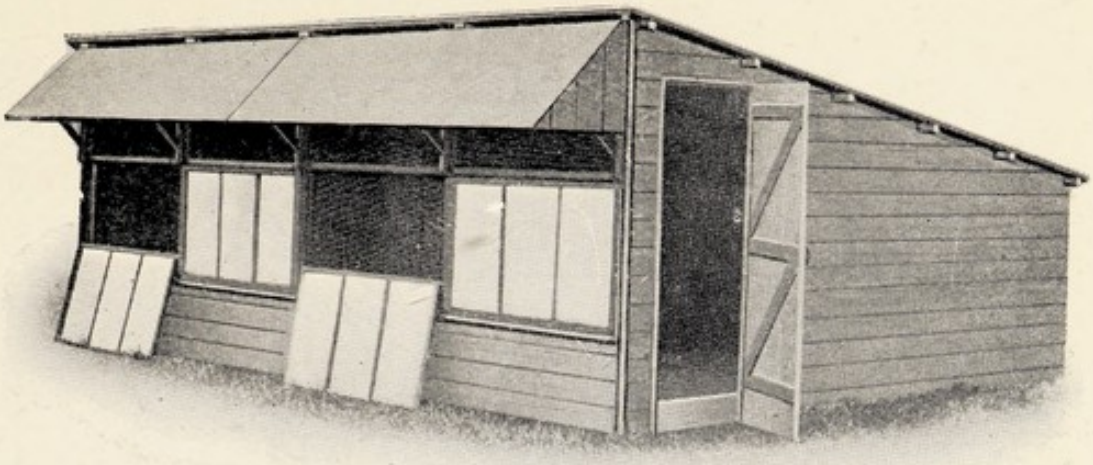
In all cases it must be remembered that it is of the utmost importance that the house should be easily cleanable in all parts, therefore the doors and other openings should be planned to this end.

So much for the general principles.

Let us now consider the case of the beginner who has a quarter of an acre of grass-land at his disposal, and is proposing to make a start in the spring with a breeding-pen of six to seven hens and a cockerel. With the best way of dividing up his ground I deal in another part of this book. Enough here to say that such a breeding-pen may advantageously have a run of 300 to 400 square yards, which run should be rested at the end of three months. The house, therefore, should be placed at the junction of two or three such runs, so that each may be available for the fowls, no matter which of the runs they may occupy at the time. This house should measure not less than 6 feet long by 5 feet wide, and it should desirably have attached to it a scratching shed of similar construction to itself but with much more open front, of at least the same measurement—preferably much longer. Such a house will, during the breeding season, house a pen of the size I have named. When the breeding season is over it

will house about twenty birds if necessary. A convenient height for a house and scratching shed is 5 feet in front—which should face as near south as may be—and 3 feet 6 inches at the back. There should be a gutter to catch the roof water, and this should lead to a barrel or tank. This tends to keep the floor of the house dry, and at the same time provides a useful supply of water. The front of the house should be boarded up to 2 feet from the bottom, and downwards 18 inches from the top. The intervening 18 inches should consist of 1 inch galvanized netting. The back and both ends should be completely boarded. There should, however, be an opening enabling the fowls to pass from the house to the adjoining scratching shed. This latter should be of similar structure to that of the house, but the front should be boarded up to about 18 inches from the ground, the whole of the rest of the front being of galvanized netting. It is a great improvement if a projecting eave about 18 inches wide is fixed along the whole length of the scratching shed. Both house and scratching shed should be provided with convenient doors, and in the end wall of the scratching shed should be an opening fitted with a sliding door, through which opening the fowls can pass in and out to their run. The floor, both of the house and of the scratching shed, should be of earth, mixed, if these are available, with stones or broken bricks, the whole puddled and well rammed down. This floor should be not less than 3 inches above the level of the surrounding ground. On this should be thrown suitable litter, to a depth of not less than 6 inches. This litter may consist of chaff or leaves, or peat-moss litter, or of dry earth. Where a little extra trouble and expense is not grudged the floor on which this litter rests can be very much improved by covering it with about 3 inches of concrete, made by mixing together one part of Portland cement and five parts of sharp sand and gravel. These ingredients should be mixed together in the dry state, and water should then be added until the

POULTRY HOUSES.



INTENSIVE POULTRY HOUSE, 20 FT. BY 15 FT.

MOVABLE HOUSE FOR COLONY OR FREE RANGE SYSTEM.

Two designs reproduced by courtesy of the makers, Messrs. Boulton & Paul, Ltd., Norwich.

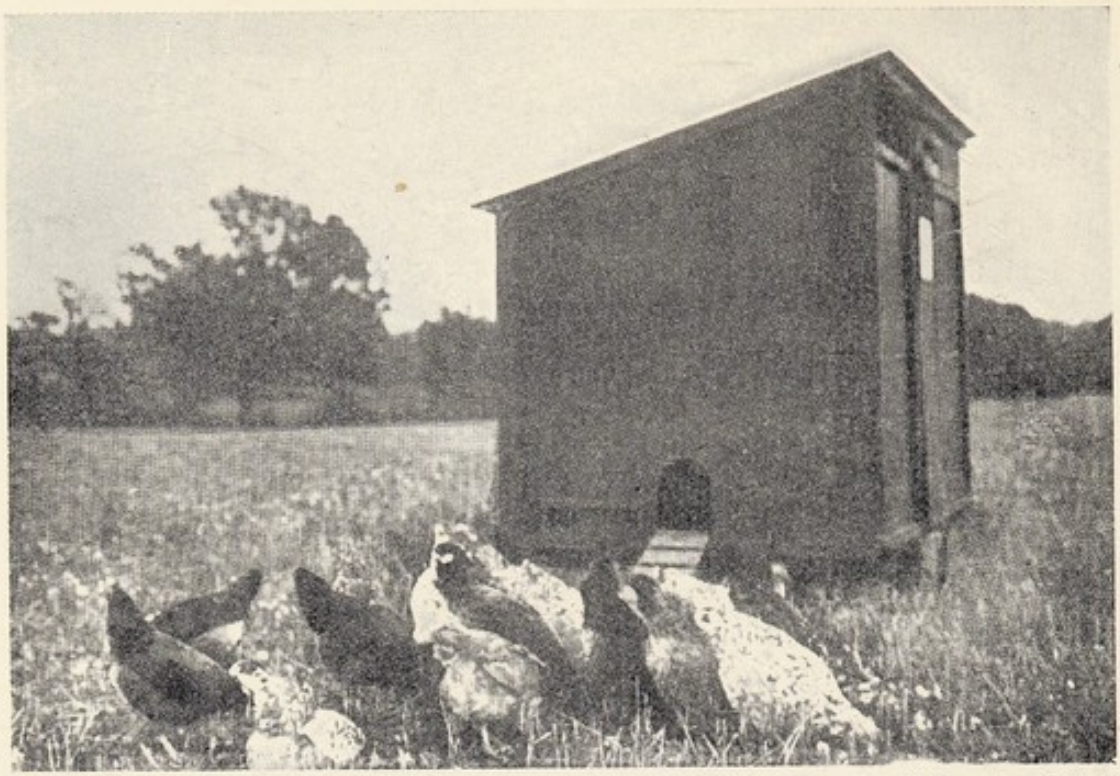


Photo by] [" *Country Life.*"

COLONY HOUSE IN USE ON A FARM.

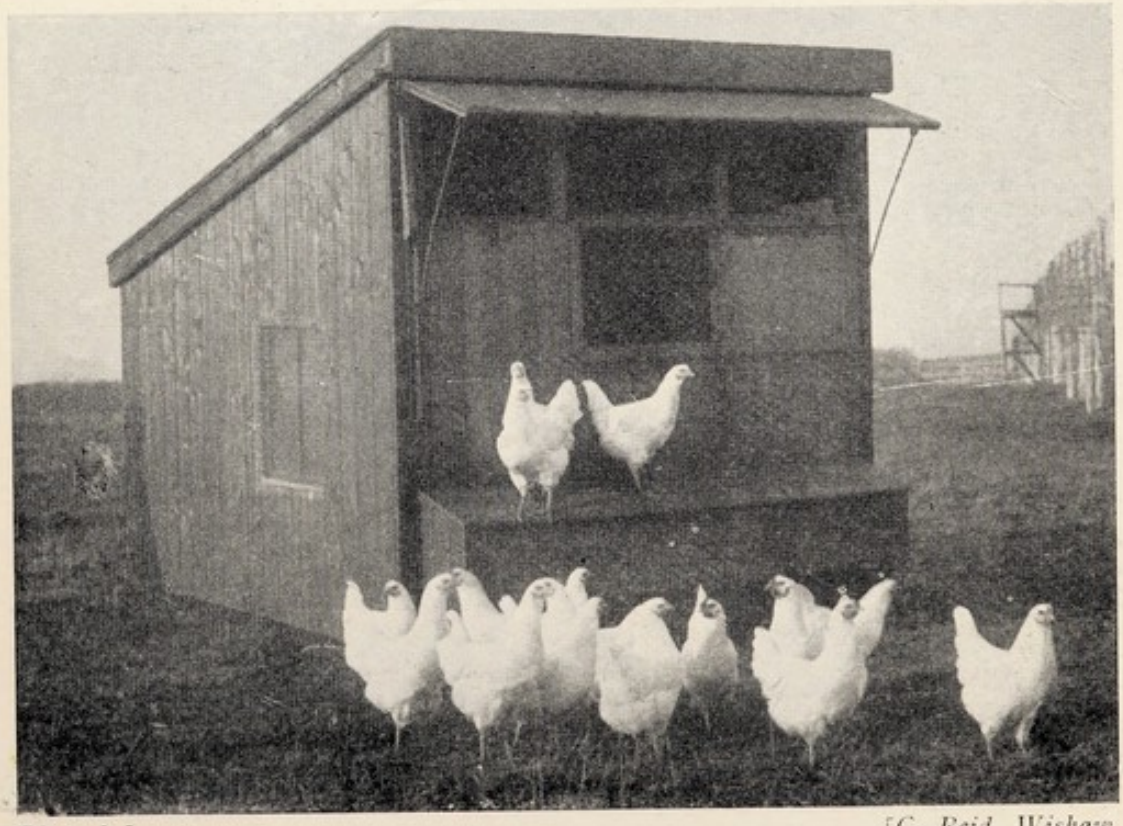


Photo by] [*C. Reid, Wishaw.*

HOUSE FOR SEMI-INTENSIVE PURPOSES.

whole is in a sufficiently liquid condition to be laid readily and evenly over the surface. This can be made even more satisfactory and permanent by covering it, when dry and set—that is in about twenty-four hours or so—with a thin layer of nearly pure cement. The litter should be changed every few weeks, the old litter making most valuable manure. All the inner walls of the house should be lime-washed not less than twice a year, preferably much oftener, and if the walls are of wood the outside should be tarred or creosoted at least once a year. Perches should be provided both in the roosting or night house and in the scratching shed for day use. And underneath each perch should be a movable dropping board which will catch the droppings from the fowls and so keep the litter from being soiled for a much longer time. The perches themselves should be readily movable so that they may be kept clean and free from vermin.

Very useful perches consist of fir poles 3 inches in diameter, sawn in two down their centres, so that each pole makes two perches. Where this is not available, satisfactory perches can be made of lengths of deal 2 inches wide and 3 inches thick, the edges being rounded off. Perch space of about 8 inches should be allowed for each of a small breed of fowls such as Leghorns ; about 12 inches per head being allowed in the case of the larger breeds. It is well to have all doors of poultry houses and all gates of poultry runs not less than 27 inches wide so as to admit the passage of an ordinary wheelbarrow. This will be found of great convenience in cleaning out the litter and in wheeling in fresh litter. The day perches in the scratching shed are an important, though often neglected, part of the equipment. Both in wet weather and in very hot weather poultry like to spend a good deal of the daytime perched in a dry place. But they have the greatest objection to using their roosting house for this purpose. And this applies as much to those fowls which have the liberty of a

run as to those who spend their entire lives in the house and shed.

In the scratching shed should be arranged convenient nesting boxes, and the most useful form for these is a square wooden frame about 4 inches deep and about 15 inches square, without top or bottom, resting merely on the floor, and provided with a little hay or similar material. These also should be kept scrupulously clean, the nesting material being frequently changed and the wooden frames being whitewashed or creosoted at intervals.

In the roosting house should also be provided a dust-bath with a depth of not less than 18 inches of fine ashes or fine dry earth with which it is as well to incorporate a handful or two of sulphur or other disinfectant. Only by the use of such a bath can the fowls keep themselves clean and healthy. The perches, as I have previously said, should be movable and should be frequently cleaned and lime-washed or creosoted, or painted with ordinary paraffin, which acts as a very efficient insecticide. Then, of course, arrangements should be made, at any rate in the case of those fowls which are confined to the house and shed, for food hoppers and drinking vessels and a vessel containing grit. All these may with advantage be securely placed against the wall some inches above the litter; and these vessels also cannot be kept too clean. Of course it will be very rarely that poultry will be kept entirely in confinement when ground suitable for a run is available. In connection with this, much the most important thing to bear in mind is that poultry soon foul the ground, and unless kept in very small numbers and frequently moved on to fresh ground they soon fall victims to disease. Therefore it is advisable, no matter how small a space at one's disposal, to divide that space into at least two or three divisions or runs into which the fowls may be turned in rotation, and then moved on, allowing the recently

occupied run to grow fresh herbage or to be planted and recover its purity.

Some idea of the number of fowls that can be kept with care on a given area may be gathered from the fact that six fowls may be kept in health on a plot 20 yards square divided into three runs, one being laid down in gravel—which gravel should be renewed twice yearly—and two in grass, part of the day being spent on the gravel, and part on one of the grass runs; each grass run resting entirely for a month or two at a time. Whether few or many fowls be kept, if any chickens are to be raised in the early spring a roomy house with a thick layer of sand or gravel on the floor, devoted entirely to the growing chickens, is little short of a necessity. Needless to say, this house should be made absolutely rat-proof. Where, as is advisable when the space is limited, the poultry are kept in runs, these runs should be fenced with galvanized netting 6 feet in height. This netting should be of eighteen gauge, and while the upper part may be of 2 or 2½ inch mesh, the lower 18 inches or 2 feet should be of not greater than 1 inch mesh. The posts to which the netting is attached should be about 6 feet apart, and the lower ends of them should be boiled in tar so as to preserve them. An interesting experiment has been tried, of planting standard fruit trees in lines and attaching netting direct to them. This has apparently proved successful. If so, it has a great advantage, in that the supports are not liable to rot. It is, as I have previously said, a good plan to arrange the runs around the poultry houses as centres, so that one house may serve for three or four runs used in rotation.

On farms, whether general or fruit farms, it will, as a rule, be found best to keep the poultry, or most of them, on the movable house system. In this way the fowls can frequently be given fresh ground, and can, at the several seasons of the year, be given the run of ground from which, at that time, they can obtain the greatest amount of food.

Thus the recently ploughed fields yield an almost unlimited supply of worms and other animal food, whilst the cornfields after harvest supply an abundance of grain which would otherwise be wasted. When kept on this system, or, for that matter, on any other, fowls do best in comparatively small flocks. A good general number is twenty-five, and even so, the houses should not be kept long in one place. The importance of an unlimited supply of water and grit must not be forgotten, though on open ground these are generally available.

Portable poultry houses should be very strongly made as they have to stand a considerable amount of knocking about, and have to undergo a good deal of strain and movement. They should be furnished with wheels, or, in the case of small houses, with substantial handles to assist in lifting. The houses should have outside nest boxes so made that the hens can only reach them from inside the house. For twenty-five fowls kept on this system a floor space of about 50 square feet is wanted.

CHAPTER IV

FOODS AND FEEDING

IF the problem of feeding were only a question of keeping the fowls alive and healthy, it would be a very much simpler business than it is. But there are many issues to consider. Certain results have to be obtained; the effect of seasons, climate, weather, have to be met and overcome. The question of economy arises; for example, the best egg-producing food may be found too expensive to adopt. A knowledge of the elements contained in the various forms of food obtained, and of the elements necessary to produce desired results, is essential before any idea can be got of a suitable and economical diet.

Certain food-stuffs go to the making of fat, others produce heat, others muscle and bone, and so on. Fowls which are kept for their egg-laying qualities will receive food varying in the proportion of constituent elements from those whose value depends on the quality of their flesh; and the same is the case with birds kept for stock and breeding purposes. The correct feeding of chickens is a most important work and one which should be made the subject of careful study. For, on the successful rearing of chickens depends much of the success of the poultry farm as a whole. Chickens suffer more from errors in feeding than adult fowls. In the case of the latter, unsuitable food merely causes a suspension of the particular development aimed at. In young chickens it often results in high mortality, or a deterioration of the entire flock.

Malnutrition at an early stage is difficult to catch up with, whereas chickens starting off under the good auspices of a wisely calculated diet, combined, of course, with equally good general conditions, will be more likely to develop into strong sturdy birds, and be in a far better physical state to resist any hardships they may encounter later on, than chicks whose exact requirements have not been so studied. A simple definition of the chemical terms employed to designate the various constituents of food will be found useful for reference.

Nitrogenous substances or proteids form the main constituents of eggs. The white of egg (or albumen) is almost entirely protein. They also form bones, blood, muscle, brain, nerves and feathers. These elements are found in all forms of animal food, and certain cereals contain a high proportion. The protein element is, therefore, one of the most important in supporting the life of the fowl, and in maintaining its productiveness.

Carbohydrates, or starchy substances, contribute to heat and energy. They contain starch, sugar and fibre. Maize is the most important of these foods, and wheat runs it fairly close. Carbohydrates are fat-producing, and therefore should be given in carefully calculated quantities only, otherwise there is over-stimulation and congestion.

Ash or mineral substances contain lime, potash, soda, etc. They help to form the bony framework of growing stock, and supply the necessary ingredients for making the egg-shell. Further various vegetable salts are necessary to healthy functional activity. A certain proportion exists in most of the cereals, chiefly in the husks. Fish meal and green bone are by far the richest in this constituent and form a most important part of the diet of laying hens. Of the plant foods, clover hay and dried lucerne contain the greatest proportion. It is also found in fresh grass, plants, weeds, etc. The value of a grass run is that it provides unlimited quantities of this material.

Fats supply heat in a far higher degree than carbohydrates. They also provide oily secretions, which affect the plumage and maintain its glossy appearance. In birds reared for table purposes the fats permeate the flesh and render it tender and succulent. Fish meal and green bone are also valuable in this product.

Water, without exactly being a food, is an essential to all forms of life. It is present in all plants in large quantities, and in some proportion in all the foods. The body of a laying hen is more than 50 per cent. water, hence the necessity of keeping her supplied with a profusion of water as well as large quantities of green food. For formation of eggs, water is a requisite.

Fibre, which is present in all forms of plant food, and is thus taken by the fowl, is not assimilated, and is of little use as a food and merely passes out of the body as waste matter. It, however, has an important action on the digestive apparatus.

Birds in a natural state will by instinct manage to secure the right proportion of the necessary constituents for their needs, and those fowls having a fair amount of liberty to range about for their living will be found to obtain in the way of slugs, insects, worms, grasses, seeds, lime and other minerals, enough food to keep them in perfectly normal condition. What we ask of them, however, is something more than normality. We wish to encourage the birds' productiveness of eggs or to increase their capacity to put on flesh. It, therefore, becomes necessary to supplement with food calculated to have the desired effect. Where the birds are in semi-captivity, or during the winter, when conditions make foraging results inadequate, green and animal food must be provided in just such quantities as the fowls would be able to get it for themselves if circumstances permitted.

The value of any food-stuff depends on the proportion it contains of the constituents necessary for the special purpose in view. All vegetable substances contain the

essential ingredients, but not always in the right proportion. There are various foods in which the desired elements exist in a more highly concentrated form. A table showing the different proportions of the constituents in available foods is given at the end of this chapter, but in referring to it, it must be remembered that in some cases only a certain proportion of the foods is assimilable by fowls. Economy should be an ever-present consideration, and it is well to note that often a food may recommend itself by its apparently high proportion of some valuable constituent which, after all, may turn out to be in a great measure unable to be digested by the birds, and so wasted. Digestibility is an essential factor.

Points to be Observed

A very great deal of the economical value of any food-stuff is the amount of its constituents that can be properly assimilated by the fowls. Certain nitrogenous substances become more easily digested when heated, although in the heating process some actual loss of value in the food results. The loss, however, has been found to be more than compensated for by the additional ease with which the balance is digested, more especially by fowls unable to obtain the maximum of exercise. In winter-time a wet hot mash, therefore, early in the morning or in the evening, for opinions vary on this point, is recommended, the actual composition of which will depend on the time of year and the results required. In summer it should be given cold.

All soft mashes should be given in vessels and not thrown down or scattered on the floor of the house or run. The soft mash should not be sufficient to satisfy the needs of the birds, especially of laying fowls. They should be hungry enough to use their own exertions to obtain supplemental food, whether they are getting this by natural means or whether it is grain scattered for them, in which case it must be so disposed as to give them some trouble to obtain

it. So-called wet mashes should never be sloppy. A dryish crumbly texture is what should be aimed at.

Variety in foods is desirable, as the birds' interest in their food is thus maintained, and their appetites in consequence remain fresh and vigorous.

In arranging a diet care should be taken so to balance the food given that the proportion of nitrogenous substances should be high enough not only to maintain the life of the birds, but to leave a surplus towards the production of eggs. This applies to other food constituents. The accepted proportion for laying hens is 1 part nitrogenous to 4 or 4½ parts carbohydrates. Mineral substances must be much in evidence.

An interesting point to note is that all starchy foods, fats and sugars are only valuable when surrounding air conditions are good. This, of course, applies broadly to all food. But in the case of carbohydrates, it is necessary that they become mixed with the oxygen of the body before their influence can be derived.

The quantity of food varies with the age of the birds. Chicks can hardly be overfed. Laying hens very easily can. Also the time of year must always be considered. All birds require more warmth-producing food in winter.

Give a sound meal last thing at night. During the day the birds should be kept just hungry enough to hunt energetically for food. At night-time they should have their fill just before turning in to roost.

Where the birds have a large area of land to range on they will, in summer, be able to find for themselves almost all the food they need during the day. After a half ration in the morning the fowls can be given liberty to range for the entire day and only receive the supplemental feed of grain last thing. In winter, and where the ground is not productive of much in the way of natural food, a portion of grain, and also an allowance of green food, should be given during the day.

A good deal of emphasis has already been laid on the necessity of mineral foods, especially for growing birds and laying hens. Grit is another important item. Crushed flint is the best form of grit and should always be before the birds. Ranging at liberty, they pick up grit in various forms, but there should always be opportunity for them to supplement this if doubt exists as to the supply.

Feeding Chickens

The feeding for naturally and artificially reared chickens is essentially the same. But it should be decided early whether the birds are intended for layers or table birds, as the treatment will vary accordingly. In feeding young chicks the main object is to get them to exercise themselves as much as possible in the pursuit of their food. For this reason many people advocate a diet consisting entirely of dry food. Another reason assumed is that dry feeding minimizes the risk of internal disorders. Experience, however, has shown that some moist food is essential to well-balanced development. However much this may be found to answer, a dry diet should never be adopted for birds intended for table purposes. When the chicks are intended for table purposes the soft food should be in greater proportion than in the food of laying or stock birds. Nourishment is contained in grain foods in a more highly concentrated form, and in consequence when chickens are fed solely on grain they are satisfied before the crop is distended to its fullest extent. This is found to be a drawback later on when the fattening process begins, as it is discovered that the crops are unable to contain sufficient food at a time.

The simplest method, and one which seems to answer extremely well, is to give a soft mash early in the morning, followed by grain, which should be buried deep down in the litter so that the chicks are obliged to work hard to find it. It is found that chicks prosper under this system presum-

ably because of the amount of exercise they take in their efforts to discover the grain.

If the dry system is favoured—and it is sometimes desirable, when labour is not available, and it is found impossible to give the necessary time to the preparing of a morning meal—the following is a good mixture, and may be given as described above, buried in the litter: Wheat, buckwheat, dari, canary seed and millet in equal parts, with granulated meat forming about 10 per cent of the mixture. This, with the addition of a half part of linseed and hemp, will be found a capital mixture.

It is worth while employing a good nourishing diet for the first few weeks, thus giving the chicks a good start, which will be found to be an economy in the end. Also, the above mixture will not work out at very much more than the patent chick foods which are on the market, certain of which, however, are quite reliable.

If it is decided to adopt the combination system of dry and wet feeding, the above mixture should be given for the first fortnight, and after that, for the next couple of weeks, give a morning mash of ground oats, or oatmeal, or barley meal and good middlings, mixed with skim-milk, with a small proportion of bone meal and meat; or, as an alternative, biscuit meal and bran, scalded, barley meal and sharps in equal parts. The above mixture of grain should be scattered amongst the litter. The chicks should have a square meal of grain towards evening to carry them through the night. When they are a month old all the small grain should be discontinued, and a little maize may be substituted, which should be kibbled or broken.

If the chicks are going to be put on the market at an early age, their growth must be pushed forward as much as possible, and the above is a first-rate food for hurrying on their development, but is not quite so suited to birds intended for laying or stock, as it makes for the formation of flesh rather than bone and strength. On the other hand, it is

admirably adapted for birds which are going to be kept and reared for table purposes, and may be continued up to the age of twelve weeks.

There must be no lack of green and vegetable food—onions are very much appreciated, and can be given chopped up. Grit must always be present in the brooder, or run, and can be mixed in with the mash. Do not give the mash too wet, but only damp enough to be able to be crumbled in the fingers. See that plenty of pure water is always at hand.

After the first four weeks chickens intended for breeding and laying must have a diet which is calculated to develop the growth of bone and muscle. Animal food is most important at this stage, and cut green bone should be included. Foods containing a high proportion of nitrogenous substances should be employed, and those tending to create fleshiness and fat should enter only sparingly into the diet.

Laying and Stock Birds

At the age of eight weeks birds intended for laying should be given as much liberty as possible to range about and keep themselves exercised. The object now is to develop them muscularly, and to get rid of all superfluous fat. Food at this stage, with the exception of what they pick up in their foraging excursions, should be almost entirely grain, unless they are in such an environment that this amount of liberty cannot be enjoyed, when a certain amount of animal and green food must of course be included. If circumstances necessitate their being in semi-confinement they should be furnished with a good-sized scratching shed, attached to which should be a large run.

The foods most necessary for adult layers are those containing the constituents necessary to the production of eggs. In summer a fair proportion of such foods will be

sought and found by the birds in their daily wanderings. Grubs, worms, insects and such prey will provide the nitrogenous elements, and the green food they pick up will have similar value. The cereals on which they are fed in summer should be as free as possible from heat and fat-producing elements. Nitrogenous substances and proteins must find a large place in the diet, and for this purpose both dried-fish meal and dried blood are valuable. Sussex ground oats combined with either of the above form a most suitable food for laying hens. That, however, is not procurable in many parts of the country. In its place any of the other meals, with fine sharps or middlings, should be employed. Wheat and maize should be used sparingly. They are each too rich in fat and carbohydrates to be a good food for laying hens. Skim-milk and buttermilk are both rich in proteids, and for this reason can be usefully employed in mixing the soft food. Crushed oyster shells are essential for providing the shells for eggs. They contain a high proportion of lime, without which the bird is unable to form the shell.

Vary the diet as much as possible so that the birds take a lively interest in their meals. Having found a diet which seems to agree thoroughly with the birds the temptation is to continue with this particular diet until the birds show signs of falling off. A far better plan is to have a set of, say, three kinds of diet, which can be given alternately, and although there may have been no sign of the fowls tiring of the food, a change will be beneficial and go towards preventing their becoming dull and lethargic or going off their feed. Some people entirely discard the hot meal in summer-time. In winter it should always be given.

The Ministry of Agriculture gives the following table of foods, which will be found useful in preparing morning meals.

FOOD FOR PENS OF TEN FOWLS (averaging about 6 lbs. each in weight) FROM THE COMMENCEMENT OF THE LAYING SEASON.

	Morning.		Midday.		Evening.	
	Weight of Food. Ounces.	Food-stuff.	Weight of Food. Ounces.	Grain.	Weight of Food. Ounces.	Grain.
I.	2 Lean meat *3 Bran *3 Cut clover hay 2 Barley meal		12	Barley	15	Wheat
II.	2 Cut raw bone *3 Bran 3 Chopped cabbage 2 Sharps (middling)		12	Oats	15	Maize
III.	*2 Meat meal *3 Bran 3 Chopped cabbage 2 Boiled potatoes		12	Oats	15	Wheat
IV.	2 Lean meat *3 Cut hay chaff *3 Bran 2 Pea or bean meal		12	Oats	15	Maize
V.	*3 Bran 3 Chopped cabbage 4 Rough oatmeal 2 Lean meat		10	Barley	15	Maize
VI.	*2 Bran 3 Barley meal 4 Fine ground oats *3 Cut hay chaff		10	Oats	15	Maize

Those marked thus (*) should be scalded.

The moulting period is one during which the birds cease to lay, and the old feathers fall off, while new ones take their place. It generally induces a rather debilitated state in the birds, although strong and healthy birds are able to resist any ill effects without much strain. During

Photo by] *[C. Reid, Wishaw.*

WHITE WYANDOTTES.

[Frontispiece

the moulting period the birds should receive a rather more generous allowance of food to enable them to re-feather rapidly. And, before moulting, if it is desired to hurry on the moult, the food supply should be decreased. If feathering is slow it may be accelerated by flowers of sulphur—sprinkled on the morning meal about twice a week, in the proportion of an ounce to each twenty birds. Birds do not, as a rule, moult in their first year. It takes, in the ordinary way, about six weeks.

In winter care must be taken that the birds get a little more in the way of heat-producing food, without in any way receiving enough to induce any superfluous fat to accumulate or to encourage anything approaching laziness.

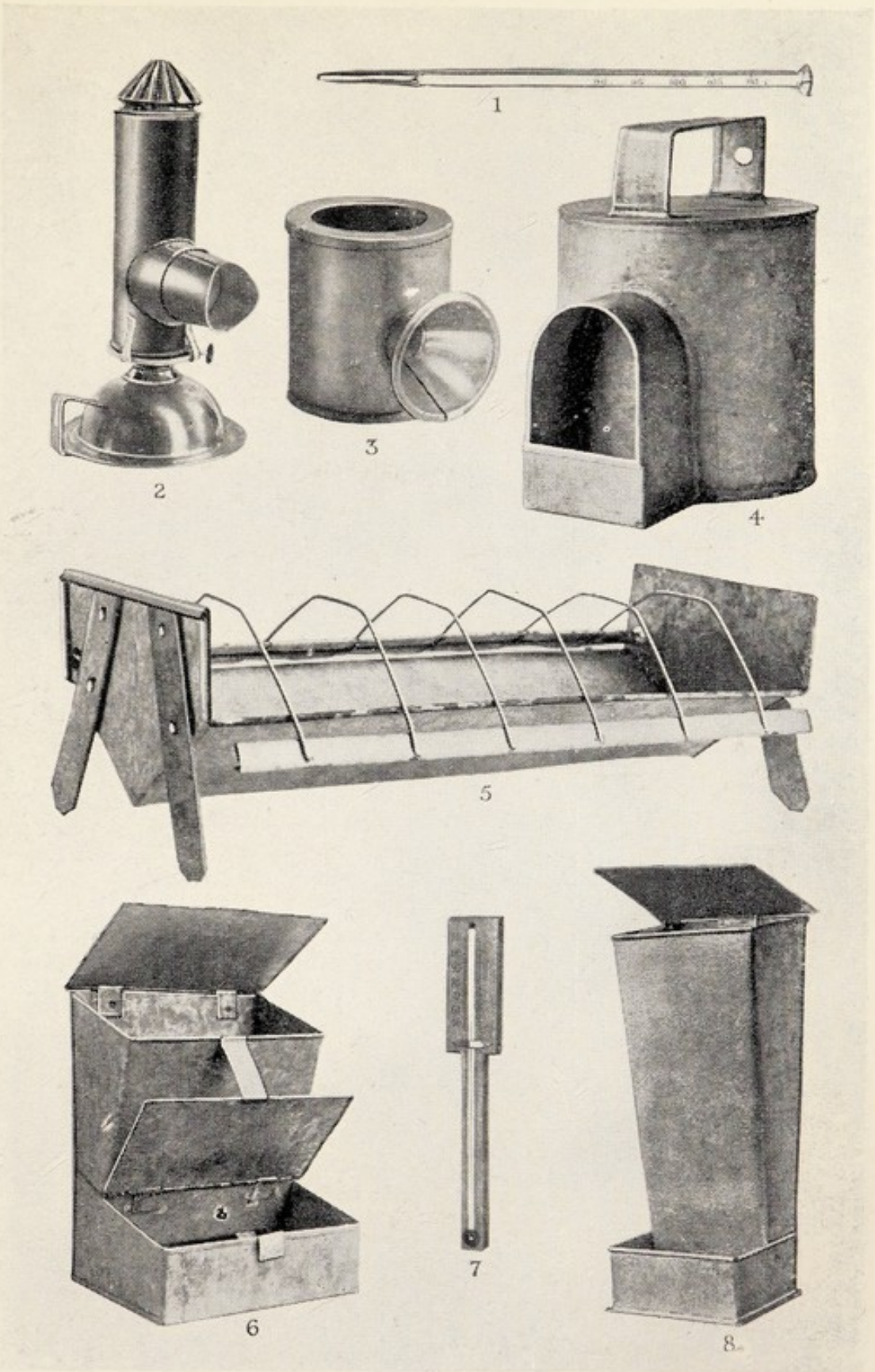
Feeding for Table Poultry

The early feeding of these chicks should, as already pointed out, contain a greater proportion of soft food than that adopted for the laying and stock birds, and also should include less of the bone-forming materials and more carbohydrates. It is necessary to force the growth of these chickens as much as possible, especially if they are wanted for early killing, whereas in the case of the laying and breeding stock the steady building up of bone and muscle is the aim. Ground oats mixed with skim-milk, augmented with a small allowance of grain, is a sound flesh-producing diet. But the food should be varied, and a certain amount of vegetable food and some fresh green food should be given. Broken or kibbled maize, well cooked in boiling water or milk, and mixed with ground oats and a little meat meal, is a food which will induce rapid flesh forming, and is excellent if the birds are to be marketed young. Generally speaking, no chicken is placed on the market younger than four months. There are, however, some unusually quickly developing breeds which are sometimes suitable for killing at three months.

There are two ways of disposing of chickens which have

been raised for table purposes. One is to fatten, kill and market, carrying on this work as a branch of the general industry; or, after the age of three months they may be sold to the higgler or professional fattener. The last-named is more general. The opportunity afforded by the existence of this very ancient and highly-skilled profession should be taken advantage of by all who have not the necessary time, experience, or skill to undertake the fattening of table birds. All such matters as fattening, cramming, killing, preparing, packing and dispatching are thus avoided, while at the same time use can be made of the broody hen in hatching and bringing up chicks to this age. It is a branch of the poultry industry which pays extremely well. The highest prices are secured for chicks ready to be handed over to the higgler from March to June. There is no expense attached to the transit of the birds as it is usual for the higgler to make his calls in person, when he collects the chicks, generally paying ready cash. It will be seen that this is a profitable side of poultry farming, and, given success in raising the chicks to the required age, it is worth while running it co-extensively with the industry of egg-production.

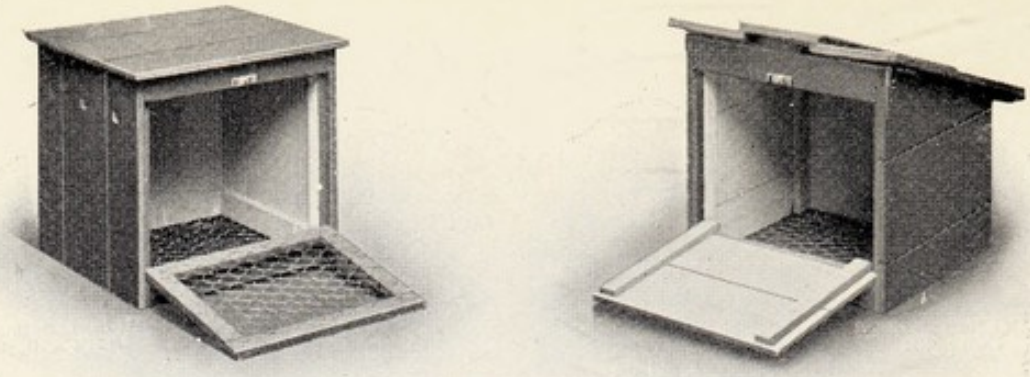
The production of finished table birds calls for a much greater degree of skill and experience than that of egg-producing, though much may be done by devotion and careful study. The object is to increase the fleshy productiveness of the bird whilst preserving the softness and delicacy of the flesh. It will readily be seen that in order to prevent the strengthening and consequent hardening of the muscles the bird must be deprived of exercise. It must also be fed on a liberal but careful diet, containing fats and carbohydrates. No foods predisposing to activity must be given, and the birds must be kept warm and free from draughts and exposure. The surroundings must be quiet and calculated to produce contentment and placidity on the part of the birds. The very



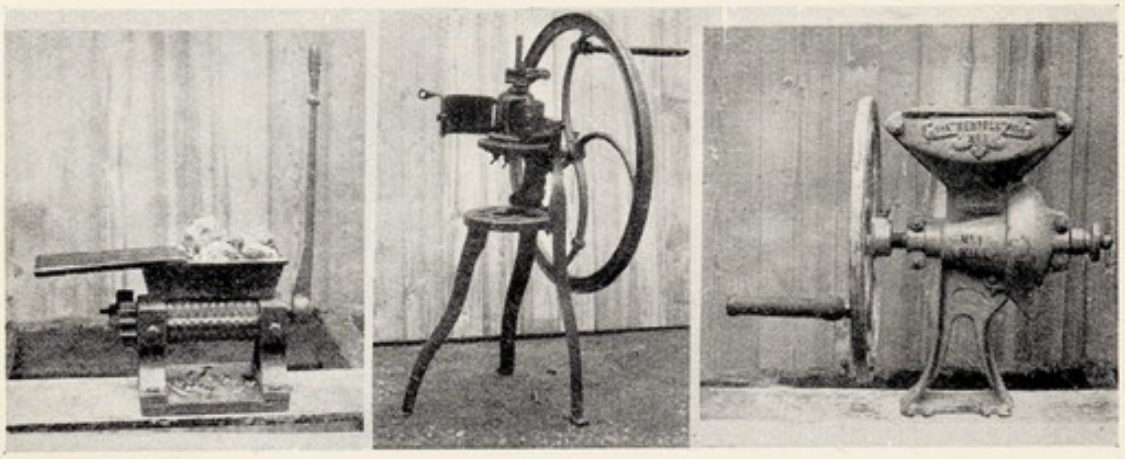
POULTRY APPLIANCES.

1. Incubator Thermometer.
2 and 3. Egg-Testing Lamps.
4. Automatic Water Fountain.
5. Trough for Wet Mash.
6. Dry Mash Hopper.
7. Brooder Thermometer.
8. Grit Trough.

POULTRY APPLIANCES.



HATCHING BOXES.
Reproduced by courtesy of the makers, Messrs. Boulton & Paul, Ltd., Norwich.



