**MY POULTRY
DAY BY DAY**

ALFRED GIBSON

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MY POULTRY DAY BY DAY

SICILIAN BUTTERCUP COCKEREL

MY POULTRY

DAY BY DAY

BY
ALFRED GIBSON

WITH MANY ILLUSTRATIONS AND DIAGRAMS

NEW YORK
DODD, MEAD AND COMPANY

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INTRODUCTORY

“ I HAVE ‘kept’ poultry in every sense of the word,” a friend once remarked to me. There was pathos in his voice and a decided emphasis on the word kept. His experience was by no means unique. There is a marked difference between keeping poultry and being kept by poultry. My friend did not suggest that poultry-keeping could not be made profitable. As it happened, he knew better than that. The point he tried to make was that *he* had once upon a time bought some fowls, put them in a shed, and with the most meagre feeding and attention waited for the golden eggs. He is still waiting.

The point of view of my friend in his first experiment is unfortunately not uncommon. Some people have the vaguest notion about domestic fowls. They know that they lay eggs, for they have eaten them, but they have no notion under what conditions eggs are laid. They do not even reflect that any special conditions are necessary. If their mental attitude was put into words it would run as follows:—“All birds lay eggs. The domestic hen is a bird, therefore we will get a few domestic hens and eat their nice new freshly laid eggs every morning.” An idyllic picture!

Such people proceed by looking up an advertisement and buying a few hens—any old hens will do; they also get hold of a shed—any old shed will do; and they buy food—any old food will do. Then they sit down and wait for the eggs. To say they are disappointed is to do injustice to their feelings—they are properly disillusioned, and if they do not blame the fowls they blame the grain merchant. They rarely learn that the fault is with themselves.

I had a letter from a lady who told me that she had bought a few fowls and kept them for several months, with the result that they had laid less than half-a-dozen of eggs between them. Her husband, who is an accountant, blandly informed her that the eggs cost 10s. 6d. each !

I suppose there are people who will bungle anything and everything they touch. And yet there are those who do quite well in the business they are trained in who fail to see that poultry-keeping is also a business that requires learning. It is one of the primitive industries, I grant, but so is sheep-grazing, and so is cattle-breeding; yet, strange to say, no one ever suggests that a sheep farm or a cattle ranch can be made a success by those who know nothing of the ways of sheep and cattle.

It is only when we come to poultry that a blank mind is presented to the subject. We have all seen hens picking up food in farmyards, and we, some of us, think that all a fowl needs is a few handfuls of grain—when we remember to feed it.

“Has anyone fed the fowls ? ” is not an uncommon question when the master of the house is putting out the lights preparatory to going to bed. “Oh, gracious, no,” is often the answer, “but I will give them an extra handful in the morning.” Just so. And these people expect their fowls to thrive and lay eggs. All of us have a certain amount of intelligence, and why does the fowl, of all animals, not get the benefit of it ? Well cared for and properly treated, it will pay all our attention tenfold. After all, there are few animals, not even the domestic cat, that will respond so promptly to the right kind of treatment. Like the dog and the cat, a hen has a stomach that ought to be well filled at least twice a day. It is true a fowl under certain conditions may pick up part of its food, but a hen kept in a small, close run will rarely capture anything of greater feeding value than a stray earwig.

If, on the contrary, fowls are kept in cold neglect they will make no return for the little you do give them. I think it is John Stuart Mill who says : “Small causes not only do not produce small effects ; they produce no effect at all.” How very

illogical and how very true ! If you provide a fowl with half its necessary food it will not provide its owner with half an egg. It will yield no egg at all. Nor if you give it sawdust instead of bran, as the man did with his donkey, will it grow and thrive. It will probably die.

Yet only a little elementary knowledge of physiology is needed to make one understand that all animals must be fed on the special foods that are necessary to their well-being. It is so easy to learn what those foods are. A hen, contrary to the general impression, is not a strict vegetarian. Neither is it entirely carnivorous. It does not imbibe strong drinks—at least it ought not. There is nothing better for its welfare than water—pure water and plenty of it. I am going to tell in the following pages how to feed, what to feed, and when to feed. Feeding is a very important matter in fowl culture.

Again let me warn whom it may concern that for egg-laying a young fowl is better than an old fowl. Some people cling to their old birds. A poultry specialist was once called in to advise two maiden ladies about their birds. The hens were not laying and they were not prospering. His practised eye soon discovered the reason. The fowls were patriarchs. He quickly picked out two birds, male and female. "Now," he remarked, "have you any idea of the age of these birds ? These are the two fowls that Noah took with him into the Ark. You must have them killed."

"Oh," cried one lady to her sister, "the gentleman wants us to kill poor Kruger and Queen Victoria."

"I never kill any of my fowls," another lady once remarked to me. "Really ? What do you do with them ?" I answered. "Why, wait till they die, of course," was the cutting reply.

Needless to say, such people are hopeless—they *keep* fowls in every sense of the word. My object in this book is to try to tell the best means by which fowls may keep their owners, or at least minister to their breakfast-table.

In recent years poultry-keeping has become fashionable, and a number of titled ladies have become poultry-farmers on a small

or large scale. The following verses from *The Daily Express* hit off the situation rather well :—

“ When the dawn steals o’er Kensington’s squares,
We will list for your cluck with delight,
Right from Knightsbridge to Kew
We’ve been waiting for you—
For your fine golden yolks framed in white.
All the eggs that you lay are new-laid,
From Belgravia to Chelsea you’re blest,
And so sweet is the lay
A-down Eaton Square way,
Of the little brown hen in the West.

All the wounded men welcome you, dear ;
Your rich ovals of strength we adore,
Though the war may be long
In our hearts there’s a song,
We forget we were weary before.
Your sweet cackle is heard in the morn,
Of the shells we’ve seen yours are the best,
For you build wounded men
Up to power again,
Little speckled brown hen in the West.”

CHAPTER I

IN THE BEGINNING

POUTRY-KEEPING is probably the most primitive of all industries. One can imagine a knowing man, thousands of years ago, owning flocks of fowls on the banks of the Nile or on the shores of the Mediterranean. I call him a "knowing man" because in those days the birds would have a free range, pick up practically all their food, and all "increase" in the form of eggs or surplus fowls would be net profit.

In those mild latitudes no expensive housing schemes would be required—any old shed would do for shelter—and the man who owned a few thousand fowls, while earning an easy livelihood, would speedily become a person of rank and power.

But while the Egyptians were noted for their profitable flocks, and the Mediterranean fowl to this day is famed for her laying qualities, those of us in the British Isles have a different problem to face to make our fowls yield their increase.

Among the general public there are two distinct opinions concerning the keeping of fowls. One is that it never did, and never can, pay. The other is that any ignoramus can make money out of poultry. Needless to say, both views are utterly wrong. A very large number of people in these wild and windy isles have succeeded, and are still succeeding, in making poultry pay. Another large class has made the attempt and failed. I take it that any man starting poultry-farming on the right lines can make it pay. If he does not, the chances are that he will make nothing pay.

One often hears the question asked: Does poultry-farming pay? It is a stupid question. If poultry-farming did not pay there would be no poultry-farmers. No industry can exist for any length of time on sufferance, on outside aid, or on its own vitals.

If a poultry-farmer fails to make his business pay, he either gives it up or it gives him up. It is the same with any other sort of business. Either it pays or it does not pay. The failure is not in the nature of the business, but in the man that runs it or in the methods he employs.

Given the correct conditions, all businesses pay; given the wrong conditions, all businesses fail. Luck is always a factor leading to success or failure, but luck is present more or less in every commercial enterprise. As a rule the weak man blames his luck, while the strong man creates his luck.

One might as well ask: Does banking pay? Does shipping pay? Does shopkeeping pay? The answer is invariably the same—sometimes it does and sometimes it does not. Much depends on the personal factor. There is a type of man who seemingly can make anything pay—"All he touches turns to gold," we say. There is another type who can make nothing pay—the apple of Sodom turns to dust at his touch.

BEST METHODS

The question, therefore, is not, Does poultry pay?—but rather, What is the best method to make poultry pay? And further, What are the conditions necessary to success?

Strange to relate, poultry-farming is so essentially profitable that it can be made to pay, by those who take the trouble to learn a few essential details, such as may be found in this book.

When I began poultry-farming I knew nothing of the game, but I had the assistance of an experienced man for the first three months. Afterwards I had to depend upon myself. All I could lay claim to was a certain amount of "horse sense," such as is possessed by every nine people out of ten. I had no predilections and no prejudices. I was open to learn from everyone and anyone. But I had to be convinced. I was not swallowing anything blind or anything whole. I had to see the proofs where they could be produced. I entered into the preliminaries wholeheartedly. I read a good deal—all I could lay my hands on—

and I consulted various experts. I did not take any lessons, did not become a pupil, nor attend a "course" at a college. I would probably have done better if I had taken a few lessons before starting—the experience might have saved time and money in the end. I do not advise others to do exactly as I did, but as matters turned out luckily for me, I have little to regret.

At the same time my success, which is neither isolated nor unique, goes to prove that poultry-keeping and poultry-farming can be undertaken without any special knowledge, by most persons of average intelligence. I claim to be a person of average intelligence—no more, no less. I did not "go at it blind," but my eyes were only opened step by step. Even now I have much to learn and probably always will remain in that delightfully unfinished state. The man who is too proud to learn will never get near the top.

My argument is that if I could succeed, you, dear reader, could hardly fail. So essentially profitable is poultry-farming that it was a very long time before I discovered how it was possible to fail at it, but I suppose there are people who are so constituted that they would fail with a gold mine in their back-yard.

One cold day I called upon a man who had started a poultry farm. It was about noon and I found him smoking a pipe with his feet in front of a roaring fire. Very nice, and very comfortable! Who would not be a poultry-farmer? I thought.

In the course of conversation I discovered that he had not fed his fowls that morning. No, he confessed, he had not exactly forgotten about them. He had meant to go out hours earlier, only his breakfast and a pipe and the morning paper intervened.

I was present at the settling-up of that man. He was still smoking his pipe, and no doubt wondering where he had gone wrong and why he had failed. Some people never learn.

If there be such among my readers, they should not touch poultry-farming or any other industry. The only safety for them is to convert all their cash into an annuity and live (or rust) on the result.

Another class of people who rush into poultry-farming is

composed of those who have failed at everything else they have tried.

"Poultry?" they seem to say. "Oh yes, fowls and eggs and things! Jolly profitable business!" They buy a few fowls—any old fowls will do—provide some tumble-down houses—any old sheds will do—and purchase some cheap food—any old food will do. Having well and truly laid the foundations of failure, they begin systematically to neglect their farm. And when the final reckoning comes, as come it will, they blame the fowls, they blame the shelter, they blame the food, they blame everything and everyone but themselves. They will tell you that the poultry industry is played out, that they have tried it and that there is nothing in it—nothing at all.

If this were the last word to be said about poultry there would be no need to write this book, but it is precisely because of the foolish things that have been said about fowls that another book is necessary. Poultry need no apology, nor am I an apologist.

THE QUALITIES NECESSARY

Whether one begins in a small way or a large way the same qualities are necessary. Given good fowls, good houses, and good food, the other needs are common-sense and business methods. I do not decry knowledge. On the contrary, one cannot have too much real knowledge unless where it runs to seed. I know some poultry-keepers who know much more than I do, but they spend too much of their time theorising, and too little in actual contact with their birds. An ounce of experience is worth cart-loads of theory. I bank on experience—the experience that has met difficulties and conquered them, the experience that has already borne fruit. Give me the successful poultry-farmer, the man who has made a living at it for "donkey's years," and I will give in return all the book knowledge, all the college certificates, all the long-winded treatises that ever were written.

Not the man who has "kept" poultry, but the man who has made poultry keep him and put money in the bank—that is the

man to put your trust in. I grant that poultry-farming to be successful requires a certain amount of knowledge, skill and general adaptability, but one may be overburdened with knowledge ; skill may be of the dilettante order and adaptability may be another name for inefficiency. The qualities necessary above everything are grit, confidence, sound common-sense, carefulness, observation and business methods. Nothing slipshod, nothing casual, nothing taken for granted will ever do for poultry-farming. Depending upon other people may bring you to fortune or to Carey Street, the chances are all in favour of the Bankruptcy Court. Depending upon yourself may not lead to fortune, but with normal luck it will bring you a measure of success. If you have to employ labour, see to it that the labourer works upon your lines, your knowledge, your methods, for then and only then will he be a profitable servant. One might, were it necessary, refer to poultry-keeping as a duty — as a form of patriotism. Certainly if Adam Smith was right in saying that the man who could make two blades of grass grow where one grew before, was a public benefactor, so assuredly is the man who can make one egg grow where none grew before. Fortunately in this calling the poultry-keeper has the pleasant reflection that duty and desire may be one.

CHAPTER II

THE NEED FOR POULTRY

SOME people embark on poultry-keeping for pleasure and some for profit. Happy is the man who takes up the business for both purposes. One may succeed in an undertaking in which one has little or no interest, but it helps one immeasurably when inclination enters into the scheme of things, when interest and self-interest grow out of the same stem.

Only those who love their profession can do it full justice. The man to whom every call in business is in the nature of a trial, to whom every action is a task, is fettering his feet with chains.

Poultry-keeping for the amateur is well worth considering. Regarded as a hobby, it has one advantage over most other hobbies; it is not only self-supporting, but it can be made to realise a profit. Gardening is to many a delightful hobby, but it invariably costs money and often yields small results. Bee-keeping is said to have its fascination—and its stings—but of late years Isle of Wight disease and other troubles have played havoc with the honey layers. Vegetable-growing, fruit-growing and market-gardening is one continual fight against weather, slugs and pests of various kinds, while the results even in a favourable season are not exactly lucrative. A man may love flowers, and get into a kind of personal relation with his garden, but he can hardly get on intimate terms with bees or vegetables.

Now poultry make an appeal to most people. They present so many aspects to the owner that his interest is never allowed to slack. Fowls are interesting in themselves, apart from anything that may be got out of them. There are so many varieties, so many different breeds, such a wealth of glorious colourings, such a multitude of characteristics. They may be made a light or a profound study, and they will richly repay the labours of the

student. One man may take up fowls for their utilitarian qualities, for the eggs they produce and for the table delicacies they supply. Another may view his birds from the standpoint of the fancy breeder. He may wish to breed and rear for show purposes—often a most profitable department of the poultry fancier.

But generally speaking, whether poultry be kept for pleasure or for profit—or both—the aim is usually to get eggs, and plenty of them.

Until the outbreak of the war in 1914 this country was importing some £9,000,000 worth of eggs and poultry every year, and the figure was always growing. Russia, Holland, Denmark, France and other countries kept pouring in their poultry produce day by day. Among other things, the war made us realise how dependent we were upon other nations for large portions of our food supplies. In some instances, it was inevitable that part of our food, such as wheat, butter and cheese, should be grown abroad, but it is clear that there was no reason why all the eggs and poultry we consume should not be home grown in these islands. The number of hens kept per acre in Great Britain and Ireland is fantastically low. Since the introduction of the intensive and semi-intensive systems of keeping fowls, the numbers might be increased indefinitely. Few countries are better adapted for growing poultry produce than Britain, and, on the whole, in no other country are better results achieved. Of more importance still, England, Scotland and Ireland provide the best markets in the world. New York is said to consume more eggs and poultry per head of population than any other city, but the fact remains that London is the largest and probably the best of all markets.

In an address delivered before the Congress of U.S.A., Dawson, of Iowa, paid this tribute to the American hen: "Poets may sing of the eagle and artists may paint the beauties of birds of plumage, but the modest American hen is entitled to a tribute for her industry, her usefulness and her productivity. The American hen can produce wealth equal to the capital stock of all the banks of the New York Clearing House in three months and have a week to spare. In less than sixty days she can equal the total production

of all the gold-mines in the United States. The United States proudly boasts of its enormous production of pig-iron, by far the greatest of any country in the world, and yet the American hen produces as much in six months as all the iron-mines in the country produce in a year. In one year and ten months she could pay off the interest-bearing debt of the United States."

If this can be done in America, why should England wait ?

There never was a time equal to the present for the profitable production of poultry produce either on a large or a small scale. During the next decade we will probably see a development on this side of the national food supply that was undreamt of a few years ago, and it naturally follows that those who get in early will reap the greater benefit.

It is true that poultry food prices are high, but it is not generally known that they are not high in proportion to the price of eggs. After all, that is the main thing to consider. The increase in prices during the past two and a half years is considerably under 100 per cent. To be well on the right side, let us assume that the increase in poultry food prices is 100 per cent. Does that mean that to balance matters eggs and table poultry must fetch double their former price ? Not at all. Before the war an adult fowl cost approximately one penny per week to feed. To-day food costs threepence per bird. If a hen laid only one egg per week, one would have to charge just double the price to make up for the increased cost of food. But on the average a good fowl lays three or more eggs per week. Threepence feeds the bird. After the first egg, which all the year round is worth fully twopence, the other eggs laid represent profit.

Let me put it in another way. In pre-war days a hen cost a penny per week for food, and it laid three eggs that were worth a penny each—gross profit twopence per week. To-day, the food costs threepence, but the three eggs laid yield at least sixpence—gross profit threepence per week, or just 50 per cent. better than when food was half the price. No doubt fowls and fowl-houses are dearer, appliances cost more, but when every item is taken into consideration, the profits to-day are immeasurably greater

than ever before. The price of eggs advances steadily, and must continue to advance with the price of all other foods.