GRIT CRUSHER. BONE CUTTER. KIBBLING MILL.
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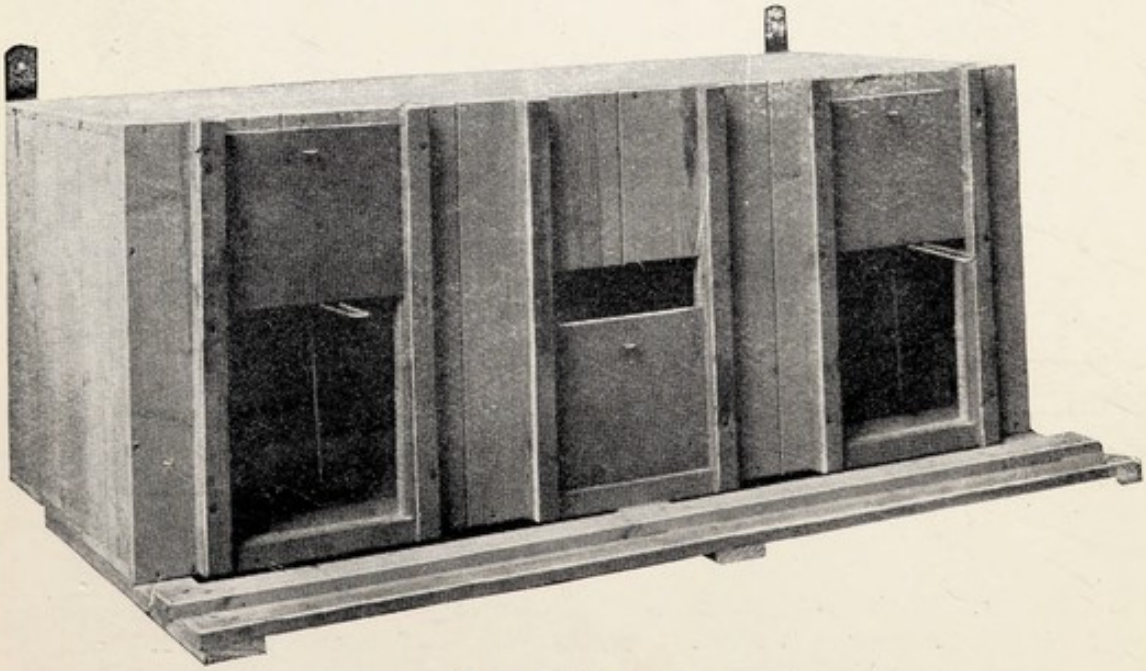


TRAP NESTS.
Reproduced by courtesy of the makers, Messrs. Boulton & Paul, Ltd., Norwich.

best table birds have the tissues impregnated with fats and oils in the place of water, and in the process of cooking these permeate the flesh and make it succulent and tender. Almost the reverse regime of that adopted for laying birds should accordingly be employed.

After they are twelve to sixteen weeks old, chickens for fattening should be placed in groups of three to six in separate coops, either in sheds or open air. Plenty of oxygen is necessary as in their confined state their digestions may easily suffer, but at the same time subjection to severe weather must be avoided. Outdoor shelters are therefore advisable in summer, but in winter it is wiser to keep the coops or cages in a shed or building, thoroughly ventilated. The size of the cages should be about 7 feet long, 2 feet wide, and 2 feet high, to contain ten birds. These cages are raised from the floor, and the bottoms are open and fitted with bars on which the birds stand. The droppings fall through to the earth below and are removed at frequent intervals. Even in summer some shelter should be erected over these pens, in case of rain and too strong sunshine. It is a good plan also to have them arranged if possible under the shadow afforded by some trees or hedge. The cages are constructed of bars or rods of wood about 1½ inches apart. The food is placed in a trough suspended outside the cage, and the space in front between the rods should be large enough to permit the birds to reach the food.

The deprivation of exercise and freedom and the general change in conditions sometimes has the effect of putting the birds off their food. If they show signs of this, do not force them. Leave them for a few hours, when they will generally be found to have settled down to a philosophic acceptance of their new state, and to begin once more to take an interest in their food. Milk and ground oats still form the staple diet in the south-eastern counties. It is found most economical for this purpose to employ

the best quality ground oats, when obtainable at a suitable price, and to avoid any substitutes, except perhaps buckwheat or barley meal, both of which are excellent foods; but the ground oats seem to provide the best all-round proportion of the necessary constituents. This is the food almost exclusively employed by the Sussex and Surrey producers of table birds, and to its use much of their success is attributed.

There is a distinct advantage in using sour rather than sweet milk in mixing the food. The digestibility of the food is a most important point in the case of birds deprived of all activity, confined in a small space, and receiving an abundance of food. All methods, therefore, of achieving as digestible a diet as possible are seized, and it is found that the acid in the sour milk is a valuable aid to digestion, so much so that, where it is employed, it is found unnecessary to give any vegetable food, a small proportion of which is otherwise found necessary to preserve the fowl in health. The food should be mixed to a rather sloppy consistency, and fed in the troughs twice a day. The first meal should be given as early as six or seven in the morning in summer—an hour later in winter. Eight hours should elapse before the evening meal is served. No grain should be given, and no water is necessary as the food is moist enough. After about two weeks of this feeding the birds are sometimes killed in what is called a half-fatted condition—that is to say, they have not been subjected to the cramming process. In which case it is wise to introduce some fat or pieces of suet into the diet some days before they are killed. There is quite a good market for birds in this condition. The best results are, however, arrived at by allowing the birds to remain in the fattening pens only for a fortnight, after which they are crammed by hand or machine, the process lasting a week or ten days.

Cramming

Cramming may be done either by machine or hand. It is unfortunately a case of necessity if first-rate quality poultry is to be secured. It should be the aim of the operator to become so proficient in his art that the least possible inconvenience—in the hands of a clumsy person it may amount to extreme pain, and even death—may be felt by the bird. The object is, as the name implies, forcibly to feed the bird after its appetite is satisfied until the crop contains as much food as it will hold. In the hand process use similar food to that which has been given in the troughs, rather stiffer in consistency, so that it may be rolled into pellets about 1 inch long. The pellet, first being moistened by being dipped into milk, is inserted into the bird's throat, and by means of the fingers, applied to the outside of the crop, is gradually worked into the crop. This process is continued until some eight or nine pellets have been passed into the crop, and is repeated again during the day. The machine method is a much more rapid one. Elaborate instructions are given when the machine is purchased as to the way it should be managed. The novice is advised to use the utmost care and patience in undertaking the work. Any hurry or carelessness, in addition to causing unnecessary pain and misery to the birds, may result in death. Some birds cannot take so large a quantity of food as others. It is in their exact knowledge and large experience of different birds that the professional fatteners score.

Proportional Table of the Composition of Poultry Foods

Compiled by the Ministry of Agriculture and Fisheries

	In 100 lb.					
	Water.	Protein.	Oil.	Carbohydrates.		Ash.
				Sol.	Fibre.	
Barley	14·9	8·6	1·5	67·9	4·5	2·6
Dari	11·1	9·6	3·8	71·2	1·9	2·4
Maize	13·0	9·9	4·4	69·2	2·2	1·3
Millet	12·5	10·6	3·9	61·1	8·1	3·8
Oats	13·3	10·3	4·8	58·2	10·3	3·1
Rice, Polished	12·6	6·7	0·4	78·0	1·5	0·8
Rye	13·4	11·5	1·7	69·5	1·9	2·0
Wheat	13·4	12·1	1·9	69·0	1·9	1·7
Beans	14·3	25·4	1·5	48·5	7·1	3·2
Lentils	14·0	25·5	1·9	52·2	3·4	3·0
Peas	14·0	22·5	1·6	53·7	5·4	2·8
Linseed	7·1	24·2	36·5	22·9	5·5	3·8
Hemp Seed	8·9	18·2	32·6	21·1	15·0	4·2
Rape Seed	7·3	19·6	45·0	18·0	5·9	4·2
Sunflower Seed	7·5	14·2	32·3	14·5	28·1	3·4
Buckwheat	14·1	11·3	2·6	54·8	14·4	2·8
Barley Meal	12·6	11·9	2·2	65·5	4·6	3·2
Blood Meal	14·0	81·0	0·8	1·5	—	2·7
Fish Meal	13·0	55·6	4·4	2·1	—	24·9
Meat Meal	10·8	72·2	13·2	—	—	3·8
Linseed Cake (English)	11·2	29·5	9·5	35·5	9·1	5·2
Milk, Skimmed	90·3	3·5	0·4	5·0	—	0·8
Wheat Offals (Pollards)	13·3	14·3	4·8	55·6	7·7	4·3
Maize Bran	11·8	8·4	4·2	62·0	11·7	1·9
Maize Meal	15·0	9·2	3·8	68·7	1·9	1·4
Oatmeal	8·2	16·0	6·7	65·5	1·6	2·0
Carrots	87·0	1·2	0·2	9·3	1·4	0·9
Potatoes	76·2	2·1	0·1	19·7	0·9	1·0
Turnips	91·5	1·0	0·2	5·7	0·9	0·7
Turnip Leaves	88·4	2·2	0·5	5·3	1·5	2·1
Cabbages	84·7	2·5	0·7	8·1	2·4	1·6
Red Clover (in flower)	81·0	3·4	0·7	8·1	5·2	1·6
Red Clover Hay	15·0	11·1	2·1	37·8	28·9	5·1
Lucerne Hay (in flower)	16·5	14·2	2·6	29·2	29·5	8·0
Meadow Hay	14·3	9·7	2·5	41·0	26·3	6·2
Oat Straw Chaff	15·0	3·8	2·3	40·7	32·6	5·6
Wheat Straw Chaff	14·0	3·7	1·2	42·6	27·7	10·8

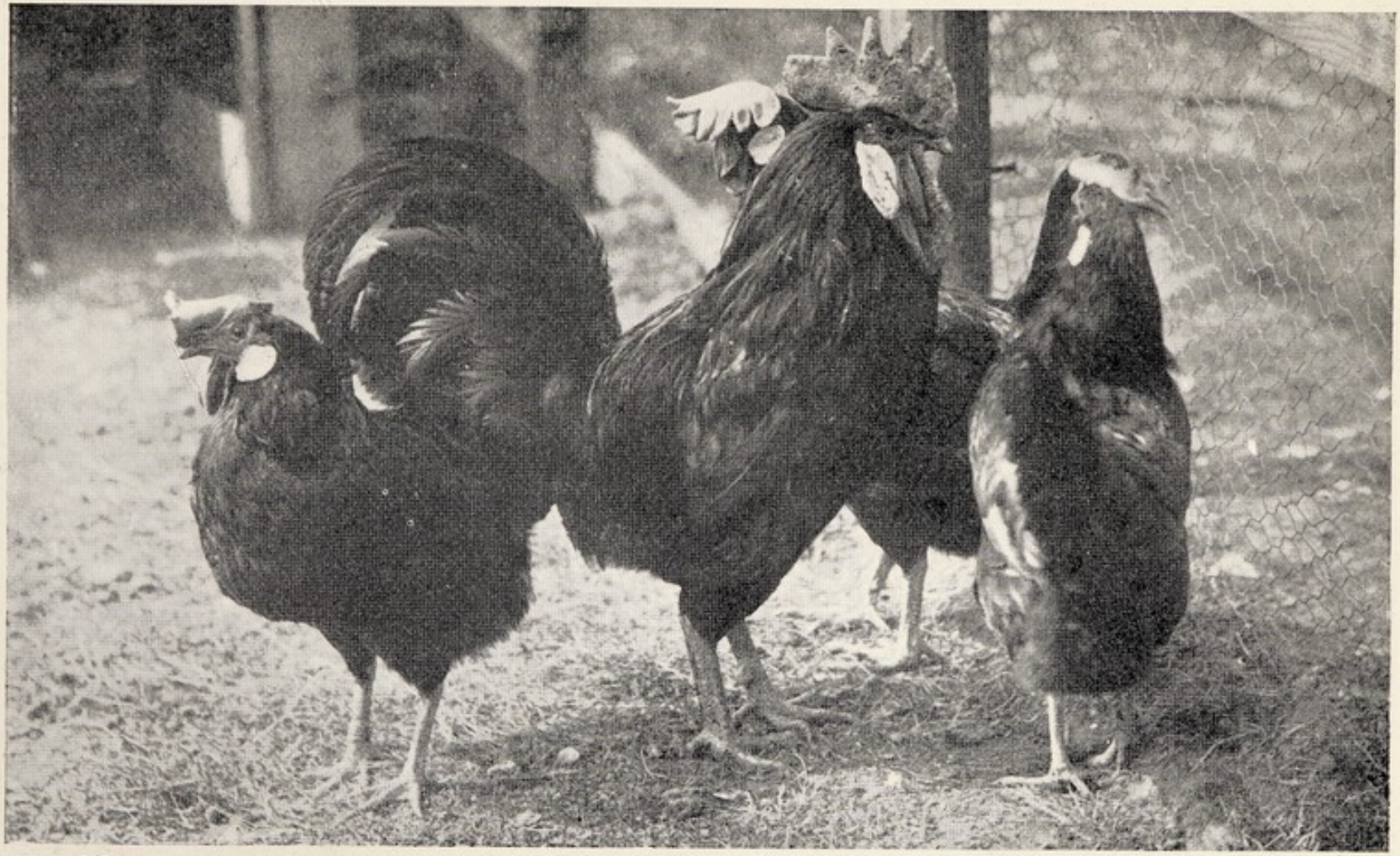


Photo by] [*C. Reid, Wishaw.*

MINORCAS.

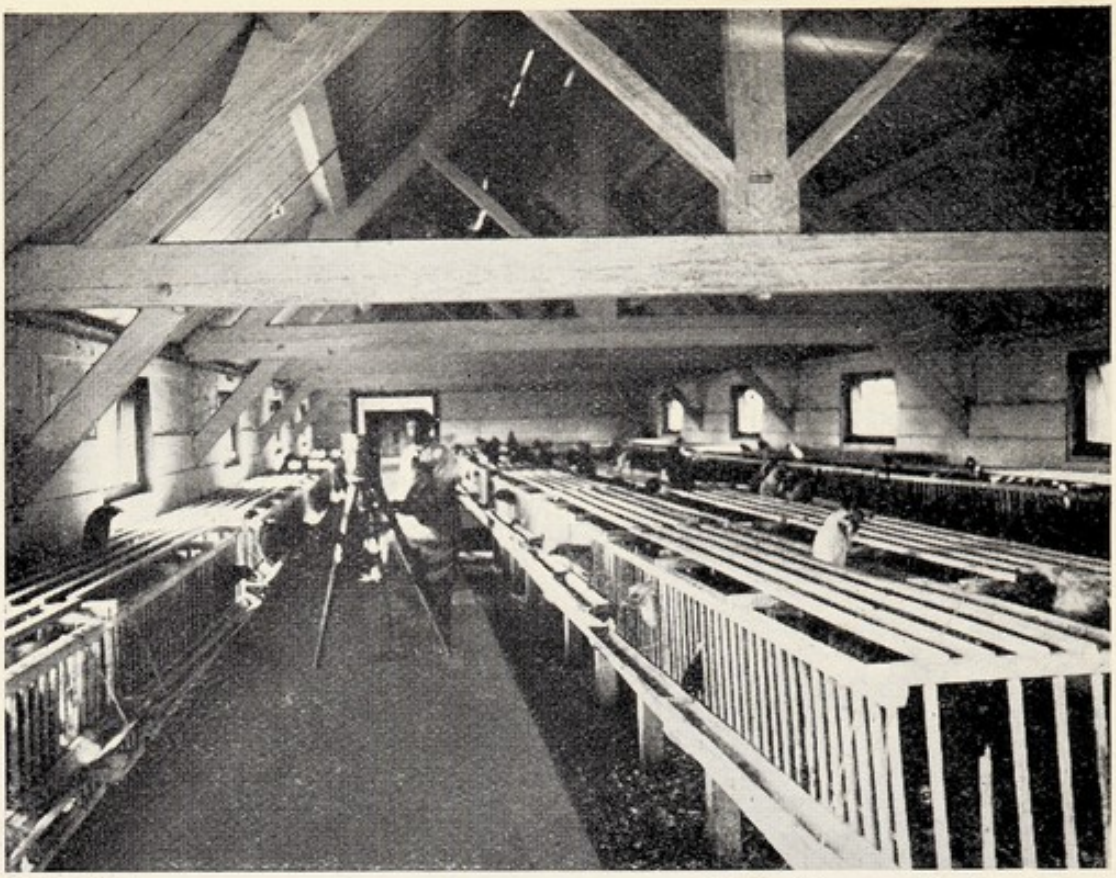


Photo by] [*J. T. Newman, Berkhampstead.*

FATTENING PENS.

Photo by] [*"Country Life."*

PEN FOR CURING BROODY HENS.

CHAPTER V

HATCHING

IMMEDIATELY an egg comes into contact with the requisite heat the germ begins to develop, a definite change taking place in the contents of the egg within the first twenty-four hours. The substance of the egg itself is a delicately and beautifully contrived mechanism for sheltering and supporting the life of the embryo on its progress to maturity. The germ is at first a minute organism which floats on the yolk, and it is from the yolk that it derives its sustenance. The yolk is suspended within three layers of albumen by two cord-like arrangements of the albumen (chalazæ), and Nature has provided that in whatever direction the egg may be lying the germ will always be carried to the upper surface and thus receive the direct warmth of the hen. As the embryo develops the yolk of the egg becomes absorbed by it until, on the day of hatching, it will be found to have been entirely absorbed. The shell of the egg is completely covered with tiny pores through which the oxygen necessary for the development of the chicken is conveyed. Evaporation is constantly taking place through these pores, in fact there is a continuous inhalation and exhalation going on from the time that the germ begins to become active until hatching takes place. In spite of the complex structure and apparent fragility of the egg, hens, in a natural state will in most cases hatch out a high average of their eggs. But hatching on a large scale involves interference on the part of the

poultry keeper, involving all the possible chances of contamination and interruption of the natural processes. As a consequence, great stress must be laid on the necessity for fresh air and proper conditions in the incubator and henhouse, and on care and cleanliness in handling the eggs.

Incubator *versus* Natural Hatching

Although hatching by natural means, that is, by the employment of broody hens, may recommend itself by reason of its simplicity and the way in which it relieves us of direct responsibility, artificial hatching by means of incubators has now been brought to such a pitch of excellence that incubators have become a necessity even to the quite small farmer. It is still a matter of opinion as to the results achieved by these alternative methods. Some poultry keepers of wide experience, while admitting the value of the incubator for emergencies, and where large numbers of eggs are concerned, still maintain that under the natural method chickens hatch with better results and turn out to be more vigorous and healthy birds, while others are of the opinion that there is a far lower mortality among incubator-hatched chicks. Whatever the intrinsic merits of either method, one thing is certain. We cannot do without the incubator. The advantages in the matter of reliability of a mechanical incubator over a hen hardly need stating. The hen, being a living creature, is subject to many influences which the incubator escapes. She is affected in some mysterious way by wind and weather. An easterly wind or a sudden cold spell will often cause her to desert her nest. She will also desert it for no apparent cause whatever. A bad sitter or an awkward bird will often break quite a number of her eggs in settling down on them after an absence from the nest. Her capacity is limited. She cannot cover more than a certain number of eggs at a time. Where a large number of eggs accumulate the right number of hens cannot be relied on to go broody

just at the moment when they are wanted. So that, even where a strong prejudice in favour of natural hatching exists the incubator takes its place as a reliable auxiliary. In fact all enterprising persons regard it as indispensable in hatching on anything much more ambitious than a back-yard scale.

There are, however, disadvantages which may be to some extent controlled by the operator. Any irregularity in the supply of heat, more especially an excess of temperature, inattention to lamp, to supply of moisture, to turning and cooling the eggs, if the atmosphere becomes contaminated by fumes from the lamp, will have more or less serious results. It has, also, been proved in experience that a machine is less reliable than a hen for hatching highly-bred stock, which, together with the great increase of death in shell, referred to below, among incubator-hatched eggs, indicates that there is some influence exerted by a hen which is lost under the artificial method.

Incubators entail a certain amount of management and attention, but a good machine intelligently handled will amply repay the care and labour expended on it by the great number of eggs it can undertake at a time, and by its freedom from such concerns as weather, mood and season.

Selection of Eggs

It must not be supposed that eggs selected at random and without regard to their antecedents are going to give first-class results under any method. The eggs intended for hatching should be carefully chosen from those produced by well-matured hens, whose laying results have been watched and proved satisfactory during their first season—these hens mated with first-class pedigree cockerels.

Attention to the needs of the laying stock is highly important, especially if the birds are kept in confinement or part confinement. The fowls must be strong and active. The sound layer has what one might almost call

the qualities of an athlete—a good circulation, muscular development, leanness, firm limbs, and equally sound and vigorous internal organs. Do not hatch from forced or artificial layings, i.e. winter eggs. Eggs laid in the spring-time are more likely to result in strong, sturdy chicks.

Choose those eggs having a good average size and shape, rejecting all that show abnormality of any kind. A large egg does not always imply a large chicken and may often prove a less vigorous and healthy bird. It is the quality and inherent health and strength of the germ that are the primary factors in the production of a strong and healthy chicken.

Hatching by Natural Means

The Broody Hen

Moisture, heat and oxygen are the essential conditions for successful hatching. When a hen becomes broody the normal warmth of her body is increased by the condition of the blood-vessels in that part of her body coming into contact with the egg. These become distended, and the accelerated blood-flow causes the temperature of the atmosphere around the eggs to rise to about 103° or 104° F.

Reference has already been made to the presence of the germ at the upper surface of the egg. When the hen leaves her nest to seek food or exercise the eggs are left for a short period during which they cool. When she returns to the nest, in settling down she shuffles and rearranges her eggs, and thus the necessary turning is accomplished. If the eggs were not turned there would be danger of the germ adhering to one of the walls of the shell, which would result in the death of the embryo. The process of turning also helps to diffuse the oxygen which is conducted through the albumen to the germ.

After the hen has returned to her nest it is as well to see that she has all her eggs covered. Sometimes one or two

may get left outside the shelter of her wings, and, becoming chilled, be rendered useless.

An average-sized hen cannot comfortably cover more than thirteen eggs. With a small bird do not chance more than eleven. If hatching is done in the late autumn or winter eleven eggs will be enough for a moderately large bird, and not more than nine for a smaller one. Once the hatching has started endeavour to keep the hen on the nest until all the chicks are out. It is a mistake to take away the chickens as they hatch. They should be left to the care of the hen until the whole brood is out, merely removing the empty shells now and again.

Accommodation for Broody Hens

During early hatching, when the weather is too cold for the sitting box to be placed out of doors, choose some quiet shed or outhouse where the hen is not likely to be disturbed by sudden noises or vibrations or visits from other animals or persons. She will do better in a dark place and out of sight and hearing of her fellow sitters. The shed must be well ventilated. Whatever impurities may be in the air will be readily absorbed through the porous shell of the egg and the inmate be affected.

Cover the floor with several inches of earth. On this place the sitting boxes as far apart as space will permit. The boxes should have no bottoms so that the nest comes into direct contact with the earth floor. If the shed happens to be too dry the earth on the floor can be kept at the right degree of dampness by water poured on it—about a pint daily, in the neighbourhood of each box. The water should be hot. The boxes themselves should be so ventilated that a current of clean air passes through them above and below the level of the hen : holes pierced in the back and sides will answer the purpose. The front of the box is best left open, so that the hen is at liberty to leave her nest whenever she is disposed. If she is a good

sitter she will not leave her eggs unduly long—though her movements should be observed for a day or two.

The Nest

Make the nest circular in shape, inclining towards the centre in a slight hollow. But only a slight one. It is a common mistake to make the nest too hollow, when the eggs roll together and become cracked or broken, and the hen additionally finds some difficulty in getting into contact with those in the deepest part. On the other hand, it must not be too shallow so that the eggs roll out and get chilled. Make the foundation of the nest of earth or ashes, and on this foundation construct the nest out of straw which has been bruised or softened by rubbing between the hands. Hay can be used, and is a very good material because it conserves warmth, but straw is to be preferred as less likely to encourage vermin. Do not forget to fill up the corners of the box so that there is no chance of any of the eggs rolling out and falling into them. A little brimstone scattered over the finished nest will help to keep it free from parasites. And it is very necessary to take precautions to keep such pests out of the nest. Nothing will so quickly drive a hen away from her eggs as a verminous condition of the nest. The dust bath is an invaluable cleanser. Always have a good deep box half filled with dust or ashes within reach of the hen. She will invariably use it, and will be all the better and cleaner for it.

Never allow nests to stay fouled, or broken eggs to remain in them. Examine them every day when the hen comes off, and, if necessary, wash any of the eggs that have become stained. Every source of contamination will militate against the future of the chicken. If it is necessary to wash any of the eggs, use warm water, and be careful that they are thoroughly dry before they are returned to the nest.

Treatment of the Hen

After the hen is once settled she should be left undisturbed, except for her daily exercise and feeding. If, however, she is disinclined to come off her eggs, she must be lifted off, both for the sake of her health and so that her eggs may be cooled. Most good sitters attend to these matters themselves, but some individual birds, good in every other way, may show reluctance to come off the eggs. In lifting her off great care must be taken to see that no eggs are concealed between her wings or feathers. Occasionally one or two eggs will adhere to the feathers, and dropping, will not only be broken themselves, but may break the others below.

When the broody hen is first settled on her nest try her with two or three artificial eggs. After a day or two of attention on her part, they may be removed and the real eggs substituted. It is hardly safe to entrust a good sitting of eggs to a bird whose habits are not known

Nests Out of Doors

Early in spring, when the weather is getting warmer, nests should be made outside, when a rough shelter erected over the nest box, or the nest made in a coop, will be all that is necessary. It is a good plan to have a small wired run in front of each coop or box. The hen will thus have liberty, without the opportunity to go away for any indefinite time, or to wander off to the wrong nest. Any number of hens can thus be set in a moderate space. If, for any reason, such as economy, a separate run cannot be permitted to each hen, one run can be made enclosing as many coops as are occupied. These coops will have barred fronts or doors. One hen at a time can then be liberated, and, on her returning to her nest, the next one can be let out, and so on until all the hens have had their outing. The drawback to this method is the extra labour and attention it involves.

Eggs that have Become Chilled

Sometimes a hen deserts her eggs and cannot be induced to return to the nest. This phenomenon often occurs during a period of sudden cold or wind. In the absence of an incubator the eggs must be distributed among other sitting hens. Eggs that have become chilled, even if quite cold, provided they are not frozen, can often be saved by prompt attention. Immerse them in water heated to 105° F., then give them to another hen, or place them in an incubator.

Feeding

Feed sitting hens on hard grain. Avoid giving soft food. The hard food takes longer to digest and can be depended upon to sustain the bird for longer periods. Maize is an excellent food for maintaining heat. Fresh water should always be within reach, but it is better that the food be put some little distance from the nest so that the hen cannot take it without coming off the nest. This guarantees the cooling of the eggs, and provides some exercise for the hen. Feed the hen at a definite time every day; the eggs will then get regularly cooled and turned. Do not give the chicks any food for the first day or two, and then start them on grit.

Incubator Hatching

In selecting an incubator it is advisable to go for a well-known make of machine. Not only is a machine having a reputation more likely to prove reliable; there is the practical question of obtaining spare parts and fitments. In purchasing a little-known machine, or a second-hand one of unknown make, remember that there may be trouble in the event of spare parts being wanted for repairs.

Of the two types of incubators now in use the hot-water or tank pattern is generally preferred. Hot-air machines, to work successfully, require a particular environment

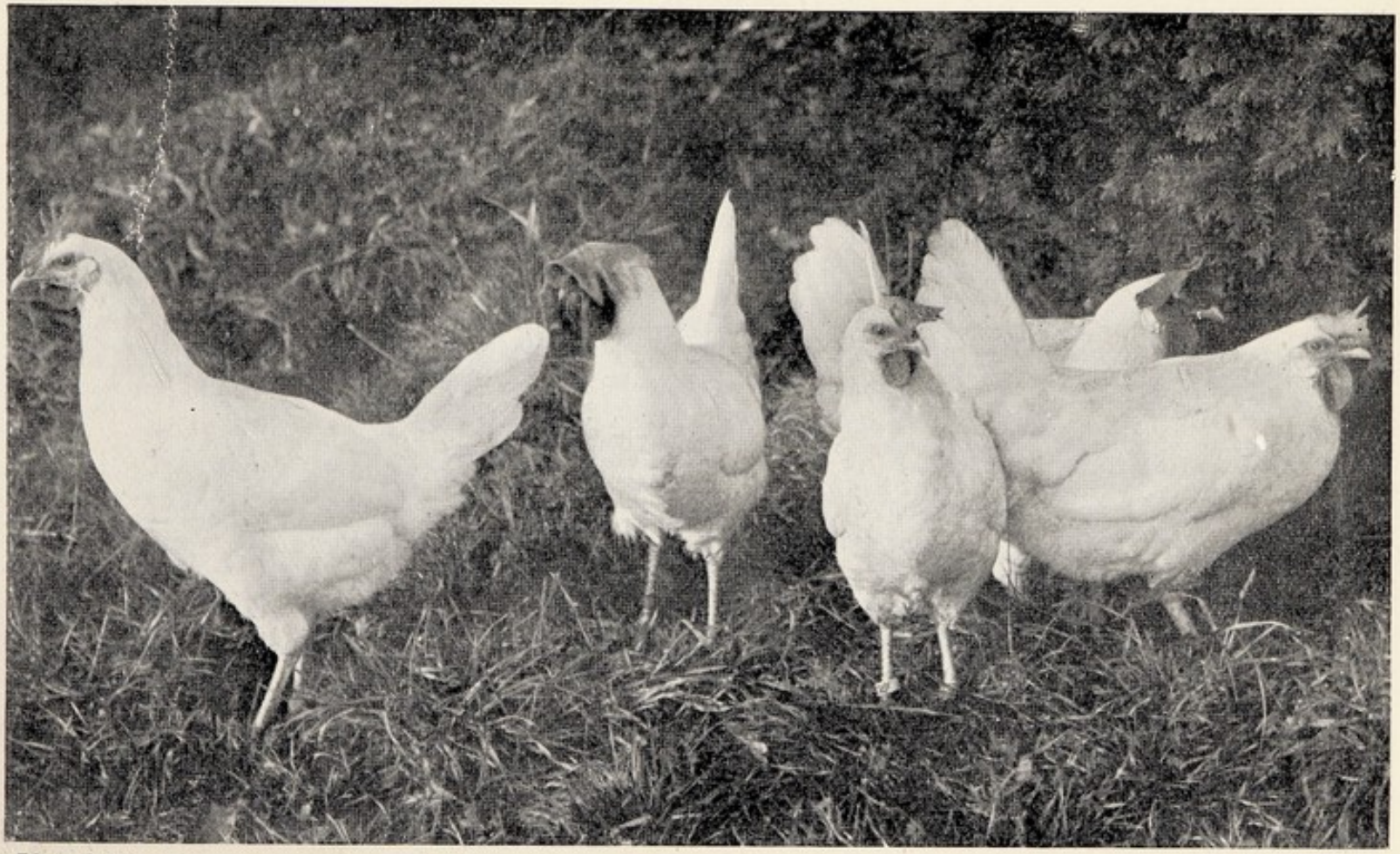


Photo by] *[C. Reid, Wishaw*

WHITE LEGHORNS.

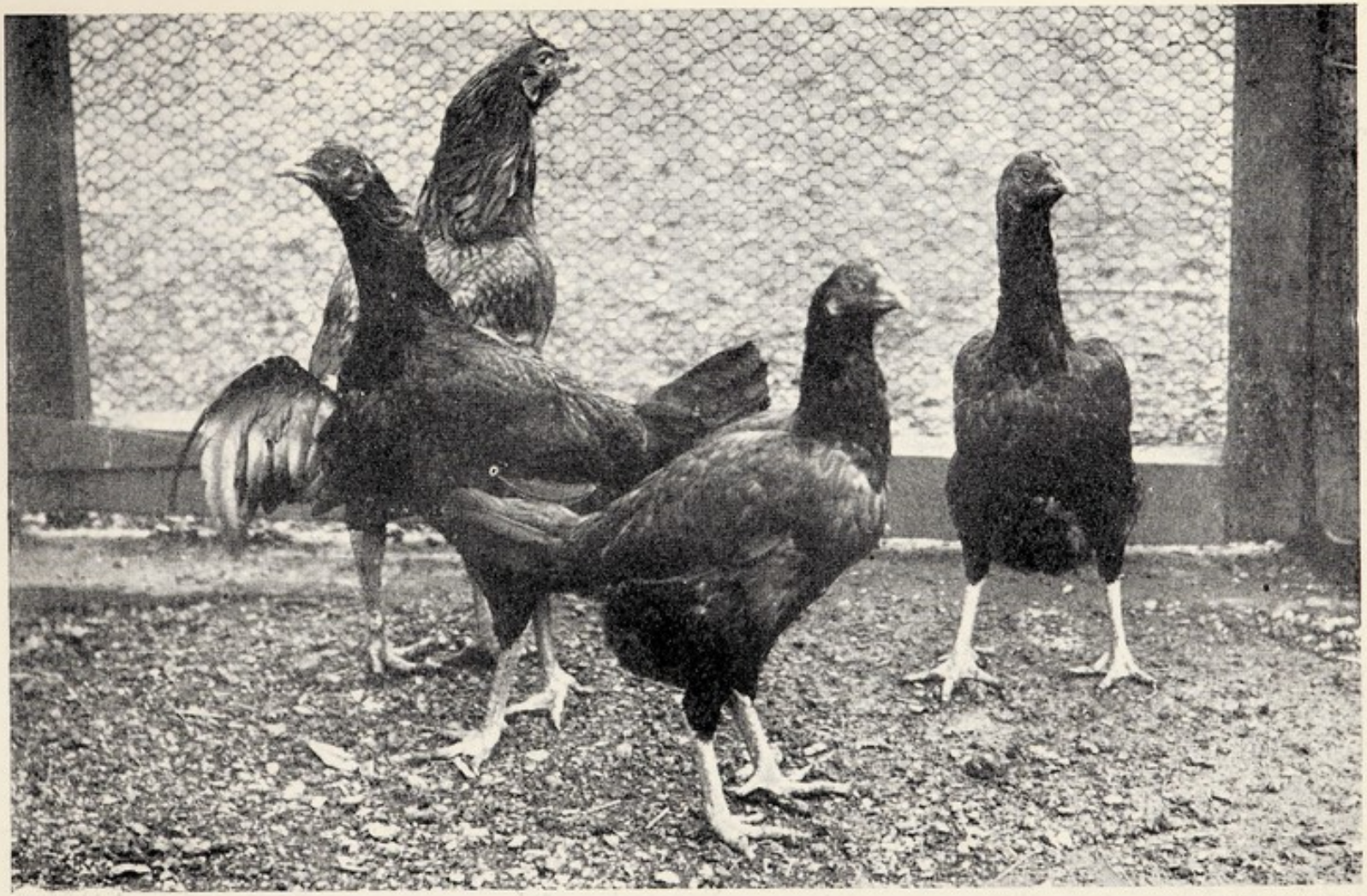


Photo by] [*C. Reid, Wishaw.*

INDIAN GAME.

and involve the erection of special houses, or at any rate the use of a building in which atmospheric conditions can be precisely regulated. This also holds good with the hot-water pattern, but not in nearly so great a degree.

In all incubators the heat comes from above, in imitation of the broody hen. In the hot-water pattern the tank containing the hot water receives heat from a flue pipe connecting with the lamp, which is usually worked by petroleum. The egg drawer is placed below this tank, and underneath is the water tray supplying the necessary moisture. Heat, moisture and oxygen being the three essentials in hatching, incubators must be so constructed as to provide these conditions. In these machines the ventilation is arranged in such a manner that fresh air can only enter from below, and must pass through a wet cloth before reaching the egg chamber, thus the air is laden with moisture before it touches the eggs. There is also a drying box provided for the chickens to be placed in after hatching.

There are various contrivances for regulating temperature, the most satisfactory of these consisting of a small capsule made of two thin pieces of brass, joined at the edges. This capsule contains a few drops of a fluid which boils at a temperature of about 104°—that required for the incubator. Directly the air of the incubator reaches 104° the fluid begins to boil and the steam generated expands the sides of the capsule. This action lifts a lever connecting with the cap of the escape chimney, and the extra heat, instead of following the usual course, is diverted and escapes. This arrangement is automatic, so that a good deal of responsibility is removed. At the same time there are sundry details which will be found in the instructions supplied by the makers. The hot-air type of machine is usually a cheaper article, as the cost of the tank is dispensed with. The warm air from the heater flows into the heating chamber above the eggs, and, as

it cools, descends through a piece of stretched felting placed between it and the egg drawer. Here it diffuses itself over and between the eggs, and, continuing to cool, passes downwards through a further layer of porous material stretched over a ventilating chamber, where it mixes with the incoming fresh air and is drawn into the heater. In another make the cold air is carried off simply by diffusion after reaching the lower chamber. There is no water tray in these machines. The water exhaled by the eggs is retained by the hot air about the eggs, and as the cool air descends the greater part of the moisture is left behind, since, as air becomes colder, its capacity for retaining moisture is reduced.

The result of experience in using both types of machines goes to prove that, on the whole, the tank pattern is the simplest one for use in England, and the one most likely to yield the best results.

The important points to look for in an incubator, whichever pattern is finally adopted, are that there should be a proper supply of fresh air, and that this air should reach the eggs in a suitable condition, that is, heated and charged with the right amount of moisture; that there should be no danger of lamp fumes penetrating into the interior of the machine and contaminating the atmosphere; that there should be a reliable system of regulating the temperature, and the supply of moisture; and that the entire working of the machine should be as simple as is compatible with the work it has to perform. The interior walls should have a lining of non-conducting material so that the temperature of the egg-chamber may not be unduly influenced by the outside atmosphere. Draughts, cracks, or ill-fitting parts stamp a machine as second-rate and unfit, and all such must be rigorously avoided.

Working the Incubator

All incubators have elaborate sets of rules which must be

carefully studied before any attempt is made to use the machine. In the incubator room the thing to aim at is a constant supply of fresh air combined with a freedom from draughts and an even temperature. The temperature of the room ought to be steadily maintained at 60° F., while that of the incubator should not be allowed to fall below 102°.

In starting the incubator run it for two or three days before putting the eggs in, and look carefully for defects in working or irregularities of temperature. Do not put any eggs in until there is good evidence of smooth and steady working. See that the machine stands level and in a place where it will not be subjected to jars or vibrations, or to a direct draught.

Place the eggs in the drawer so that the small ends point toward the centre. The egg drawer is slightly concave. The egg, therefore, will lie with the broad end tilted slightly upward. The chicken always develops with the head in the highest part, and it is desirable that this should be the broadest part. If the chick should grow with the head in the narrow end of the egg, it will experience great difficulty in extricating itself from the shell and in some cases fail to do so.

The supply of water in the water-tray must be kept to within a ½ inch of the top, and in filling the trays use warm water, whilst these trays should be scalded weekly.

Turning and Cooling the Eggs

Turn the eggs twice each day, morning and night. The reason for turning them has already been given. Neglect to turn the eggs regularly is the surest way to "dead in shell."

Have clean hands for turning the eggs. It is a good plan to put an alternative sign—say a cross and a circle—on the opposite sides of the eggs as a guide in turning. After the eighteenth day the eggs should not be turned.

In fact they should, if possible, be left quite undisturbed and the drawer not opened more often than is absolutely necessary.

In a room having a mean temperature of 60° F. the eggs should be cooled for ten minutes a day for the first two weeks of incubation, and after that for fifteen minutes. To cool the eggs it is only necessary to leave the egg drawer open for the time stated. If the general temperature of the room is much lower than 60°, cool the eggs for a shorter period. It must be possible to get the heat of the incubator normal again within an hour. When hatching is in progress do not allow any empty shells to remain in the drawer. Remove these at regular intervals, and place the chickens in the drying box.