FOR THE AMATEUR

The popular notion that one needs a large garden or a meadow for the purpose of egg production is not easily dispelled. No doubt, the larger the garden or the greater the dimensions of the meadow, the better for fowls kept on a large scale, but let it be said once for all that birds will live and thrive and produce profit in the ordinary back-yard, on the housetop, or indeed anywhere that light and sun are available. It is possible, though perhaps hardly desirable, to get fair results from hens hung up in a cage outside of a wall. I knew a man who did something of the sort. He kept a couple of fowls in a large cage that he had fixed to the window-sill of his flat. He took the birds inside in bad weather every night, and put them outside in the morning. And he got eggs. Needless to say, such methods are clumsy and cannot be advocated, but they do show what can be done in very confined spaces. On the tops of flat houses many splendid fowl-houses exist, even in the city and environs of London. Given a flat, open space anywhere that light, air and sun can penetrate, it is just a question of the number of fowls that may be kept. The ordinary back-yard, the small garden, the bits of waste lands that abound even in the heart of great cities could all be utilised for poultry culture. To-day there are thousands of so-called back-yarders keeping their dozens and half-dozens of fowls with extraordinary results. Not only do those enthusiastic men and women find the produce of the birds useful for domestic purposes, but many of them are able to supply the household with eggs and to sell sufficient to yield a profit. And, believe me, there is no egg half so sweet as the home-grown egg. If one goes into a shop and pays even top prices, one is not certain that he has got an egg he can eat. The shopkeeper may do his best and yet fail. He cannot guarantee either the date or the history of the egg. Roughly speaking, not one egg in six of the best quality as sold

in shops is less than a fortnight to a month old. More often it is three months old.

The way, and the only way, to make sure of getting "new laid" eggs is to grow them yourself.

"But I have only a little patch of garden 12 feet by 8 feet," I hear someone say. It is small certainly, but not too small if you give up one half of it to keep six nice fowls. If you give up the whole of it you may keep ten or a dozen. A fowl-house 6 feet long, 5 feet high and 4 feet deep will just give you accommodation—120 square feet—for six birds. It will also give each fowl 4 feet of floor space to allow it to scratch for food, to exercise and to keep in good laying condition. If you desire to keep more birds the same proportionate area and floor space is the necessary minimum. If you can give a little more so much the better. Better far to possess fewer birds than overcrowd. It has been proved again and again that, say, sixty birds in a house suited for only thirty will yield fewer eggs than if the smaller number were housed. It is not necessarily numbers of birds that count. It is birds kept under proper and healthy conditions. On the other hand, one does not want a house unnecessarily large. To put half-a-dozen birds in a house 12 feet by 16 feet might do quite well in summer-time, but they would be far too cold in winter. Fifty fowls in a house of these dimensions will enable them to keep up the necessary warmth in the colder months.

POULTRY WITHOUT CAPITAL

When birds are kept in confined spaces and are not allowed a "run" outside, it is better that the floor of the house should be of wood. Wood is much more easily cleaned than almost any other material. It is also warmer for the feet, no small matter in winter-time, when eggs depend on the fowls being kept cosy and comfortable.

Most fowl-houses are built of wood, because they are lightest, cheapest and most portable. If you build one of brick or stone, you cannot carry it away with you in the event of removal. Of

CROAD LANGSHAN COCK

course, if there be a suitable brick building in your yard, it can usually be adapted for the accommodation of fowls. The chief thing is to make sure of sufficient light and ventilation.

The Hon. Mrs Lionel Guest wrote a delightful little pamphlet on "Poultry without Capital." In it she advocated the back-yarder "borrowing" a piano case and converting it into a fowl-house. In the event of any reader being unable to "borrow" a large packing-case, he can no doubt purchase wood, new or second-hand, that will do equally well, or better. Mrs Guest's *Poultry without Capital* reminds me of the man who was determined to begin poultry-farming. He stole a setting of eggs from a farmer, borrowed a broody hen, from the same man, and collected enough wood to make a house whilst the chicks were being hatched. That was Poultry without Capital, but on the whole, it is considered more respectable, if less enterprising, to buy your poultry and your house.

It is wonderful, though, how easy it is to make a small poultry-house. If one cannot afford the £2 or so necessary to buy a house to accommodate six hens, you may be able to pick up some wood in the form of large packing-cases, bacon boxes and the like. Splendid bacon boxes made of strong one-inch matching may be bought from most provision merchants for about 2s. each. Four of these will be found sufficient to make a house 6 feet by 5 feet by 4 feet. You will find plenty of good designs in any penny poultry paper, and all that will be necessary besides locks, keys, wire for windows, and perches, is enough creosote to give the wood one coat to preserve it from the weather. If you are not fortunate enough to get good, stout wood cheaply, five-eighths matching, or even smaller, will do, provided it is covered back and side with tar felting, which will keep out cold and rain and last for years. A man handy with saw and hammer need not spend more than a sovereign on a house to hold six birds. There is a certain added pleasure in putting up your own sheds. One can point to the house and say, "Alone I did it."

Personally, I am a poor hand with tools, and would rather pay than work on an uncongenial job, so I bought all my houses

ready made and, of course, put down more capital than if I had built them myself. But I strongly advise the handy man to erect his own buildings. Some of the houses constructed by amateurs are equal, if not superior, to those made by the trade. I give an illustration of a fowl-house made by an amateur in Peckham, and erected in that densely populated part of London. Not only is it an excellent house, but it has the additional advantage of being a double-decker, so that the birds may, at will, walk up to the upper story and get a better view of the surrounding chimney pots. In fine weather the fowls can remain underneath in the house proper, and when the sun shines they can get all the air and a sun-bath. There are many small ways that count, ways by which the intelligent amateur can improve the conditions for his birds.

Perhaps there is no better means of increasing the nation's food supply than by each family with the necessary accommodation keeping a few fowls for the supply of eggs to be used on the premises.

A large number of people have recently taken up poultry for patriotic as well as economic reasons, but there are doubtless thousands of others who, favourably situated for poultry-keeping, are still holding back. Some may be afraid of the work involved, and others of the high price of poultry food. In neither instance is there the least need for hesitation.

If the birds are fed on dry mash, as suggested from time to time in this book, half-an-hour a day will amply suffice for the work connected with anything up to twenty fowls, while I can safely promise that given even a moderate laying strain of young birds—Leghorns, for choice—the experiment will result in a handsome profit.

Correspondents with small lots of hens kept in back-yards or small gardens keep sending me their records, and the results are splendid. A gentleman in a high position sends me the following :

AN EXAMPLE

“The following account may induce others to attempt to produce their own eggs. My home (detached) and garden of about one

rood is in a small town of about 8000 inhabitants. I keep 12 pullets in a lean-to run, 28 feet by 9 feet. The roof is boarded, covered with felt, and on top galvanised iron. A well-sheltered roosting-place is at one end, and all is wired in to prevent sparrows stealing the food. The fowls have the lawn-mowings and spare greens from the garden. They have also the waste food from a family of four persons, and we use all the eggs. I keep the fowls two years, and then buy in fresh pullets. This has been continued for eighteen years. The following is the result for the past two years :—

	£	s.	d.
Nov. 1914—To 12 bought for	2	0	0
One old one left	0	2	6
Food bought	10	5	0
Balance	10	5	6
	<hr/>		
	£22	13	0
	<hr/>		
	£	s.	d.
One old one eaten	0	2	6
One died	...		
11 killed and eaten at 2s. 6d.	1	7	6
3384 eggs at 1½d. each	21	3	0
	<hr/>		
	£22	13	0''
	<hr/>		

It will be observed that my correspondent values the eggs at 1½d. each. Obviously he might have made it 2½d. each without overstating the price of the new-laid egg, in which case his profits would have come out at about £18, but no doubt he is fully satisfied with the £10, 5s. 6d. as given in his financial statement.

It seems to me that while the Board of Agriculture is desirous of every yard of land being put into cultivation, there are thousands of patriotic citizens who could give far greater assistance by keeping a few fowls in their gardens. The yield per acre from poultry kept intensively would be infinitely greater than any other food crop that one could name, and even if we can produce only one egg where none was produced before, we are fulfilling a public duty.

CHAPTER III

WHAT BACKYARDERS CAN DO

ALL over the country, and especially in the North and Midlands, thousands of working men of the better sort have taken up poultry for profit. Incidentally it has also become a hobby, and what some of these "amateur" poultrymen do not know about their birds is not knowledge. Such is the care and attention given to their small flocks that, as far as results are concerned, they make the professional poultryman green with envy. It is, of course, possible with small flocks to give individual attention to each bird when necessary. If a bird is ailing it is quickly "spotted," isolated, so that it will not infect the others, and then dealt with as effectively as possible. The man whose flocks run into hundreds or thousands, with the best attention possible may not be able to note an ailing bird for several days, if at all. Obviously, he cannot watch his fowls individually. Again, a bird may be off its feed. In a flock of a dozen birds this may be noted at once, and a little special treatment may put the matter right. In very large flocks a bird off its feed or not doing well has just to take its chance of recovery. Meanwhile, it may not lay for weeks or months, and no one will be the wiser, or it may "peg out," and it rarely pays to have a post-mortem.

The small poultry-keeper has many advantages, and very often he makes the most of them. The records of backyarders especially prove conclusively that fowls may be kept in close confinement, in the most unlikely places, and not only pay well, but produce results that are frequently not obtained under what we call ideal conditions. It is simply surprising to hear of the repeated successes of the city dweller with his fowls.

No doubt there are failures, but the majority of these are due,

not to the fowls or their environment, but to carelessness, neglect and general mismanagement. I have also known instances where failure has been the direct effect of starvation. The owner may not—probably did not—have any intention of deliberately underfeeding his birds. To do so would imply a foolishness that self-interest rarely exhibits.

DO NOT UNDERFEED

It may happen in a variety of ways, but chiefly by a desire to “save” a part of the food when the fowls are not laying. Now nothing could be more stupid than a policy of this kind. When a normally healthy bird is not laying it is due, as a rule, to one of two things. Either it is “resting” after a period of laying, or it is undergoing the annual moult, when feathers instead of eggs have to be produced. The bird that lays when moulting is flouting the laws of nature, and it will assuredly suffer for it later on. When the non-laying bird is having a temporary rest, or is undergoing the longer suspension of the moult, underfeeding will only aggravate the trouble. It is during these periods of nature, when the bird is recuperating and storing up energy and material for a new cycle of production, that she needs plenty of good food. To underfeed a bird during these times is like starving a cow that is about to calve. Parenthetically, I may say that there are no periods in a laying hen’s life when she may, with profit, be underfed. Old hens do not need quite so much food as younger hens, but if you want the best results they must receive adequate nourishment.

No doubt there is a tendency on the part of some thrifty-minded people to keep back part of the food when the hens are not laying. They seem to argue that if the fowl does not lay neither shall she eat. Or it may be that if the owner is not getting eggs, he cannot afford to pay for a full feed. But no matter what the reason assigned for underfeeding, the policy is wrong from beginning to end. Besides, it is suicidal. By underfeeding during the non-laying periods, you are directly prolonging the unproductive stage. Feed well and your eggs will come all the quicker.

There are, of course, some people who try to run fowls on impossible lines. They systematically neglect them, underfeed them, and keep them in a most insanitary state. Of such people I can only say that they ought to be dealt with by the authorities.

How Not to Do It

I have before me letters from two correspondents which exactly answer each other. The first, which is in the nature of a warning to those keeping fowls in back-yards, reads :

“In discussing ‘back-yard’ poultry-keeping, two points always seem to me to be overlooked—viz. the insanitary conditions frequently brought about in the immediate vicinity of dwellings, and the incessant suffering inflicted on helpless birds by the ignorant amateur thus induced to keep poultry. Such a person seldom seems to realise the amount of attention that even half-a-dozen confined birds require. He is terribly apt to leave the wretched creatures permanently penned up in a small house with the tiniest of runs attached, the cleaning out of which is lamentably casual and spasmodic, while the importance of regular and systematic feeding hardly ever seems to occur to him.

“I have been a reluctant witness of the miserable spectacle of some half-a-dozen White Wyandottes so treated, and it is no exaggeration to say that these birds are in a disgusting, indeed a loathsome, condition. The little dark house and wire run, a few feet square, in which they are imprisoned has in the course of months piled up with filth and coal ashes, and is always innocent of any kind of litter. They are not infrequently left from early in the afternoon till late in the following forenoon without a scrap of food, and, of course, cannot forage for it.

“Their water-bowl for days together is dirty and empty. When they do get food, it consists, winter and summer alike, of a microscopic amount of maize and any scanty table scraps available. The owners have not the remotest idea of cruelty, and are ordinary worthy folk in other respects. They act thus

from sheer ignorance and thoughtlessness, and are comically surprised and disappointed at not getting a constant flow of eggs, and that the birds one by one sicken and have to be destroyed.

"Doubtless, many 'backyarders' with previous knowledge, or who have been intelligent and painstaking enough to make themselves efficient on the subject, conduct poultry-keeping on sanitary, humane and paying lines, but I think a moment's consideration must lead to the conclusion that many townsfolk have been led astray by glowing journalistic efforts, and, while waiting for the 'golden egg,' have let a pleasant little garden become a place of horrors.

"COUNTRYMAN."

No doubt what "Countryman" says about fowls being kept in insanitary conditions by ignorant amateurs may be perfectly true in some instances, and with him I would emphasise the importance of keeping the birds and their houses perfectly clean. Of course, people who neglect and starve their fowls will not keep them long. I have seen some loathsome fowl-houses, but not so many in town as in the country.

As a rule, the town dweller, taking up poultry intelligently and as a hobby, devotes much time and attention to his charges, and the results of "backyarders," as a whole, will compare favourably with the results achieved by cottagers, or even farmers. It goes without saying that fowls must be well cared for in every respect if they are to be a success.

In these days thousands of "backyarders" are doing themselves and the nation service by producing eggs for food. The warning of "Countryman" should be taken seriously by those it may concern, but in the meantime I present another picture of the "backyarder," from Mr R. Leonard Davey, who writes :

"My father, a man of 73 years of age, and living in the heart of London (Newingtonbutts), received from me in May of last year 15 month-old chicks. I sent them up from a farm at Marton,

near Rugby. One died, and seven of the remainder turned out to be cockerels, leaving seven pullets.

“I have a letter from my father, dated the 5th May, wherein he records the fact that his seven pullets have laid 610 eggs in five months of their first year. He has, of course, kept a very careful record, it being his particular hobby.

“It really is a marvellous record, taking into consideration the locality in which the birds exist, although, as I say, they have had every care and attention. My father himself built their run and night-house on the intensive system.

“R. LEONARD DAVEY.”

The experience of Mr Davey is no isolated one. I could fill this chapter with remarkable results achieved by those who keep fowls in town. I would point out that it is not in poultry-keeping alone that bad management is seen. There is a right way and a wrong way in all pursuits, and while one can earnestly advocate the keeping of fowls in back-yards, it is always to be understood that to gain success care and cleanliness are among the first essentials.

Let us assume that the town dweller has the necessary space in his back-yard, garden or plot. Let us assume also that he has built his house with an open front and a wooden floor on the lines I have suggested.

He has, I presume, the house well littered with clean straw, peat moss or wood shavings. For town dwellers perhaps the best and cheapest scratching material is not straw or peat moss. If he can obtain cedar-wood shavings, and as a rule they are not difficult to get, he will have the best possible material. Not only do the cedar-wood shavings give forth a nice, lasting, pungent smell, but they are largely charged with anti-insect quality. They will certainly tend to keep down some of the parasitic pests to which fowls are prone.

Only the birds are now required to make the establishment complete.

The question that next presents itself is, “What breed of fowl shall I buy?”

The answer to this question is important. If you have a small house in a back-yard without a run you are keeping the fowls intensively. If you have a run, and allow the birds to go out in fine weather, you are keeping them semi-intensively, but whether you keep them shut up altogether or allow them a little liberty in favourable weather, the total area is so manifestly confined, that they had better be treated as birds kept on the intensive system.

Now there are some breeds of birds that thrive quite well under these conditions, others that do moderately well, and again other breeds that are not at all adapted to the strictly intensive principle. Among the birds that flourish under close confinement may be mentioned the Leghorn, the Ancona, the Campine. These three are each and all small birds, and in a little space a small bird is a consideration. Not only are these different breeds small, but they are active, full of energy, and with immense reserves of vitality. They all belong to the hardy variety. For convenience they are classed as light breeds. They are also non-sitters; they do not get broody. To get a fowl that is active by nature is an important matter. Part of the skill of the poultry-keeper is to devise means to keep his birds busy. A lazy fowl is a bad fowl. Nature has supplied the Leghorn, Ancona and Campine with surplus energy, with a restless and inquisitive nature, with a tendency to keep on the "go" all the time. That is one reason why these three different breeds are all prolific layers. Excepting a bird takes plenty of exercise and keeps itself fit, it is not likely to lay many eggs. Unfit, fat and lazy fowls are an abomination. They are unproductive and are better dead. If your birds will not keep themselves busy, you must try to devise means to give them exercise. It is therefore obvious that if you buy birds that are by nature active, that cannot keep from moving about, that are fond of a scrap with their neighbours, you have already solved part of the problem. An active fowl is a happy fowl, and a happy fowl is a productive fowl.

Whatever may be your predilection for other breeds do not give way to them if you are to keep your fowls intensively. There

are two heavy breeds, however, that do quite well run on intensive or semi-intensive lines. I refer to the Wyandotte and the Rhode Island Red. These fowls are an American importation.