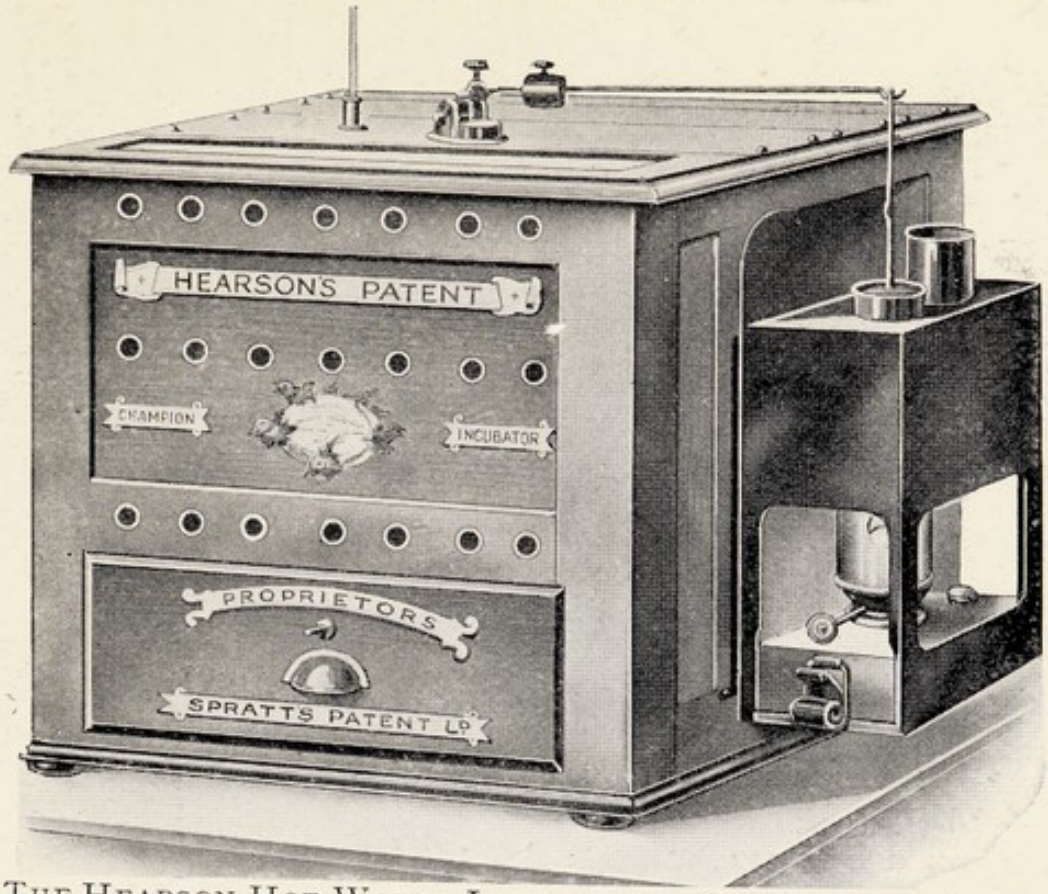
Testing the Eggs

Poultry keepers having energy enough and time enough to make a thorough examination of all eggs before submitting them to incubation will often be able to detect peculiarities and imperfections which only become apparent after the period of incubation is over and the chickens fail to appear. Examination, however, is, for all practical purposes, quite satisfactory if postponed to the eighth day, when the usual test for infertiles is made.

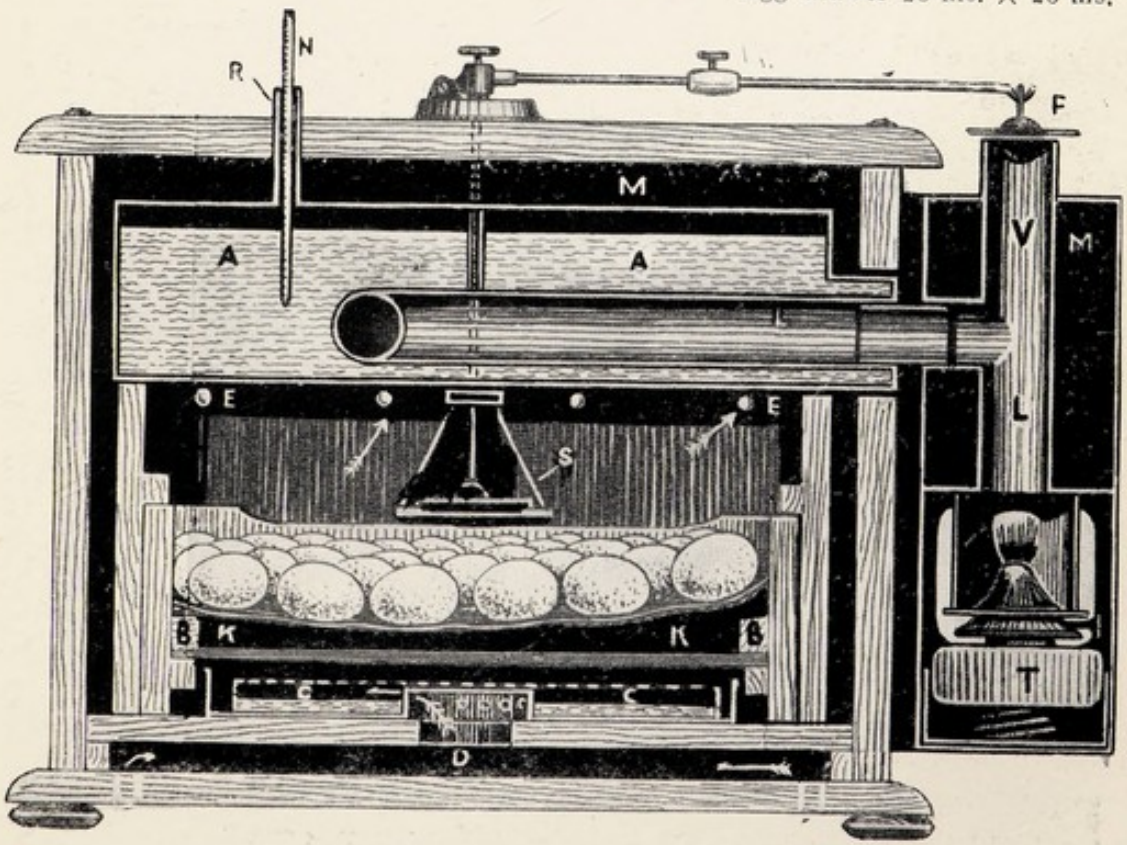
The simplest way to test eggs is by the light of a small lamp or candle. Exclude all other light from the room and put the candle or lamp on a suitable table. Hold the egg in the left hand between the forefinger and thumb, curving the right hand into a sort of tube to shade the light from the eye. The egg, if held close to the lamp, will then be sufficiently transparent for the germ, if present, to be easily discernible. There is always some sign of the embryo, even after two or three days, and an egg which is quite clear on the eighth day may readily be discarded as infertile.

A fertile egg will clearly show through the tester at this stage a dark spot from which radiate a number of little

INCUBATORS.



THE HEARSON HOT WATER INCUBATOR, for 100 to 120 Hen's Eggs. Egg drawer 20 ins. × 20 ins.



SECTION OF HEARSON'S HOT WATER INCUBATOR.

AA Tank of water.
BB Movable egg tray.
CC Water tray.
F Damper.
MMM Non-conducting material.
N Tank thermometer.
R Filling tube.
S Thermostatic capsule.
T Petroleum lamp.

Reproduced by courtesy of the makers, Messrs. Spratts, Ltd., London.

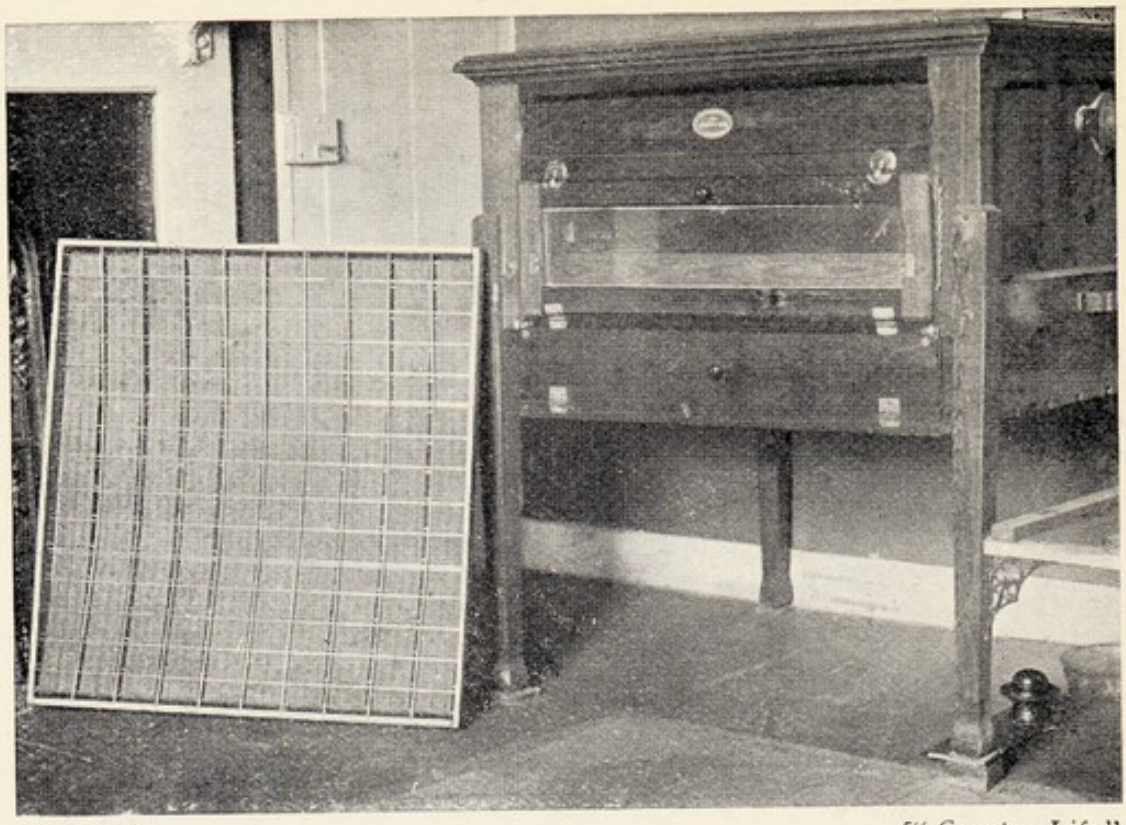


Photo by] [" *Country Life.*"

A 150-EGG HOT-AIR GLOUCESTER INCUBATOR, WITH AUTOMATIC EGG-TURNING TRAY.

Photo by] [" *Sport and General.*"

TAKING NEWLY-HATCHED CHICKS FROM AN INCUBATOR.

blood vessels. It is best when about to test eggs to choose a time when they have not been recently turned, and in picking them up to be careful not to change the position of the egg. The germ, if present, will then immediately be seen floating on the top. Infertile eggs should be taken out of the incubator and can be used for culinary purposes. Remove also eggs which show a dark shadowy mass when seen through the tester. These are probably addled, the germ having for some reason had its development arrested at an early stage.

At about the fifth day of incubation a network of little blood vessels, starting at the germ and spreading over the yolk, should have covered the entire surface of the yolk.

Should this process have been interrupted by any cause, there will be a corresponding interruption in the development of the chicken, caused by its failure to take up all the nourishment provided by the yolk which is conveyed to it by these little veins. If, on examination by means of the tester on the fourteenth day, an egg should show spaces at either end not filled by the opaque mass which occupies the rest of the shell, it will be because of the above failure to surround the entire yolk. The chickens may not hatch out. If they do they will very likely be of a less vigorous and healthy development.

A small egg-tester made of tin can be bought for about a shilling, and other and more elaborate lamps are made by which the germ can be recognized at an earlier stage.

Eggs for Incubator Hatching

Eggs intended for incubators should be gathered from the nest at frequent intervals in order that they may be kept clean, cool, and uncontaminated. If left too long in the nest they may be subjected to the warmth of the hen. Once the egg begins to germinate a sudden arresting of the process by taking the egg away will most likely result in a

final stoppage of its activity. See that the utmost cleanliness is observed in the handling, the condition of the nest or laying box, and the place where the eggs are stored preparatory to being placed in the incubator. Always remember that egg-shell is porous. This fact presents two possible chances for the eggs to be spoilt. The liquid contents may begin to evaporate if the atmosphere is too dry, or the eggs may become contaminated if the surrounding air is impure, or if any foulness comes into contact with them. Therefore preserve a special, clean, cool, but not cold, well-ventilated place where the eggs may be kept until there are enough to make a start with. The sooner they are put into the incubator the better. Eggs started when they are quite fresh usually hatch in twenty-one days. Those kept over for some days generally take a little longer.

The temperature of the place they are kept in must not be lower than 40° F., nor higher than 60°. They must never be allowed to freeze, nor yet be subjected to a temperature which will in any way affect the germ. Germ changes are known to take place at a temperature as low as 65°. Therefore for storing the temperature of the room must be well below this figure.

CHAPTER VI

REARING

Situation and Soil

CHICKS do best on a soil containing a supply of natural food. Animal food is an important factor in the diet. Clay is not very helpful from its tendency to retain damp and cold ; in fact, any heavy soil is to be avoided for chicken raising, except during the warmer months of the year. A light, gravelly, but not sandy soil is best for promoting the growth and rapid development of the chicken.

A south aspect is preferable wherever a choice is possible, and if the ground has a slope the situation is ideal. If the soil does not drain itself it is worth while to drain it artificially rather than to allow damp to accumulate.

When the soil itself provides an abundance of natural food there is ample opportunity for exercise in the continuous efforts of the chicken to secure his food, as there is nothing he likes better than to scratch and hunt about for grubs and worms. Where this does not exist all grain food given should be buried well down in litter.

The Hen

When a hen has successfully hatched out a batch of chickens, before she is removed to her new quarters she needs a sound meal of soft mash and some green food, since during the period of hatching she has been too much

absorbed in her duties to have much time to devote to her own needs, and has generally fed rather sparingly.

In summer, chickens brought up by a hen should be placed with the hen in wire-covered runs for the first two weeks. After that period the hen may be allowed liberty to range about with the chicks, as there is no fear of her wandering too far away with them. If they are not so enclosed the hen should be cooped and the grass kept fairly short in the neighbourhood. If the grass is too long the chickens may lose their bearings and be unable to find their way back again.

On a dry soil the coop need have no bottom, but if the soil is at all inclined to dampness a wooden floor should be provided. This floor should be movable so that it may be taken out and cleaned.

Coops should be moved on to fresh soil every day, and the same piece of ground not occupied again for at least ten days, and for a longer period if circumstances allow. If, for reasons of want of space, it is impossible to move the coops on to a different spot every day, fresh soil must be imported.

When chicks are taken from an incubator and given to a hen it is advisable to observe for a little the behaviour of the mother bird. Some hens are born bad mothers, and the chickens will stand a very poor chance of existence if left in charge of a bird of this kind. One night of neglect will be enough to finish a batch of chickens newly emerged from the heated atmosphere of an incubator.

Cleanliness, freedom from damp, proper shelter from hot sun in summer and from wind and rain in winter, and constant change of quarters are not only desirable—they are primary necessities for successful rearing. In cold weather provision must be made for the coops or foster-mothers to be removed into a shed or outhouse having plenty of clean, fresh air, and the floor well covered with fresh earth, frequently renewed. Even then the chicks

should be gradually hardened by accustoming them to open-air conditions. Every bit of warm, bright weather should be taken advantage of and the chicks got out into the open. On the other hand, they must not be subjected to cold winds and rain.

Artificial Rearing

Just as artificial or natural means may be employed for hatching, so in rearing there are alternative methods, any of which may be adopted with success, and which will recommend themselves according to the prevailing circumstances. In comparing the mechanical foster-mother with the broody hen, consideration will be given to such questions as quantity of chicks, season, and the number of broody hens available. Where incubators are used and a large number of chicks hatch out simultaneously it will nearly always be found necessary to have some mechanical help. Now that foster-mothers and brooders have been soundly investigated, their weaknesses laid bare, and for the most part overcome, no farmer having ordinary intelligence and energy need be afraid to avail himself of their help.

Brooders

In bringing up chicks in a foster-mother, the first step is to secure a reliable make of machine.

Any brooder is good which conforms to the following conditions:

That the heating apparatus is not too complicated for an ordinarily intelligent person thoroughly to understand it.

That it is easily regulated, easily repaired, and its parts easily replaced.

That it is reliable in that the lamp will burn steadily and well if given reasonable attention, and is in such a position in relation to the brooder that it will not be extinguished in

a sudden storm or be incapable of being regulated in a high wind.

That the lamp fumes are carried off by proper flues and vents.

That there is a sound system of ventilating.

That all parts of the brooder can be got at without difficulty for cleaning.

That there is no risk of overcrowding either in the inner or outer apartment.

That the heat is so distributed there is no danger of the chicks huddling for warmth.

The heating apparatus should be so contrived that the main heat comes from above so that the heat descends on to the chickens, and the floor should be free from cracks and draughts. There should also be an even distribution of heat all round—but the greater part should be above.

Hot-air and hot-water patterns are equally successful. Those systems which by means of a diffuser, or by the arrangement of flues, etc., spread the warmth over a large surface of the brooding chamber, are to be preferred to those in which the heat is more concentrated. In the former there is less tendency to crowd on the part of the inmates.

Another form of rearer is the "metal hen," which can be placed in a covered run or coop, and which, as its name implies, is designed to take the place of the real hen. In this make there is no second apartment and the chickens only retire to the "hen" for sleeping. It is doubtful whether this contrivance is quite so reliable as a brooder The intermediate warmth of the outer apartment in a brooder is of much use.

It is a very difficult matter entirely to imitate the exact proportion of heat and ventilation which the chickens enjoy under a broody hen, and in colder weather transition from the warmth of the metal hen to the outside air may easily prove too sudden. Everything may work

perfectly well for a week, and then on an abrupt change of weather the mischief is done.

Indoors, however, or used in the warmer months, there is nothing against this machine, and it is useful for brooding on a small scale.

Fireless brooders are run on the principle that the heat generated by the chickens themselves, if conserved, will prove to be sufficient for their needs. An arrangement of curtains and quilts is adapted to that end. In this method chickens have to be kept in a limited space to concentrate their heat, and therefore more watchfulness and attention on the part of the attendant are required. Floor space must be kept scrupulously clean, the temperature closely watched, and any sudden drop quickly noted and the outside air prevented from entering until the temperature is right again.

Accommodation

Opinion varies as to the exact number of chickens that ought to be kept in one brooder, but experience proves that in artificial rearing as much as possible of natural conditions should be preserved. Thus light and air and space, all of which the chicken is free to enjoy in his natural state, must be provided by the foster-mother.

All these conditions are more likely to prevail where a moderately small number of chicks are brought up together than when they are crowded in too large quantities. It is a far better economy to spend a little more money and secure sufficient brooders to start the chickens comfortably than to overcrowd fewer machines and have a regular and heavy death-rate.

The right number of chicks in a brooder is about thirty to thirty-five in a machine advertised to hold sixty. If sceptical about this point just experiment with a flock of sixty chicks and one of thirty in identical brooders and watch the result.

Indoor brooders are not recommended on economical grounds. They are, as their name implies, not built to weather storms and sudden heavy showers and strong winds, and are only suited for use in brooder houses. A brooder that can be shifted indoors or outdoors as occasion demands is a far better investment for the ordinary poultry keeper.

The brooder is far better kept out of doors than under cover, though shelter from sun in the summer is just as necessary as in the case of the naturally reared chick.

The brooder and its adjacent surroundings should be arranged in such a way that so soon as the chicks know their environment they will find accommodation for themselves under all conditions of temperature and weather, and before long they will automatically take advantage of it. These conditions imply the hover, warmed to the natural heat of a hen, a larger adjoining chamber with provision for them to scratch and to exercise themselves.

If the brooder can be placed in a wired enclosure the lid should be left open during the day in summer, and during spells of sunshine in colder weather, and the chicks be allowed liberty to find occupation in the open.

Three degrees of temperature are thus provided—the open air warmed by the sun, the inner apartment, warmer than the outside air, and the still more remote sleeping apartment, where the hover or other heating apparatus provides the necessary warmth at night.

Educating the Chickens

For the first few hours the chicks will not understand the hover. When being naturally reared they go to the hen for warmth and shelter, but they are evidently more attracted by the clucking of the hen than by any consciousness of warmth and safety. They may, therefore, stand about within a few feet of the hover and die of chill. They

must therefore be put under the hover, and, if necessary, prevented from wandering away from it until they are conscious of it and go to it as naturally as they would to a hen. The danger of neglecting to see that they are safely under the hover lies in the fact that as they grow chilly they will crowd upon each other for warmth, and almost inevitably crush or smother one another.

Directly they are observed collecting in a little crowd at any time of the day they should be turned in under the hover to show them where they may seek and find warmth. They will seldom take longer than forty-eight hours to learn their lesson, but attention should not be relaxed until it is quite certain that they have learned it. This accomplished, they should not be encouraged to shelter in the hover more than is absolutely necessary.

Ventilation and Cleanliness

The ventilation of the brooder ought to be so arranged that the entering air does not come directly into contact with the chicks. Certain brooders have special ventilating arrangements by which a constant current of warmed fresh air continually passes through them. Other makes have no such arrangement, and it is most important that other means should be used to get a through ventilation. If necessary the lid of the brooder should be raised, and if this is found to reduce the temperature too much, the lamp should be turned up until the temperature is right again.

Search the brooder thoroughly every day for possible dead chicks. One or two corpses lying about will quickly contaminate the air, especially if they happen to be under the hover.

Look out for parasites, and if any appear, dust the chickens immediately with a good insect powder; also fumigate the machine.

Repeat this as often as is necessary.

Unless there is some one about to keep an eye on the temperature an automatic regulator should be attached.

Keep the interior of the brooder scrupulously clean, allowing no loophole for the entry of parasites. Clean and scrape all interior boards and loose parts certainly not less than three times a week, and if possible more often. See that the drinking water is regularly changed, the vessel thoroughly washed, and the water uncontaminated by droppings or other refuse which may be scratched into it by the chickens' activities.

Causes of Failure

The mortality among young chickens through unsuccessful rearing is responsible for most of the failures in poultry keeping, and the farmer is often at a loss to account for his bad luck in this respect. It is not generally recognized how fatal and insidious an enemy dampness is, or, if recognized, it is not sufficiently guarded against. The warmth in a brooder is so arranged that it descends on to the chicks in imitation of the hen, but the presence of a damp floor is often overlooked, whereas the warmth of a hen not only descends on to the chickens, but penetrates to that part of the ground which she covers. The young ones are thus protected from the damp.

Certain soils are good and others bad for chicken raising, and where the soil is unsuitable steps must be taken to obviate its drawbacks as much as possible.

Proper protection from weather conditions, chills and cold need to be provided, and persistent cleanliness in housing and regularity in feeding observed.

Rats also are deadly enemies of young chickens and are able to cause great havoc. These pests will be treated at greater length in another chapter.

Chicks will sometimes fail to do well through weakness or deterioration in the stock. Where no other cause can be

attributed for weakly chickens it is well to look for the trouble here.

The mistakes that can be made in management of the stock birds are many, and they are notoriously responsible for lack of vitality in the progeny. Want of proper feeding, too little green and mineral foods, presence of parasites, impure water, subjection to severe weather conditions, excessive egg-production, are all faults which will lead to trouble when the rearing of the newly-hatched chicks begins.

Sometimes the chickens' chance of success is reduced through errors in incubation which, though not vital enough to prevent them actually hatching, leave them little reserve strength to contend against the slightest destructive influence. In the rearing stage there is not much to be done about this. The trouble lies further back. The only thing to do is to give the chickens the best possible chance, track down the incubator trouble, and take steps to prevent a recurrence of it.

Working the Brooder

Begin to warm up the brooder when the eggs are beginning to hatch in the incubators or under the hens.

Strew either hay, cut fine, peat moss, litter or chaff over the floor of the brooder. Keep the chickens in the drying box of the incubator for 24 hours (without food), then remove them, in a covered bucket—to avoid chills—to the brooder, the temperature of which should register between 90° and 100° F. The temperature of a brooder may be safely regulated as follows : 90° for the first week, gradually lowering after a day or two to 80° at the end of the second week, until it reaches 70° at the end of the third week. At the same time the general appearance of the chicks should be observed. They will certainly show signs of discomfort if there is anything wrong with the temperature. Chickens that are very active may quite reasonably gener-

ate a greater amount of heat in the air around them than more phlegmatic ones. Hence, the thermometer should be watched for a few days and the lamp regulated as necessary.

In order to preserve a pure atmosphere it is an urgent matter that the lamp fumes have a free escape and do not penetrate into the sleeping apartment.

Feeding

A difference of opinion exists as to the value of a dry-food as compared with a wet-food diet; or rather a combination of the two. While the feeding of quite little chicks differs hardly at all whatever future is intended for them, at a later stage—that is, after about four weeks—birds intended for table purposes will require a larger proportion of soft food, the reason for this being that the crops of dry-fed birds never become distended to their fullest extent, and afterwards, when the time comes to fatten them, the crops are not large enough to allow of an adequate amount of food to be taken at a time. Birds intended for stock should, on the other hand, receive more dry food, the birds being hardier and stronger as a result.

Newly-hatched Chickens

The chicken must never receive a meal until it is certain that he has consumed plenty of grit. Grit is the only means he has of grinding his food, and grit (preferably flint grit) must be constantly given throughout his entire life in the brooder. In fact, at every stage in a fowl's life grit is essential to the digestive process. Most fowls at liberty are able to procure it for themselves out of the soil, but in confinement it must form part of the diet just as much as grain and other foods.

The chickens require no food whatever for at least the first 24 hours of their life. The natural provision of the

yolk, on which the chicken has been nourished during its residence in the shell, is not exhausted until quite a day and a half or two days after hatching. After a meal of grit give bread and milk, not too fluid, or some hard-boiled egg finely chopped.

Quite small chicks require a meal about every two or three hours until they are about a month old. In order to save the labour involved in the preparation and giving of the food, it has been found expedient and quite successful to give one soft meal at midday, and in the mornings to scatter enough grain to last the entire day, burying it well down in the litter or chaff so that the chicks are well exercised in searching for it. See, however, that they get a sound meal last thing at night, and that they do not go to rest hungry. Small chicks have not a great amount of vitality, and they cannot pass a long night foodless. Early hatched chicks should be fed by lamplight between seven and eight o'clock in the evening. Cut green bone is useful for building up the bony structures. Give also plenty of green food, clover, lettuce and chopped onion tops.

Give all moist food in troughs or other vessels, and after the chicks have had a reasonable feed remove the trough, saving the surplus, if any, for the next meal. The moist food should not be given too wet. The right consistency is a rather crumbly texture, well soaked, but free from surplus moisture. Very wet foods induce diarrhœa and other bowel troubles.

Never feed young chickens exclusively on soft food, as they are thus relieved of the need for exercise in obtaining it, and exercise is as important to them as food itself. With the dry feed an abundance of clean, cold water should always be at hand, and the vessel containing it as clean as if it were for our own use. Stale water is another source of internal disorders and one which is often overlooked.

Separating the Sexes

This should be done as soon as it is possible to recognize the signs of sexual development. It is difficult to say exactly at what time the manifestation will begin. In the more rapidly developing breeds it naturally starts earlier. A good indication is the growth of the combs in the cockerels. Directly these are exhibited it is time for the separation to be carried out.

Housing after Six Weeks

After six or eight weeks all chickens can be placed in a large, free run, if such is available. This should have a covered shelter for sleeping provided with good wide perches about 6 inches broad. This shed should contain an inner apartment or well-ventilated box which can be used at night-time to conserve the heat of the birds if the weather should be cold. Artificial heat is not necessary at this stage but, if the weather is very severe a fireless brooder in the shelter is advisable. A covering of straw or litter should be placed on the floor of the shelter as all the birds may not roost directly they are placed in their new surroundings. In summer some shelter from the sun is essential. Where the land offers natural shelter, such as hedges and trees, the birds can be observed to take advantage of these means of keeping comfortable and cool. If such natural provision does not exist some substitute must be provided. Hurdles are always useful and may be arranged in various ways, either placed in pairs and tied, and litter strewn under, or just raised high enough off the ground one side by means of short legs.

Keep them busy and exercised. If there is no available space the scratching shed is an excellent device. Of course it is far preferable for them to have a free run on good soil containing natural foods, but when this cannot be secured the scratching shed is a capital substitute.

Different Treatment for Stock and Table Birds

It should early be determined for what purpose the chickens are being raised. If for table birds the feeding and treatment will differ from the age of four weeks on. Some people prefer to feed the chickens with a view to their future disposal, from the time they are first hatched. Chickens intended for early killing should, anyway, from the age of four weeks, be fed mainly on a diet of ground oats (see Chapter IV) and skim-milk. The birds make rapid progress under this treatment, and the flesh is found to be very delicate. These birds should have less grain than stock birds. Grain makes for hardness and vigour, and is not suitable for birds whose delicacy and whiteness constitute their value. Give grain only once a day and towards evening. Meat meal is useful to augment the ground oats. Birds having this diet will not require a great amount of water, since the moisture in the soft food will be nearly enough for their needs.

At about six weeks old birds intended for stock should be fed largely on grain. Their diet, however, should always include a liberal allowance of green food and animal food. They will augment this themselves if they have the advantage of an open run where there is grass or other plant food, worms and insects.

CHAPTER VII

BACKYARD POULTRY KEEPING

BACKYARD poultry keeping, once it is undertaken and established, involves so little labour that it can be regarded more in the nature of a recreation or hobby than an industry. There is so much to be said in favour of it, and so little against it, that it is difficult to know why every one who has an available spot in yard or garden does not keep a number of hens to supply their household requirements. Certainly backyard poultry keeping need not be the sordid and unwholesome-looking business it so often appears viewed from the windows of a suburban train—a few rather sorry hens trying to find a meagre living in the arid waste of a neglected backyard; their habitation a broken and tumble-down erection of wood and wire—unclean and unattractive. And yet, even under these apparently hopeless conditions, somehow the birds contrive to live and produce a certain number of eggs, though it cannot be said that they prosper. With a little organized attention, decent accommodation, and proper feeding, they become an indispensable source of food supply. Also most people find it easy to work up a real interest in their poultry yard, and to an active-minded and energetic person there is ample opportunity of applying ideas in attempting to increase the birds' productiveness by experimenting with foods and conditions, and in constantly improving and repairing houses. On the other hand, if there is not much spare time available, an easy system of

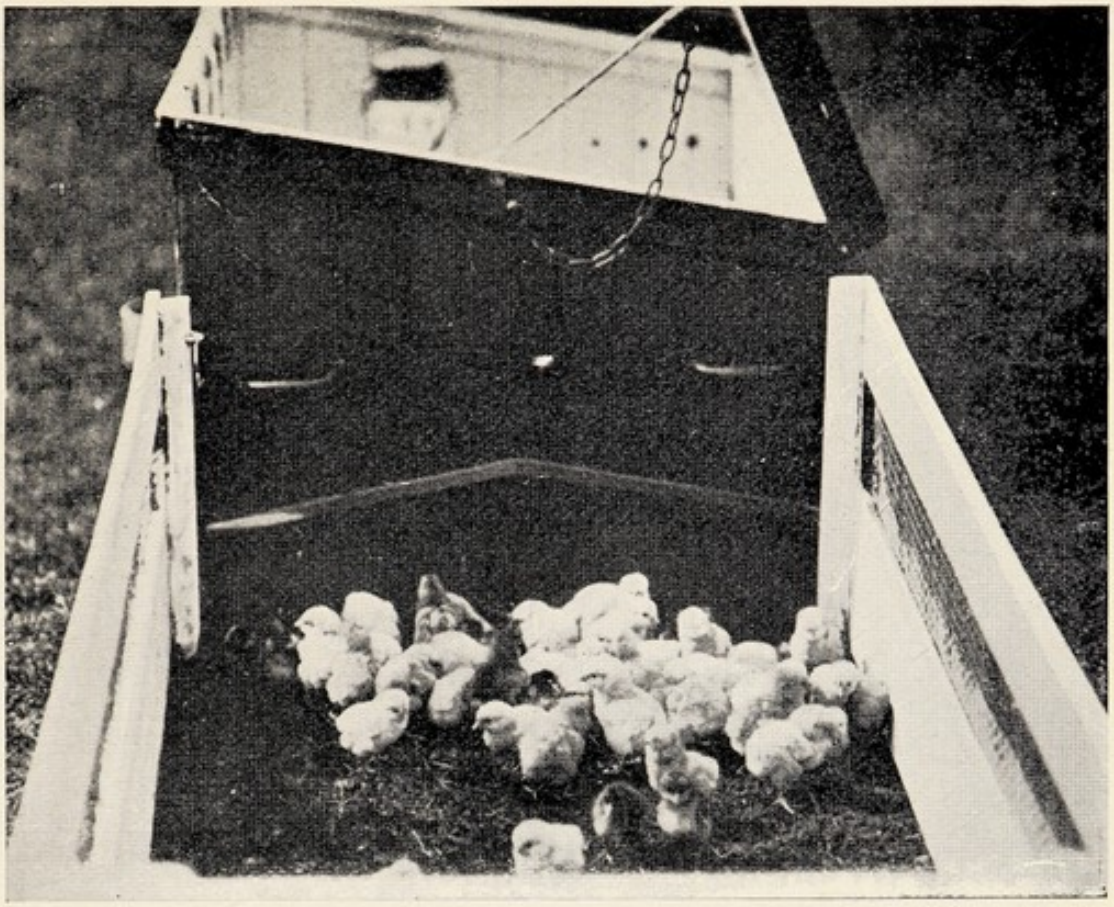


Photo by] *J. T. Newman, Berkhampstead.*

COMBINED BROODER AND RUN FOR CHICKS HATCHED IN AN INCUBATOR.

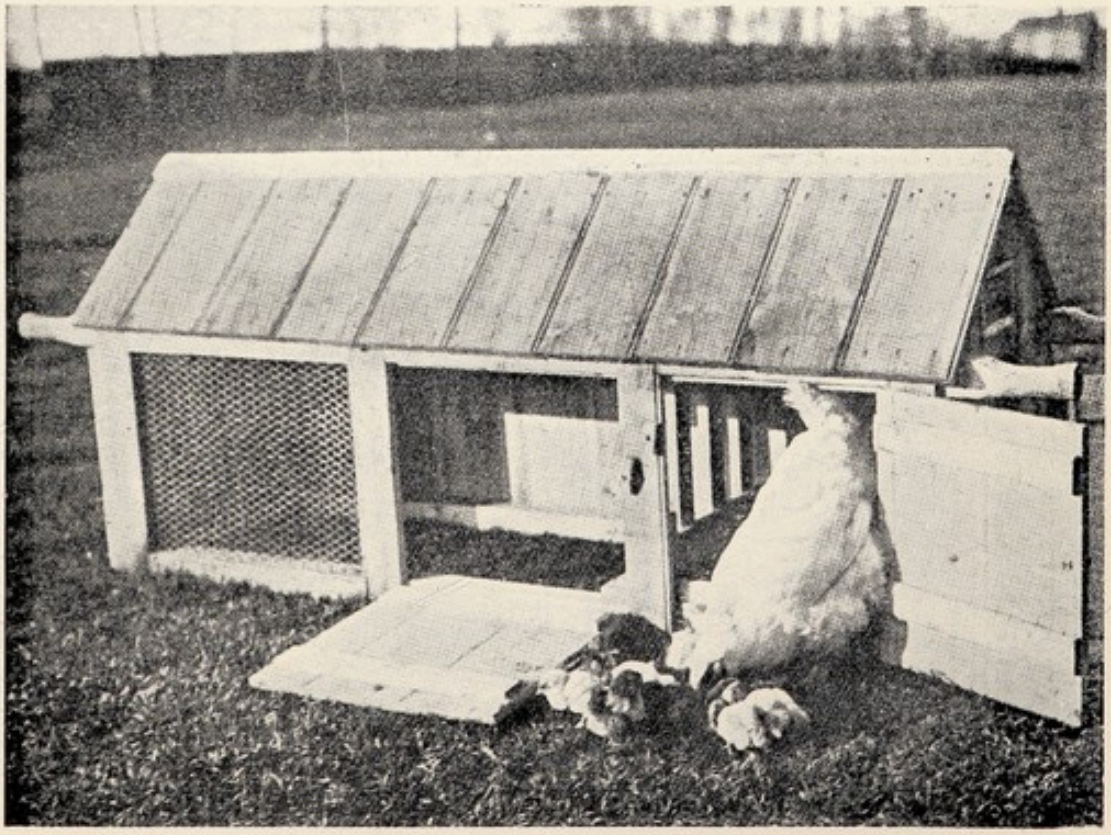


Photo by] *["Country Life."*

COMBINED COOP AND RUN FOR HEN AND CHICKENS.

Photo by] [" *Country Life.*"

BROODER WITH GROWING CHICKS ALLOWED TO RANGE.

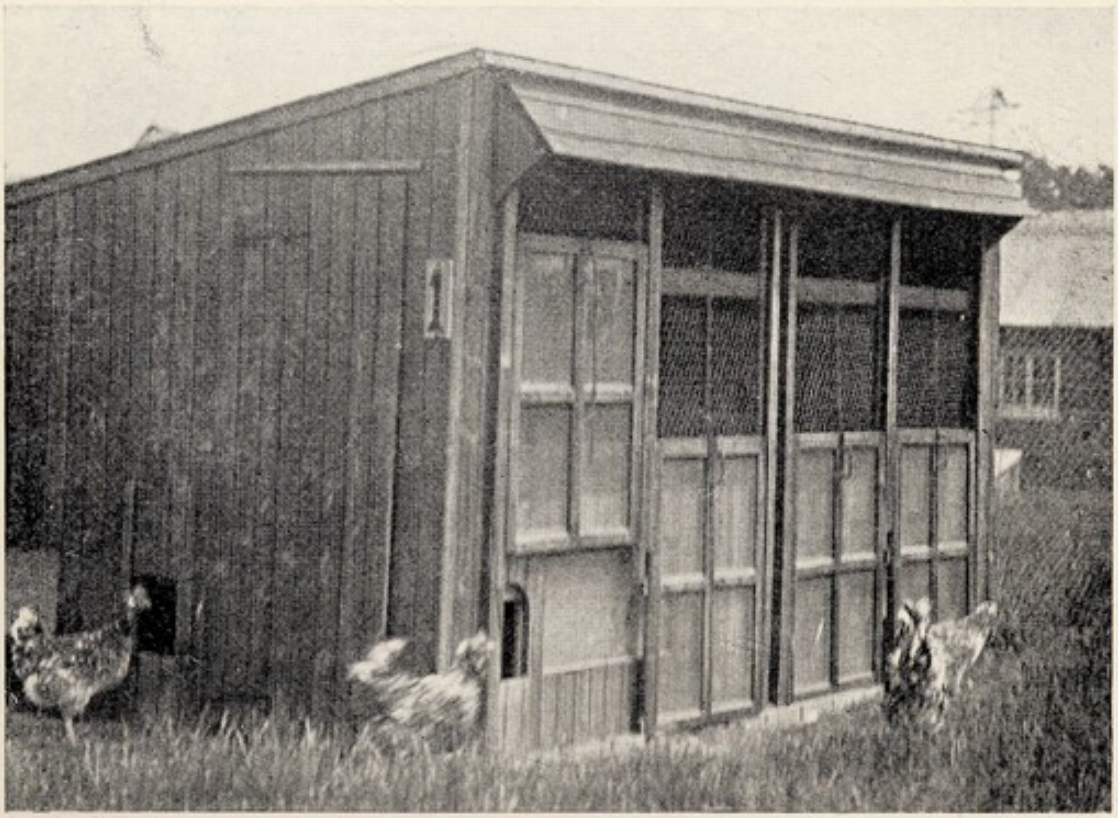


Photo by] [" *Country Life.*"

COMBINED HOUSE AND SCRATCHING SHED, WITH SLIDING GLASS SHUTTERS.

feeding at stated intervals, cleaning and looking after generally, need not make great inroads on one's leisure. And it will be found that, in addition to the material pleasure of having a supply of fresh eggs, there is a good deal of satisfaction in the sight of the well-tended prosperous little flock.

Most women make good poultry keepers. They usually have an interest in the birds apart from their value as egg-producers, and, in consequence, the birds, when left in their hands, seldom suffer from neglect and bad conditions. Just as it is the habit of a good housewife to have an alert and discerning eye on the needs and comfort of her family, so, in the case of birds and other helpless things left in her care, she is quick to note symptoms of discomfort and ill-health. Her inherent maternal instinct gives her a natural sympathy with living things and causes her to regard even the humble hen as a sentient creature, with certain needs and a sensitiveness to pain.

So many people are apt to forget that birds and animals in confinement are, through no fault of their own, cut off from the means of supplying their own wants and are entirely dependent on us for the necessities of life. In the case of fowls, retribution quickly follows neglect, and an arrested egg-production will soon point out to us the error of our ways.

Housing need not be a very extravagant business, nor need the house be unsightly. Pleasantly designed and simply constructed poultry houses can be obtained from the makers of poultry appliances from a few shillings upward. Stained the pleasant colour produced by creosote, or with other preserving and weather-resisting preparations, and looked after with proper care, the poultry house, far from being unsightly, becomes a welcome addition to the aspect of the yard or garden. If rigid economy has to be practised or if there is some one about with an interest in carpentry, a large packing-

case may be converted without a great amount of labour into a quite reasonably presentable poultry house. On the other hand, anybody not very well acquainted with tools should, however ambitious, consult the catalogues of the various makers before attempting an amateur house.

Feeding is a simple matter. The birds can be fed on scraps of food such as potato and apple parings, cabbage leaves, cold potatoes, stale bread, bones, sour milk, sour cream, cheese rinds and other refuse which usually finds its way to the dustbin. House food in any shape never comes amiss to poultry. This, properly and regularly given, and augmented with a small allowance of hard grain and a fair amount of green food, will be found ample for the needs of the birds. If beginning poultry keeping in this small way, it should be the actual aim to get something for nothing, or for the smallest possible cost. Rigid economy, if not actually necessary, should be assumed to be necessary. It is a most unsatisfactory and illogical business to keep fowls which cost more to maintain than their yield of eggs is worth. If there is a small garden it will supply much of the necessary green stuff—grass cuttings particularly will be much appreciated.

Points to be Observed

Great stress must be laid on the necessity for cleanliness, exercise, ventilation and regularity in feeding, and on the negative side, an avoidance of draughts and damp. Neglect generally results through want of method, so a system of feeding, cleaning and watering should be laid down so that the care of the birds becomes a household habit, like getting up and having breakfast. A special tin or bowl kept for all table scraps should stand in some handy corner, and it should be a matter of routine to turn into this all suitable table leavings and kitchen stuff. Where there are children they will enjoy a little job connected with the

fowls—so long as they do not have too much to remember. To fill the water vessel daily before going to school, and to scrub it once a week, and to see that the water is always fresh and uncontaminated, is a useful little work for a small boy, and one well within his compass and not tedious enough to bore him.

Ventilation is a question of housing. The thing to remember is that for birds in confinement we must endeavour to supplement as much as possible the healthy out-door life to which their instinct prompts them and which is denied them. Open-fronted, or rather partly open-fronted houses, therefore, should always be adopted, and there should be ample ventilation in the sleeping apartment. In feeding, an eye should be given to the kind of food requisite for egg-production. That is to say, sufficient quantities of the materials necessary to the making of eggs and of their shells must be present in the daily allowance in addition to that required for the support of the birds themselves. Happily most of the household scraps contain suitable elements, but sometimes fowls in confinement do not get enough of the shell-forming food. Fowls must not be allowed to get too fat. If overfed or the food is of an unsuitable nature, they will become lethargic and ultimately refuse to lay. It must be remembered that fatness is not always a result of overfeeding. It is in the majority of cases due to want of exercise or rather, the fact that the birds obtain their nutrition without any effort.

Exercise is as important as food itself, and if the fowls can be let out for a run during the day it will greatly improve their bodily health. If this liberty is denied them some system must be devised for keeping them exercised. Dampness can be avoided by having the floor of the house raised a short distance from the ground, or the floor covered with a few inches of peat moss or earth firmly beaten down before the litter is spread

How to Start

Intending backyard poultry keepers will do well to limit their flock to six or seven birds. The reasons for this will be clear later. The raising of stock should not be attempted, but the sole aim be to produce eggs. Incidental to this will be the occasional killing of birds past their egg service. The raising of chickens for stock is an industry in itself, and the limitations of space and the general conditions of backyard poultry keeping make it almost an impracticable, and certainly a most uneconomical, proceeding. Stock, therefore, must be renewed from outside sources as the egg-laying capacity of the hens becomes exhausted.

After two-and-a-half years the fowl has no economic value as a layer, and following a period of fattening, should be killed and used for table purposes after the second laying season and before the moult begins. It is therefore a good plan, in starting, to have three birds one year older than the others, so that they will not all reach the end of their egg-production together. Kill off the older triplet as recommended above, replenishing with pullets in their first season. These old fowls do not make such bad eating if properly cooked. They must not be treated like a Surrey capon, but steamed slowly for quite two hours, when they prove almost as delicate eating as a bird purchased for table purposes. The object of limiting the flock is not only for reasons of space, but also because it is illogical to attempt to run backyard poultry with more than the number that can be almost wholly maintained by food left over from meals. Six fowls can practically live on the household scraps of an average family plus a little purchase of grain. But it could not be expected that more than six, or at the most seven, birds could be thus maintained. This fact must never be overlooked, as it explains the great discrepancy in the

profits accruing to household poultry keeping as compared with the industry carried on on a business scale. Household birds can be kept on next to no expenditure, but it is a false premise to assume this as a basis for estimating the probable profits of a poultry farm.

Breeds

Egg-producing being the principal aim, breeds notable for their laying capacity should be adopted. General utility birds, although having certain desirable qualities such as a greater disposition to winter laying, and the production of coloured eggs, have certain drawbacks from the householder's point of view, practically all of them being sitters, and therefore likely to lose some weeks' egg yield while broody. Some use can be made of a broody hen, however, by even the small keeper, providing he can devote the necessary space to the purpose—but then his poultry keeping will be on a slightly more ambitious scale than that under discussion.

A sitting of eggs can be purchased from some reliable source, and the chicks hatched out and raised to four months for killing. It may or may not be worth while to attempt this, but the idea will recommend itself to those persons who have space at their disposal and a certain amount of time on their hands. The breeds most useful for the present purpose, however, are those specially raised for laying and remarkable for a high average egg supply. A point to remember when selecting a breed is that of colour and general appearance. The flock, being in all probability in close vicinity to the house, needs to be attractive looking, and if kept in town or suburban yards or gardens should not be too light in colour. All plumage of delicate tints soon takes on the hue of a dingy grey under the influence of town air and conditions. Select, therefore, if appearances are going to matter at all, a bird

having a dark or speckled plumage. The breed must also be one that can bear confinement well.

The Leghorn has qualities which recommend it to the household keeper. It is extremely hardy, is a prolific layer of capital eggs, and is a small eater. These birds, however, are very active and require a good deal of exercise. They like to hunt for their food, as they have a strong foraging instinct, and will lay all the better for having opportunity to indulge this propensity. Plenty of dry litter with a little corn buried in it will keep them busy for hours. There are some dozen varieties of this breed, but the white, brown and black are those most in favour. A breed resembling the Leghorn, and having, in common with it, a first-class egg-laying reputation, is the Ancona. Both these breeds are small and active, and are more attractive in confinement than heavier and slower birds.

Other breeds strong in egg-laying qualities are Andalusians—having blue plumage, rather larger in type, and laying larger eggs. Campines (gold and silver)—first-class layers of medium-sized eggs. Minorcas—excellent layers under the right conditions, but not quite so hardy as the varieties mentioned above; and Scotch Greys—having an attractive plumage and laying large eggs.

Persons wishing to adopt one of the general utility breeds would do well to try Orpingtons (Buff or White), Rhode Island Reds, or Wyandottes. The latter is specially prolific of eggs in the winter, but the eggs are of a rather small size. The flesh of these breeds makes very fair eating. The Plymouth Rock lays well in winter, but the drawback to this breed from the present point of view is its persistent desire to sit. The Faverolle—a French breed—has a decorative plumage, which might recommend it for a garden poultry run. The plumage is dark, or sometimes salmon coloured, and the legs are slightly feathered, and clumps of loose feathers appear under the head.

Housing

Give the house the best possible position. Do not erect it in some odd corner of the yard or garden as if it were something to be ashamed of. There is nothing against a poultry house, providing it is properly looked after. In fact, a very pleasing effect can be produced by a well-designed and neatly-constructed house, creosoted, the floor covered with chaff or straw gleaming brightly in the sunshine, occupied by half a dozen happy, well-cared-for, comfortable fowls. Choose, then, an aspect most suitable for the well-being of the birds—a sunny aspect for preference, facing south or south-west. In any case avoid a position in which the front of the house faces due north. To keep healthy the birds must get a fair amount of sunshine. The chief points to go for in housing are dry conditions, weather- and draught-proof roof and walls, and good ventilation. The most economical way of putting up a poultry house at home is to construct a shed of the lean-to type against a suitable wall. There is a great saving of material and labour in adopting this method. The most important concern is the roof, which should incline at an angle sufficient to carry off rain, and project beyond the eaves some 2 to 4 inches. A gutter with a drain-pipe helps to preserve the immediate vicinity of the house from becoming muddy and water-logged from rain drippings. Otherwise a simple drainage can be constructed on the ground. The roof may be of corrugated iron, or wood covered with felt, which should be tarred periodically—say once a year. The floor should be raised from the ground, especially if the house rests on a clay soil. The whole house can either rest on supports, or have beneath it a layer of bricks round the edges, the space between the floor of the house and the bricks being filled with earth well beaten down. Over this have a layer of peat moss for a couple of inches. A good thick litter of chaff will be warm and useful for the purpose

of scratching. Food can be buried and mixed with the chaff and the fowls kept busy hunting and scratching for it. In some cases a movable poultry house is more desirable than a lean-to pattern.

A person experienced with tools will be able to construct a simple, efficient and pleasant house with little trouble. The walls should be made of 1 inch thick boards, grooved and tongued. A thinner wood can be used if the economies are to be studied, but with 1 inch wood there is a certainty of the walls being damp proof. Most of the cheaper houses on the market are, however, made of $\frac{1}{2}$ or $\frac{3}{4}$ inch wood. In a movable house the roof should be made of wood, over which tarred felt should be nailed. In either the lean-to or movable pattern the front of the house should be open. Weather boarding up to a height of 3 feet should be used, and fine mesh wire netting completely covering the front, nailed on from the inside. This applies to the day or scratching shed, the house having two compartments, the smaller of which is the sleeping or roosting house, which can either be left open and wire netted like the remainder, or boarded up to a height above the level of the perches, where a space for ventilation, wire netted, must be left. Or the low weather boarding can be continued, and movable shutters running in grooves provided, which can be raised in severe weather. The house should never be less than 4 feet high at its lowest point. Unless there is ease of movement in cleaning out the house, it is likely to become neglected, also it is healthier for the fowls, and more convenient in every way.

It is important that some form of shelter from extreme heat should be available. It will generally be noticed that on a very hot and sunny day fowls at liberty will take advantage of any shelter offered by bushes or trees or hurdles, and this fact must be recognized when penning them into a place where they are unable to choose any protection for themselves. Arrange a movable shutter,

or some board nailed together, or a canvas blind so fixed that it can be easily let up and down.

The sleeping quarters must be fitted with perches on which the birds can roost at night. A method adopted by some people is to fix the perch, which can be of circular or flat 2 inch wood, at an inclined angle, one end resting on the floor, the other higher up on the opposite wall, in imitation of the birds' natural habit of roosting in trees.

It is generally more convenient, and quite as comfortable, for the birds to roost on perches parallel with the ground, but raised not more than 2 or 3 feet from the floor. The birds keep warmer in winter and cooler in summer if the perches are not placed too high. The poles should be movable, and so constructed that they drop into slots fixed each side of the apartment. It is a very good plan in making fittings to contrive them all so that they can be easily removed, and not likely to get out of order: no elaborate fixings and screwings and nailings every time a cleaning day comes round. Otherwise things will get neglected.

If it is decided to purchase a poultry house, the catalogues of well-known makers of poultry appliances should be carefully studied, and although a certain kind of house can be bought for a few shillings it is advisable, if circumstances permit, to go in for a make that can be relied on as rain-proof, thoroughly ventilated, and made of wood of a thickness and quality that will not warp or split; and having all locks, fastenings, handles and other fittings that may be depended upon and that will not get out of order directly they are used.

The idea of raising the house some 2 feet from the ground is a good one in the event of circumstances allowing the birds liberty for some part of the day. The space thus created affords a shelter both from rain and sun, and fulfils the important object of ensuring a warm, dry floor to the house. Unless, however, the ground beneath

the house is regularly cleaned and frequently renewed it will become foul and a cause of disease.

Where it is possible, a wired and covered run attached to the house affords the birds a good deal more exercise than they can get in the house itself, but great attention is required to keep this run sweet. Poultry very quickly foul a run, and in the ordinary way they should be removed after a period of a month into another run, and the original one planted with some quickly growing crop such as clover, vegetables, or roots. If there is no space to give them a second run, the best plan is to make a floor of gravel firmly beaten down until it is quite solid and compressed. This will present a surface which can be swept clean from time to time, and the litter above completely removed. This arrangement will keep sweet for quite a year, and then, if necessary, the gravel can be removed and a fresh lot imported while the previous lot is exposed to the air until the time comes for it to be used again. The run may be covered with ordinary weather boarding, tarred.

A movable dropping board should be placed under the perches, and this board removed and cleaned daily. Periodically it should be scrubbed. This relieves the necessity for constantly changing and replacing the litter in the sleeping quarters as most of the droppings thus get caught. The manure will be of the utmost value if there is a garden. Dried and thinly scattered it forms a capital top-dressing.

The laying boxes can be placed where most convenient, but they are best kept rather in the shade. Some people object to their being placed in the sleeping quarters, but if the apartment is airy and fairly roomy, there is nothing against it. In some of the best makes of poultry house the nest boxes are placed under the cover formed by the dropping board. They are safer from contamination there than anywhere else in the house. Single boxes are best, and they should be so constructed as to be easily taken out

and cleaned. They must never be allowed to remain fouled or the straw stale or evil smelling. Once a month they should be lime-washed, and the straw or litter taken out and replaced with fresh. Unless creosoted, the whole interior of the house should be lime-washed twice a year, and the lime-wash should contain a proportion of carbolic acid—about one pound crude carbolic to five gallons of lime-wash, slaked with fresh water. Use a spray so that no crevice may escape, and thoroughly spray the interior of the house. When dry it will present a perfectly white even surface. This will quite certainly prevent the possibility of any kind of vermin becoming established.

If there is no space suitable for an open run some means must be employed to keep the birds exercised. There are various contrivances for making them active in a small space, the most obvious being that of burying or mixing their food in the chaff of the scratching shed. Another method is to hang some attractive form of green food—a cabbage or lettuce—high enough to be just out of their reach. This causes them to spring up in order to peck it. Some people arrange a series of low barriers which are erected between the birds and their food so that they must jump over them in order to reach it. But scratching is a fowl's most natural form of exercise; and food buried well down in the litter will keep them busily employed, providing they are kept hungry enough to exert themselves to obtain it.

Fowls in confinement should always be provided with a dust bath. That is, a large square box or other vessel should be half filled with fine dry earth or ashes. This enables the birds to clean themselves in the same way as they would under normal conditions, and goes a great way toward keeping them free from lice and other pests.

Feeding

Before settling the diet of the laying fowl it is well to think for a minute what sort of food she would provide herself with if left at liberty, and to arrange the meals accordingly. Animal food at once suggests itself. The hen may be seen continually scratching up worms, darting at insects. The household food on which such stress has been laid in most cases takes the place of such natural prey. All meat scraps, fish, and organic food has a most important place in the fowl's diet. Another form of food which she is able to provide herself with when at liberty to range in field and meadow is green food, grass, leaves of vegetables, etc.

In most houses there will be an abundance of all these foods from time to time. But some regularity in the method of their presentation to the birds must be sought. Most kitchen leavings are best cooked and should be kept aside, and, at the end of each day, boiled in a saucepan or vessel specially kept for the purpose. Boil potato parings separately, as the liquor given off is harmful to the birds. This food can be dried off with a little biscuit meal; in any case it should not be given wet. A crumbly texture is the right consistency for the soft feed, which should be served to the birds hot in the winter and cold in summer. Meat scraps and bits of soft cooked fish need not be further boiled or cooked.

Lime is essential in the diet, as without it the egg-shell cannot be produced. Crushed oyster shells are valuable in this respect; in fact, oyster shell ought never to be absent from the run. Grit in abundance must also be present. There are no teeth in a fowl's mouth. The food passes to the crop in the same state in which it is taken up, and there it is masticated or crushed by means of the grit which the bird has consumed during the day. Without their allow-

ance of grit the birds would literally starve through inability to digest what they have eaten.

Water must be renewed daily, and the vessel in which it is contained kept clean and sweet. In close quarters fowls are very apt to contaminate their water by their scratching activities unless it is kept out of their way. It is a good plan to have a platform, or box, large enough to allow the fowls to jump on to it, and on this the water trough can be placed.

Give the soft meal early in the morning. Later on in the day some leaves of cabbage, lettuce, or grass clippings will be appreciated. In the afternoon a few handfuls of grain—wheat or oats—should be well mixed with the litter.

In winter stop all fattening food, and an increased allowance of such foods as are known to be egg-producing must be given, particularly of the organic kind. A certain amount of warmth-producing food must be contrived. The wheat allowance should be rather decreased, and means taken to promote exercise. A study of the chapter on Winter Laying will be found useful. The foods necessary and the reasons for their adoption are there fully stated. If green food has become scarce, its place can be filled by clover hay. In most houses, however, even in winter, there is usually some green vegetable in which the birds can share. The condition of the fowls should be observed. What is required now is a lean, healthy condition, but certainly not a starved one. The wheat allowance should be reduced some little time before the winter comes on so that the birds have had no chance of becoming fat and lethargic. If a special emphasis is going to be laid on winter eggs, secure pullets hatched late, say March or April. They will then be ready to start operations in the autumn. Fowls do not moult during their first season, so there should be an uninterrupted egg supply during the whole of the winter months.

CHAPTER VIII

INTENSIVE POULTRY KEEPING

BROADLY speaking, this is little more than an attempt to apply backyard methods on a large scale. The backyard poultry keeper has been farming on intensive methods for generations. But there are certain differences. While the term "intensive" in its industrial application is used primarily to indicate an increasing development of productiveness without a corresponding increase of environment, in poultry keeping it is applied to the system by which all natural conditions of the life of the bird are eliminated, except only such as will tend to increase its normal productiveness to an abnormal degree while maintaining the bird in perfect health. Obviously, in back-yard poultry keeping the natural life of a fowl is, already very much restricted and its existence made artificial to a degree, and it is common knowledge that with a little care there is considerable profit accruing to these little enterprises.

Artificiality may be said to be the keynote of intensive poultry farming. The birds are kept in enclosures which are very small when considered in relation to their real needs. Consequently the work of providing them with sufficient exercise, of keeping their quarters free from filth and from vermin, of calculating to a nicety the proportion of food compatible with their restricted activities and the production of eggs expected of them, becomes a matter of very considerable importance. The aim being to make

them as little conscious of, or susceptible to, changes of season and climatic irregularities as possible, and yet to accord them such conditions of exercise and air as shall make for health and productivity, it follows that the greater degree of intensification aimed at, the greater must be the labour and close attention involved. The best results in intensive poultry farming having been achieved by backyard owners of quite small flocks (not more than six to eight birds), an attempt to maintain backyard conditions and multiply the number of birds kept is the desire of all intensive farmers. In undertaking this work it must be borne in mind that unlimited and unstinted labour is one of the primary conditions, and must be weighed against the possible results to be obtained.

The outstanding difference between intensive and *extensive* poultry farming being the substitution of artificial for natural conditions, it is important to remember that the birds are entirely dependent on those who have the management of them in hand. The feeding, exercise, and the removal of manurial products are matters to be dealt with regularly and systematically. It is obvious that the accumulated droppings of some hundreds of birds would speedily become a source of contamination and consequent disease if not removed regularly and thoroughly. Labour of the most energetic and conscientious kind must be employed to keep pace with the constant demands made. Orchard or paddock poultry keeping, which forms almost a directly contrasting method—the birds having free access to open cultivated or grassy spaces—carries not only the advantages of a constant supply of natural foods, but the droppings of the birds are in a great measure automatically disposed of, and in the most profitable way, and with no demand on labour. Similarly, the scratching of the birds all day looking for grubs and insects, from which they, in their turn, protect the crops, keeps them in sound and healthy condition.

Under intensive methods there is none of this see-saw of advantages. Everything must be provided and calculated. Those doing intensive poultry work seldom undertake the cultivation of land, except in so far as is indispensable for hygienic reasons. So that whatever profits are made must be such as will cover all expenditure and show the necessary living surplus. It is necessary to set against these objections the greater productiveness which naturally follows on the intensive system being properly and vigorously carried out. The intensive system will recommend itself most to those people energetic and ambitious enough to run a larger business than the land at their disposal would, under ordinary circumstances, permit. A better winter egg season may also be expected under intensive management. How far this system can be applied commercially has yet to be proved. Its limitations are very marked, and many failures have resulted

Housing and Accommodation

The best results are secured by separating the flocks into small numbers in separate houses, but it is clear that the larger the flocks maintained in each house the less labour is required to look after them. As before indicated, the greatest success is obtained by backyard keepers with flocks of a half-dozen. But the ratio of expenditure involved in dividing a flock of say 250 birds into units of six or eight would be out of all proportion to the possible profit. Twenty-five to thirty birds in one house is the agreed average number to work with ease and success; that is, where eggs are the object. Stock birds kept for breeding purposes should be housed in flocks of not more than fifteen.

Whatever the size of the house employed a floor space for each bird of at least 2 feet square is necessary. Where possible as much as 4 feet should be allowed. A compromise

is sometimes adopted, where conditions make it possible, by which the birds are allowed open-air exercise in grass runs adjacent to their houses. The grass runs are divided into pairs of compartments, of which only one is used at a time, so that after a period of use it can be vacated and allowed to sweeten. To that method the term semi-intensive has been applied. Where the method used is more strictly intensive and the birds have no out-door exercise at all, the houses should consist of two compartments, viz., a roosting house and covered run or scratching shed. The scheme of ventilation should make it certain that the birds get an adequate amount of pure air to breathe, both by night and day. Open-fronted houses, netted and with a sliding shutter which can be closed in the winter or during severe storms, are best. If the building is permanently fixed, floors of cement are excellent as being damp-proof as well as rat-proof. They also offer a good surface against the absorption of manure. Cement floors should always be covered with thick layers of litter or chaff, as they present a chilly surface to the birds' feet. Floorless houses are good if there is an opportunity of removing them at intervals on to fresh ground. Otherwise floors of wood covered with sand, or litter, or dry earth, are better. The supply of sand or litter should be liberal, and constantly dug over and renewed.

Where the birds will spend almost their entire lives within the house, it is of primary importance that the house itself should be suitable in size, adequately ventilated, and well-arranged with regard to internal fitments. All remarks which are applied to poultry houses in the chapters devoted to that subject, and in "Backyard Poultry Keeping," are equally applicable to houses intended for intensive work. But it is even more important that the birds should have the right amount of floor and air space when, as in this case, they have no other means of obtaining it. Although 3 to 4 feet square is the floor space usually allotted to birds

of the smaller breeds, larger varieties such as Orpingtons or Wyandottes require 5 square feet. The breed of poultry kept will, therefore, determine the size of the flock in proportion to the house. With a view to preserving the fitments as much as possible from fouling by droppings, they should all be arranged so that the birds are discouraged as much as possible from roosting on them. For this reason nest boxes outside are recommended rather than inside ones. These should be fixed at some little distance from the floor, and a step or platform provided inside the house to allow the birds to reach them. The nests are found to be much cleaner than those placed inside the houses, and are protected from being littered by the birds' scratchings. If the nest boxes are fixed inside the houses they should still not rest on the floor, and it is a good plan to arrange them under a sloping board, which is placed above them too low to admit of birds perching on the top of the nest boxes and consequently fouling them. This board should be removable without any trouble, and constantly washed and scraped. The feeding trough should be of the "hopper" variety, the top having a slope sufficient to prevent the fowls from perching on it. Always have the feeding trough long enough to admit of all of the birds feeding at once, so that they are all certain to get their ration. This trough should also be raised about a foot above the ground. Green food should be given in a rack or manger attached to the side of the house, the lid arranged on hinges and fixed at an angle which effectually prevents the birds getting a foothold. Water vessels should be on platforms, fixed, but easily removable for cleansing, or attached to the outside of the house. A box or vessel for grit and crushed oyster shells should hang within reach.

In the larger intensive farms, where space is a serious consideration, houses of two stories are used. Such a plan makes the work of attending to the birds more simply and quickly accomplished, but again it follows that

the houses must be kept even more scrupulously clean. Ventilation under these circumstances must be most carefully managed.

Feeding

The question of feeding is discussed in the chapter devoted to that subject, and as the conditions of intensive poultry work will vary so much in individual cases, it is impossible to lay down any hard and fast rules. The yield of eggs and the condition of the birds must be carefully watched until the right balance of food and exercise has been obtained.

Chicken Raising

It is generally agreed that chicken raising should only be attempted by farmers having a large amount of free land at the disposal of the breeding stock. Under intensive methods this is naturally out of the question. While the intensive treatment of laying birds has been found by experience to increase their laying power, the question whether the stamina of breeding stock is reduced by close confinement to the extent which makes it impossible for them to produce healthy progeny is not yet completely settled. And until there is more evidence to go upon it is well for the farmer to take no risks. He should only raise chickens if he has means of maintaining his breeding stock out of doors—or at least to permit them outdoor exercise for some considerable period of the day.

Experiments in breeding from birds kept in confinement are still being made by enthusiasts, but the results cannot be known until a long enough time has passed for the ultimate results to manifest themselves. Experience up to the present time has been against using intensively kept birds as breeders. Until such time the intensive farmer is recommended to leave such experiments for the more

adventurous, and to purchase his chickens from some reliable source, or obtain sittings of eggs and broody fowls or incubators. In this case he will follow the advice given in the chapters on Rearing and Hatching. Of course it is understood that he should even then only attempt rearing if he has space enough at his disposal to give the chickens a free run during the more critical time of their lives. If such is not the case he must be content to purchase pullets at five or six months old. At this age a confined and restricted life does not have the cramping effect that it notoriously does on younger birds.

"Dry-Mash"

This is a system that is gaining popularity and is very suitable to intensive methods. Whether birds do better on dry than on wet mash has still to be proved, but the dry has one great advantage and that is the saving of labour. Dry-mash consists of various meals, mixed in the following proportions: ground oats 2 parts, barley meal 2 parts, bran 2 parts, middlings 2 parts, clover meal 1 part, and fish or meat meal 1 part, all mixed together dry and fed from a hopper kept continuously before the birds, so that they may help themselves. The birds must have access to a plentiful supply of fresh water.

Suitable Breeds

Both heavy and light varieties thrive on the intensive method, provided due care is taken in their management. As birds are kept intensively almost solely for egg-production and not for table, it would seem profitable to keep the light variety, as owing to size so many more may be kept in a given space. For winter eggs many prefer to keep the heavy (sitting) breeds, but recent competitions have made it very difficult to place the one before the other.

Of the "light" breeds the Leghorn, Ancona and Campine are extremely suitable, while of the "heavy" varieties the White Wyandotte and Rhode Island Red are favourites.

CHAPTER IX

WINTER EGG-PRODUCTION

THE capacity to fulfil a want when the general output is beginning to fall off is attended by something more than profit—though this recompense is certain to follow. The farmer who is able to keep up a regular supply of eggs to his customers, irrespective of season, will earn a reputation for efficiency and reliability that will go a long way to increase his business and firmly to establish it. That is not so easy as might be anticipated, yet is capable or accomplishment.

The production of eggs by fowls on a scale which we have come to regard as normal is the result of elaborate study and experiment, careful selection, the encouragement of certain traits, and the modifying of conditions. Otherwise the normal egg-laying capacity of a fowl would be similar to that of any other bird. The production of eggs in abnormal numbers in winter involves a still greater opposition to natural habits. In the spring the hen has, in common with other birds, a natural impulse to produce eggs. The problem was merely to accelerate this production. There is no natural impulse to lay in winter; consequently in attempting to increase winter egg-production the farmer is confronted with a more difficult task. If he takes an intelligent interest in the science of his work he will not be satisfied with getting as good results as he can—he will want to get as good results as are practically possible. And he will only get these by observa-

tion, by an accumulation of facts, and by a judicious and intelligent application of the knowledge thus gained.

Choice of Breeds

To secure a steady and plentiful egg supply in winter a breed must be kept that will respond to management. No hard and fast rule can be laid down about breeds. Much depends on conditions, soil, and general circumstances. Sitters are naturally more successful winter layers than non-sitters, although the average *annual* output of non-sitters may be higher. It has, however, been abundantly proved that the last-named are capable of doing what is required. Given favourable conditions the Plymouth or Buff Rock, White Wyandotte, Rhode Island Red, Sussex, Langshan, Orpington, Faverolles and similar breeds can generally be relied on for good results. Of the light varieties White and Black Leghorns and Anconas are considered the best. But individual birds vary a good deal, and the farmer who breeds his stock layers for several generations will be in the best position to keep his laying birds up to a high standard of reliability.

Strains.—More attention might advantageously be paid to developing strains of good layers. Study not only the best laying breeds, but also the individual birds. Trap-nests are an invaluable accessory as indicative of a laying strain. Records of each bird's productions are kept, and the proved best layers mated with one-year-old cockerels, which should also be descended from layers. By a gradual process of elimination the flock will become free from bad layers, and the average laying capacity should be markedly developed. Eggs from the best layers of these birds will be selected to perpetuate the laying stock, mated in their turn with pedigree cockerels, and so on, until a high result is arrived at and maintained. That will, however, be dependent upon other factors, and from time to time a tendency to repression will be manifested. Further, in

this respect it is undesirable to use eggs from abnormal layers, as these are usually weakened for breeding.

Pullets are best for winter laying. After the second year hens will be found to lay fewer eggs in winter, though they may go on being quite prolific in summer for a third year. It is recommended, however, to dispose of laying birds after the second year, taking care to select a certain number of good layers to breed from. At the same time, opinion varies as to whether or not it is more remunerative to get rid of the one-and-a-half-year-old hens, and to replace them with six months pullets, or keep them until they are two and a half years old. There is no doubt as to the greater laying capacity of the younger birds, but there is the practical question of expense and labour in raising pullets to replace the stock each year. This difficulty may be met by a system of annually replacing only half the laying stock by pullets.

By June the hens will have performed a fair egg-laying service, and will not have begun to moult. Having been through the moulting period only once, they are quite reasonably good table birds, and there will be found a demand for them before game and foreign chickens appear on the market. If sold much later than this, not only will there be less opportunity of securing good prices, but the moult will have started, and additionally, the birds will have consumed more food than their yield of eggs justifies.

The first year of a fowl's life is the most profitable. After expenses have been covered, the normal earnings of a one-year-old hen can be reckoned at five or six shillings; in its second year it is not worth more than three or four shillings; and in the third year the profit would become merely nominal, and as a winter layer the bird will be of practically no value. Her value as a breeder may then warrant her retention.

Hatching for Stock

Pullets which are to replace those of the old stock hens, which it is decided to discard from the laying stock, should be hatched so as to start laying in late autumn. The characteristics of the breed which has been chosen will modify the time of suitable hatching, as some of these, notably the Leghorn, Ancona, and similar breeds, start laying several weeks earlier than pullets of the larger varieties, due to more rapid attainment of maturity. March is the best time for hatching the heavier and sitting varieties. The non-sitting breeds may be hatched in April, or early in May. They should be ready to start their winter work in October or November.

Important though right selection of breed may be, it is equally necessary that there be use only of vigorous parents for stock, and that the chickens have every advantage during the growing period. Any check in that respect will be disastrous. That does not mean forcing, much less coddling of the birds, which weakens the system. As natural conditions as possible, abundance of range, and encouragement to forage for food are essential for the stimulation of the organs and muscles of the body, and to promote digestive activities. It is not how much a bird eats, but what it digests that counts.

Housing

In dealing with fowls for winter laying, what we are trying to do is to minimize as much as possible the effects of extreme cold and to secure, so far as we can, something like a continuity of the conditions which have prevailed in the warmer months. The whole system of egg-producing on a large scale is so artificial and opposed to the general laws governing bird life that we have to provide in every sort of way against a reversion to the natural state of things. And, although in arranging housing and accommodation

for the birds we must seek to establish the best sort of substitute we can for a continuously mild and equable climate, the mistake must not be made of supposing the birds to need coddling. Winter quarters should, above all, be thoroughly well ventilated. The fowls need warmth and shelter, but they also need a great amount of clean fresh air. They should be given every opportunity of keeping up their bodily warmth by their own natural inclination to activity. The scratching shed should be utilized for shelter in the day-time. On fine days the birds should be got out into the fresh air. The exercise derived from scratching about in the open will be beneficial, but it must be borne in mind that the results they get from their exertions, in the way of food, are very inadequate at this time of year. Their sleeping quarters should be soundly and substantially constructed and free from draughts. The roosting house should have a good rain-proof roof, and open fronts not only simplify ventilation but are stimulative to activity. Moreover, the area in a house must be adequate to content ment. Rain must not be allowed to penetrate, nor dampness from any source.

Feeding

The egg supply decreases in winter owing to the deficiency both of animal and green food—each important for egg-production—and to the additional fact that the birds themselves naturally require more heat-producing food than in the summer. Any surplus, therefore, which would go towards egg-making is considerably lessened. Corn, wheat, oats and barley contain essential ingredients for producing eggs, but these cannot be taken in sufficient quantities to provide necessary heat and energy to the body and at the same time leave sufficient surplus to be diverted towards egg-making. This deficiency must be supplemented as much as possible by food in which the necessary elements are most highly concentrated.

It must also be remembered that in winter the birds are provided by nature with a reserve of fat in order to maintain them during the colder months. The ovaries or egg-producing organs do not begin to act until this reserve of fat is used up. It is, therefore, clear that a bird in the right condition for winter laying must be lean and hard, but not hungry or ill-nourished. The leanness must be due to judicious feeding and sufficient exercise. It is our object to get rid of the fatty reserve and at the same time to increase the bird's bodily vigour; therefore the rations must be strong in albuminoids, and without excess of carbohydrates. Immediately on the decline of summer, assuming that they have a free run in the open, the older hens should be fed with a view to getting them into active and hard condition. At that period foraging should be encouraged, and for some time the diet mainly grain.

Pullets will require less encouragement to activity than the older birds. Also, they are more likely to begin laying earlier, and should, therefore, receive a slightly larger proportion of food than the hens.

During frosty or severe weather, when no opportunity exists for finding animal and green food for themselves, or if they are in confinement or semi-confinement, green food should be given, and a fair supply of grain buried in the litter at night. Some animal food or green bone should figure in the diet.

Cut green bone is a first-rate egg-forming food. In fact it is generally recognized that the constituents of the hen's egg are to be found in almost the same proportions in green bone. The importance of this article in the diet of laying hens cannot, therefore, be over-estimated. An allowance of about an ounce to each bird should be given mixed in the soft meal, and should be followed by a somewhat scanty scattering of grain. For birds in confinement, at about twelve o'clock a further meal of grain should be given, well mixed with the litter. Towards evening give a sound

meal of grain or meal, the latter as wet mash, as it is necessary to conserve heat for the long winter night. It is well to vary the morning meal as much as possible, as anything which tends to keep alive the interest of the bird will naturally also help to keep alive her activities. Alternative suggestions for feeding will be found in Chapter IV.

The "dry-mash" method is one which is at present meeting with a good deal of favour. This consists of various meals—barley, ground oats, sharps or middlings, bran, clover meal, fish or meat meal, mixed together dry and fed from a hopper kept continuously before the birds, so that they can help themselves. There must always be a plentiful supply of fresh water, as the food being entirely dry, the birds require a much larger quantity of moisture than would be the case with a mixed diet. With this and grain in litter they are eating all day. It also saves labour, though if the hoppers are not properly constructed there may be considerable waste of food. All birds should always have before them grit and broken vegetable charcoal.

Overfeeding is a fault easily fallen into where there are stated times of feeding. Keep the fowls alert for food and yet not really hungry. They should never be replete, but interested enough to go on scratching. Perhaps one of the things most difficult to learn, except by experience, is the right amount of food for a laying hen. Soft food should never be given on the ground. Feed in specially constructed troughs of a fair size so that all the birds have an equal opportunity and are certain to get their share. Do not leave any soft food about after the birds have had their feed, which should last just as long as they feed hungrily and eagerly, after which remove the trough and thinly scatter grain. If birds are getting fat on what is believed to be the right allowance of food it may be a sign that they are having too little

exercise. Fat fowls will not lay well. For good laying the birds should be lean and in hard condition, which condition cannot be maintained without ample opportunity for exercise.

Grain should always be scattered or buried in the chaff or litter of the run and never given in heaps or so that the birds may too easily find it. The amount of exercise a bird gets in a small run is not nearly enough to keep it healthy, and every artificial means must be utilized to keep up its activity.

Unless the birds are able to secure it for themselves, green food should be given at least once a day. For this purpose winter greens should be grown, or roots fed, though the latter are less satisfactory. Clover hay will do equally well when no green food is available. It may be mixed in the mash or steeped and fed separately. Water must be supplied regularly. The water troughs should never be empty and should never be dirty. In winter, and especially during severe and frosty weather, it is best to keep water troughs inside the house to prevent freezing. Water at freezing temperature is bad for poultry to drink. If the water in the trough is found to be covered with ice add a little warm water before allowing the birds to take it.

Colour of Eggs

Tinted eggs are almost always in greater demand than white ones. There is a belief common to most consumers of eggs that the quality of the eggs is affected by the colour. Whether or not there is any basis of truth in this assumption, it is well to do what is possible to comply with the demand. Certainly the bloom and colour of a perfect and freshly-laid egg make it an attractive object. The eggs of the Langshan are particularly notable for their colour. Plymouth Rock, Orpington, Wyandotte, Rhode Island Red,

Brahma, Faverolle and similar breeds produce eggs with coloured shells. It must be borne in mind that tinted eggs are produced entirely by sitting varieties of poultry. Another point to note is that in some instances the tinted eggs are of a smaller size than white eggs. Crosses, however, may be made between layers of white eggs of a large size and the brown egg varieties, with the view of producing a large tinted egg. In making the crosses choose cockerels of the white laying breed; it is from the female that the heritage of colour in the eggshell proceeds.

A cross of a White Leghorn cockerel with a Plymouth Rock hen is recommended; or a Campine cockerel with an Orpington hen. Beware of crossing birds from two breeds having a similar bad characteristic, such as slow feathering or slow maturing; otherwise a good cross for a large well-tinted egg should be a Minorca cockerel with a Langshan hen. But each of these breeds is slow feathering and slow growing, and it would be undesirable to perpetuate and increase this characteristic.

A Minorca cockerel crossed with a Buff Orpington hen will give a large egg. A White Leghorn cockerel crossed with a Buff Orpington hen is recommended for strong hardy chickens. The Wyandotte is a first-class layer, but the eggs are small; therefore a cross with a White Leghorn cockerel is desirable, to improve the size of the eggs whilst maintaining their quantity. All such crosses should not be used for breeding.