But if you are to keep heavy breeds do not make the mistake of mixing them with light breeds. Light and heavy breeds are always better apart, and on the intensive system it is imperative that they should be kept strictly separate. I know an instance of a poultryman who bought a number of Buff Orpington pullets—a heavy breed—and put half of them in a house with White Leghorns. The other half he put in a house by themselves. They were all kept on the semi-intensive principle and fed exactly alike. The birds that had a house to themselves began to lay almost at once, but after two months not a single Buff in the Leghorn house had laid an egg. He separated the two breeds and put the Buffs in another house by themselves. They also began to lay almost at once, but were two months behind the lot that had the advantage of a separate house from the beginning. One reason, no doubt, why the Buffs in the Leghorn house remained backward was because, being slower and heavier birds, they did not get their fair share of food. While they were picking up one grain of wheat the Leghorns would have swallowed two or three. A Leghorn is a nippy bird and will dash in and secure what is going before a heavy breed realises that it is feeding time. And no doubt the Leghorns resented the intrusion of the Buffs into their house. The lighter bird, which is also the quicker and fiercer, picked and chivvied the slower-moving fowl, and generally gave it a bad time. Therefore, if you want the best results do not mix light and heavy breeds together.

Leghorns, Anconas and Campines being smaller birds need less food for their smaller frame. That may be a consideration or it may not. I find that when hens are laying heavily there is little or no difference in the amount of food eaten by light and heavy breeds. A bird in full lay needs as much food as it wants. Otherwise the light breed may be said to eat a little less. The weight of the light breed varies from three to four pounds or a little more. A small bird does not necessarily mean a small egg. A Leghorn

HOUDAN PULLET

weighing three and a half pounds will lay as big an egg—perhaps bigger—as one weighing four and a half pounds. But the lighter bird, during the laying season, will eat as much food as the heavier bird. It needs it. Eggs are composed of the matter the hen eats and drinks. They are not spun out of the “inner consciousness” of the fowl like the theories of the German professor. Nothing comes out of a hen but what enters into it. The matter changes its form, that is all. The concentrated food after it has undergone a chemical change in the bird’s body, necessary to make it into the organic product, we call an egg. The materials necessary to make eggs we shall deal with later on.

THE INTENSIVIST

The poultry beginner is now on the point of selecting his stock. As an intensivist he is recommended to select his birds from a light breed or alternatively from the Rhode Island Red and Wyandotte. To the inexperienced I would say—without beating about the bush—choose a Leghorn. I do so, because on the whole they are easier to get, they are very hardy and they are more universally proved egg-layers. Far more attention has been given to the Leghorn to produce eggs than has been given to the other light breeds. No doubt there are certain strains of the Ancona and Campine that are about equal to the Leghorn as prolific egg-layers, but these are by no means easy to procure, whereas anyone with the means can purchase a good laying strain of the Leghorn. The Leghorn is of various colours—White, Black, Blue, Brown being the best known. The White is perhaps the best egg-producer but the Black is little, if any, behind. For the town dweller, then, one would commend the Black in preference to the White, but it is a matter of æsthetics rather than one of profit. A white bird in the midst of the soot and dirt inseparable from large cities will obviously not be able to maintain its pristine colour and will approach nearer the Blue or the Black in hue, without being either the one or the other. If one does not mind a dirty white, then a White Leghorn will do, but if a Black Leghorn is selected, then

in the middle of a town it will always be able to retain practically its original colour. But you pay your money and take your choice. The colour—or, within limits, the sooty atmosphere—will not greatly affect the number of eggs laid.

The Ancona is in nature and habits very like a Leghorn, and in colour is black with white spots. It is admirably suited for town life.

The Campine is a small bird of varying shades of grey, and would do quite well in the midst of bricks and mortar.

These are, of course, all pure breeds I have been dealing with.

There are certain cross-breeds that would thrive and do well in the confinement of town life, but I do not specially recommend them. If, however, anyone fancies a cross-breed, there is no sufficient reason why they should not be kept. Some crosses, especially first crosses, do remarkably well. A first cross is, of course, a mating between two pure-bred fowls. I have tried two different first crosses that have yielded excellent results. One is a Leghorn Buff Orpington, the other a Leghorn Minorca. I have also seen remarkable results from Leghorn White Orpingtons and Leghorn Wyandottes. All these four first crosses are well tried and profitable. As a rule, a cross-breed is hardier and easier to rear, but it has not been proved to be a better egg-layer. One need not elaborate this part of the subject at present, as it will be dealt with fully later on.

All that is necessary to say here, is that a first cross may make a most profitable fowl for the backyarders. Of all first crosses, the Leghorn should form one of the parents for intensive purposes. Perhaps the Leghorn Minorca is as good as any. It is a bird hardly larger than the average Leghorn and retains most of the characteristics of its male parent. It is sharp, active and a good forager. In colour, it is white picked out with black, and has the black legs of the mother bird. It is equally suitable for town or country.

CHAPTER IV

SUBURBAN POULTRY-KEEPING

IN order to show the profitable nature of poultry-keeping in the suburbs of a large town, I give extracts from an article that appeared in *The Journal of the Board of Agriculture*. It is not because the profits of this particular experiment are exceptional that I select this article for special mention. The profits, as it happens, are quite normal, but as the accounts have been kept with special care, and have received the honour of being treated as an object lesson by a Government publication, there can be no question about the authenticity of the facts as set forth.

“At the outbreak of the war X. decided to set aside a part of her back garden for the keeping of poultry. As she had very little time to devote to her fowls, she decided from the first to work on rather novel lines. She decided to keep the birds for egg-production only, and do no rearing—hence no male bird was kept, and no annoyance caused to any of her neighbours. The ground was too small to admit of alternate runs, and yet it was necessary to give it a rest from time to time if used year after year, so X. decided to sell her fowls before they moulted, thus setting herself free to close the house and have a holiday. During the interval the run was cropped with some gross feeding greens, such as cabbage. The daily work consisted simply of feeding the birds three times, watering them twice, cleaning the dropping-board each morning, and occasionally digging the run. X. considers that for any active girl the work need only occupy thirty minutes a day, and may be safely undertaken, as in her own case, without previous experience.

“When she came to arrange the details X. found that the space at her disposal was about 50 square yards of sandy soil. On

looking out for a suitable poultry-house, she was fortunate enough to come across a small wooden hut which had been built as a motor-cycle shed. This was sold to her for 36s. when adapted as a poultry-house. The shed was 7 feet long by 5 wide; 5 feet high at the eaves and 7 feet at the ridge. It was so placed that the original window of the shed was placed on the north side. The east end was occupied by a dropping-board three feet from the ground, with three perches above. The upper part of the remaining half of the south front was replaced with wire-netting and an adjustable shutter. The shed was only partly in the run, so that on wet days, when the birds were not allowed out, the work was done without entering the run. An orange box placed under the dropping-board was used as a nest-box, and a wooden feeding-trough, a zinc drinking fountain and a broody coop completed the equipment. The sandy floor was covered with straw litter which was removed from time to time as it became broken up. The run was surrounded by wire-netting, 8 feet in height. The total cost of the house, fittings, run, etc., was £3, 0s. 3½d.

"The arrangements were complete towards the end of October, and on the 30th X. received from friends who were poultry-farmers eighteen pullets at a price that was practically only the cost of rearing—3s. each. The birds were all cross-bred from ordinary farm stock, and were of the heavy type, having been intended for table purposes and retained for laying owing to the war. A few had begun to lay, but four had been hatched later than the rest and did not commence to lay till February. One bird died during the first week. The remaining seventeen fowls were quite healthy during the whole period. The birds were fed three times per day as follows:—

<i>Time</i>	<i>Quantity</i>	<i>Food</i>	<i>Method</i>
8 A.M.	1½ lb.	Wheat or oats	Given on alternate days
2 P.M.	(1) 6 oz.	Meat meal	} Scalded with boiled household scraps For drying off
	5 oz.	Clover hay	
	1 lb.	Sharps	
	3 teaspoonfuls	Poultry mustard	

<i>Time</i>	<i>Quantity</i>	<i>Food</i>	<i>Method</i>
2 P.M.	(2) 6 oz.	Bran	} Scalded as above
(Earlier in Winter)	5 oz.	Clover hay	
	$\frac{1}{2}$ lb.	Pea or bean meal	} For drying off
	$\frac{1}{2}$ lb.	Sharps	
	3 teaspoonfuls	Mustard	Mixed in meals
5.30 P.M. . . .	$\frac{3}{4}$ lb.	Wheat or oats	As in morning

"The mash (1) was given on two consecutive days, and (2) on the third day. In cold weather maize and oats were substituted for oats—that is, a half-feed of maize was given every other day. The mustard was discontinued in the warmer weather. A little sulphate of iron was used in the mash once a week, and permanganate of potash in the drinking water another day. The mash was fed in the trough; the grain was scattered in the litter in wet, and on the sandy soil (sometimes lightly buried in the soil) in fine weather. Greens—chiefly cabbages—were hung up in the house or run. As X.'s family is a very small one, consisting generally of only two persons, household scraps were few, and when, as was sometimes the case, they failed altogether, a handful of biscuit meal was given instead, and was scaled with the meat meal and clover hay. X. sold six of the fowls on 11th June, as they showed a constantly recurring tendency to broodiness; the rest were retained until 14th September. The total cost of food, £5, 17s. 5½d., was thus for 6 birds for 224 days, and 11 birds for 318 days, thus averaging 8s. 7d. per bird per year. The food was, for the most part, bought in small quantities at the rate per stone or score.