It has been found that hens which have been permitted to hatch and bring up a brood or two of chickens during the season when eggs are plentiful often turn out to be good winter layers. Early moulting is encouraged, and the small sacrifice of eggs during the period of plenty is amply compensated for by the higher production of eggs when these are scarce and the markets high.

CHAPTER X

DAY-OLD CHICKS

SPECIALIZATION in some form or another is more often than not found to pay better in the poultry world than an attempt to carry on various branches at one and the same time. In some ways specialization is less interesting, and where poultry keeping is taken up as a hobby there is a bigger field for energetic inquiry and scientific interest if the whole progress of evolution from the egg to the finished bird can be observed. Where, however, the question of profit making comes in, that industry which is likely to offer the best results according to the available conditions is obviously the one to choose. And in specialization there is the opportunity for concentrating every energy to the attainment of some one end, and the work becomes in some measure simplified. Broadly speaking, the poultry industry is divided into two great branches—egg-production and table poultry. There is also the branch which deals with the production of fancy stock and show varieties, but this does not come into the scope of the present book. Within these divisions are a large number of sub-divisions—breeding, incubating, rearing, fattening, any one of which is an industry in itself, calling for experience and special knowledge. The average all-round poultry keeper usually manages to keep a hand on all these departments, but it will be found that he instinctively specializes in one of them. He will be reputed for his rearing successes, or for his hatching results, or for the condition

of his breeding stock. Since the introduction of the artificial incubator there has developed an industry which occupies itself entirely with the production of chickens to be sold within twenty-four hours of being hatched. There is a very big demand for these birds, mainly in utility breeds. And although there would seem to be a tremendous advantage offered to the rearer of table poultry, inasmuch as the land which he now is obliged to devote to the maintenance of breeding stock, and the time and space necessary to the work of hatching, might be utilized to the development of his own particular line of business, he has not so far availed himself to any great extent of the advantages offered by the sale of day-old chicks. The largest purchasers of these birds are small and suburban poultry keepers. But the trade is so recent that farmers, who as a race are slow to avail themselves of modern improvements, have hardly yet realized the extent to which they might be benefited by this possibility of obtaining stock with so little trouble to themselves.

Equipment

The first necessity is a regular supply of fertile eggs from January to June. Therefore either an adequate number of fowls must be kept, or arrangements made by which the requisite number of eggs are forthcoming from farmers either in the district or elsewhere. The most satisfactory method is to start the business with first-class stock birds, sufficient in number to produce the quantity of eggs that it is intended to hatch. For this purpose a good area of land is not only desirable but necessary, because the ultimate success and reputation of the concern will rest not only on the number of chickens produced, but very largely on their quality. The strongest and most vigorous chicks can only be produced from parents whose liberty is unrestricted, which can only be

a possible condition where there is a large range. The demand for these chicks lasts for about twenty weeks, beginning in February and ending about June. The work of production must accordingly be conducted within this period. Assuming that an output of 500 chickens a week is contemplated, the number of eggs required during the season will approximate to 15,000, as a certain number must be assumed to fail. Placing the average production of eggs at sixty per hen, between 250 and 300 hens will be required to lay steadily during this period. Rather than that the laying stock should be kept in close quarters, it is better to purchase the eggs from reliable outside sources, preferably local, since the sending of fertile eggs long distances is attended with certain risks. The sale of feeble chicks, unable to survive the journey to their destination, or unlikely to make strong and profitable birds, foredooms the business to failure. And these results are certain to ensue if the stock is not of first-rate quality and living under the best conditions. So that, in organizing an egg supply, care should be taken to ascertain, preferably by a personal inspection, and by constant supervision, that both these demands are fulfilled.

The only practical way of hatching for this trade is by incubators. The number of incubators required will depend on the number of chicks it is proposed to produce in a season, and also on the hatching capacity of the particular type of machine favoured. Assuming that 10,000 chickens are to be hatched in twenty weeks, the capacity of the incubators must be 15,000 eggs, which allows a suitable margin for failures. The incubating period being twenty-one days, the incubators can be used five times during the season. To hatch 15,000 eggs in twenty weeks would therefore require thirty machines, each capable of taking 100 eggs. This allows several days' interval between the successive hatchings for cleaning and sterilizing the incubator.

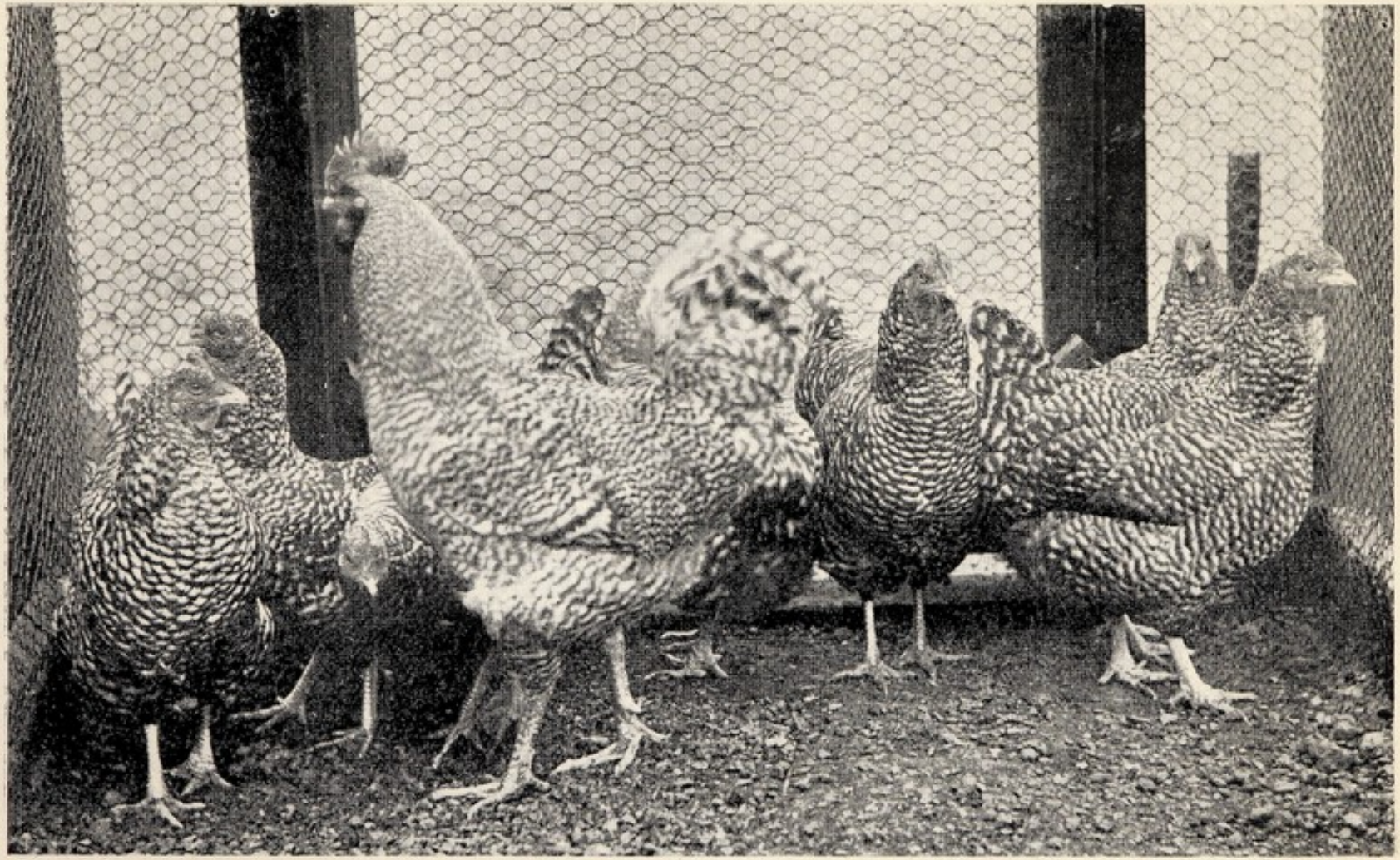
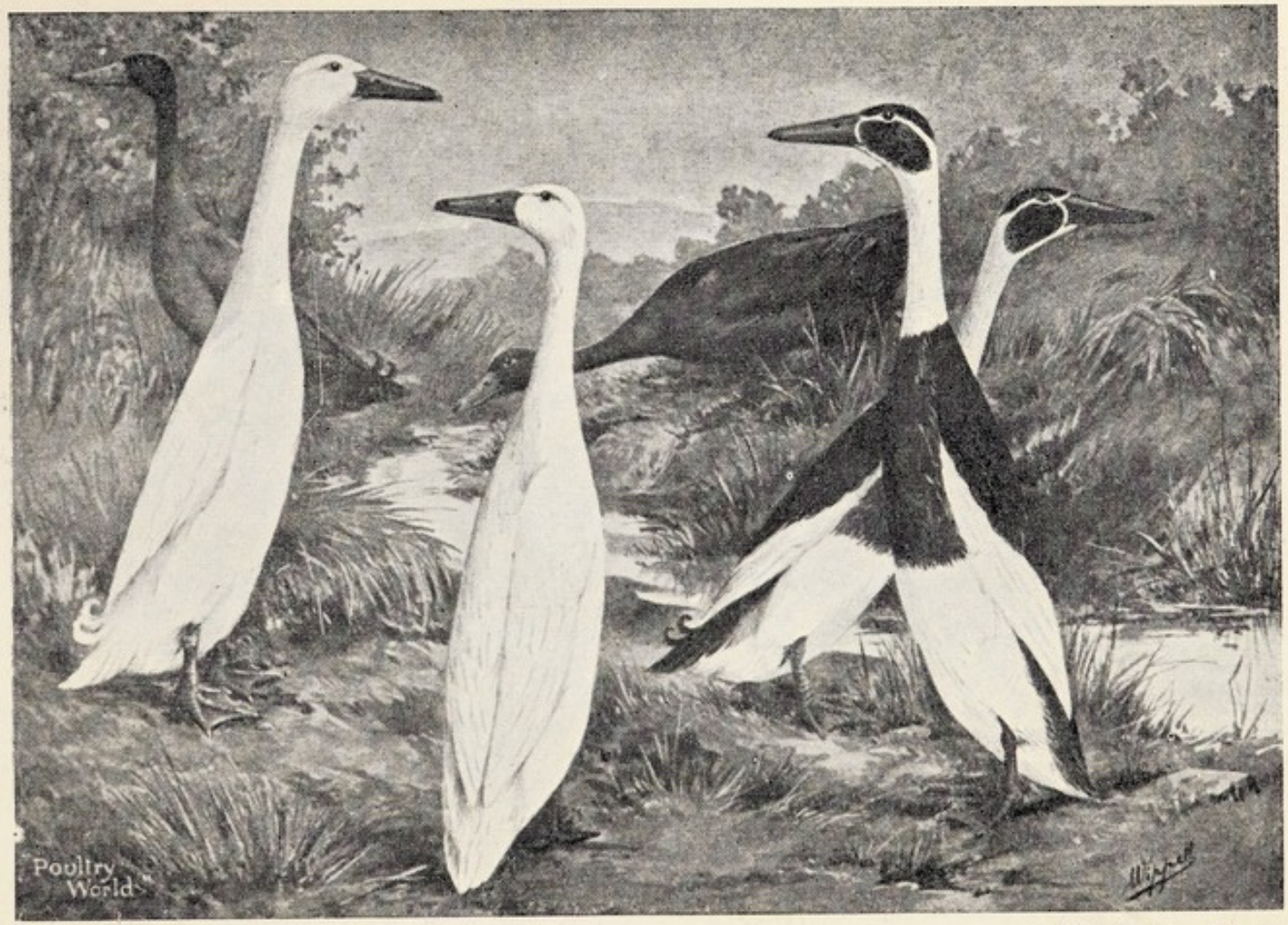


Photo by] [*C. Reid, Wishaw.*

BARRED PLYMOUTH ROCKS.



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INDIAN RUNNER AND BUFF ORPINGTON DUCKS.

Breeds

Before any steps are taken to secure either stock birds or eggs for hatching purposes, it must be ascertained what breeds are likely to be most saleable, and action taken accordingly. The interest in newly-hatched chickens being at present confined to breeders of laying stock, only a small percentage of the table varieties are in demand. In certain districts it may be found necessary to maintain more than one breed. In other neighbourhoods, or where the business is conducted on a limited scale, often only one breed need be adopted. Whatever the demands, the producer should make it his aim to meet them, as in this way he will be able to build up for himself a reputation of some importance.

So far as profit is concerned there is little to choose between the cross-bred and the pure-bred varieties, although at first sight there seems to be a difference in immediate results. Pure-breeds are usually in greater demand. The hatching of cross-bred chicks is attended with a higher average of success; the birds are hardier, and are better able to stand long railway journeys. On the other hand, the pure-bred varieties command higher prices, and as the cost of production is the same in all cases, the differences are pretty well adjusted. The choice of breed will, in nearly all cases, be dictated by the demand.

The profit attached to this branch of poultry keeping is variable, much depending on the class of fowl undertaken, labour, and maintenance of laying stock. The figures given by the Ministry of Agriculture, and derived from experiences conducted upon the Reading College Poultry Farm, Theale, during 1905–6, showed that "assuming the cost per egg to be one penny, and allowing for 30 per cent. of fertile eggs not hatching, but without charging anything for interest upon capital or for labour, the actual expense of producing a chicken was approxi-

mately $1\frac{3}{4}d.$ Putting interest and labour at the same figure, though this would be increased or decreased according to the extent of the operations, the prime cost may be reckoned at 3*s.* 6*d.* a dozen. To that must be added the cost of a suitable box for packing the birds, and conveyance to the nearest station." Since these figures were published the value of eggs, as of other expenses, has greatly increased. Therefore, it may be assumed that the prime costs, apart from labour, interest and profit, have doubled.

In estimating the probable cost of this industry, it must always be remembered that the only safe way is to reckon two eggs to each chicken. Where percentage of death in shell is great it would be relatively higher. The initial outlay will be heavy, the cost of incubators and laying stock involving considerable outlay.

Dispatching

Contrary to what might be supposed, chickens twenty-four hours old stand a journey better than those a day or two older. So soon as they are dried off they should be packed into suitable boxes, and at this age they normally do not suffer ill effects from journeys occupying as long as two to three days. The boxes should be of cardboard or light wood, pierced with a number of holes near the top for ventilation. The lids should not be nailed on but tied with stout string. The boxes need not be very large. Two dozen chicks can travel comfortably in a box about 15 inches square. For a dozen chicks the dimensions should be about 14 by 9 inches. In each case the height of the box should not be less than 9 inches. Some boxes are made with a felt lining, which, arranged in either square or circular shape, cuts off the corners of the box. If this is dispensed with, the corners should be filled in with soft hay, and the bottom of the box should have a thick covering

of hay or chaff, amongst which should be scattered a little small grain, such as canary seed. In severe weather, or if the birds have to travel a long way, strips of flannel should be attached to the lid of the box so that they hang down and afford some warmth; or the lid may be loosely lined with felt or flannel. The above described felt-lined boxes are recommended for long-distance travelling. All boxes containing chickens should be labelled "Live Chickens" in bold type, and it is well to take the precaution of consigning them by fast train. It is a good plan in advising their dispatch to the consignee to give a few hints as to their treatment on arrival, or to have a paper with directions pasted in the top of the lid. Immediately on arrival the chicks should be placed under a reliable broody hen or in a brooder heated to 95° F., afterwards reduced to 90°, or placed near a fire in a basket. They should receive a meal of oatmeal or biscuit meal prepared with hot milk. In giving chickens to a broody hen they should be placed under her wings at night. It is as well to give her only a few at first, and to observe what sort of reception she is prepared to offer them, as a broody hen will sometimes object most strongly to a strange brood of chicks.

CHAPTER XI

DUCKS

THE rearing of ducklings for the spring market is an industry which should recommend itself to the small poultry keeper within reach of the chief markets, by reason of the large amount of work that can be carried on in a small space. The only reason why a greater number of people do not attempt this highly profitable work is a want of knowledge of the method. The first thing that strikes a novice contemplating poultry keeping is that ducks require water and that a pond or stream is a necessary part of the equipment. It is so customary to associate ducks with a semi-aquatic life that the statement that duck rearing can be carried on with perfect success without the presence of water might be received with incredulity. But the fact remains that not only may they be successfully reared, but that swimming checks the growth of a duckling intended for table purposes. Beyond making a demand on skill, industry and energy, duck rearing presents few difficulties of any kind. In common with hens, and to an incomparably greater extent than chickens, ducks can be brought up in proportionately small acreage. Both turkeys and geese demand a large amount of free space and cannot thrive without it. Ducks, however, seem to have little or no wandering instinct, and are happy and prosperous under conditions which turkeys could not endure for a week. It must be remembered, however, that these remarks apply only to the *rearing* of ducklings.

Duck *breeding* presents a somewhat different problem, and for this purpose water in the neighbourhood is essential. The actual mating of the birds usually takes place in water. Also ducklings bred from parents who have been deprived of their natural means of exercise and habit of life are weakly and unsatisfactory. Conditions, therefore, which are capital for rearing will not do for breeding. In most districts, therefore, where the duck industry is carried on to any serious extent, the work is usually divided into two distinct branches, namely breeding and rearing. And while numbers of farmers are concerned solely with egg-production, still larger numbers purchase the eggs and concentrate on hatching and rearing the birds to a killing age. Ducks are, on the whole, hardy, and have the advantage of not being affected nearly to the extent that chickens are by close quarters. Another point in their favour is their capacity at an early age to do without artificial heat. After a week, or, in cold weather, ten days or a fortnight, of life in a brooder, the duckling becomes independent of extraneous warmth—in fact some rearers dispense altogether with heated brooders, finding that the heat generated by the birds is sufficient. But this is, perhaps, except in certain mild climates, rather drastic.

The most important points then to bear in mind if duck rearing is contemplated are proximity to markets, and close touch with the egg-producer. Ducklings are most in demand between the end and beginning of the shooting season, that is, between the months of February and August. The best prices are obtained for birds sold in March and April. The demand is for birds of about nine weeks old, and this is the most profitable market. Ducks of a fuller growth have also a market value, but a good deal of careful calculation and weighing of economic considerations are necessary before attempting to produce such birds. Ducks are notoriously voracious eaters, and on this account the making of the work profitable is a

somewhat difficult business. As ducklings of nine weeks old sold in the spring fetch higher prices than those marketed later, there can be no doubt—if the eggs are obtainable at the right season—that the former is the market to supply. People who aim at less intensive methods and employ the slower maturing birds may prefer to fulfil the later demand.

Difficulty is often experienced in securing eggs at the right season. In consequence of this some producers combine the two branches of the industry, and where there is water conveniently situated and abundance of space, both breeding and rearing may be successfully carried out. The capacity of ducks, however, to endure extremely intensive conditions discourages most producers with very limited area of land from giving up any portion of land for breeding when they might be using it to such good purpose by rearing large numbers of ducklings. Also there is a better chance of securing strong and healthy and quickly-maturing birds if the eggs are purchased outside, from unrelated sources. There is also the question of labour to consider. And although this method places the rearer rather at the disposal of the breeder, inasmuch as the latter may not always find himself in a position to supply the required number of eggs, it is a better plan than to attempt breeding without full recognition of the breeder's responsibility, and, in consequence, risk suffering from an enfeebled stock.

The prospective duck farmer will have to consider his available conditions and, if water exists in addition to the other requisite conditions, can make his own choice as to whether he will undertake egg-producing solely for breeding purposes, or attempt a combination of both breeding and rearing, or, in the absence of water, merely assume responsibility for the hatching, rearing and fattening of ducklings and ducks.

Breeds of Ducks

The six most important breeds, and the only ones which are profitably employed to any serious extent, are the Aylesbury—a white variety, which earned its name by its, at one time, almost exclusive breeding in the Aylesbury Valley; the Indian Runner, remarkable for its egg-producing capacity; the Buff Orpington; the Khaki Campbell; the Pekin; and the Rouen.

The Aylesbury duck is without question the best breed for the production of early ducklings. It grows and develops with great rapidity, ducklings of seven to nine weeks old weighing as much as five pounds. Such early maturity is not common to any other of the known breeds, and, keeping in mind the extraordinarily large appetites of ducks, it is easily seen how desirable a quality such rapid growth is. The body structure of the Aylesbury is small and light compared with the entire weight of the bird, and the flesh is light in colour and of splendid quality. The eggs are large and the output extremely good—about ninety to one hundred and twenty being an average annual production. A cross of a Pekin drake—the Pekin being a larger and more vigorous variety—with an Aylesbury duck results in a hardier bird, and is recommended, the resulting progeny losing little in rapidity of growth, and often gaining considerably in size.

The Pekin itself—a Chinese native, as its name indicates—is most useful when crossed with the Aylesbury. Its intrinsic qualities are vigour and a great capacity for laying. Pure-bred birds of this variety do not fatten well, and the flesh is neither so abundant or of so good a quality as that of the Aylesbury or Rouen breeds.

The Rouen does not compare favourably with the Aylesbury in rapid growth. It is slower in development, and therefore has no value for the early duckling trade. Birds of this variety are usually put on to the market in the

autumn and winter. The flesh is dark, rich and abundant.

The Indian Runner has an extraordinary laying capacity. It naturally follows that as table birds they fall short of first-class quality, but, considering the output of eggs these birds are capable of, the flesh is quite reasonably good. The birds, however, are small, the fully-grown adult weighing only three to four pounds.

The Khaki Campbell is a most prolific layer and the fine flavour of the flesh makes it very saleable as a table bird. The Buff Orpington, being an excellent layer and also a good table bird, is, perhaps, the nearest approach to a general purpose duck that we possess.

Breeding and Selection

It is essential that the breeding stock should have access to water. Although ducklings should, as already stated, be reared and brought to marketing age without experiencing life in the water at any time, it is fatal to deprive the stock birds of their native element.

The conditions required for duck breeding differ considerably from those which are necessary to raise chickens. For this reason duck breeding may be resorted to in districts and under conditions which would be disastrous to chickens. On the other hand it can often be carried on co-extensively with chicken farming, providing the land offers the necessary variety A low-lying or undulating country is, however, the environment to aim at, though ducks do best on a light gravelly soil, so long as it contains plenty of moisture, is full of natural food, and herbage grows well, and providing that they have free access to a stream or pond, also that the altitude is not too high. While a dry soil is particularly to be avoided, care must be taken to secure that the sleeping quarters of the birds are perfectly dry. For this reason they should be situated at some distance from the stream where the birds

disport themselves. Where they are too near the water, or when damp is permitted to penetrate into their houses, the birds soon fall victims to cramp and allied troubles. It is a good plan to have a grass run, situated between the stream and the sleeping quarters—if possible—sloping upward to the house. The birds—especially those of the Aylesbury breed, because of their quick maturing character—should be given liberty with free access to water as soon as possible after hatching, unless intended for early killing. Thus their precocious tendency will be checked, and they will progress more slowly and completely towards maturity, during which process the bony structure and muscular system will have opportunity to develop. This is important in the case of birds which are going to be used for breeding vigorous and rapidly-maturing ducklings.

In starting, secure birds hatched in the early part of the year, and in the autumn mate them with drakes of about eighteen months to two years old—not older. They should begin to lay in December. Take trouble to ascertain the pedigree of the drake. The usual breeding pen contains thirteen birds—ten ducks and three drakes. But a smaller pen of five ducks and two drakes is found to yield excellent results.

Accommodation for Breeding Stock

Housing accommodation must be dry and well ventilated. The houses need neither be very large nor very high, since ducks, unlike hens, naturally do not roost, but sleep on the floor. The houses should be placed at some distance from the water, and high enough from water-level to secure perfect freedom from damp. Where there is no natural slope they should be elevated by means of brick foundations. In order to prevent the ducks yielding to their instinct to lay their eggs in any odd place, or on the water, an arrangement of wire netting enclosing the house and run is necessary. The birds should be confined within these

enclosures until about eleven o'clock, when laying operations are almost certainly over for the day. Ducks cannot stand extremes of heat. In summer, where the vicinity does not afford natural shelter, contrivances of hurdles interlaced with branches of trees or straw should be fixed up so that they may get shelter when they need it. This applies to old and young birds.

Feeding for Breeding Stock

Up to a certain point the early diet given for table ducklings holds good for birds intended for stock. Having their freedom from a fortnight on, they are able to pick up something for themselves in the way of slugs and worms, but their need for nitrogenous food must be met, and plenty of lean meat supplied to make up any deficiency. There is no change to rice at five weeks as with the forced birds. Avoid all foods of a fattening nature, particularly after the ducks have been mated, as otherwise the egg supply will suffer. As in the case of hens, breeding stock should be hard and muscular, the body structure well developed. Ducks are extremely large eaters and should be given a sufficiency of food, particularly of a nitrogenous nature. Liver, butcher's offal free from fat, lean meat or tallow greaves should be mixed with the meal, the meat chopped fine and the tallow greaves boiled until tender.

The food should be mixed to a crumbly texture with the liquor in which the meat or tallow greaves has been boiled, or with boiling water. Allow to cool and do not give too wet. Adult birds at liberty need be fed only twice a day, early in the morning and in the evening.

Purchase of Eggs for Hatching and Rearing

As already stated, where conditions are not suitable for stock breeding, or if the producer wishes to concentrate

all his energy and utilize all the land at his disposal in flesh-production, it is possible to dispense with breeding altogether and purchase the requisite number of eggs from a neighbouring breeder. High prices are asked for eggs laid in December, but birds hatched from these eggs will be ready for market at a time when prices are at their highest point. Prices of eggs differ according to the recognized market value of the bird at the time when it will be expected to mature; thus eggs purchased in the late spring will be cheaper because the birds will not be marketable until the demand has considerably lessened. Some breeders will agree to supply eggs at an average price throughout the season.

Hatching

It is only comparatively recently that the incubator has been recognized as an efficient instrument for the hatching of ducks' eggs. Hitherto huge numbers of hens have been employed—ducks being unreliable mothers and quite disqualified by the fact that they go broody much too late to be of any use for the purpose aimed at. The old duck rearers of Bedfordshire and Buckinghamshire retained for a long time the old prejudice against the importation of artificial means of hatching. This prejudice, however, has been steadily undermined by the results obtained by breeders and rearers who have given the incubator a fair chance. For hatching on anything like a large scale there is really nothing which will quite take the place of the incubator. The method of working the incubator is fully described in the chapter on incubators as applied to chickens. In the case of ducks it differs in no way, except that perhaps even greater emphasis must be laid on the necessity for fresh air, and that the eggs should be thoroughly damped every day during the period of incubation. This lasts twenty-eight days, and care should be taken, when the ducklings are due to come out, to watch for signs that any

of them need help in breaking the shell. The period of incubation is a week longer than that of chickens. Where hens are used the nests may be placed in sheds, the same procedure adopted as in the case of chickens.

Rearing

Ducklings require very little heat. One hen will be quite adequate to look after five or six broods of newly-hatched birds. If placed in brooders artificial heat will not be required after a week, unless the weather is unusually severe, when it can be continued for a little longer. After about a week the ducklings should be removed and placed in flocks of varying size—from fifty to a hundred. These flocks must be kept in fairly close quarters and not allowed to swim. Although ducks suffer very much less than any other domesticated bird through crowded conditions, land on which large numbers of ducks have been reared in a season should be sown with crops and allowed to sweeten before being used for the purpose again. Under very intensive conditions that will be at least two seasons. At about the age of two weeks ducklings are sufficiently hardy to stand a good deal of exposure. Small wired patches—the wire need not be higher than 12 inches—can be set out, the number of them depending on the number of ducklings and the size of the flocks it is intended to run. A quite simple shed, with a litter of straw, providing it is dry and thoroughly ventilated, is quite sufficient for their needs, and a little later on they do quite well in the open, day and night. Some slight structure over which sacking can be thrown in the event of storms or severe wind should be erected—or a temporary shelter of sacking placed over the wire netting will answer.

Feeding for Table Birds

All feeding of ducklings which it is intended to fatten for market should be calculated to produce the most rapid

growth of flesh with the least development of bony structure and hardening of muscle. For this reason they must be deprived of exercise and kept in close quarters. The food should be varied as much as possible. The first feed should be of biscuit meal, scalded, or finely-chopped hard-boiled eggs, mixed with boiled rice, or some efficient substitute. This diet is suitable for the first few days of a duckling's life. After that barley meal, or oatmeal mixed with tallow cake and toppings or sharps, should be substituted, alternated with boiled rice and toppings—a variation in diet being advisable to maintain the interest of the birds in their food and get them to eat with zest. Feed three times a day—morning, midday, and late afternoon. After the end of the growing period, that is, when the birds are a month to five weeks old, the food should consist almost exclusively of undressed or "paddy" rice, cooked as stated below. On such a diet the birds develop with incredible speed, and although some farmers make use of Indian meal mixed with pollards or thirds as a variant, this food does not produce the same quality of flesh. The simplest way to prepare the rice is to mix in the proportion of one part rice to four parts water with one sixth part of fat meat or tallow greaves. Allow the mixture to simmer slowly until the rice is cooked through and quite tender, when the right consistency will have been obtained. In preparing Indian meal, do not cook it, but boil the meat or tallow greaves and add them to the meal, and with the liquor in which they were cooked mix the whole to the proper crumbly texture.

Always mix plenty of grit or fine gravel with the food. Without it the greater part of the food eaten goes undigested. Give also a generous allowance of green food. At this stage keep the birds in flocks of about twenty and feed from troughs. Avoid interruptions and alarms through loud sudden noises or strange visitors. Keep a plentiful supply of fresh drinking water within reach, in which is a

deep layer of coarse grit, and do not allow the birds to swim

Killing

Ducklings should receive no food for twenty-four hours before it is intended to kill them. The actual process of killing is that employed in the case of fowls, namely, by dislocation of the neck. Having killed the bird, hang it head downwards for a few minutes to allow the blood to drain out of the body. All feathers should be plucked except those of the head and upper part of the neck. The wings should be turned. Place the birds in rows on their backs, the heads hanging down. A weighted board should be placed on top. Do not pack whilst warm.

Feathers

The marketing of the feathers and down is an important item in the profits of duck farming, and will be found treated in a general article on feathers, etc.

Average Weight of Aylesbury Ducklings

Age in Weeks.	Weight lb.	oz.	Age in Weeks.	Weight lb.	oz.
1		$2\frac{3}{4}$	6	2	9
2		5	7	3	3
3		$6\frac{3}{4}$	8	3	11
4	1	4	9	5	0
5	2	3	10	6	8

CHAPTER XII

TURKEYS

THE turkey industry is a branch of poultry keeping which demands certain definite conditions, and nobody who is unable to comply with these requirements should attempt to raise turkeys. A large area of land and liberty to roam over it are absolutely indispensable to the development of young turkeys and to their existence. The general belief that turkeys are among the most difficult of birds to rear is not without foundation, but the reasons are not far to seek. Many people attempt to raise turkeys on the principles which they have found successful with ordinary fowls. Intensive methods, however, under which fowls prosper, prove disastrous to turkeys, and even in semi-confinement they are not happy. They cannot tolerate confinement or concentration. The chicks pine and die in spite of every care, and the belief gains credence that they are extremely delicate and not worth the trouble they give.

Of all the races of birds which have been domesticated the turkey is the last. Hence his strong roving instinct. All the old native wildness has not yet been eliminated. And this being so, restraint is intolerable to him. He loves to roam at will, and in captivity becomes listless and unhappy. It is therefore true that even under the best conditions we can provide for them, there must be some struggle with environment and a consequent loss of vitality. And it is equally true that the chicks, as naturally follows,

want a good deal of care and attention in their passage toward adulthood. But this is amply compensated for by the fact that as soon as they reach the stage of youth—which they do quite soon—they become increasingly hardy and give very little trouble. Most of the losses in young turkeys are due not so much to climate as to unsuitable soil, irrational feeding and undue restraint. They like a dry climate, but are known to do perfectly well in damp climates, providing the soil is good and adequately drained.

The soil, in addition to being dry, should be rich in natural foods. Turkeys are voracious eaters and will hunt diligently for food. A hilly or undulating surface is better than a flat one, and a plentifully wooded country better than one without natural shelter or protection. Turkeys avoid seeking shelter in houses or under roofs, and the shelter afforded by the foliage of big trees or high hedges is a great advantage.

Because of all these factors which are necessary to success, and because of the undoubted difficulty of rearing them under conditions which are quite favourable to the ordinary fowl, turkey raising has not the popularity which the market prices commanded might very well give it. The raising of turkeys on a large scale had, until quite recently, been confined to farmers in the eastern counties. Now that demand has greatly increased, and the reasons for failure have been made clear, enterprising farmers in other parts have taken up the work.

The season, which at one time hardly extended beyond Christmas, has lengthened considerably, turkeys being in demand quite six months of the year—the season beginning in November and lasting until April; while the poults or young ones have a high market value from about July to October. The largest birds are in greatest demand about Christmas-time, when large, heavy birds command a really substantial price. An average-sized bird—say of a weight

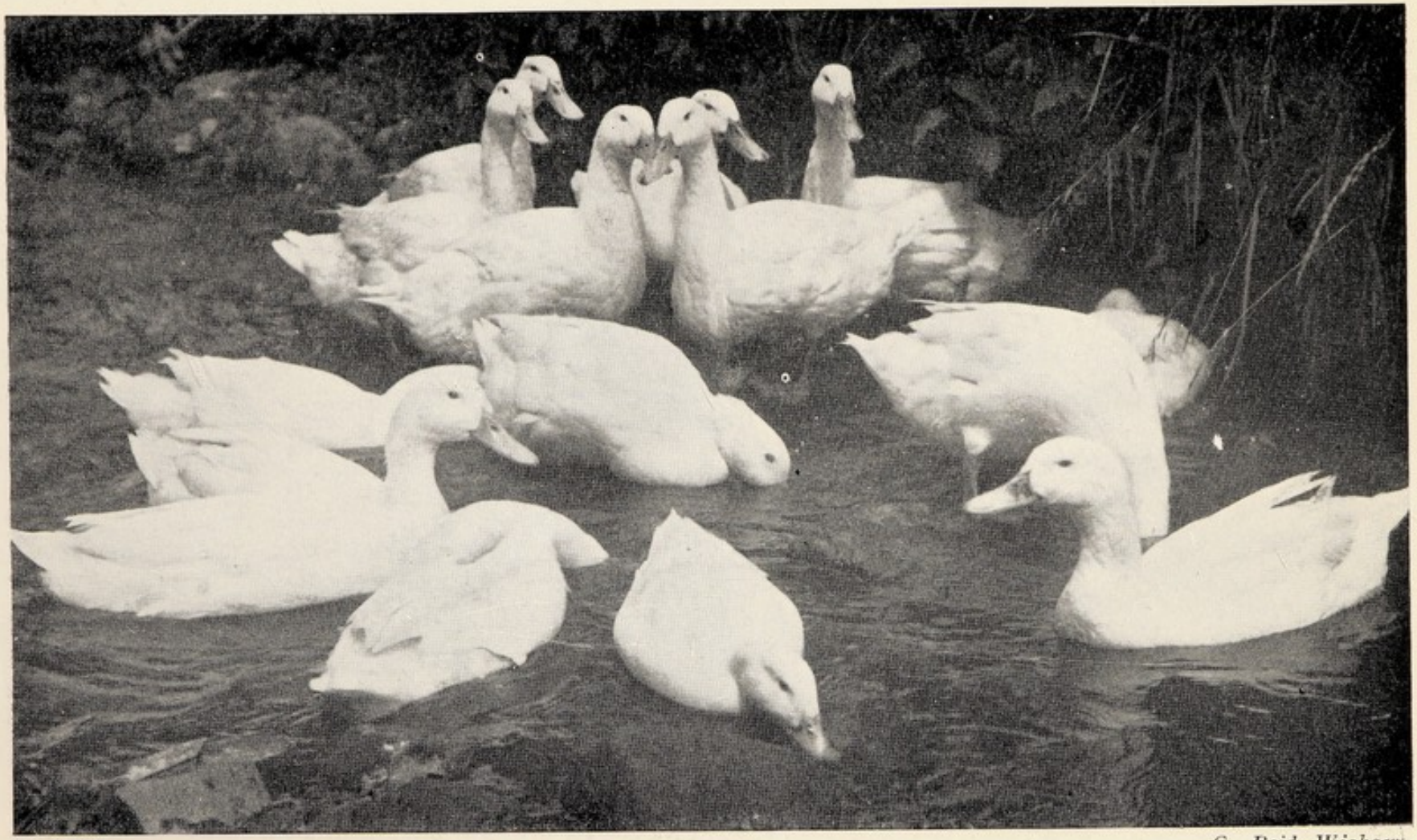


Photo by] *C. Reid, Wishaw.*

AYLESBURY DUCKS.

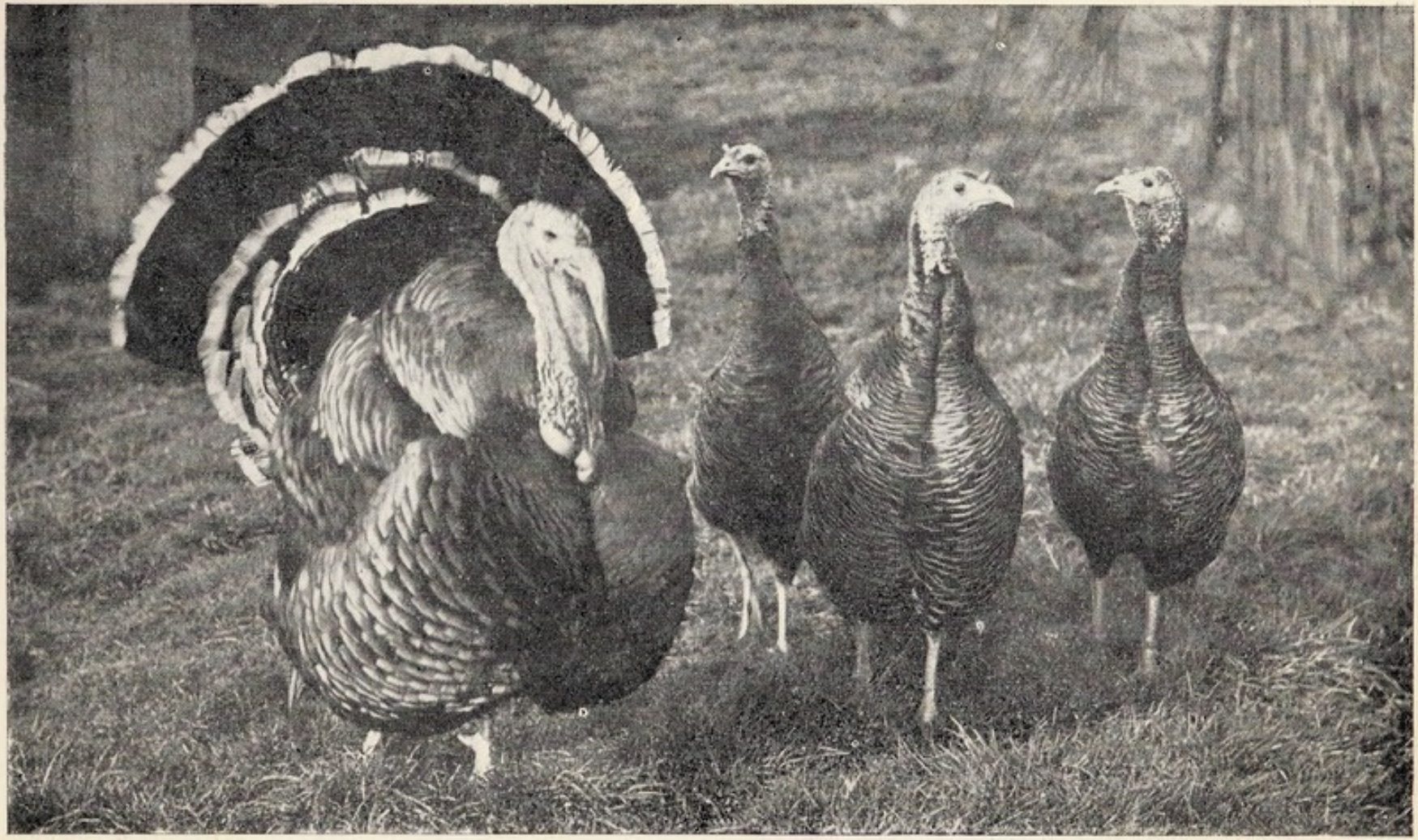


Photo by] [*C. Reid, Wishaw.*

BRONZE TURKEYS.

of about 12 to 16 lb.—is, however, best to cultivate for general needs. The chicks remain somewhat delicate until the age of about eight weeks, when the primitive wattles which adorn the head and neck change colour. This process is known as shooting the red, and marks the start of the chick on a more hardy and vigorous phase. Reared carefully to this stage they grow and harden very quickly, their appetite increasing with their growth. The chicks are pleasant, active little creatures, betraying no sign of inherent feebleness.

Space and Soil

The first and most obvious necessity, then, if the rearing of turkeys is to be attempted, is space. Enough has been said to make it clear that the small poultry keeper must perforce leave turkeys alone. The great appetite of the young birds, combined with the fact that they must have freedom, makes big areas of land, containing plenty of natural food, a prime necessity. The industry is therefore confined to farmers, or to those amateurs having the good fortune to own large meadows or woods to which the birds may have access. Even where large spaces are available it must not be forgotten that the nature of the land is a matter to be carefully considered. All attempts to rear turkeys on a heavy, damp soil have failed. Dryness, but also richness of soil, and an undulating surface, natural shelter, and space, constitute the only conditions under which turkey raising ought to be attempted. Much, of course, may be done, if one or two of these conditions are present, to provide the others artificially, but these are the actual conditions which are to be aimed at.

Breeds

In the early days of the turkey industry the Norfolk Black was the breed most usually adopted. This variety

is still held in high favour by some farmers, though its merits are now rivalled by the Cambridge Bronze—a cross-bred variety. A handsome breed, and one which retains many of the signs of its wild ancestors, is the American Bronze. Where weight is a matter to be considered this breed should be adopted. The males often run to 28 or 32 lb., and the average weight of the females is 14 to 16 lb. The body and head plumage is black shot most attractively with bronze. The tail is a blend of black, brown and grey, while the wings are black with bars of white or grey and touches of green, the wattles and face being of course red. The white variety, hitherto rejected through a fallacious theory that the white plumage denoted feebleness of vitality, is now coming more into prominence. These birds are small. An American Bronze male, of a moderate size, crossed with a white hen produces a hardy bird of vigorous constitution. These birds do not attain to great weight, but are found a useful size for general marketing.

Housing

In the housing of turkeys one thing must be kept in mind, and that is that the latent wild instincts of the birds are far nearer the surface than in the case of the earlier domesticated fowls. And these instincts must be respected or the birds will fail. The natural habit of wild birds to roost in trees is very noticeable in turkeys, and may be allowed some licence in districts where there is no danger from foxes or other night marauders. The young birds, however, must have suitable quarters, and these must approach as nearly to open-air conditions as their desired end will allow. They must still be impervious to damp and draughts—the floor particularly—while at the same time fresh air must always be present. A floor of earth is best, well beaten down and covered with litter or chaff.

Thatched roofs are desirable where they can be managed, and the perches should run the length of the shed and be sufficiently broad. It is important that the house should be arranged with a pair of large doors or gates, or the whole front of the house constructed of an easily movable wire-covered framework, on hinges, which can be thrown open so that the birds can fly straight from their perches through the open door into the air, alighting some distance from the house. They will greatly prefer this method of making their morning entry into the world to that of alighting from their perches and walking out. It accords more with the vigour and eagerness with which wild birds start their morning flight in search of food. Where narrow doors only are provided the birds will still attempt to fly through them, thus injuring their wings.

Even where adult birds are allowed to roost at large during the night, some provision must be made in the way of a shed or building to accommodate the birds during the month of fattening. In constructing a house, allow 15 square feet of floor space to each bird. Turkeys like perches erected about 3 feet from the ground, under the shelter of some big tree. Always bear in mind the possible proximity of foxes in erecting an open-air roost. Certain chemicals sprinkled in a circle around the perches will sometimes have the effect of keeping such unwelcome visitors away.

Feeding Stock Birds

The food of the stock birds is a matter for careful consideration. The greatest error that can be made is a surplus of fattening food. This is often attended with serious results. The effect of over-feeding the male with fattening foods may have the effect of causing him to fail to fertilize the eggs. And the effect on the hen is equally disastrous. The condition of "egg-bound" often results from the condition of the oviduct, or from shell-less eggs

being broken inside her. A generous allowance of grit and mineral foods must form a regular part of the diet. Ground oats, barley meal and middlings in the mornings, with a feed of dry grain towards evening, which may include some peas or beans. Or a dry-grain diet throughout may be adopted, varied as much as possible, but consisting mainly of wheat, barley or oats. An intelligent view of prevailing conditions must be kept, and variations in diet will suggest themselves accordingly. The chief point to remember being that stock birds must be muscular and strong and not running to fat.

Breeding

In view of the fact that the rearing of young turkeys is usually accompanied by considerable difficulty, care should be taken to ensure, by every possible means, the highest degree of strength and vitality in the chicks. To attain this end the parent birds should be mated not earlier than between the ages of two and three years. The male bird should be selected for his quality rather than for his size. Strength and activity, a certain pompousness of carriage, with a well-developed pugnacity, are all signs of a normally healthy bird. The female, who is normally not much more than half the size of the male of the same age, should also show eagerness and activity, particularly in foraging. She should carry herself with dignity rather than pompousness, and while the virility in the male asserts itself in a certain fierce aggressiveness, the hen bird's nature shows more gentleness. The plumage of the female bird is much less striking than that of the cock, which in some breeds is remarkable for its brilliant colouring. She is quiet and tractable and a good mother. In developing a strain of turkeys it is wise not to resort to in-breeding. The stamina and vigour of a flock can best be maintained by the regular introduction of fresh blood. Turkeys are seldom bred for any but table qualities. The eggs are not often

placed on the market. The birds used for breeding should not be fat, but in good muscular condition. Such birds as these will produce chickens more adapted for fattening than would those of heavier and fatter parents. Small birds, running to fat, should be set aside for fattening, and not used for breeding. The suitable number of hens to a cock varies according to individuals. From five to six hens to a vigorous cock is generally found satisfactory. The owner can use his own discretion as to whether more are desirable. Some turkey breeders allow as many as a dozen. As one batch of eggs is commonly fertilized by one service, the cock bird may be mated to as many as twelve hens, but in this case the mating must not be a permanent one, and the cock should not be allowed to remain indefinitely with the hens.

Hatching

The hatching season is from April to June. Usually only one batch of eggs is laid in a season, unless the hen is discouraged from sitting, in which case two or even three may be produced. The chickens resulting from the first laying are, however, generally found to be better birds. The number of eggs in the batches can be increased if desired by removing the eggs from the nest as they are laid. This causes the hen to continue to deposit her eggs. The normal batch of eggs will in most cases be all fertilized by one mating. If the number of eggs is artificially increased, a further mating is desirable.

Care should be taken, as the nesting season approaches, to secure the hen against her instinct to fly off and seek a nest in some isolated spot. Her desire will carry her incredible distances, and once lost sight of she is difficult to track. She should be tempted to make her nest near home by boxes or barrels being placed endways in some likely corner where she is sure to wander. As she begins

to lay, remove the eggs, substituting chalk nest eggs, until a sitting has accumulated, when the real eggs should be restored, and she will probably begin to sit. She may either be left to hatch in the spot she has chosen, or she and her eggs removed at night to some selected place. This will be a necessary precaution if there is any likelihood of her being disturbed by the male turkey or other visitors.

If more than thirteen to fifteen eggs are produced the surplus should be given to an ordinary hen, the turkey mother not being expected to hatch out more than her normal number. Turkeys are usually exemplary mothers. A turkey hen will successfully cover fifteen average-sized eggs. The nests, and the general treatment of the sitting turkey, will be practically the same as that adopted for ordinary fowls. The nests should be out of doors, but some kind of shelter is necessary.

Rearing

To avoid losses in turkey chicks the utmost care is necessary during the period of the eight weeks following hatching. Artificial rearing is not recommended ; the chicks do better when brought up under the care of their own or an adopted mother. Leave the newly-hatched chicks in the nest for a clear day before attempting feeding, though the mother should be given a good feed as soon as the last chick is out. Coops of the usual pattern, but larger, should be placed on short turf and in a spot sheltered from wind and rain. In severe weather it may become necessary to cover the front of the coop with a screen of sacking or branches of foliage. It is most important that the coops should be moved on to fresh ground every day. Wire-covered runs may be attached to the coops for the first ten days, after which the turkey mothers may be given liberty to forage with her offspring for a certain period every day, beginning with an hour and increasing as time goes on.

Care should be taken that the mother and chicks are cooped at nightfall. In the daytime turkeys seldom wander too far away with their young, and if the grass is kept short there is little danger of the chicks straying. After a period of about two months or six weeks the wattles of the young birds begin to show signs of red. At this period the chickens are becoming hardy and vigorous, and are well on the way to early adulthood. In most cases it is expedient to plant a meadow with rye or oats to provide the birds with sufficient food to satisfy their enormous appetites. Beware of allowing young birds freedom among tall grass. In wet weather they will assuredly suffer from the dampness which will accumulate on their feathers in their passage through it. They should be turned on to the planted meadows when the crop is young and green. Keep the chicks as dry as possible through these early days, but in no way deprive them of fresh air.

Feeding Young Chicks

A certain proportion of animal food should always be present. Start the young birds on rice boiled in milk, or a little chopped hard-boiled egg mixed with soaked bread. Dry off these mixtures with a little Sussex ground oats. Grit must be given from the start, and should be mixed with the food. After a few days feed on Sussex ground oats or oatmeal and skim-milk, with a sprinkling of hard grain during the day. Meals should be frequent and regular. Turkey chicks require feeding six times a day. The quantity given at a time, therefore, need not be large, but should not be stinted. Give the first meal in the morning, as early as possible, and the last about dusk. Where there is an insufficient yield of natural green food through drought or any other cause, supplement by additional green food in the meals. Plenty of chopped onion in the food is very beneficial. Clean fresh water must always be present.

After the period of shooting the red give wheat, buckwheat or barley, animal food consisting of chopped meat, bone meal or cut green bone. Continue a soft feed in the morning, which may be of boiled wheat or oats dried off with barley meal or ground oats.

Fattening

About November the selection of suitable birds for fattening should be made. Or it can be made earlier, and the birds marketed, but they should be allowed a free and normal life to within a month of marketing. Choose fleshy birds with small bones, reserving those showing strong bony structures and sturdy limbs for stock. Give plenty of ground oats about this time to the birds it is intended to kill. Allow a month for fattening. Therefore separate the intended birds a month before they are actually wanted, and confine them in a shed in a place secure from noise or interruption. The front of the shed should be open and wire covered, and the shed itself free from draughts. Perches should be arranged of sufficient breadth for the birds to roost comfortably. Cramming is not found necessary with turkeys. They will continue to eat what is placed before them long after their appetites would be assumed to be satisfied. Sussex oats or oatmeal mixed with soured skim-milk or barley meal again appear as the best and most rapidly fattening foods. The addition of about half an ounce of fat per bird three times a week is an advantage. Sour milk and buttermilk always prove advantageous in fattening. Potatoes (cooked) may be given. Mix the food to a soft crumbly texture—not too wet. Keep all vessels and utensils scrupulously clean, occasionally boiling them out. Water, renewed daily, should be placed well within reach of the birds, also a good supply of grit. Give two meals a day, the second meal of whole grain, oats or barley and maize.

Maize is a very fattening food. If scalded these are more easily assimilable.

Killing

Give no food for twenty-four hours before killing. Dislocation of the neck is the method generally adopted. Some people prefer to bleed the birds, in which case the throat should be cut immediately after death. Pluck whilst still warm, leaving the neck and wing feathers.

Trussing

Turkeys are plucked and singed in exactly the same manner as fowls, but before trussing draw the sinews. To do this, break the leg bones close to the feet, run them on a hook placed in the wall (*above* you, so that weight as well as strength can be brought to bear), and draw out the sinews. This is sometimes rather a hard task, but it must be done or the legs will be uneatable. Next cut off the neck close to the back, leaving enough skin to turn over it, and loosen the liver and the rest of the inside at the throat end. Cut off the vent, take out the gut and draw the bird with a hook sold for this purpose. Take great care not to break the gut joining the gizzard, for fear of grit, or the gall-bladder, which, if broken, would make the flesh bitter.

Next dry the inside thoroughly. Cut the breastbone through at each side close to the back, beat it flat with a wooden rolling-pin, then place the pinions, neatly folded, close into the sides, and skewer.

Press the legs close to the body and skewer at first and second joints, and the turkey will now be ready for stuffing.

Having filled the bird with the forcemeat (the fuller the better and neater it will look), skewer over the flap of skin, also that at the neck.

Turn the bird back uppermost and put a string across and across, except in the case of a very small turkey, when it will not be required.

CHAPTER XIII

GEESE

GEESE live almost exclusively on grass, and unless there is unlimited freedom—that is to say, unlimited in the sense that the birds are free to roam and forage all day—over a considerable extent of rough grass land, goose farming should not be attempted. To this fact may be attributed the marked decline in recent years of goose raising, which had always been conducted to a large extent on open or common lands, the area of which is now greatly restricted. Farmers have found that the area of land necessary to maintain the existence of a flock of geese might be more profitably employed in growing crops. On the other hand, geese require very little other feeding besides grass, and where there is the pasturage available, it will be found advantageous to utilize it in this way.

Under these conditions geese are profitable, hardy and self-reliant, and give very little trouble. Side by side, however, with the growing popularity of the turkey, there seems to have occurred a decrease in the demand for geese. Certainly the Michaelmas season, which used to be so important a one, has almost ceased to exist, and the Christmas goose has been largely superseded by the turkey. Also there is a great deal of foreign competition to be met, large importations of geese from Canada reaching the markets, as well as those from the continent of Europe. These birds, however, are much inferior to those produced at home, and are offered at extremely low prices. The aim of the English farmer, therefore, is clearly to avoid

competition with these imports and occupy himself with producing an altogether superior bird for which there is a limited market, yet a steady one, and the maintenance of a good price admits of ample profit. The early or green-goose market is an important one, and the question of competition is much less serious. In Norfolk and a few other counties large numbers of goslings are hatched and reared to the age of five or six weeks by small farmers and cottagers who have access to commons and large waste grass lands. From April to June these birds are sold to dealers and fattened by them for the green-goose market. Providing, however, that a suitable grass run or waste land is accessible, the breeding and rearing of the birds presents no insurmountable problems.

Mating

A stretch of water is necessary for successful mating to take place. Two geese are usually mated with one gander, but as many as three geese may be run. The sex of these birds is rather difficult to determine, the plumage of male and female having no perceptible differences. The gander usually holds himself very erect, and his call has been described as clear and silvery. Another distinguishing mark is the size of his head, which is proportionately larger than that of the female, and rounder in shape. The upper mandible of the bill is also heavier.

Housing

Open-fronted houses should be used, and they should be lofty and roomy. The roof should be sound and rain-proof, and the ventilation thorough. There must be no possibility of damp penetrating into the house, and the house itself should rest on land which is above water-level, otherwise, no matter even if it is at some distance from the water, there will be danger of percolation. Cover the floor

with a litter of leaves spread on earth well beaten down to form a firm floor. Perches are not required.

Breeds

The choice of breeds is not large, only three varieties having any popularity in England.

The Embden—a bird having white plumage and blue eyes and a pinkish bill. This bird is highly recommended for the young or green-goose market. The young ones grow and mature quickly. The goose is a good and reliable mother. The egg supply is average. These birds have square deep-set bodies and an erect carriage. The weight of a full-grown goose is 16 to 18 lb. normally, but this can be increased by fattening. The normal weight of the gander is 20 lb.

The Chinese has grey-brown plumage, the neck and breast feathers inclining to yellow. A bar of dark bronze on the neck is a characteristic marking. This bird displays a knop-like growth at the base of the bill. It is a remarkably good layer.

The Toulouse has dark grey plumage, with white tail and underparts; the bill is reddish, and the legs orange. This bird attains a large size, and is a good layer. The goose of this breed is sometimes found to be without the instinct to sit. The young birds mature slower than the Embden. It is, therefore, most suited to sale at Christmas.

A cross between the Embden and the Toulouse. The quality of early maturity remains unimpaired, and the size of the bird is increased.

The Canada, used largely in America, and not in great favour here, does well on low-lying marshy lands. The flesh has a peculiarly delicate flavour, which is its chief trait. The plumage is black, white and grey, and the bird has a rather distinguished appearance.

There is a steady demand for geese weighing about 8

or 9 lb., so that, except for special markets, it is not always wise to try to produce a large and heavy bird. A smaller but high quality and fleshy goose has, again, a better market value than a larger and heavier one which may carry little more flesh.

Hatching

Geese are long-lived birds and will produce eggs up to the age of sixteen or eighteen years—sometimes longer. Birds for breeding stock should be hatched from eggs laid by a goose not less than two years old mated with a gander of three years or more. If the birds are wanted for early marketing they may be hatched from goslings' eggs, the advantage being that the younger birds begin to lay a full month earlier than those of more mature age. Such eggs as these, however, should never be hatched for breeding stock. Geese start laying early in March, goslings, as stated, a month earlier. A goose lays about fifteen to sixteen eggs before displaying any tendency to sit, and she may be induced to increase the number to as many as fifty or sixty in a season if the eggs are removed as regularly as she deposits them and she is not allowed to sit. A goose will cover some twelve to fifteen eggs, and, assuming that she is going to be permitted to hatch them herself, she should be induced to lay about twenty eggs before starting, the first four or five being given to an ordinary hen. Some farmers prefer to hatch out all the eggs by means of hens, in order to get a large number of eggs in a season, and also on account of the alleged clumsiness of the goose as mother. The writer's experience does not conform to this last charge, and he has found geese for the most part steady and reliable mothers. If the eggs are hatched by hens, sprinkle them daily with water, which tends to reduce the toughness of the shell. They should also be sprinkled even when the goose is hatching them herself, if she does not have daily access to water, otherwise

there will be trouble experienced by the little goslings when they begin to make their attempts to break their way through. The goose should be provided with a nest box about 2½ feet square, which can be placed in the sleeping apartment. Cover the bottom of the box with plenty of straw, softened by rubbing between the hands. She will add little touches of comfort herself with feathers and down which she will pull from her own plumage. The period of incubation is thirty days, and during this time the mother bird is very fierce and aggressive. Any attempt to interrupt or disturb her in her occupation, more especially by anyone with whom she is unfamiliar, will be met with great hostility both by the goose herself and by her mate, and as these birds possess remarkable strength in their wings, they can prove powerful assailants. The prospective goose keeper will be relieved, therefore, to know that there is seldom any necessity to disturb a sitting goose, as she can be fairly well relied on to come off her eggs regularly for food. Leave a good supply of fresh drinking water and grit near by.

Rearing

After hatching, the goose and her brood should be left undisturbed for twenty-four hours. At the end of this time a good meal should be given to the goose. For the first fortnight the little goslings should be placed, together with their mother, in a coop about a yard square, or with the hen if they have been hen-hatched. The coop should rest on grass and be in a sheltered position within easy reach of the shade of trees or bushes. Direct sunlight is harmful to little goslings. If such natural means of shelter do not exist, arrange hurdles, interlaced with furze in such a way that they will form a protection from the heat. The grass on which the coop stands should be short and the coop floorless. After a fortnight the birds can be

freed from all restrictions and will have a joyous time foraging with their parents.

Feeding

For the first two days they can be fed on soaked bread, or on breadcrumbs mixed with chopped dandelion leaves, and, after that, a mixture of boiled rice, chopped hard-boiled egg, with onion tops, dried off with barley meal, or, as an alternative, ground oats and milk. After a fortnight give scalded wheat or oats dried off with sharps. This is a sound food for building up the frame. At about two months old maize may be substituted for birds which are going to be marketed later on, and they are very fond of potatoes. Potatoes, however, prove an uneconomical food, and, except for the last stages of fattening, are for this reason not recommended. Goslings have a great liking for the green tops of onions, and also for young grass, and should receive a generous allowance of these foods. They should be given their freedom whenever possible in fine weather, and in most cases—depending, of course, on the situation and general conditions of the land on which they roam—should be tended by a boy who may be relied on to see that they do not stray so far as to lose their bearings, which they are very prone to do if left quite to themselves. Goslings intended for the early market, and which are to be ready for killing at about three months, should have their liberty in a considerable measure restricted. These birds should receive two feeds a day of barley meal and middlings, with a small addition of brewer's grains mixed with water to a crumbly mash, alternated by steeped oats or barley. Birds wanted for the autumn and winter markets, which are getting plenty of grass, and which range on a soil rich in natural foods, except for a small mash of maize or barley meal in the mornings, will require very little food beyond what they

are able to find by their own exertions. They need plenty of fresh drinking water, and during a dry summer, when the grass is scarce and dry, it naturally follows that they need more supplemental feeding than when the grass is succulent and plentiful. The main point is to let the birds find all the food possible by foraging, and where grass is plentiful an evening feed is sufficient. A month before killing, all birds should be deprived of their freedom and fed according to the instructions in " Fattening."

Fattening

Goslings intended for the green-goose market should be fed on barley meal or maize until they are between two and three months old. They should be confined to pens early, and at no time allowed to swim. In confining geese for fattening do not use separate pens. They pine and fret if deprived of their companions, so much so that it is found expedient to kill off at the same time all birds which have been brought up together. They should be placed in pens about a month or five weeks before killing, and as soon as they begin to lose interest in their food it may be assumed that they have arrived at the right stage for killing, and should be killed without delay. For the final fattening give a soft feed in the morning of barley meal and maize mixed together and moistened, and a feed in the afternoon consisting of steeped grain. Always have plenty of fresh drinking water and grit within reach of the birds. Green food and roots must also figure regularly in the diet.

Killing and Marketing

These birds, being large and strong, there is sometimes some difficulty experienced in killing by dislocation of the neck unless the operator is experienced and has powerful hands. If this method can be adopted it is the best, but, failing that, a good plan is to secure the wings of the bird

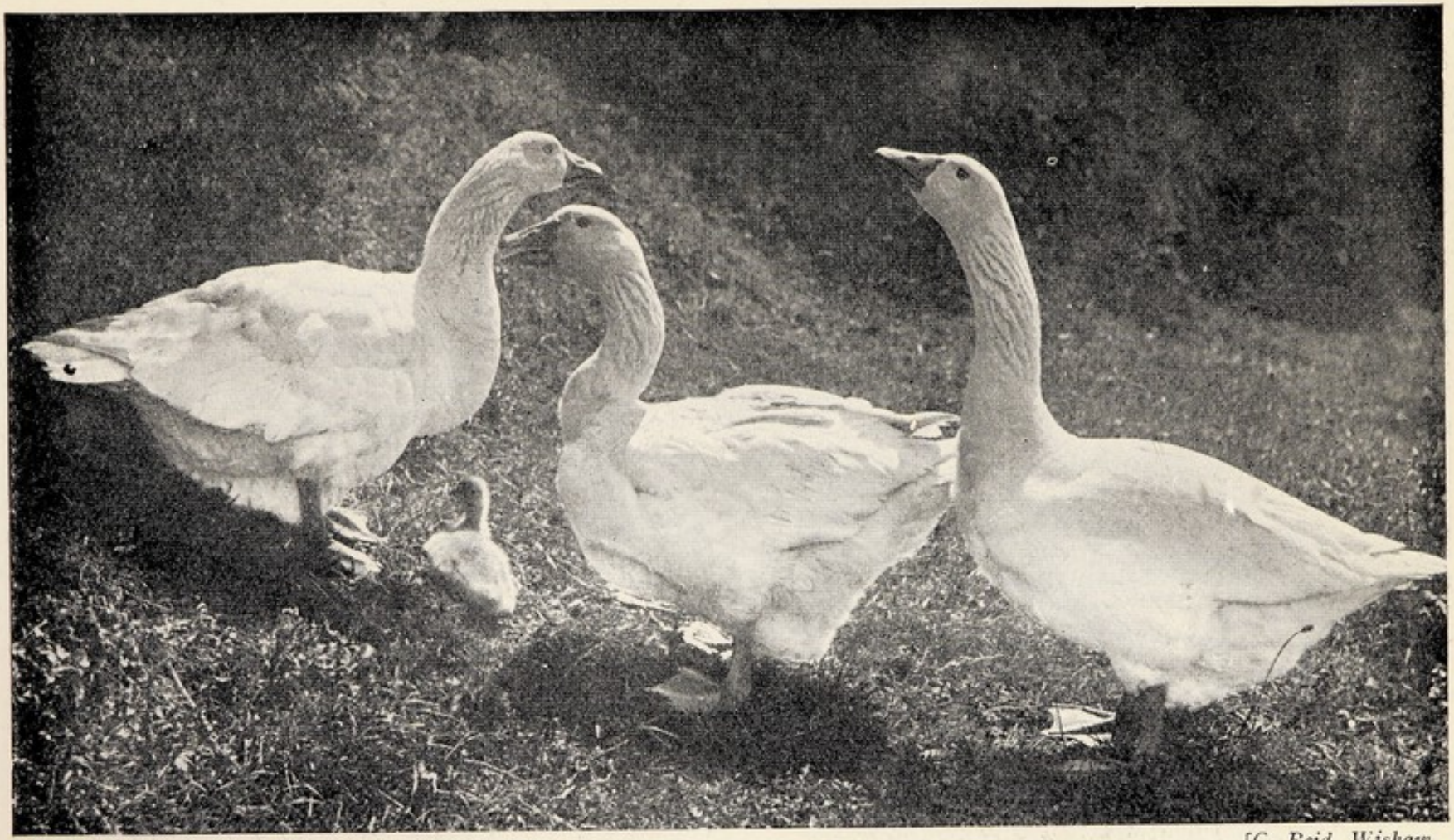
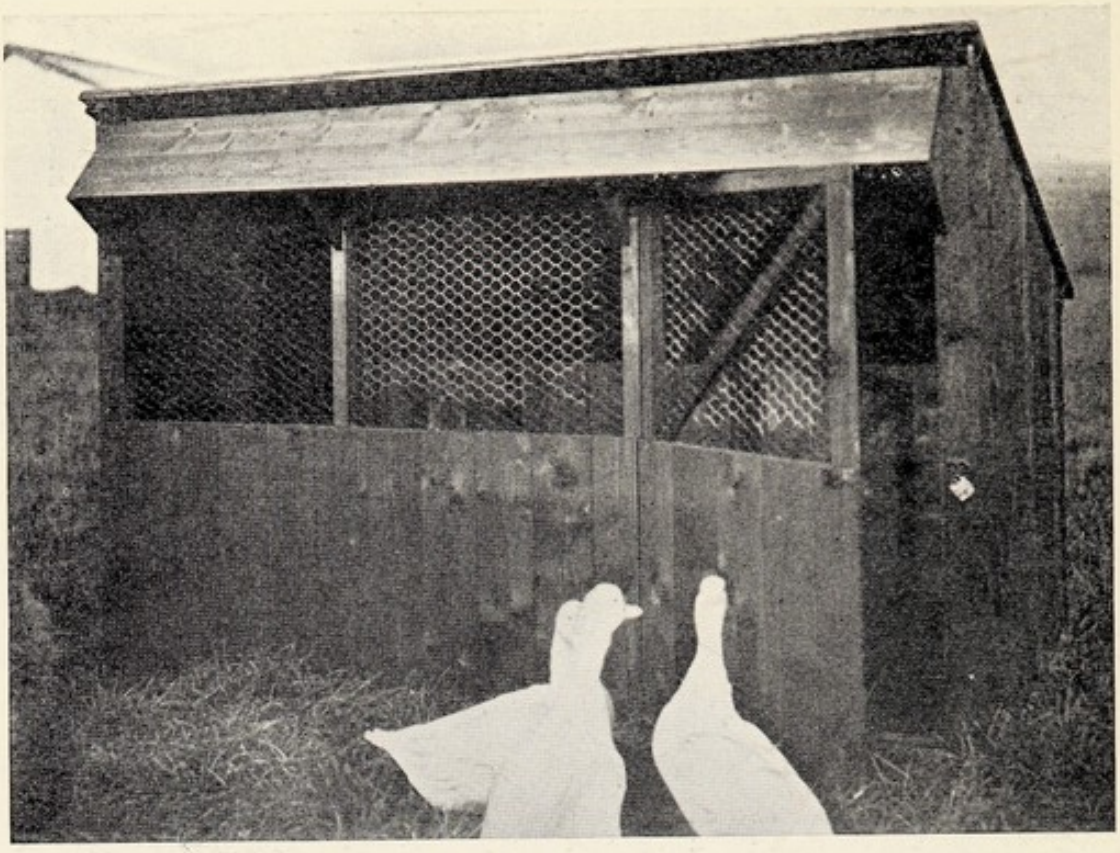
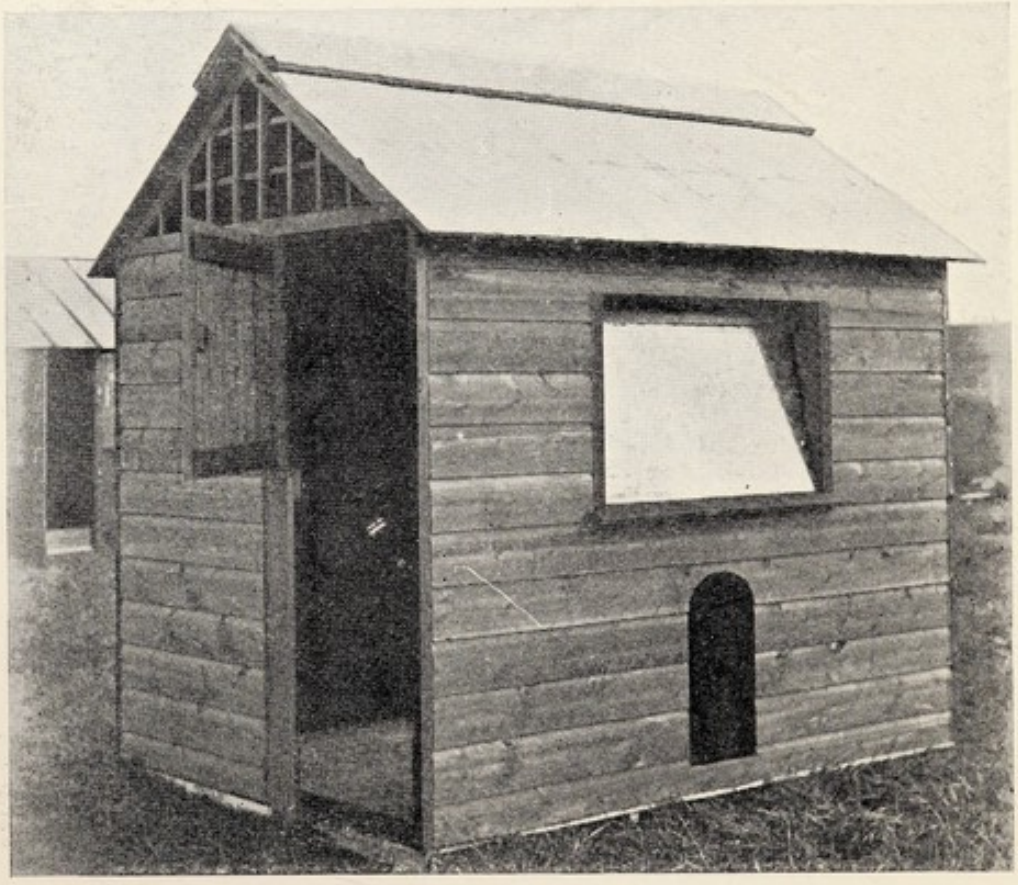


Photo by] [*C. Reid, Wishaw.*

EMBDEN GEESE.



DUCK HOUSE.



TURKEY HOUSE.

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by interlocking them across the back. Then suspend the bird by the legs and give it a sharp blow on the back of the head, stunning it, and at once sever the jugular vein by an incision in the neck just under the lower jaw. It is needless to say that the operator should aim at the utmost rapidity and decision in his work, as a great deal of unnecessary suffering is sometimes inflicted on the poor birds by inexperienced and clumsy killing. The bodies should be roughly plucked and placed under a weight until cold.

As before remarked, in marketing it is unwise to compete with the cheap imported geese, but to aim at a superior bird. If this plan is adopted sound good quality birds will find a ready sale at Christmas, and goslings from the grass sent in May and June are pretty sure of a good market, since there is a regular demand for this class of bird.

Trussing

Geese are prepared, drawn and trussed in the same manner as fowls and turkeys, except that the wings or pinions are cut off at the first joint.

Having well plucked and singed the bird, cut off the feet at the joint, the pinions at the first joint, and the neck close to the back, leaving enough skin to turn over the back. Next loosen the inside at the throat end. Cut the bird open between the vent and the rump and draw; then wipe out the bird and very carefully flatten the breast-bone with a rolling-pin, taking care not to break the bone into splinters. Put a skewer through the under part of one wing and bring it through the other. Skewer the legs by passing the skewer through the first joint and carrying it through the body so as to secure the other. Always remove the merry-thought from a duck or a goose.

CHAPTER XIV

GUINEA FOWLS

THE desire to experiment with all classes of poultry has often led farmers to assume a little too lightly the responsibilities and cares of raising guinea fowls. Encouraged by successes in other branches of poultry keeping, and led away by the very attractive appearance of these birds, they have found out by experience that they have taken on a little more than they bargained for. Guinea fowls will only do well under conditions which place the least possible restraint on their movements ; yet, given freedom, they will use it to the disadvantage of their owner. They are the least domesticated of any farm-yard stock, and their nomadic habit is a constant source of disappointment and trouble. It is no unlikely thing for the hen to go off and make her nest in some unknown and out-of-the-way place, which would be impossible to locate if she did not often betray it herself by her continuous discordant cry. If she is aware that her nest has been discovered she will forthwith abandon it, and make another somewhere else. Nor does the trouble end here. If she can so far evade discovery as to hatch out her young ones undetected, she will carry them off and keep them in seclusion. Even when hatching has been conducted within bounds she will seize the first opportunity to lead her progeny away, and will keep them away for long periods, during which time it is, of course, impossible to feed them. If, however, the farmer is of a philosophic and humorous turn of mind, he

will find much to compensate for these disadvantages, and by the aid of a little ingenuity and a good deal of patience will discover practical means of dealing with most of the difficulties. There can be no question about the profitableness of guinea fowls where conditions are really suitable. Between the end and beginning of the game season they fetch an excellent price, requiring no special feeding, fattening or other treatment before being sent to market. Their presence in the farm-yard or about an estate gives it distinction; in fact they are sometimes kept merely as ornamental birds, in much the same way as peacocks. Their great disadvantage as neighbours is the characteristic continual harsh and penetrating note of the female, which, when the birds are in large numbers, tends to become a source of irritation and annoyance.

Starting

It is better to start with eggs than with chicks. Obtain the eggs from some reliable source, and hatch under an ordinary hen. Eggs may be had at any time from April to September, but May is the best time to hatch, the young birds being more likely to prosper when brought up during the warmer weather. When they are out of the shell the chicks should be placed with the hen in a coop. Have the coop on a short grass, and place a wire run outside it, giving the birds plenty of space, but no opportunity to stray off and get lost.

These chicks are very hardy, and after three weeks can be allowed to sleep out at night. They roost on the lower branches of trees and are able to take care of themselves from this period on.

Feeding

At first feed every two hours with chopped hard-boiled eggs and bread-crumbs, mixed with a little chopped lettuce

or onion tops. Alternate meals of barley meal or wheat should be given. Where the soil is rich in natural foods they will, when at liberty, do much of foraging for themselves.

Mating

It is usual for the birds to pair, but as many as three hens to one cock may be kept. More than this, however, are not advised, as the eggs are likely to prove infertile. As already indicated, strict watch should be kept on the hen at the time she is due to lay, and she should not be allowed to hatch her own chicks.

There is no marked difference in the appearance of the male bird, so that it is a matter of some difficulty to distinguish the sexes. Some people say that the wattles of the male bird are longer than those of the female, but no reliance is to be placed in this sign, which varies with individual birds. The only way is to observe them with close attention, and it will be found that the male bird exhibits signs which unmistakably proclaim his conscious superiority. He will strut and display the pompousness common to the male in most races of birds. He is active, and at times aggressive, even to his own kind. The female alone utters the strange harsh note so characteristic of these birds, and this fact helps in recognizing the sexes.

CHAPTER XV

DISEASES OF POULTRY

ALTHOUGH great developments have recently taken place with regard to the diagnosis and treatment of poultry diseases, these troubles are by no means on the decline, but call for a vast amount of energy and care to prevent their occurrence. Just as in towns, where half the human inhabitants spend a great part of their time in factories and in crowded dwellings, strict measures have to be taken to guard against the increase of sickness, which would be a certain accompaniment of this state of things, so, where large numbers of poultry are brought up together under what are—even the very best of them—artificial conditions, similar risks are run, and the same constant use of preventive measures is necessary.

The determining factor in the causation of disease is faulty environment. Whether or not any of the birds have a predisposition towards any form of disease is another matter. Given proper conditions, there is no doubt that, even if they had, the large majority would escape it.

It has not yet been decided how great an influence heredity extends on the transmission of disease. For example, eggs produced by tuberculous hens have turned out healthy and average chicks, while on the other hand, some of the progeny have shown signs of a predisposition towards the disease, or, anyway, an obvious want of resisting power. In any case, it is wiser to refrain from breeding

from birds showing signs of disease of any kind, unless it were a passing ailment and could be recognized as such.

The question referred to in the preceeding paragraph is complicated by the fact that bacterial infection may be communicated through the egg from which a chicken is hatched, and that a bird apparently immune to certain diseases may be a medium by which these are passed to others incapable of the same resistance. In the former instances the bacteria are in the female parent when she lays, yet no evidence is forthcoming that this is the case. Such is a further reason for careful and rigid attention to environmental influences, as to correct methods of feeding. The subject, however, is very complex and beyond the scope of this book.

Absence of sufficient exercise is one of the most frequent causes of a debilitated system. Because the bad effects are not immediately seen, one is apt to lose sight of the results of what is theoretically known to be a questionable state of things. It cannot too often be repeated that evil results are certain to follow the lack of provision for free activity. In some breeds of fowls this has even to be encouraged, as certain races are lethargic by nature. On out-door exercise depends the amount of oxygen which the system receives, and consequently appetite, digestion and muscular development. The want of the right amount of exercise reduces the powers of resistance, and if disease germs are encountered they find a ready host. Other causes of low vitality in the birds are the want of proper ventilation in the houses, the presence of parasites on their bodies, and unsuitable feeding. These predisposing causes are pointed out to demonstrate that much may be done by proper care and attention to get the birds into such a condition that they are able to resist germs of disease. And these are often introduced in quite unexpected ways. They may be imported by a newly-purchased hen, or chickens. Or, as sometimes happens in starting, the ground

may have been contaminated by previous flocks, and the germs of disease be ready to attack the new occupants. Such cases as these can hardly be foreseen, and the only thing to do is to have the flock strong and healthy enough to resist such attacks, though there is danger of breaking down the power of resistance by exposure to adverse conditions. A precautionary measure in buying new stock birds is to keep them for a week or two before introducing them to the flock, watching for signs of possible disease meanwhile.