"Three features of the above diet are worthy of note, as contravening some of the generally accepted principles in feeding for egg-production.

- (a) Beyond the alternation of the two grains, and the somewhat different mash every third day, there was no variation in the feeding.
- (b) Although the diet was particularly rich in nitrogenous foods, the good health of the birds, their freedom from ovarian disorders, and the absence (with very few exceptions) of

soft-shelled eggs, showed that it was not too stimulating. Contrary, too, to the usual advice, this high albuminoid ratio, and the same quantity of food, were continued throughout the summer, and with uniformly good results.

- (c) A comparatively light meal was given towards the end of the day, whereas the general practice is to make every effort to send the birds to roost with their crops full.

“The following table gives the number of eggs laid each month :—

<i>Month</i>	<i>No. of Eggs</i>	<i>Month</i>	<i>No. of Eggs</i>
October 31, 1914	. . 2	<i>Brought forward</i>	. . 1478
November „	. . 184	May 1915	. . 285
December „	. . 240	June „	. . 205*
January, 1915	. . 224	July „	. . 186
February „	. . 255	August „	. . 179
March „	. . 315	Sept. (to 14th)	. . 71
April „	. . 258		
<i>Carried forward</i>	. . 1478		<hr/> 2404 <hr/>

* 79 up to and including 11th June, when 6 fowls were sold.

“Thus, during the first period up to 11th June, 1842 eggs were laid by 17 birds, or an average of 108·3. In the second period, 12th June–14th September, the remaining 11 birds laid 562 eggs, an average of 51·1. Taking the two periods together, the 11 birds retained the whole time laid an average of 159 eggs in 318 days—exactly an egg every other day, or at the rate of 182 per year.

“The lowest number of eggs laid on any one day was 1 on 3rd and 6th November, and the highest 13 on five days in March. The eggs were sold chiefly at wholesale prices to a local dairy, a few only being sold at the retail rate. For her own household use X. retained the smallest eggs at the wholesale price. The highest price was obtained from 1st–25th November—viz. 5 per 1s. (wholesale)—and the lowest from 21st–24th April—viz. 11 per 1s. The amount realised by the sale of eggs was £16, 6s. 5d., being an average of 1s. 7½d. per dozen.

"After the sale of the birds on 14th September X. was able to draw up her trading account and balance-sheet as follows:—

Trading Account, 31st October 1914-14th September 1915

	£	s.	d.		£	s.	d.
To 18 Pullets at 3s.	2	14	0	By Sale—6 Pullets, 1/6	0	9	0
„ Carriage (birds and food)	0	10	0	„ „ 11 Pullets, 1/10	1	0	2
„ Straw litter	0	1	4	„ „ Eggs	16	6	5
„ Food . . . £6 5 5½							
Less Stock remaining 0 8 0							
„ Balance c/d		5	17 5½				
		8	12 9½				
	£17	15	7		£17	15	7
„ 10 per cent. Depreciation on Plant, £3 0 3½	0	6	0½	„ Balance b/d		8	12 9½
„ Interest for one year at 5 per cent. on £3 0 3½	0	3	0				
„ Capital	8	3	9				
	£8	12	9½		£8	12	9½

Balance-Sheet as on 14th September 1915

<i>Liabilities</i>	£	s.	d.	<i>Assets</i>	£	s.	d.
From Trading a/c	8	3	9	Plant	£3	0	3½
				Less 10 per cent. 0 6 0½			
				Stock of food in hand		2	14 3
				Cash		0	8 0
						5	1 6
	£8	3	9		£8	3	9

"The profit on the 10½ months' working was thus £8, 3s. 9d. Allowing half-an-hour a day for the work, this represents payment at the rate of a fraction over a shilling an hour.

"During the following year X. repeated her experiment with variations. She began work on the same day, 30th October, but this time she had twenty pullets, including Leghorns, Minorcas, Orpingtons and first-cross breeds. She paid 5s. each for the fowls, and she fed exactly as during the first year. Owing to earlier holiday

arrangements she sold all her birds in the middle of June, having kept them only $7\frac{1}{2}$ months. On this occasion she produced 2262 eggs and made a net profit of £8, 10s. 11d.

“The time spent over the work during the $7\frac{1}{2}$ months was $113\frac{1}{2}$ hours ; the profit earned was thus at the rate of 1s. 5d. per hour—5d. per hour more than in the preceding year.

“The work of the two seasons sufficiently demonstrates the possibilities that lie in poultry-keeping on a small scale. X. had an advantage in having the birds at no greater cost than if she had reared them herself, but even if she had, for example, in the second year paid 7s. 6d. each for the pullets (leaving 2s. 6d. per bird as profit for the breeder), she would herself have realised a total profit of £5, 12s., or 1s. an hour, for her work. It must be remembered, too, that X. made this profit after purchasing practically all the food. There are numerous households where house scraps would reduce the food-bill very considerably—in many families the scraps alone, with the addition of a little meal, would be sufficient to keep at least half-a-dozen hens.”

I have given the experiences of X. at some length because they may serve as a guide to anyone taking up suburban poultry-keeping.

Any intelligent person having a little space in a garden or back-yard can do as X. did and anticipate similar results. They may not be able to buy their stock as cheaply, but there is an ample margin of profit to work upon if ordinary market prices have to be paid. In the case of X. all eggs were sold at wholesale prices, so that where part are used in the household an extra sixpence per dozen, the difference between wholesale and retail prices, may be credited to the account. Ladies who have a little spare time could easily follow the example of X. and if necessary extend it. To all intents and purposes it is as easy to keep fifty fowls as twenty, if only one has the accommodation for them. I know two cases where ladies keep 60 and 100 fowls respectively, and both make a very handsome return to the family revenue. In each instance the owner renews her stock by buying settings of eggs and using broody hens to incubate and rear. There is

then no necessity for a male bird, which is so often objectionable in a populated district.

I am tempted to give another instance of success on a small scale in a suburban district. This is an instance known to me personally, and the results, if rather remarkable, are by no means unique.

From five pullets and one year-old hen—all cross-breeds—1010 eggs were laid from the 1st January 1916 to 14th October of the same year. After the third week in January, when 11 eggs were laid, there were never fewer than 17 in any one week. The highest total in one week was in April, when 37 were laid. The highest possible number—if each hen laid every day for a week—would, of course, be 42, so that for one week the number fell only five short of the maximum.

Perhaps the most important matter in this instance is the simplicity of the feeding arrangements. A warm mash was given in the morning, composed of one-third broad bean and the rest middlings, maize meal and fish meal in equal parts. Such a menu is, in my opinion, just as likely to be successful as the more elaborate menu provided by X. In the evening mixed grain—chiefly wheat and oats—was fed, and an ample supply of green stuff was always provided. This proves that poultry-keeping can be reduced to so simple a matter that an intelligent boy or girl, once started, could be as successful with a small flock as the most erudite professor of fowl culture.

It is perhaps necessary to state once again that all soft foods should be fed in troughs made of wood or galvanised iron. To throw the food on the ground is wasteful and insanitary. All grain should be buried in the litter to make the birds scratch for it. Scratching is a provision of nature for making the fowl work for her food. A hen is never so happy as when scratching and finding the coveted grains. The exercise keeps the hen in good condition, and, above all, prevents her from becoming fat and lazy. It is the lean, well-fed hen that lays eggs. The fat hen will never pay her way, and if one should get chronically fat, do not hesitate to get rid of her. Otherwise she will soon “eat her head off” and diminish your profits.

CHAPTER V

HOW TO BEGIN

FOR one like myself—a poultry-farmer—to advocate something like universal poultry-keeping seems like ruining my own business, for, indeed, if even half the community kept a few fowls the occupation of the egg-farmer would be gone ; but in spite of the great increase in poultry-keeping for private purposes, there is little fear of this source being able to supply all the eggs required—at least, in my lifetime.

There is a strong and growing desire on the part of the public to make a start in poultry-keeping for purely domestic purposes. Naturally many of these good people do not know how to proceed. As a rule, they have little or no difficulty about securing a decent poultry-house at a reasonable figure to suit their requirements, but the difficulty is to find laying pullets.

A friend taking up poultry wrote to me : “ I have got a nice poultry-house all right, but although it has been erected over a month it is still tenantless. The fact is, I am nervous about buying fowls. When I write to a first-class firm the price asked is for me prohibitive, and I do not care to trust myself to the unknown advertiser in a poultry paper. I have, for instance, no means of knowing the age of a fowl—whether it is a pullet or a great, great-grandmother, and I am told not to purchase anything in feathers over twelve months old. What am I to do ? ”

I fully appreciate the dilemma of my friend. In fact, I have been “ caught ” myself when, in thinking I was buying yearlings, I got two-year-old hens. It is almost impossible for the ordinary man to tell the difference between a one-year-old and a two-year-old hen ; and, indeed, many poultrymen might easily be deceived.