Every means should be taken to ensure a correct diagnosis of the complaint from which any bird has died, even to the point of postmortem examination. Timely knowledge of a contagious disorder may sometimes save a whole flock. And it is also often found that the cause of death has been some easily avoidable condition of one of the internal organs, perhaps through mistaken feeding, which, by discovering, one can remedy. The lungs should always be examined if there is the slightest ground for suspecting tuberculosis. The existence of the tubercle bacillus in the lungs can readily be ascertained by an examination of the organ after death. If small whitish nodules are found within the tissue of the lungs, often spreading to the heart, tuberculosis is present. The tissue in the immediate region of these nodules will be found broken down and presenting a generally unnatural and unhealthy appearance. The ordinary colour of healthy lungs is pink. If a bird is known to have died of tuberculosis or any other infectious disease, examine the remainder of the flock for symptoms, and immediately isolate all suspicious cases. Remove the flock to fresh ground and thoroughly disinfect the vacated runs and houses.

Vermin

Diseases caused by internal parasites are among those most common to poultry, and external parasites are also

a great source of trouble. It is always advisable when fowls show signs of uneasiness or ill-health to examine them for possible external causes before attributing the symptoms to some other ailment. Lice, red mite, fleas, all tend to produce discomfort and irritation in the birds, in addition to which certain parasites burrow under the skin and suck the blood of their victims, all of which lead to a general debility making them liable to contract the more formidable diseases. Every effort, therefore, should be made to prevent the possibility of these parasites gaining access. Thorough disinfecting and cleaning of houses, combined with frequent dusting of the birds under wings and tail feathers with a powder consisting of one quart powdered lime to two quarts flowers of sulphur and two ounces of carbolic acid—a method generally successful in maintaining freedom from these troubles. The dust bath, so often mentioned throughout this book, must again be referred to as providing one of the surest ways of keeping the fowls free from vermin. It should consist of ashes or fine garden soil, or even sand, in which a 2 per cent. solution of carbolic acid has been mixed. Keep the box where plenty of sun and air can reach it. Light is the enemy of most parasitic vermin.

External Parasites

Lice generally appear on the more downy and fleecy parts of the birds, and under the wings particularly. They are often responsible for the death of large numbers of chickens, the young birds being unable to offer sufficient resistance to the discomfort, irritation and debility these creatures, by their boring and blood-sucking, provoke. Directly lice are detected dust the chicks with the preparation described above, or with pyrethrum powder. Thoroughly cleanse and disinfect their houses, foster-mothers, or sleeping quarters. To get rid of the larger and more

formidable type of louse which sometimes establishes itself in the birds' head feathers, rub the head and neck with turpentine mixed with fat or vaseline. Anything which tends to block up the pores of the skin (by which the lice breathe) will destroy them—hence the value of the dust bath.

Red Mite is a blood-sucking pest also, so small as to be almost invisible. They only become red when they are full of blood and are normally whitish or colourless. They secrete themselves within the structure of the house and, in consequence of their extreme minuteness, many hundreds can exist unperceived in a small space. They prey upon the bodies of the birds at night, and, retreating to their hiding-places in the morning, easily go unobserved. They are a grievous enemy of sitting hens, who are sometimes driven to desert their eggs, in consequence of the misery caused them by these little creatures. Warm summer weather causes them to increase, and, if allowed to thrive uninterrupted, they will begin to colonize on the bodies of the fowls themselves, and cease to make their morning retreat, remaining to prey upon the birds by day as well as by night. Although these creatures do not depend on the pores of their skin for the absorption of air, as in the case of lice, most of the means used for checking the inroads of lice will do much to keep them away. In addition, all crevices, joints, etc., in the structure of the house should be sprayed or painted with paraffin disinfectant, or creosote. Movable parts should be dipped into a 2 per cent. solution of carbolic acid. If everything else fails, fumigate with sulphur, first sealing up all air exits.

Scaly leg, so-called from the crusts which form on the lower legs of the birds, is sometimes caused by a form of scabies, in which minute organisms burrow under the skin. This is a contagious disorder and should be speedily dealt with. Stand the fowl affected in warm soapy water, and when the scales are soft enough, remove any that are loose,

and rub the affected parts with sulphur ointment. A similar condition may be caused by excessive dryness of the skin, and may not be due to the intrusion of a parasite. The treatment is the same, but use carbonated vaseline instead of the sulphur ointment. Be careful to destroy all skin and scales that are removed from the affected birds.

Almost all other forms of external parasites will yield to such treatment as already described. But best of all is it to prevent their having any opportunity to establish themselves by scrupulous attention paid to the cleanliness of the birds and of their habitations.

Internal Parasites

A troublesome complaint for which it is difficult to track down the cause is Gape-worm. This complaint is confined to young chickens. It is thought that the parasites may be present in earth-worms eaten by the chicks. They seem to be associated with the spring, and are presumed to be present on the ground after the frosts have disappeared. Damp or marshy land seems to contribute to their presence, though that is not always the case. The most obvious symptom is a constant gasping for breath, and the birds assume the humped up appearance and drooping wings which always indicate that a chicken is out of sorts. The gasping for breath produces an appearance of continuous gaping, hence the name. Gaping, however, is also associated with certain respiratory troubles, but there are usually other symptoms which help the diagnosis. The worms are found attached to the inner surface of the windpipe. Each apparent worm is actually two worms—male and female—which attach themselves to each other. They become distended through the blood which they consume, and thus interfere with the passage of air through the windpipe; and gaping ensues. The

worms may sometimes be removed from the throat by a loop of horsehair. Tie two horsehairs together at one end. Open the bird's mouth, and insert the horsehair as far as possible into the windpipe, avoiding the food passage. Twist the hairs and draw them out again, when one or two or more worms will appear. Repeat the process until no more worms adhere. Or a feather stripped to within about an inch from its end may be passed into the windpipe, twisted and withdrawn with similar results. Another method of treating is by placing the chickens in a box, the top of which is covered with a thin cloth, over which fine, dry slaked lime is sprinkled. The lime-dust inhaled by the chickens causes the worms to relax their hold, and they can be ejected by the birds. In its early stages the disease is remediable by blowing into the coop—which has previously been made something approaching air-tight—a preparation called Camlin. Special bellows are supplied for use with this powder and the process is generally attended with very good results. A piece of camphor in the drinking water is a preventive. Chopped onion once a day is also useful in the feed.

Other forms of internal parasites are Tapeworm and Round-worm. The first is similar to that which attacks the human intestine, being composed of sections which break apart. These sections are found in the excretions, and their presence is usually accompanied by wasting and weakness. Give 1 drachm of extract of male fern before the morning meal, followed, after an interval of two or three hours, by a purgative such as Epsom salts—about 20 to 30 grains.

The usual symptoms of Round-worm are wasting and diarrhœa. Santonin is the best remedy. Two grains before the morning feed followed by 20 grains of Epsom salts.

Treatment of Diseases

Care should be taken to watch for signs of ill-health, as a single case taken in time sometimes saves an entire flock. Diagnosis is a difficult but important matter. So many diseases of birds present similar symptoms that it is often impossible to detect from early signs. The following list may be found useful as a help in distinguishing those ailments for which remedies are known, and which can be applied by the average poultry keeper, from those which are beyond his skill to cope with.

APOPLEXY.—*Causes:* Overfeeding, insufficient exercise, food of too heating a nature. *Symptoms:* Staggering, apparent giddiness running backwards. *Treatment:* If acute, it is hardly worth while attempting to save the bird. Milder cases may yield to treatment, but the attacks are very likely to recur. Keeping the bird in a dark cage, and feeding sparingly on a diet free from stimulating or heat-producing qualities, occasional purgatives, such as Epsom salts, 20 grains dissolved in the water which the fowl drinks, and bathing the head with cold water. Birds which are known to have suffered from an attack of apoplexy should never be used for breeding.

BRONCHITIS.—*Causes:* The same as those responsible for colds and catarrh, viz., draughts, changes of temperature, exposure to weather. *Symptoms:* Wheezing, rattling in the throat, heavy breathing, gaping, excessive thirst. *Treatment:* Warmth. Two or three times a day give a teaspoonful of glycerine into which two or three drops of spirits of camphor have been added, or five drops of spirits of turpentine in a little castor oil. Give soft food, warm.

BUMBLE-FOOT.—*Causes:* Probably too hard ground, or badly-shaped perches. *Symptoms:* Lameness. Bumble-foot takes the form of a gradual hardening of the skin on the sole of the foot. This eventually becomes a corn and

if neglected may lead to an abscess. *Treatment:* During the corn stage it may be pared with a knife, then soaked in hot water, and either acetic acid or iodine applied each day. The foot should then be bandaged with lint, over which carbolized vaseline has been spread. If an abscess has formed, open when ripe, and squeeze out the contents, after which well wash the foot in warm water containing a small proportion of Izal or Condy's Fluid. Watch the place, and if necessary open it again. Keep the wound clean.

Catarrh or Cold.—*Causes:* Draughts, undue exposure to weather, ill-ventilated houses, sudden climatic changes. *Symptoms:* Watering and running of the eyes and nose, sneezing, debility, bronchial sounds in the throat. *Treatment:* Sponge face, eyes and nostrils with hot water, to which a tablespoonful of vinegar has been added. To the drinking water add a few drops of essence of camphor. This will keep the cold in check until a good roup powder, which is the most easily administered remedy, can be obtained for the drinking water. For severe cases, see Roup.

Cholera.—*Cause:* A specific germ. *Predisposing causes:* Bad water, filthy condition of run, dampness, lack of green food, bad atmosphere. *Symptoms:* Extreme weakness, diarrhœa of a white or green colour, dark or purple comb, extreme thirst. In this disease the intestines become highly inflamed, and it is accompanied by a good deal of pain. It is a very contagious disorder, and may be conveyed from an infected bird to a healthy one by contamination of the grass by the evacuations. Isolate the affected bird therefore immediately, and thoroughly clean and disinfect the run it has occupied. Remove all the remainder of the flock to another run and carefully watch for symptoms. *Treatment:* In severe cases lose no time in destroying the bird. The body should be burnt. For milder cases try a strong solution of Epsom salts in the

drinking water, to which may be added a half-teaspoonful of carbolic acid (in two quarts of water). Fortunately this disease is rare.

CONGESTION OF LIVER.—*Causes:* Overfeeding, unsuitable feeding, insufficient exercise. *Symptoms:* Lethargy, increasing fatness, depression. *Treatment:* Increased exercise. Alter food, avoiding foods containing much starch or fat.

CONSTIPATION.—*Cause:* Unsuitable food, want of exercise, producing obstruction of the bowels or vent. *Treatment:* Bathe the vent with warm water, give Epsom salts—20 grains in warm water—or a drachm of castor oil. Increase exercise and green food in diet.

CRAMP.—*Causes:* Dampness (in chickens), poor circulation in the legs, cold flooring. *Symptoms:* Contraction of legs, clenched toes, inability to stand or walk. *Treatment:* Remedying of conditions, warmth, gentle massage with liniment two or three times a day.

CROP-BOUND.—*Causes:* Careless feeding, the swallowing of long fibrous stalks of grass, accumulation of food in the crop from any cause. *Symptoms:* This complaint is easily distinguished by the external appearance of the crop. It hangs down heavily, is much distended, and if felt, a hard ball of food can be found within. *Treatment:* Pour a little oil down the throat, then from the outside knead or work the contents of the crop with the hand. This causes the oil to permeate the food, and it will generally soften and pass through after an hour or two. The hardness will not yield at once, but the treatment should be persevered with. Another course is to give fairly frequent 20-grain doses of Epsom salts, and follow with the kneading process. Give the salts in warm water. If this treatment fails to remove the obstruction, the bird will either have to be destroyed or an operation must be performed. A sharp knife or scalpel is sterilized, and a clean cut about an inch long is made at the upper part

of the crop. A small silver spoon passed through the opening thus made can be used to remove the contents. When the crop is empty wash out with warm water containing a very little non-poisonous disinfectant. Stitch up the wound with a surgical needle, sterilized, and silk thread, stitching the inner skin first and then the outer one. Keep the bird on bread and milk diet for a day or two, fairly dry, and give no water, plenty of green food and air.

DIARRHŒA.—*Causes :* Bad water, decayed food, chill, change of diet, want of grit, too much green food. *Treatment :* The condition often rights itself. Being a symptom of digestive trouble, the obvious step is to correct the diet. If the diarrhœa is obstinate, give a purgative to remove the internal cause of irritation—Epsom salts, about 20 grains. Feed on boiled rice for a day or two. While not a serious disorder in adult birds, it has a very weakening effect on chicken, and should in no case be neglected.

DIPHTHERIA.—*Cause :* A specific germ, therefore highly contagious. General bad conditions conduce to its presence. *Symptoms :* Inflamed throat, yellowish patches appearing on the mucus membrane of the throat and sometimes of the mouth and eyes. These patches resemble those which characterize canker or roup ; but whereas the latter can be removed from the throat, the diphtheretic patches adhere too tightly to admit of removal. Immediately isolate the fowl, and, if not a very valuable bird, destroy it. If *treatment* is attempted, keep the bird warm, and paint all patches with a lotion composed of carbolic acid, 1 drachm ; sulphurous acid solution, 3 drachms ; tinct. perch. iron, 4 drachms ; glycerine, 4 drachms (as prescribed by the late Mr. Lewis Wright). All patches that can be removed should be immediately burned. The risk of infection is so great that unless the case is an exceptionally mild one, or the bird of unusual value, treatment should certainly not be attempted.

DYSENTERY is a complication or aggravation of diarrhœa.

The excretions are liquid and often bloody. Adopt the treatment advised for diarrhœa. Isolate the bird.

ENTERITIS—An acute and dangerous disorder and one to which fowls are very liable. *Causes:* Overfeeding, poisoning, dirt. Or it may be due to a germ, in which case it is highly contagious and may spread rapidly over the flock. *Symptoms:* Diarrhœa of a bright yellow colour, sometimes flecked with blood, prostration, shivering, dejection, excessive thirst. *Treatment:* None but the mildest cases should be treated. In all severe cases destroy the affected bird, remove the flock, and disinfect run and house. Give milk to drink, also a half-ounce of olive oil three times a day. Feed only on bread and milk.

FAVUS.—An affection caused by a minute vegetable fungus. Pale crust or scabs form on the comb and face, sometimes spreading to the neck. If neglected, these thicken and become more difficult to treat. *Treatment:* Wash with vinegar, and after drying, bathe the affected parts with salt and water, fairly strong. Then apply carbolized vaselin or red oxide of mercury ointment. Repeat daily until cured.

GLEET.—Inflammation of the lower portion of the egg-passage. *Cause:* Originated by a bird which has by some means got an egg broken inside her. It may be communicated to other hens by means of the cock bird. *Symptoms:* The extremity of the egg-passage is found to be sore and red, and may be coated with an ill-smelling crust. Fœtor is one of the signs by which this complaint may be recognized. *Treatment:* Bathe the crusts until they soften and can be removed. Then wash with warm water and a few drops of Izal. Apply oxide of mercury or iodoform ointment, or carbolized vaseline. A purgative may be given. Repeat this process until all signs have disappeared. Isolate the bird for some little time after she is free from the trouble. If several cases have occurred in the same flock examine the cock bird, and if necessary

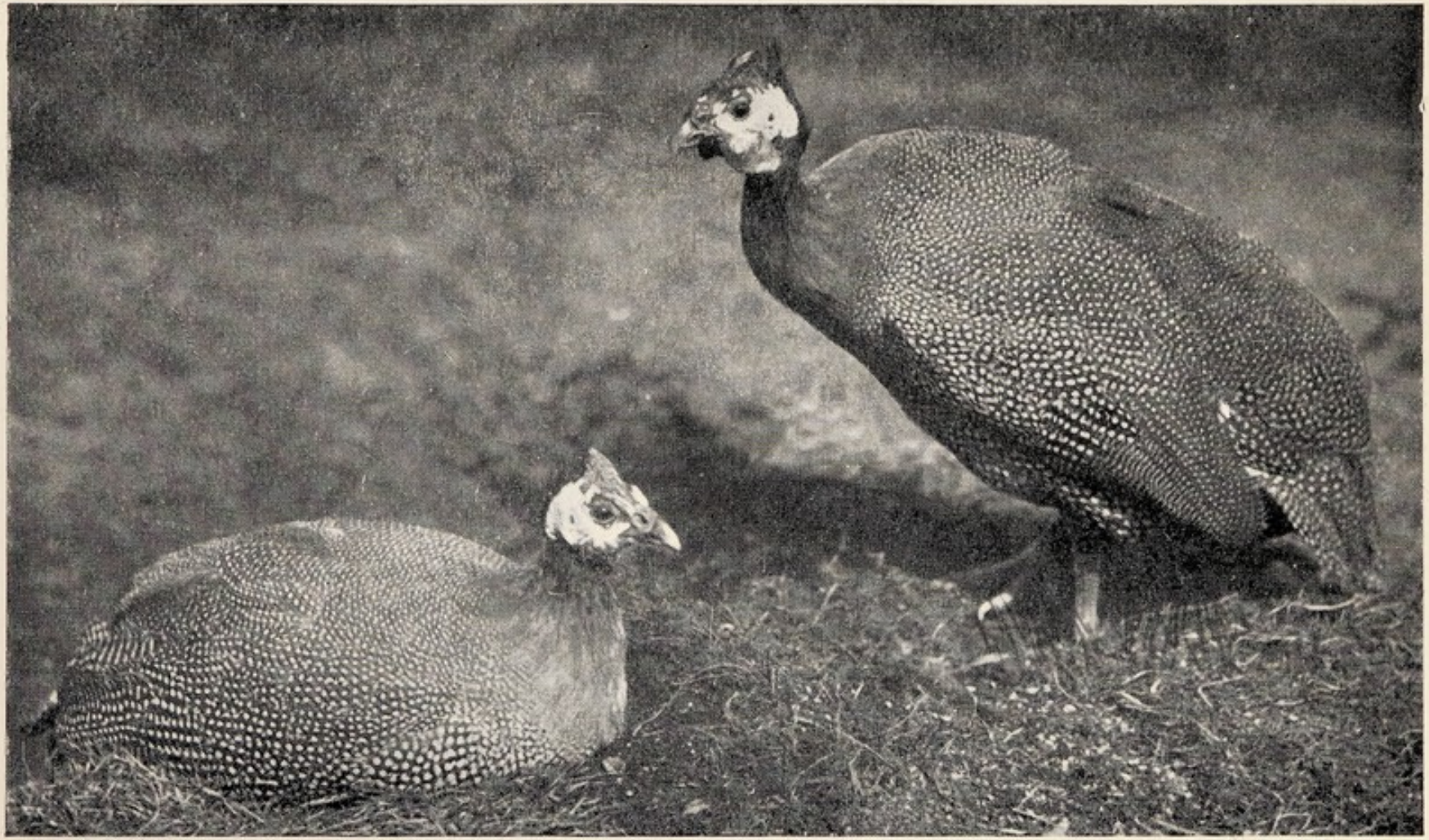


Photo by] [*C. Reid, Wishaw.*

GUINEA FOWL.

Photo by] [*C. Reid, Wishaw.*

ANDALUSIANS.

Photo by] [*"Sport and General."*

BLACK LA BRESSE.

isolate him until there is no doubt of his being free from infection.

GREGARINOSIS.—This minute organism invades the throat, nose, mouth, eyes, comb, and internal organs. *Causes :* Infection by affected birds through the excrement, damp, dirt, and general bad condition. *Symptoms :* Lethargy, wasting, depression, lustreless plumage, comb pale, yellow excretion, becoming watery, a want of control over the movements of the body. In accordance with the particular part of the body attacked the more particular symptoms vary. Where the organisms have invaded the inner lining of the throat they cause the formation of a false membrane, which affects the respiration and finally produces suffocation and death. The eyes will become inflamed and discharge profusely, or if the comb is affected, scabs form, while if the intestines are the seat of trouble, diarrhœa and general catarrhal symptoms are shown. *Treatment :* Correct the ill-conditions of environment by cleansing and spraying with a solution of carbolic acid and lime-wash, or with creosote. The disease is contagious, and therefore all birds which have died should be burned. Then apply carbolized vaseline or red oxide of mercury ointment. Repeat daily until cured. This disease is highly infectious, not only to birds, but to other domestic animals, and an obstinate case should be destroyed. See that all scabs are burnt or treated with lime. Keep the bird on a nourishing diet.

JAUNDICE.—*Causes :* Overfeeding, excess of fatty foods, want of green food, insufficient exercise, chill. *Symptoms :* Yellow skin and general out-of-sorts condition. *Treatment :* Remedy the diet, giving plenty of grit. Give purgatives—Turkey rhubarb, or aloes.

LEG-WEAKNESS.—*Causes :* Too rapid growth, a want of protein foods, or minerals, over-dryness of the floor of the foster-mother, will account for leg-weakness in young chicks artifically bred. Rheumatism. Extreme fatness in adult

birds, and sometimes the strain of laying. *Symptoms:* Staggering gait, flapping of wings in an attempt to gain balance, an inclination not to use the legs—the birds will sit about. *Treatment:* Examine foster-mothers, and look for such causes as enumerated. Correct conditions. Some relief may be given by massage with liniment. A purgative is useful in the case of adult birds.

LIVER (INFLAMMATION OF).—Caused by errors in feeding. *Symptoms:* Lethargy, depression, loss of appetite, sometimes diarrhœa. *Treatment:* Calomel, 1 grain, followed by Epsom salts, 20 grains in warm water. This is a complaint to which young turkeys are specially prone.

PIP.—A dry spot on the tongue. *Causes:* Obstruction in the nostrils causing the bird to breathe through the mouth; indigestion; or chill. The spot or scale must not be removed. Soften it with repeated doses of glycerine and water—in the proportion of one part of each.

PNEUMONIA.—*Causes:* Sudden changes of temperature, undue exposure to severe weather. Young chicks may often fall victims on coming out into cold morning air after a night spent in an overcrowded or ill-ventilated foster-mother. *Symptoms:* Coughing, gasping for breath, fever, dejection, crackling sounds can be heard by applying the ear to the bird's chest or back. *Treatment:* Much may be done to prevent this complaint by proper ventilation of foster-mothers and an avoidance of crowding. Place affected chicks in an apartment that can be heated by steam from a boiling kettle or vessel. A few drops of chlorodyne may be added to the drinking water. Painting with iodine may be resorted to in the case of adult birds over the region of the lungs where the crackling sounds can be discerned. Avoid all cold and damp. Feed on bread and milk, or raw egg.

RHEUMATISM.—*Cause:* This trouble is mostly confined to old birds, and sometimes results after a spell of unusually severe or damp weather. *Symptoms:* Swelling and

tenderness of joints accompanied by heat. The fowl will walk lame and show signs of pain when using her legs, and will sit about and squat when feeding. *Treatment :* Rub the joints with some liniment—camphorated oil or some equivalent. If the swelling is obstinate and shows signs of hardening, paint with iodine.

Roup.—A similar disease to diphtheria, of which it seems to be a milder form, and into which it sometimes develops. *Causes :* Contagion, predisposed by bad conditions, cold, damp, overcrowding. *Symptoms :* Running of the eyes, gasping, difficulty of swallowing, fever, depression, swelling of the face, offensive breath. The early symptoms are indistinguishable from those of ordinary cold or catarrh, and should be treated according to advice for this ailment. If after a cold the symptoms of roup supervene, remove the bird to warmer quarters, washing away the discharge of eyes and nose with a solution of Condy's fluid or other non-poisonous disinfectant. Give a good nourishing diet—by force if the bird refuses or is unable to eat food. Roup pills can be procured and should be given as instructed. Remove the remainder of flock to another run, and thoroughly disinfect house and run, as the disease is highly contagious. Only attempt treatment in mild cases.

Tuberculosis.—*Causes :* Tainted breeding stock ; or the bacillus may be introduced in some unknown way. The pre-disposing causes are overcrowding in chickenhood, imperfect ventilation of houses, and general bad conditions. *Symptoms :* The chief obvious symptom is rapid wasting. Also paleness and dryness of comb. Other symptoms depend on what organ is affected. Where the lungs are involved there will be shortness of breath, fever, diarrhœa. The disease sometimes attacks the joints, which swell, or it may show itself in swellings and ulcers on the skin. *Treatment :* As early as possible remove the fowls to new quarters, where plenty of sunshine and air will penetrate.

No drugs are of any importance, though a good deal may be done to help matters at an early stage by a nourishing diet and increased exercise. Mention is made at the beginning of this chapter of the desirability of a post-mortem examination to confirm suspicions of a bird having died of tuberculosis. Such birds should never be allowed into the breeding pen. In most large broods of chicks one or two isolated cases of tuberculosis may occur. This does not always indicate that the other chicks are affected. But instant removal of the suspected cases is advised.

Egg Troubles

Obstructions and irregularities in the organs concerned with the production and laying of eggs sometimes have serious results. If a hen is seen going frequently to the nest, but laying no eggs, and especially if she shows signs of uneasiness and distress, it may be assumed that she is egg-bound. That is to say that through excessive fatness, or some other cause, or because the egg is of unusually large size, she cannot produce it although it is ready. Very carefully inject a little ordinary sweet oil into the vent, taking every precaution not to break the egg. Internally doses of Epsom salts, about 20 grains, or of warm treacle, in doses of half an ounce each hour, are found beneficial. If there is still no result the bird should be held so that its hind parts are over the steam of boiling water for a quarter of an hour. Fill a jug or basin with the hot water, and renew it as it cools. This treatment generally relaxes and softens all the parts, and the egg is produced. Allow the hen to remain in comfortable quarters for a little time, and if there is no success try with the greatest care and delicacy to assist the egg on its course by gentle pressure. If the egg is broken within the hen it will most likely kill her; but also, on the other hand, she will die if she is unable to pass it. If the egg is found to be a large one

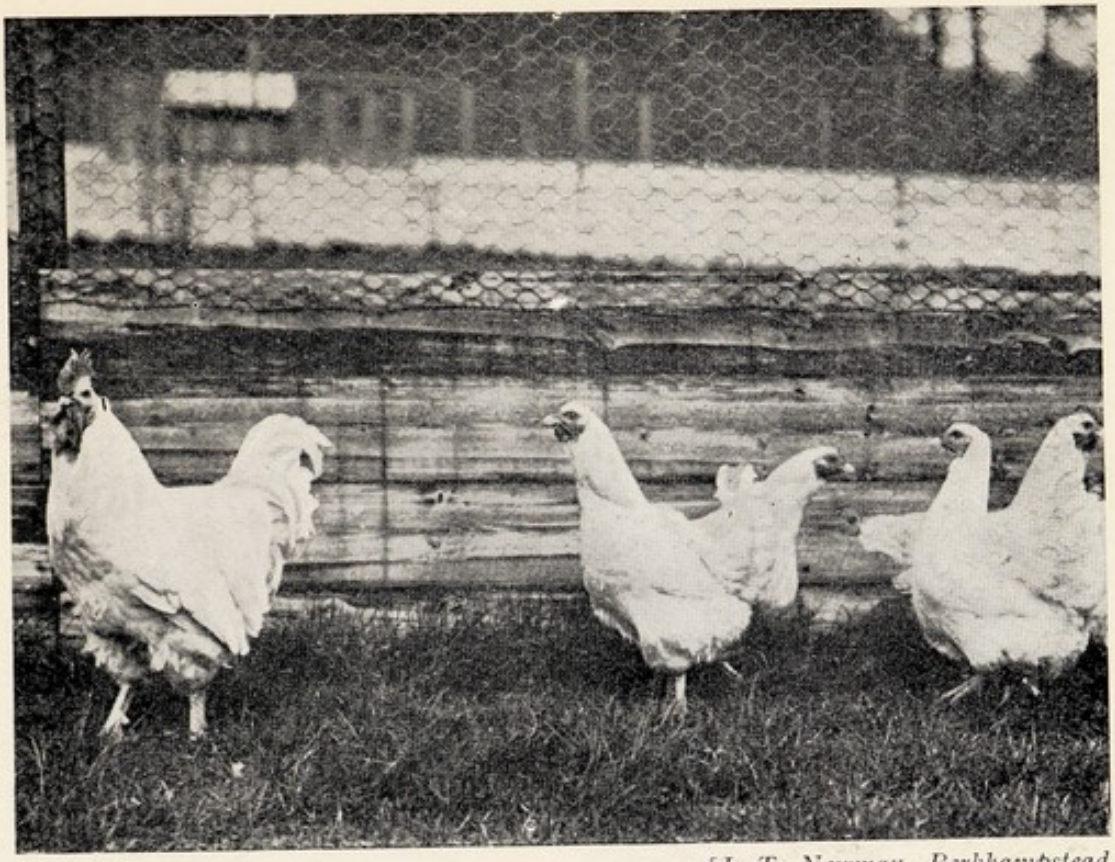


Photo by] *[J. T. Newman, Berkhampstead.*

WHITE ORPINGTONS.

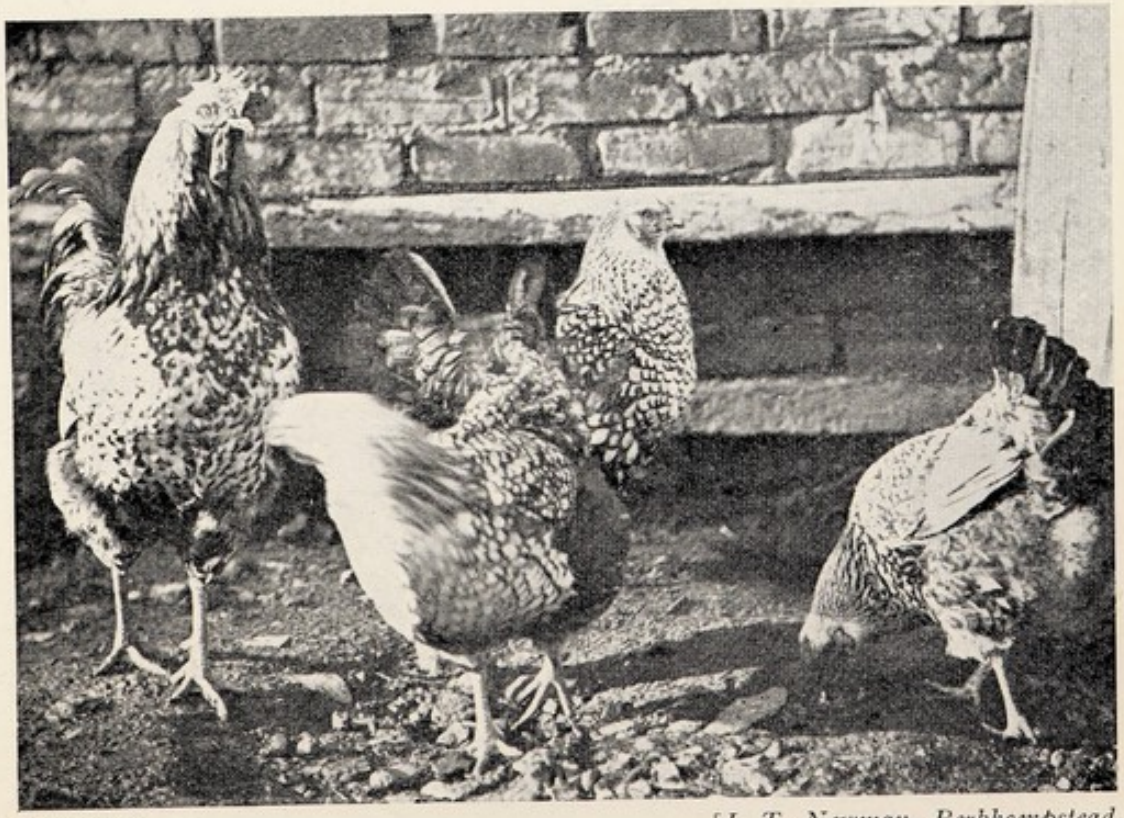
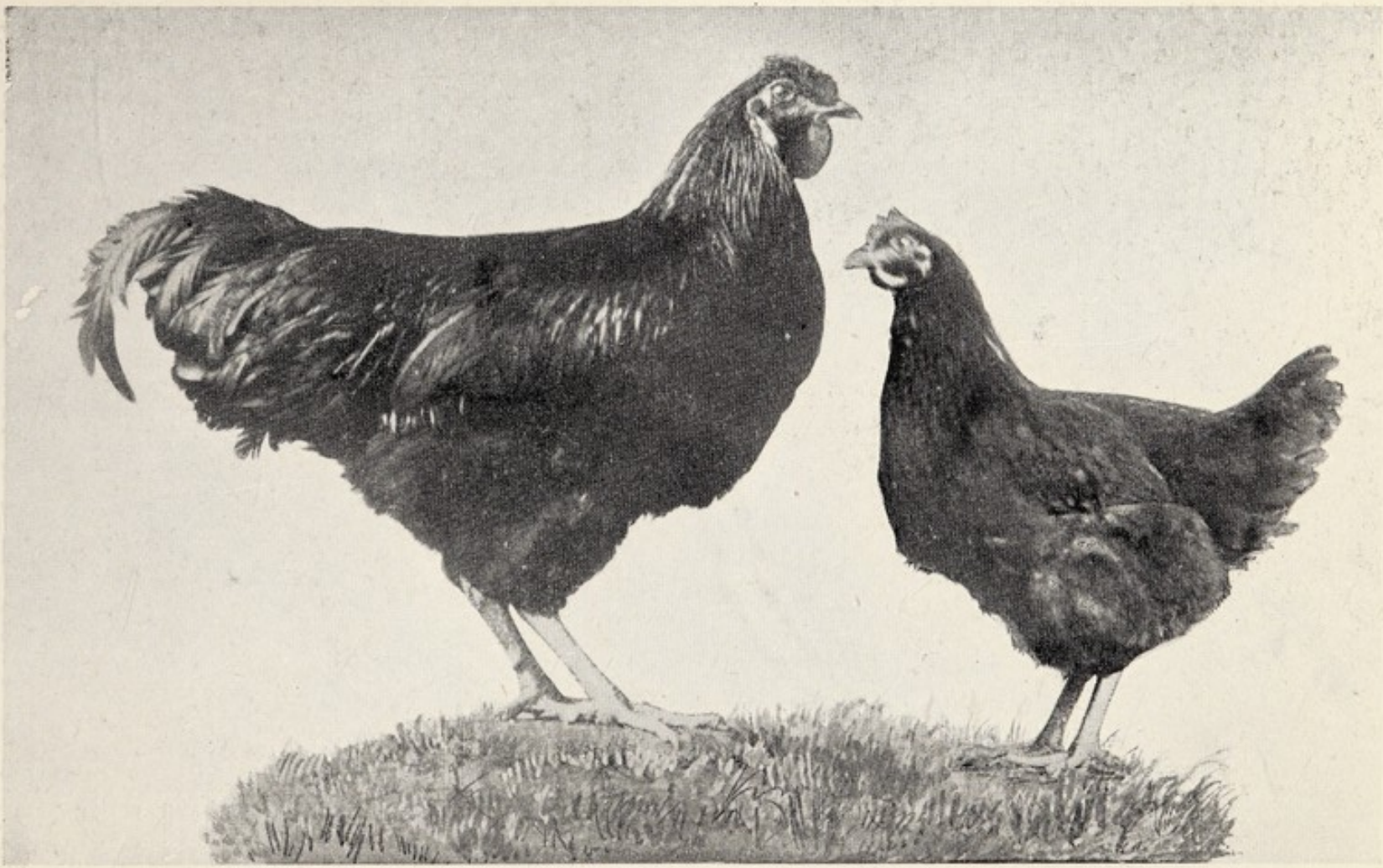


Photo by] *[J. T. Newman, Berkhampstead.*

SILVER LACED WYANDOTTES.



Reproduced by permission of the owner] *[George Scott, Windmill Poultry Farm, Pudsey.*

ROSE-COMB RHODE ISLAND REDS.

when passed, the cause of the trouble is obvious. But should it be of ordinary size, there is either inflammation and consequent contraction of the passage, or the bird is too fat. In the latter case reduce rations, and avoid over-stimulating foods. In the former case, if there is no sign of improvement and the bird is in otherwise good health, it is best to kill and use for table purposes.

Soft Eggs.—This may be either due to inflammation or other derangement of the egg-producing organs, or to a want of mineral substances in the food. If it is known that the birds are getting a sufficiency of shell-forming matter, some other cause must be looked for, and it will generally be found that the food is of too stimulating a nature and that the egg is laid before it has had time to become covered with the shell. The obvious treatment is to change the diet, avoiding all food of too stimulating a kind, and boiled rice should form part of the rations. Sometimes the trouble may be caused by irritation in the passage. This can often be removed by a purgative.

Protrusion or prolapsus of the oviduct may result from the strain of laying too large an egg. Bathe the exposed portion with carbolic acid solution of a strength 1 in 100, and gently but firmly press back, preferably with a piece of soft flannel previously warmed. Apply vaseline and give a purgative. If the condition recurs the bird should be killed for table.

Gleet has already been mentioned in the list of ordinary ailments. In all cases of egg troubles a very great deal lies in the careful feeding and managing of the birds. In well-managed farm-yards such troubles are of rare occurrence and, like most other physical ills, can be avoided by foresight and attention. It must always be remembered that birds badly housed or affected with vermin are 50 per cent. more liable to contract diseases than those whose skin is free from parasites and who are receiving the maximum amount of fresh air.

Moulting

Moulting, being a natural process through which all birds regularly pass each year, can hardly be treated as an ailment. During the process, however, they are not quite in normal health. The changing of one set of feathers for another involves a certain strain on the system, and in the case of older birds is often very trying. All egg-laying, of course, ceases. Chickens do not moult during their first year of life. Chickens hatched in January to May get their first plumage in September of the same year, and their first moult takes place in the September of the following year. Some breeds get through the period quicker than others, and the average time taken by a strong bird in its first or second year being about six weeks to two months. Older birds are slower, and may take as long as three months. Each year of a bird's life the moulting season begins later and lasts longer. These facts should be taken into consideration by poultry keepers anxious to secure a good winter egg season. It will be seen that a bird which begins to moult in October and takes three months to get over it will do very little winter-laying work, and will merely be consuming food to no purpose. The advice given to keep no birds for winter laying for longer than their second year, and to kill before the moult, should be followed. Feed well during the moult, giving a warm meal every day, and plenty of fresh water. See that the birds get a small amount of meat each day, and feed with buckwheat.

Vices of Poultry

EGG-EATING.—The culprits can be easily discerned by the tell-tale yellow stains about the beak. The most effective cure is to isolate the offender for twenty-four hours, leaving a blown egg-shell within her reach filled with mustard and cayenne pepper—the ends being sealed.

If she attempts to eat the egg she will most probably be cured of her propensity. Hens will sometimes eat their eggs if these are soft. The remedy is to adopt the treatment mentioned for this condition. See that the nests are placed where the hen is unlikely to be disturbed.

FEATHER-EATING seems to be due to the birds seeking for some element in their diet which is not being supplied them. The presence of parasites on the birds' bodies will account for their plucking at themselves to remove the annoyance. But feather-eating is not confined to the bird itself—it often plucks the feathers from the bodies of its companions. Examine the flock for signs of parasites, remove all stumps of feathers and rub the affected parts with carbolated vaseline, after washing with warm water. Give the birds plenty to do—any sort of contrivance to keep them busy should be adopted. Give bone meal in the feed. Birds having a large range seldom suffer from this vice. It is confined to those flocks which exist in fairly confined areas, which gives colour to the theory that it is the search for something missing from the dietary which is the primary cause. It is advisable to remove the offenders for a little.

CHAPTER XVI

ENEMIES OF POULTRY

IN addition to disease and parasites, a very real danger which threatens the poultry keeper is the possibility of loss by rodents and other living enemies. In some districts the fox is an everlasting source of friction between farmers and their sporting neighbours. The scale of values being what it is in England, the farmer meets with very little sympathy for his grievances.

Losses which can be proved to have been caused by the depredations of foxes are, in certain fox-preserving districts, though by no means in all, made good by the responsible Hunts. It need hardly be said that this arrangement does not always work satisfactorily. The difficulty of establishing proofs, and the delays and trouble involved in making the claims, often cause farmers to put up with their losses rather than to submit to what very often proves nothing but a fruitless and irritating experience. Nothing has done more to retard poultry development in hunting districts. Many farmers prefer not to keep poultry. The only precautionary methods to be adopted are the safe housing of the poultry at night, the setting of traps, and a coating of tar on the outside of the fence or wire netting. A good fox-hound kept on the farm will frighten foxes away, and once thoroughly scared they will not be likely to return. In spite of traditions and the sensitiveness of sportsmen, farmers are fully justified in shooting a marauding fox discovered on their lands.

By far the most devastating, discouraging and baffling enemy the poultry farmer encounters is the rat. By reason of his indefatigable industry and tenacity of purpose he will gain an entrance into apparently rat-proof enclosures, and accomplish in a single night slaughter out of all proportion to his size and imagined strength. The presence of the hens seems inadequate protection for chickens in the case of a determined attack. The present writer has seen twenty-five to thirty chicks slain in one night, although the mothers were at liberty and free to protect them.

If once the presence of rats is detected, lose no time in constructing at least one large absolutely rat-proof chicken house, able to accommodate several mothers and families. Here the hens should be cooped at night, with their chickens. The condition of the house should be observed, and from time to time any weaknesses in the woodwork or wire repaired. Rats have an incredible capacity for discovering weak spots, and will continue to work at a place night after night to gain an entrance. Foster-mothers set in the open should also be well looked after. The floor and corners are often found, on examination, to be gnawed. A rat-proof house is only rat-proof if there is not one crevice which can be enlarged by patient, repeated, nightly efforts.

To rat-proof a chicken house thoroughly it is necessary to line it throughout, i.e. floor, and sides to a height of 18 inches, with fine-mesh, rat-proof wire netting. Joins in the floor pieces—in fact, joins anywhere, should be securely wired together, and plenty of staples used in fixing the netting to the sides. The netting should be bent well into all the corners and round all structural unevennesses. Look to the door and see that no holes or bad joins exist. Patch all likely places with the netting, well nailed down. Before putting down the wire netting on the floor flatten the latter as much as possible to get an even surface. On the top of the wire netting have a good few inches of earth well beaten down, making a pretty level, solid floor above

the netting. On this the usual litter should be spread.

The variety and number of the schemes devised by suffering poultry keepers against the attacks of rats go to prove the determination and insatiable rapacity of these creatures. Where rat-proof houses are for any reason out of the question, traps seem to be the most satisfactory means at hand. The back-breaking kind—a simple contrivance with a finely-set strong spring—has been found most efficient by the present writer. Others recommend the ordinary wire-cage trap. But the rat is too wily to be caught by anything he can see. His intelligence soon convinces him that danger lies that way, particularly if he has seen another of his kind shut up inside and making fruitless efforts to get out. If there is to be a determined effort to get rid of rats by means of traps the remarkable intelligence of the animals must be taken into account. Traps should as much as possible be hidden or disguised. The bait should be frequently varied. They should be left about near the haunts of the rat, not set, for a few days, until they are so familiar an object to the rats that they will scramble over them without fear. Then they should be set, and are very likely to prove successful.

Certain rat poisons are sold which act well enough if the rats can be induced to eat the bait on which the poison is spread. Live chickens, however, have a fascination for them which exceeds any other attraction we can conceive. One farmer had a wild scheme for providing them with food in such large quantities that they would have no use for chickens. This notion savours too much of kindly encouragement to be very practical, though there is something to be said for it in extreme cases of robbery by rats of such crops as strawberries, where protection is almost impossible.

Both dogs and cats, naturally the enemies of small birds, can be trained if taken at an early age to live with them on friendly terms. Dogs in particular can be trained to be rather a protection than a danger. Cats trained from

kittenhood to regard chickens as fellow-creatures and not food can often be allowed freedom among the poultry, and will prove valuable defenders in the case of attack by rats. Dogs which can be trusted are, it stands to reason, the best defence against rats that could be devised. An ingenious idea, conceived by a farmer who combined dog breeding with poultry keeping, and who was greatly troubled by rats, was an arrangement of a circular enclosure in which the poultry were kept, surrounded by a circular run. In this run several dogs of good ratting propensities had their sleeping quarters. In order to get into the chicken enclosure the rats had to pass the dog run.

Mice are a minor source of trouble, often dangerous to little new chickens, but much more of a nuisance as destroyers of stored grain. Traps and cats are the best means for dealing with these offenders.

Destruction by hawks and other winged marauders is only occasional, but in some districts frequent enough to be extremely annoying. The presence of dogs, and the help of a gun, seem as good safeguards as any.

Crows, being susceptible to fear and suspicions, can be discouraged by loud noises and by bright objects fluttering in the wind, such as shiny pieces of metal suspended on strings.

CHAPTER XVII

EGG-PRESERVING

ALTHOUGH the branch of poultry keeping which deals with the encouragement of winter laying is rapidly increasing its production, there would be a great difficulty in obtaining eggs at anything like a reasonable price in winter if the supply were not augmented by quantities of preserved eggs. The custom now generally adopted of preserving surplus eggs during the spring and early summer months serves a double purpose. The withdrawal of large numbers of eggs at a time when they are overplentiful helps to steady the market, and, although level prices are by no means maintained throughout the year, there is less disproportion between the price of eggs in summer and winter than would be the case if no steps were taken to secure a more uniform supply. Also the scarcity in winter, which would be acutely felt if only winter eggs were available, is in some measure remedied.

Preserved eggs are good for nearly all purposes for which ordinary eggs are used. They do not, however, quite take the place of the newly-laid egg at the breakfast table. They are not recommended for boiling or poaching, since, in the process of preserving, they are bound to lose some measure of their freshness. The particular quality that lends a newly-laid egg its attractiveness and so recommends it as an article of food is one which no pickle in the world can be expected to preserve. Eggs may be preserved in any quantity, small or large. Even the back-yard poultry

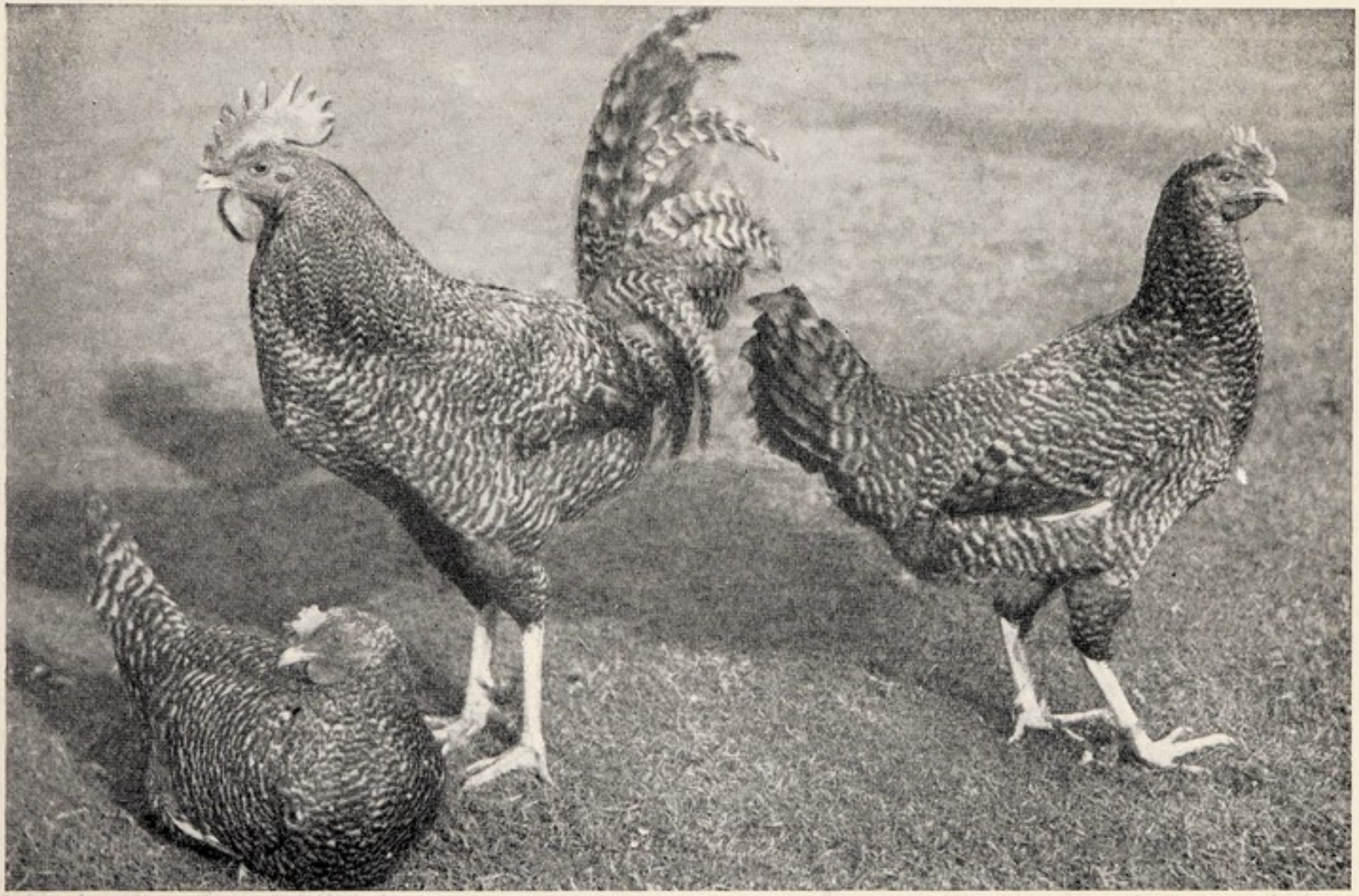


Photo by] [*C. Reid, Wishaw.*

SCOTS GREYS.

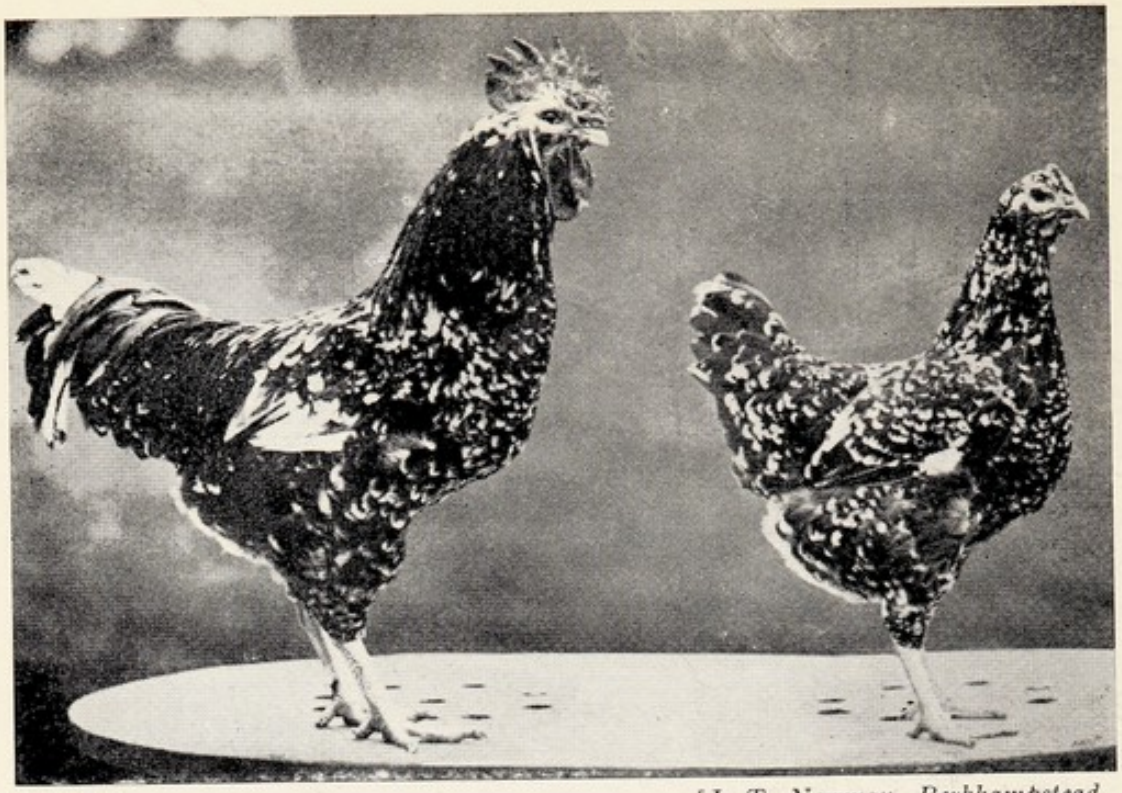


Photo by] [*J. T. Newman, Berkhampstead.*

SPECKLED SUSSEX.

Photo by] [*"Sport and General,"*

ANCONAS.

keeper may find, during a prolific season, that he is getting a good many more eggs than fulfil his domestic needs. Here is a chance to make some provision against the coming winter.

All methods of preserving eggs are alike in their main principle, that is, the immersion and storing of the eggs prevent evaporation, maintaining the contents of the egg intact, and at the same time precluding the possibility of micro-organisms gaining entry through the pores of the shell and inducing decay or developing if already present.

If eggs are only required to be kept for a few weeks just for domestic purposes, any method that will ensure a cessation of evaporation will suffice, providing that the medium used is not likely itself to contaminate the contents. The pores are quite satisfactorily closed by dipping the egg into glycerine, or by smearing ordinary butter completely over the entire shell. The eggs should then be stored endways in specially perforated shelves or trays. Some people find that turning them once or twice a week helps matters. They should, of course, be kept in a cool place and away from any other kind of food or contaminating substances. Eggs that have to be stored for any length of time, however, must be subjected to a rather more elaborate process.

There are several alternative methods of storing eggs, but only two of these are practised in England. A third system—cold storage—is little used except in America, where the climate is more favourable. It calls for special plant and the maintaining, for the whole period, of a temperature not higher than 32° F.—a task not within the power of most English poultry keepers to perform. In America the eggs are found to keep for some months under the process. The great danger seems to be in the change of temperature when they are removed from the cold store to an ordinary atmosphere.

Whichever of the methods is decided on, there are certain definite rules which should be observed.

Only the best and freshest eggs should be selected for preserving. They should be treated within a reasonable time after taken from the nest, but they must be allowed to cool before being placed in the pickle. It is obvious that if they are stale before they are put into the preservative they will stand only a very poor chance of surviving the process, and will be a very inferior article if they do, and will certainly not add to the reputation of their purveyor.

Egg-preserving should take place in the early part of the year. Most people concerned in the industry agree that eggs laid in March to May give a greater percentage of saleable eggs, and that the general quality and flavour is better than that of those obtained in later months.

The work must be carried out in a cool place. Success or non-success rests in a great measure on the temperature to which the eggs have been subjected.

The contents of an egg may begin to undergo a change at a temperature as low as 45° F. Hence a low temperature, say 35° F., is one of the first necessities for successful egg-preservation.

Infertile eggs are found to yield better results than fertiles. All eggs must be most carefully tested before being submitted to the process, and again after they are taken out, previous to being sent to market.

Discard all dark eggs, and those showing spots or black shadows on examination through the egg-tester or by being held up to the light. Also do not include any having flaws or cracks. Take the utmost care to sort out any doubtfuls when preparing for market at the end of the process.

Six months is about the maximum time that eggs should remain in pickle, though in the solution known as Water-glass they present limited signs of change after a year. However, kept for a period longer than six months, they

are liable to change, and if a year is risked a dead loss may result.

The most suitable vessels for containing the eggs while they are in pickle are wooden barrels, or galvanized tanks, jars or special vessels made of cement. Barrels can generally be obtained easily, and ordinary galvanized dustbins are quite suitable. For commercial operations cement tanks are used holding 30,000 to 70,000 eggs.

The temperature of the room in which the eggs are kept must be between 35° and 45° F. Most underground places are suitable, providing they are well ventilated and sweet-smelling. Or a room with a north aspect, or, at any rate, one into which no direct sunlight penetrates.

The Lime-water pickle, which is a method largely practised, is one of the most economical that can be adopted. For that reason, and because of its highly satisfactory results, most eggs imported from the Continent are preserved in this manner.

One of the necessities of any medium for egg pickling is that it shall have the property of destroying organic impurities in the water. This is accomplished by the lime or Waterglass. The quantity of finely-slaked lime is four parts to twenty parts of water, that is to say, about 20 ounces of lime to 5 gallons of water. This solution should be prepared about a week before it is wanted. It should be thoroughly stirred two or three times every day, and at the end of the third day a pound of salt must be added. The eggs are placed in the vessels which are to contain them, and the solution poured over them. It should entirely cover them, with a few inches to spare. Before using the preparation allow the lime sediment to settle and avoid letting any of it get into the preserving vat. As the water evaporates, sufficient solution should be added from time to time to keep the eggs well covered up.

An alternative and satisfactory method for smaller quantities is by Waterglass—a solution of silicate of soda.

A concentrated solution of this chemical is now obtainable and is sold by most chemists. This preparation is made with boiling water, but must be allowed to get quite cold before receiving the eggs.

One part of the silicate to ten parts of water is the strength generally used, though one part in twenty of water is found to be quite successful. A stronger solution than one in ten is apt to create an unpleasant flavour in the egg. Care must be taken to ensure thorough mixing of the preparation. The eggs can either be left in the solution until required, which is the most satisfactory method, or can be dipped into it and placed on shelves until dry. All eggs treated with this preparation or by lime must be washed and dried before being sold.

In taking eggs out of the lime solution protect the hands with rubber gloves. Scoop the eggs out with a perforated ladle, which, of course, must be handled with great care to avoid breakages. Wash the eggs thoroughly under a tap and stand on specially perforated or wire trays to dry.

All preserved eggs should be sold as such.

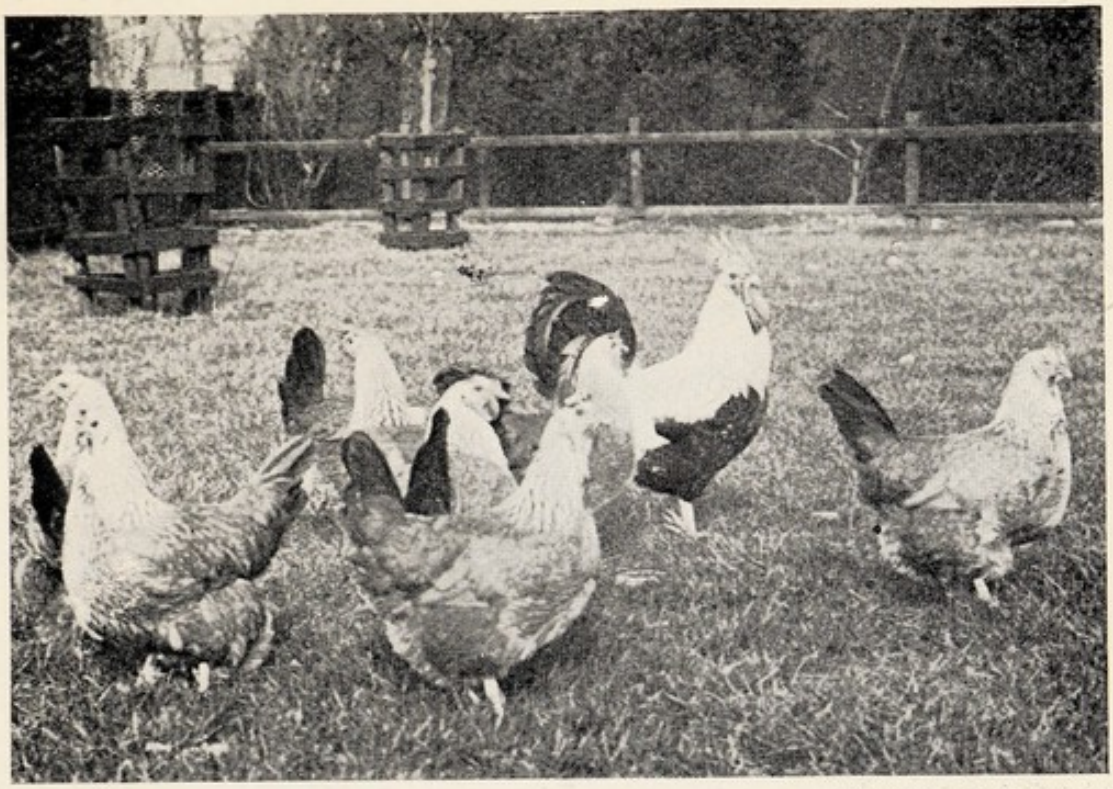


Photo by] [*"Sport and General."*

SILVER GREY DORKINGS.

Photo by] [*C. Reid, Wishaw.*

LANGSHANS.

Photo by] [*C. Reid, Wishaw.*

SILVER CAMPINES.

CHAPTER XVIII

KILLING AND SHAPING—FEATHERS AND TRUSSING

THE operator should aim at quickness and precision. Much suffering is saved the birds if the work is done expertly and without hesitation or indecision. If dislocation is the method of killing adopted—and it is a method which, if neatly and expeditiously done, is one involving the least amount of pain to the birds—the operator should, if possible, have had some concrete demonstration of the performance. It is only possible here to give an idea of the position of the bird. It should be held back outwards, the legs and ends of the wings firmly grasped in the left hand and the head bent back as far as possible in the palm of the right hand, the first and second fingers being on either side of the skull. The neck of the fowl should now be pulled in an opposite direction to the body and coincidently the head bent suddenly and rapidly backwards, by which the vertebrae is severed a little below the head without breaking the skin. Death should be instantaneous. Keep the head hanging down, and pluck almost at once. The bird will have no sensation of pain after the neck is once dislocated.

Another method of killing is by piercing the brain with a knife. This is done inside the mouth. The bird is hung up by the legs, and a pointed knife inserted into the back of the mouth. The bird is then hung until the bleeding stops. It is then taken down and plucked.

After the plucking the stub feathers are removed. A

blunt knife is the best instrument for this purpose. All adhering down, hairs and little feathers are disposed of by singeing. The bird is passed over a flame, say of lighted paper or straw, rapidly, to avoid blackening or burning. It is then placed to cool.

All birds should be starved for some hours before killing, as any food left in the crop will begin to decompose very quickly, causing a green patch to show on the skin, and giving the bird an unsavoury appearance. Shaping is done by means of proper shaping troughs made for the purpose. In these the birds are packed closely together breast down, the head hanging over the edge. A weighted board is then placed on the backs of the fowls, and left for some hours. If the shaping trough is not used the bird may be tied up with string in such a way that the hocks are drawn down and the fullness of the breast thrown up.

Feathers

In plucking keep the feathers from being soiled by blood or other matter, and have ready at hand two baskets or sacks into which the feathers and down may be separately dropped, as the work proceeds. All down from the breast and thighs should be carefully preserved in one sack, and the back and neck feathers in another. The tail and wing feathers may be disregarded as their value is of very little importance. Where the quantity makes such a course possible, the feathers and down should be baked in sacks in an oven, moderately heated. Feather dealers are always open to purchase feathers properly graded and free from stains and dirt, and the prices obtained often pay the cost of the labour employed for plucking and packing.

Drawing Poultry

Lay the bird back downwards upon the table, and cut off the ends of the pinions. Then turn the bird breast downwards, and cut a long slit in the back of the neck;

pass the knife under the skin, cut off the neck at its junction with the body, taking care not to cut through the under skin of the neck in this motion. Then cut through the skin of the back of the neck at the place where the first incision was made and through the underneath skin about three inches from the breast, leaving the two flaps of neck skin to fold over the jagged opening, and draw out the neck.

Then take out the crop, and well loosen the entrails by placing the forefinger inside the body, and working it round from left to right. Put the fowl on the table tail upwards and make a deep cut straight across the body between the tail and the vent. The vent can then be easily cut out, and the opening will be found sufficiently large to enable the fingers to be put inside the bird to take hold of the gizzard, etc., and if the loosening at the other end has been properly performed, the whole of the inside of the fowl can be easily drawn away in one mass. Care should be taken not to draw away the fat on gizzard. This can be felt with the fingers and may be easily left inside the bird.

Be very careful not to break the gall-bladder, for this accident may ruin the bird by imparting a very bitter taste to the flesh. Now wipe out the inside with a clean cloth, but do not wash the bird unless any part of the inside has been broken in drawing ; dip the legs of the bird in boiling water, scrape them, and cut off the claws.

Trussing

Place the fowl on its back upon the table, and pass a needle and string through the centre of the fowl, just above the thigh-bone, exactly in the centre of the two joints, leaving the end of the string protruding from the place where the needle entered the bird. Turn the fowl over on to its breast, and carrying the twine on, pass it in a slanting direction between the two centre bones of the wing, catching the underneath part of the pinion, and then over the bird through the pinion and then the wing of the other side,

and the string will come out near the point where it first entered the fowl; then tie the two ends together, but not too tightly or the bird will not lie flat on the dish. Next take the fowl in the left hand, breast downwards, and pass the needle and twine through the back, close to the end of the thigh-bones; put the legs into the position required, turn the fowl on its back, and carry the string over the leg and then through the breast, catching up a small portion of the bone as the needle passes through. Take the string on over the other leg and tie the ends together.

Now again singe the bird, going over it very carefully, so that no feathers remain; then, after cleaning and washing the gizzard and liver, put one in each of the pinions.

CHAPTER XIX

MARKETING

IT is clear that the next step to the successful production of eggs and poultry is the profitable marketing of the produce. One of the chief points about the situation of the poultry farm is its proximity to markets, and the organization of deliveries is a matter which must receive serious consideration, for unless this is well and vigorously carried out the most successful raising in the world is doomed to failure. It depends, of course, on what are the ambitions of the farmer. There are various means of disposing of products, and those in a small way of business may be quite satisfied to supply local needs, and deliver direct to the consumer, when marketing will be a very simple matter indeed. It is when the farmer enters into commercial competition with others that his business and organizing talents begin to count. In supplying to local consumers it is, of course, necessary to keep in touch with market prices, and to fall within the margin of the current retailing price. But it will be found that most housekeepers and private buyers, once they know that the produce they are buying is reliable and above the average in soundness and quality, are not unreasonable about prices, and will gladly pay a little more where they know they may confidently rely on the seller. This is the kind of reputation which should be aimed at, and once secured, rigidly maintained. The cost of marketing under these conditions is small. The deliveries should be organized and regulated, and

arrangements made for delivering by hand or post as distance and convenience may dictate. It may be that through introduction, or by personal activity on the part of the farmer himself, the business may increase, without its main principle being altered, and the number of private customers supplied multiplied, and the business not confined to the immediate locality. It naturally follows that in dealing with consumers direct a good deal of detail work is involved, and although in most cases the profits obtained will warrant the time and trouble spent, yet for many reasons it may be found desirable to reduce this. It is under such circumstances that the idea of supplying in quantities to retailers presents itself. The problem is rather a different one, yet the same rules apply. A high standard of quality, and steadiness in delivery, will bring its own reward, and in this connection it should be borne in mind that in order to avoid disappointing, under some unforeseen set-back, it is well to be in touch with other reliable producers from whom supplies may be drawn in emergency. All poultry and eggs temptingly prepared and packed secure the maximum opportunity of ready sale; therefore careful plucking, shaping and packing are matters of great importance.

Eggs

Eggs cease to be new-laid when they begin to lose the qualities which they have when first laid. This usually happens in three to five days, according to the season of the year, but stored in the right tenperature, they may retain their purity and quality for a longer period. New-laid eggs are very well filled, that is to say, there has been no shrinkage in the contents since they were laid. The white when boiled is milky and has a characteristic quality which all who have opened a freshly-boiled new-laid egg can distinguish. It is obvious that every

effort should be made to get the eggs on to the market before the signs of new-laidness have begun to disappear, so that rapid transport from the vendor to the consumer is the thing to be aimed at. Any eggs which have been kept longer than three, or at the most five, days should not be sent to market as top quality, but be graded to a second quality, generally called "fresh." These, whilst quite good for ordinary eating, have not got the exact tone which is recognized by egg epicures. Never include in a consignment any egg about which there is the slightest doubt. All such can be reserved for home consumption, where they can be broken before being cooked and no loss ensue, whereas a slur will be cast on the best reputation if even only an occasional bad egg is allowed to appear. Under proper and responsible management no egg need be included in any delivery that cannot be guaranteed. The best way is to test the eggs before dispatching, and many dealers do this when grading the eggs.

It must not be forgotten that in spite of their very impervious appearance, eggs are porous and subject to every contaminating influence. The air which surrounds them or the substances in which they are packed, if not clean and pure, will have a bad effect. Unclean or musty straw used in packing will ruin the flavour of the freshest eggs. In packing, therefore, use only clean straw, or fine wood shavings, or wood wool. In supplying private consumers use cardboard or light wood boxes with properly constructed partitions so that there is no chance of the eggs getting broken. Most of the poultry or dairy appliance manufacturers have illustrated price lists of these boxes. Much the most satisfactory are those made of stout cardboard, the sections for eggs being made in two halves. The lower half receives the eggs, which rest in a concave space, and the upper section, which exactly corresponds to the other half of the eggs, fits over the top. Then the lid is put on. The writer has never known any eggs come

to grief packed in these boxes. The only thing against them is their weight ; they are certainly rather heavy. In sending large quantities of eggs to retailers, the cheapest and most reliable way is to pack them in rows in wooden boxes, taking every precaution against their contact with each other.

Eggs should be sorted and graded, and as much as possible any one box or consignment should be of a size. Very large or small eggs should not be included.

Table Birds

The method of supplying to local or private consumers direct has already been mentioned. In adopting the plan of sending wholesale supplies to the retailer, get into touch with reliable retailers in good provincial towns, or in London. The prices obtainable for poultry will depend on the locality of the tradesman, and as high-grade poultry demands a high price, tradesmen living in the more prosperous parts of a town should be chosen, while for birds which cannot be rated so high a medium class trade is more suitable. When there is variableness in the birds produced, and the producer has no time to go about finding out just the precise demand for his different grades of poultry, it is well to get into communication with a salesman at one of the London markets, who in his turn will grade and supply the retailer. It is obvious that where circumstances permit, direct contact with the retailer is more desirable ; the middleman, however, has his uses where there is difficulty about finding the right outlet. He is on the spot and in touch with every sort of demand, and is able in this way to get the best prices for the article he has for sale. The London market is recommended, because here there is a centralizing of all the best produce from all over the country, and it is to the London towns that many provincial towns apply for their produce, and

not, as might be supposed, always to neighbouring market towns. The spring trade is the most important, although there is a ready sale for good table birds all the year round. Much attention should be given to the shaping and packing and cooling of the birds, and if it is desired to build up something of a reputation among buyers, send nothing below the standard quality. Ascertain cheap and rapid railway routes; arrange expeditious means of conveying the poultry to the station; have no delays and no miscalculations.

After fattening, the birds should be starved for some hours before killing. Plucked whilst still warm, and carefully singed; they should then be shaped and allowed to cool. Never pack until thoroughly cooled. They should be neatly packed in light wood boxes, known in the poultry world as peds. Pack closely and firmly, but without crushing or squashing. When the birds come out they should look clean, fresh and attractive. They will not do this if they have got jumbled together in transit, pieces of skin grazed off, and their shape spoiled.

In delivering poultry to the retailer or to salesmen, do not draw the birds. Consumers, however, prefer them usually drawn and trussed and ready for cooking. That is a method which should be carefully carried out, whether for roasting or boiling.

Advantage should be taken of the fact that at certain seasons there is a demand for live fowls for table use, and if good specimens can be supplied, almost as good a price can be secured for them as for those killed and prepared. The less prosperous among the Jewish community on certain religious festivals, buy live fowls, and get them killed by a local killer in the Jewish fashion. Crates of these birds are sent to the suitable centres at the right season, and even birds which are not in their first youth are bought for boiling and soup making. Such is an excellent method of selling older hens, if fleshy.

CHAPTER XX

ACCOUNTS

FIRST of all, have a plain, practical system of entering all transactions in such a way that they can readily be transferred to a permanent record. Careless or capricious book-keeping is worse than no book-keeping at all. One leans on a thing which is incapable of giving support and is let down ; and a business may be running at a yearly loss, while the books show a profit. And, just as the failure of some concerns is attributable to a careless habit in keeping books, so too complicated a system may still be misleading and useless as a key to the financial situation. The secret lies in not having the book or theoretical part of the business too much separated from the practical side. Books may show that certain bushels of wheat exist. Facts may prove that they do not. Small drains of resources may go unobserved, and although the business is theoretically flourishing, the success may be fallacious, and facts point to a loss. Book-keeping, while forming a most important side of poultry keeping—as of any business—should be reduced to the minimum, and what is done should be done with strict accuracy and precision.

A simple and exact record should be kept of the expenditure and receipts of the concern as a whole, as well as a record of the details of the various branches of the industry that are being worked. There will be some overlapping in this, and therefore it is recommended that the record, though detailed, should be summarized in final entering,

but the original records or notes preserved. It cannot be too often urged that in poultry keeping great heed should be paid to matters which appear to be of trifling importance. It is on such minor details that the success or failure of a concern often depends. Therefore, every minute detail of expenditure should, at the moment it occurs, be entered in a memorandum book kept for the purpose, afterwards to be summarized if necessary. It is a bad plan to trust to memory and an unnecessary waste of energy. It is important to bear in mind that in poultry keeping, book-keeping, or any other work, the simpler the method the more likely it is to be carried out regularly and promptly. The sight of an elaborate set of books which have to be searched through and pored over will turn off and discourage any but the most energetic of out-door workers, whereas a simple system by which matters can be easily and speedily looked up and as easily and speedily entered will be used and appreciated. Therefore, for all matters such as records of matings, egg-production, rearing, hatching, incubating, etc., the card-index system is recommended. This arrangement is far better than books, both for reference and for transferring rough notes made on the spot. Let me here give warning that with very little encouragement the clerical side of a business will often assume proportions greatly in excess of what is really necessary, and there is some possibility of finding oneself keeping quantities of statistics for which nobody has any use. Many business men deplore the day when they became slaves to a system which grew past their control. On the other hand, certain records should and must be kept. Experience will show which of these are inessential, and such can be eliminated as the poultry farmer becomes more informed and observant.

In a business small enough to be run exclusively by the owner, book-keeping can be reduced to the minimum of simplicity. In one book called the cash-book are recorded all expenses and all receipts. Such items as food, stock

purchased, appliances, wages, etc., are entered on the one side, and sales of produce on the other. At the end of the year a balance sheet is drawn up from information derived from this book, and the profit or loss throughout the year determined. The entries in the cash-book should be explicit in stating from what branch or department of the industry they were derived, for this reason: in the event of the concern showing a loss which is unaccountable, details of expenses incurred would materially aid in tracking down the cause of the mischief. Thus, it might be found that the egg-production might be paying very well, but there might be a loss on table poultry, perhaps through uneconomical feeding, or excess of labour; the breeding stock might be costing too much to maintain, etc. The entry of the necessary information need involve no elaboration in book-keeping. So long as it is clearly indicated for reference, the manner of doing it may be left to the individual.

Certain minor profits accrue to the keeping of poultry, such as the sale of feathers and of manurial products (or the use of them if poultry keeping is carried on as a branch of general farming, in which case a compensating advantage should be shown). The manurial droppings of poultry have been estimated by an expert to be worth £2 a ton. Thus eight birds might be assumed to yield in this respect seven or eight shillings a year. This, although an insignificant item, should yet be taken into account, as in a larger business it becomes a matter of increasing importance.

For the benefit of those who have no experience of book-keeping, it may be well to describe the simplest method of keeping accounts, which will yet afford sufficient information to admit of a balance sheet being drawn up at the end of each year.

In single-entry book-keeping, which is the simplest and most straightforward method for the ordinary poultry

keeper, all entries concerned with expenditure are entered on one side of the book, which is open at the double page, and all credit entries or receipts on the other. The first item on the debit side will be the amount arrived at by a complete valuation of the entire property, including all buildings, stock, plant, tools, and every appurtenance.

A list or inventory of these articles should be made and kept for reference—the prices fixed against each article. This is entered as an expense, and all additional expenses are entered as they arise. On the credit side are entered all receipts from whatever source, whether from the sale of ordinary products, or of a tool, or a bit of appliance, or any of the stock or products which have been disposed of as gifts, in which case the estimated monetary value should be entered as a receipt. At the end of the year the property is again inventoried and valued, and this time the estimated value is entered on the credit side. The two sides are then added up, and the difference between them (the balance) shows the profit or loss for the year, according to which side the balance appears. In the new year the property is again entered on the debit side as an expense, and freshly valued at the end of the year, and added to the credit side before the balance is cast up. If there is a balance on the credit side, it should agree with the amount of money in hand. If it does not, then there must be a leakage, and no time should be lost in finding out where it exists. Again, if the credit side shows a deficit, the business is evidently being run at a loss, and some economy in organization will have to be practised, or some impetus given to the sales.

The value of drawing up this balance sheet hardly needs emphasis. It is obvious that without some such summary of the year's work there is no means of ascertaining the real state of the business. And these remarks do not only apply to those who are making a living out of the industry. Utilitarian poultry farming done on even a small scale, and

if only to supply domestic wants, ought to be made to pay, and most people engaged in the work would, as a matter of ordinary interest, if for no other motive, wish to know whether their work were profitable or not. The balance sheet is not necessarily an annual affair. A trial balance may be taken at the end of any period it is desirable ; but in any case a final balance sheet should always be made at the end of the year. In valuing the stock and property the depreciation in value of certain of the plant and of the stock should be sought for, and the new value fixed accordingly. Depreciation is often balanced by additions in the way of new sheds, houses, and other appliances But these matters should be carefully considered, as otherwise the balance finally arrived at is fallacious, and worse than useless. And it must not be forgotten that outstanding accounts, both for and against, must figure in the balance. In a larger business the farmer will probably find that it will be helpful to have a system of double entry. This involves book-keeping on a rather more lavish scale than here indicated, and is a subject too big for inclusion in this book. A book-keeper will in most cases be required, that is unless the farmer himself has a taste for and knowledge of the work.

INDEX

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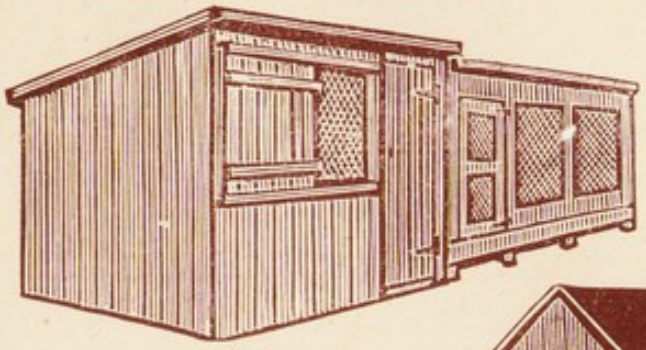

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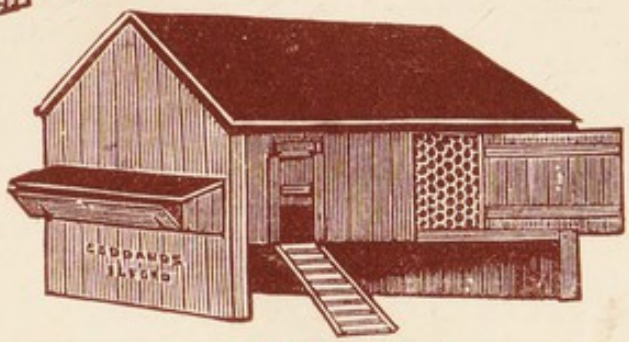

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