One of my friends, in rather a large way of poultry-keeping, once answered a chance advertisement and bought a dozen so-called

pedigree fowls. When they arrived they looked, as he said, "like nothing on earth," and rather than go to the trouble of sending them back and trusting to luck to get his money returned, he killed the lot. He would not run the risk of introducing such a "mangy" lot into his pens, where, if disease were to break out, it would be disastrous.

If this sort of thing happens to a professional poultryman, what are we to expect from a mere amateur?

The poultry papers have now instituted a deposit system whereby the purchase money is sent to them, and is not delivered to the seller until the buyer notifies the editor that he is satisfied with the purchase. In buying adult fowls I strongly advise everyone to use the deposit system. Of course, if one is dealing with responsible and respectable firms, such as Messrs Cam, Tom Barron, Will Barron, Edgar Watson, Jonathan Collinson, the Molassine Company and a host of others, you may depend on getting what you pay for.

In the early days of my poultry-keeping I bought four different lots of fowls through the advertisements of people I knew nothing about. Two of the lots were absolute swindles, one was fairly good, and one very good. I would not dream now of buying fowls from an unknown man without having the option of returning them if unsatisfactory.

There are various ways in which the amateur can make a beginning. Having determined upon the breed of birds he is to keep, he can obtain them in various ways, depending largely on the time of year. If he wants to start in the late autumn, say October or November, one plan is to buy fowls that have passed their first laying year. They will then be about eighteen to twenty months old, and will be getting over, or have passed, their first moult. This is perhaps the best season to start, because yearling fowls are then plentiful and cheap. The large poultry-farmers are clearing out their older stock to make room for the pullets they have reared during the spring and summer and are just commenced to lay. A fowl that has passed its first laying season should be purchasable for about four to five shillings. A pullet of six months

old bought during the same period will cost twice as much. You will probably get eggs earlier from the pullet, and if eggs are the only object and the original outlay immaterial, it is certainly better to buy six or eight month old pullets straight away. A well-developed pullet should be laying in October, and very few eighteen-month-old hens lay before December. Again, a pullet—at any rate a pure-bred one—will lay some forty more eggs than the hen will lay during the season. If, therefore, you get forty more eggs, worth, say, twopence each, you will get back all the increased cost (and more) as between a yearling hen and a laying pullet. A further advantage of the pullet is that after her first season's laying is finished she is good for another year's eggs, whereas if you buy birds eighteen months old they have practically come to the limit of their profit. It is rarely wise to keep a pure breed, excepting for breeding purposes, after the end of the second laying year. There are, however, some cross-breeds, and, I believe, one pure breed, that lay as well during their second season and almost as well during their third laying year. The pure breed is the Red Cap, a type of fowl now to be seen mostly in Derbyshire.

Let us assume that the beginner has bought his dozen or half-dozen fowls. If they are Leghorn pullets he had better wait till the second year before he attempts to breed from them. One may get passably good birds from the produce of a Leghorn pullet, say in April or May, but there can be little doubt that for health, stamina and vitality in the offspring a two-year-old hen is much more reliable. If one intends to breed from a pullet it is better to mate it with a two-year-old male bird. By this means you will have maturity on one side at least. But if breeding from a two-year-old hen, a well-developed, early hatched, vigorous cockerel will serve the purpose better. I think it goes without saying that all the larger and more scientific breeders go for the latter plan—the older hen and the younger male bird.

If Leghorns only are in your pen it will be necessary to get a heavy breed to hatch out your eggs, if you do not care to incubate. As a rule it does not pay to buy an incubator unless you wish to breed on a large scale. One might easily breed up to a hundred

MR. TOM BARRON'S PRIZE WHITE LEGHORNS. NORTH AMERICAN COMPETITION
—AVERAGE PER HEAD 229 EGGS

MR. TOM BARRON'S PRIZE WHITE WYANDOTTES THAT BROKE THE RECORDS OF
ENGLAND AND AMERICA. ONE LAID 289 EGGS

birds in a back-yard with a half-dozen broody hens. As far as successful incubating goes, there is not a great deal between the natural and the artificial methods. With care both methods work equally well, but no doubt the inexperienced will hatch a larger percentage with the broody hen. It is also generally agreed, although it is not readily susceptible of proof, that the chickens hatched out under hens are stronger and more vigorous than those hatched in the incubator. Probably the real reason is that the hen makes fewer mistakes than the machine is likely to do.

No one ought to set a Leghorn to hatch out eggs. A Leghorn rarely goes broody, and when it does, the "fever" as a rule lasts only a short time. If you put a broody Leghorn on a setting of eggs she will probably desert them before they are hatched, and if you do not have another broody to take her place you will lose the lot.

Again, a Leghorn is a small hen, and will not cover more than half-a-dozen eggs comfortably and securely, whereas a Buff Orpington, or similar heavy breed, will cover twice as many eggs and sit till the Judgment Day. It is therefore asking for trouble to try to hatch out eggs with a Leghorn. The Leghorn is an egg-layer pure and simple, and she should not be asked to do what nature has denied her. It will pay you better also to let your Leghorn keep on laying while you purchase a broody for hatching purposes. If your Leghorn lays normally during the time she would be sitting on eggs and rearing her chicks—say eight weeks altogether—she will have laid you about four dozen of eggs, more than enough to pay you for the broody hen.

I advocate Leghorns strongly for the backyarder because the aim and object of almost all town dwellers is to get eggs, and plenty of them. If, however, a Wyandotte is selected it may do equally well. It is a heavier bird, and, although not nearly so active as a Leghorn, thrives uncommonly well in a small space. The Rhode Island Red will do nearly as well if kept intensively, and both birds have the advantage of being much better table birds than the Leghorn. When you pluck your Leghorn you find the carcass exceedingly small, and though it may be moderately plump

—it is never fat—there are few pickings upon it. A few mouthfuls of rather dark flesh is all one can expect. The Wyandotte and Rhode Islanders are both good table birds, with plenty of flesh on the breast and wing. The best test of their relative value is that if you want to sell for the table the heavy breeds I have named will fetch you twice as much as the Leghorn.

THE BEST BIRD

But in spite of certain apparent disadvantages the Leghorn is the best bird for small intensive houses in urban or suburban localities. The Wyandotte has been bred to lay almost, if not quite, as many eggs as the Leghorn can lay, but this laying quality is not nearly so widely distributed about the breed in the case of the Wyandotte. There are few Leghorns that are not good, consistent layers, but there are many types of Wyandotte that lay small eggs and few of them. The Leghorn, on the whole, is a much more consistent layer ; or, in other words, where one strain of Wyandottes may lay remarkably well, half-a-dozen other strains may only lay moderately or badly.

My contention is that if you get a dozen more eggs per year from a Leghorn it pays you better to keep her, even if you do get a shilling less for her carcass at the end of her career.

Of course I say nothing against proved egg-laying strains of Wyandottes. Once positively assured of the right strain, one could hardly do better than keep two flocks—one of Leghorns and one of Wyandottes ; but the beginner is much more likely to get hold of a poor type of Wyandotte than a good one, while the chances are all the other way when dealing with Leghorns. For the egg-farmer on a large scale the Wyandotte for winter laying especially is almost a necessity. But in the meantime I am dealing with the amateur, who must be shepherded into the right path.

No doubt a very large number of amateurs who keep fowls for domestic purposes do not wish to breed their own stock, not even for renewal purposes. In that case they do not need male birds. The pullets will do better without them and the neighbours will

probably be more neighbourly. No one likes to be wakened in the silent watches of the early morning by the shrill calls of another man's chanticleer. It is quite bad enough to be awakened by your own male bird ; it is anathema if it happen to be your neighbour's. Therefore the backyarder who wants eggs only should dispense with the rude brawler of the early morning.

He can replenish his stock in two ways—either by purchasing new pullets or by buying day-old chickens. And those who begin poultry-keeping in the spring or early summer cannot do better than buy eggs for setting or by purchasing the one-day-old chick. If I wanted to start on a large scale I would probably use both methods. There is no doubt a certain fascination about rearing one's own chickens either from the egg or from the day-old stage. It is not difficult to bring them to maturity either way, but of course it entails a large amount of personal attention that many have not the means of giving.

The whole art of hatching and rearing chickens is reserved for a special chapter later on, but in the meantime I may propose another method by which the amateur may furnish his fresh stock. In the months of May or June, when the weather is beginning to be warm and fine, it is often possible to buy chickens varying from a month to two months old. If one can buy six-week-old chickens at the end of May they may be very easily reared. Little or no artificial heat is required. If frost is suspected, a litt'e storm lamp hung up in their sleeping quarters will be quite sufficient, and more often than not they will grow and develop without any artificial heat whatever. Certainly after two months old they will be strong enough, provided they have a cosy house at night, to defy any ordinary falling off in temperature. You will, of course, pay a little more for your six-week-old birds, but probably not more than you would have spent had you bought them when a day old. Besides, you have all the advantages of having got your chicks over the most dangerous period. The greatest mortality among chickens is during the first fortnight, and again just at a month old. If one gets them safely over the first five weeks one should lose very few indeed.

BUY AT SIX WEEKS OLD

Personally, I have never done better than when buying chickens from one to two months old. In many ways it is cheaper than rearing them on the premises ; nor is there the same anxiety about them in the early stages. The worries of the hatching season have turned many a golden ringlet to grey and many a grey to white. Some there are who have the knack of rearing chicks successfully, and these are the people who do not worry even if they do have an "accident" now and again. Temperament enters into the chicken business even as it does into every other sphere of activity, and happy the man (or woman) who can charm the chickens into health and strength.

One cannot, of course, get a large selection if one buys chickens, say, six weeks old, because very few people care to sell at this interesting stage. Yet if one diligently search the poultry papers there are always exceptions, and if one is lucky enough to make application first there are rewards in plenty. I have more than once bought chickens from a reliable man at five or six weeks old for a very little more than if I had bought them from the same firm at their birth. I have actually bought pure-bred chickens from a month to six weeks old at eleven and twelve shillings per dozen. One season I bought 50 day-olds from one firm and 50 five-week-olds from another, both at the same price. Now mark what happened. They all arrived alive, but the weather turned out to be severe, and within a month I had 32 of the day-olds left and 44 of the five-week-olds. In this proportion they were reared to maturity. I had a lot of trouble and spent much time with the baby birds that was unnecessary with the older chickens. I saved five weeks' food and five weeks' work, and a very great deal of anxiety. The older chickens gave me little or no trouble, the younger ones for six weeks needed endless attention.

I reared to maturity a dozen more birds of the older lot. More than that, they began to lay nearly two months before the others. It is a curious fact that fowls of the same breed hatched in March and April, respectively, will not start to lay within a month of each

other. The March birds are almost certain to lay six weeks earlier. That in itself is a great consideration. If I were to reckon up the actual cost of the two lots of birds without taking into consideration time and labour, the chickens I bought at five weeks' old were worth twice as much to me. In fact, it would have paid me to give twice as much for the five-week-olds as I paid for the day-old chickens.

In dealings of this nature, however, one has to be careful. When chickens are a month old and over, it is comparatively easy to distinguish pullets from cockerels, and there are some dealers who would not hesitate to select a large proportion of the male birds. Personally I have not been the victim of this trick. It would then be a wise provision in buying chickens over a month old to stipulate that a fair proportion—about one-half—be pullets. If one knows and can trust the seller, such a course would be unnecessary, but in dealing for the first time with an unknown man it would be better to make equal numbers of pullets and cockerels a condition of sale. With the heavier breeds it would be most difficult to distinguish cockerels from pullets at a month old, and in that case one might take one's chance, for even if the seller tried to keep back pullets he would as likely as not make mistakes.

Another plan would be to buy, say, two-month-old pullets. It is simply a question of price. There are not many poultrymen who would be willing to sell two-month-old pullets at less than two shillings each, but even then they would not be too expensive as contrasted with the same bird at six months, when it would be worth anything from six to eight shillings.

If there be a reliable poultryman in your district it would pay you better to give him a trifle more and see your fowls before you paid for them. In reckoning the price of fowls bought at a distance there is always the cost of carriage to take into account, while if you make your purchase locally that item disappears.

If a beginner has a stock of twelve pullets at the laying stage it will be found profitable to dispose of half of them at the end of the first laying year, and to replace them with six-month-old

birds, and to repeat the process every autumn, say about the end of September. The clever amateur will not need to be told which six to dispose of. If he has any power of observation he ought to be able to single out the fowls that lay frequently, and those that do not. With a small flock it does not require trap-nesting to know the most prolific birds, but if the owner has the leisure to trap-nest his fowls he will find it an interesting study. Trap-nests can be bought from any appliance maker. The principle is as follows :—

You first put rings round the legs of your fowls. These rings are numbered consecutively. Four nests are quite enough for a dozen birds. When the fowl enters the nest to lay, the door quietly closes behind her and she cannot get out till released. This is where the work comes in. Those in charge of the fowls must visit the house every hour or so and liberate the captive birds, in order to make room for the others. When you release the fowl you observe the number on its leg, and on a paper or chart pinned securely to the wall of the house you record the egg laid.

But, as I have said, a man with a few fowls need not, unless he pleases, bother about trap-nesting his birds. He will use his powers of observation to select the best birds and keep them for a second season. The others, who may also be good layers, he will dispose of if possible, to someone who wants to make up a breeding-pen. Second-year birds with a cockerel, if advertised, often fetch excellent prices, especially if one can guarantee that the fowls come from a good strain. It just requires a little thoughtfulness to make the most of your own fowls.

CHAPTER VI

HOW TO MAKE AN INCOME

A CITY MAN once wrote to me asking what amount of capital would be required to bring in an income of £400 per annum from poultry. It was one of those innocent questions which show that the questioner is a very innocent person.

What amount of capital would be required in any business to produce £400 a year? Obviously nearly everything depends upon the capability and character of the man taking up the business. A clever man well up in the work would need a smaller sum than a clever man who had to learn the business. Some men are so stupid or careless, or both, that they could never make £400 per annum, no matter what amount of capital they employed; they would be much more likely to lose their money.

Perhaps there have been a larger percentage of failures in the poultry industry than in any other business. The reason is not that poultry-keeping is less lucrative than other businesses, but rather because the class of person that has gone into it has not sufficiently realised that poultry-keeping is really a skilled industry.

It was once said to me that people who have failed at everything else take up poultry, and no doubt there is some truth in the remark. Now, if there is any business that people should shun who have failed at everything else it is the poultry business. I know of nothing that, apart from skill and knowledge, requires such attention to detail, such unremitting care and watchfulness, as the rearing, feeding and housing of poultry for profit.

Any intelligent person may, with little knowledge, keep a few fowls profitably, but when one attempts to earn one's whole

livelihood from poultry the proposition becomes entirely different. One may keep ten fowls and make a profit of £3 per annum, but it is more difficult to make £30 from a hundred birds, and more difficult still—but still possible—to make £300 from a thousand fowls. It is not a simple sum in proportion. There is the question of labour, rent and interest, never reckoned by the man keeping a few pullets for domestic purposes. There is the danger of disease in big flocks ; there is the packing, carriage and marketing of eggs ; there are the appliances, the egg-boxes and a hundred other items that eat up profits.

What amount of capital is necessary to make £400 per annum from poultry ? Supposing one desired to buy a business already producing that amount of profit. In the first place, it would be extremely difficult to find such a business—there are probably not a hundred such in England. But having found the business, the difficulty would be to find anyone willing to sell it at a reasonable figure, for, despite its difficulties, a well-organised and profitable poultry farm is one of the most fascinating businesses in existence. It is a delight to see one's baby chicks grow from little balls of wool, through their various stages, up to feathered giants laying their diurnal egg. Few industries bring us so close to creation ; few keep one so intensely interested.

But having found someone willing to sell a poultry business yielding £400 per annum, what would one have to pay for it ? First of all, not less than five years' profits for the goodwill. That is £2000. One must suppose a stock of 2000 laying and stock birds. At 7s. 6d. each that is another £750. Put down buildings and appliances at only £750 and you have a total of £3500. This sum invested in Exchequer Bonds would produce £200 per annum without risk. A poultry farm, even for the expert, is not unattended with adventure, but for a novice it is a gamble, and a very real gamble at that.

At the same time, I think that poultry-farming conducted upon sound lines is a good investment, provided there is a fair amount of business ability and some knowledge behind it. It is not a game for the slacker or the dilettante. And one had better begin

on a modest scale and build up a business out of profit and experience.

I have said that any fool can keep chickens, but it takes a wise man to make chickens keep him. The foolish, of course, disappear, and only the wise remain. That is why most poultry-farmers are "knowledgable" men.

Poultry-rearing is more or less a skilled industry. It is "more" if you take up all branches, including fancy breeding; it is "less" if you take up egg-farming only.

In the production of eggs only, special skill is not absolutely necessary to a beginner, but it goes without saying that the more skill one possesses the more certain is one to succeed.

TWO SUCCESSFUL MEN

Let me give a couple of illustrations where two men with a very limited knowledge took up poultry-rearing when war broke out, and look like making a success of it—one, a city man past the meridian of his years, and the other a young, energetic, professional man.

The case of the elderly city man looked very doubtful. When he resolved to begin poultry-farming he could not have named three varieties of fowls. He had certain general (and vague) ideas about feeding and housing, but had never used an incubator in his life. Before committing himself to his new career he read some of the best literature on the subject, and before actually taking a farm he had a fair theoretic knowledge of poultry, and that was all.

His capital was strictly limited, and he was compelled to begin in a small way. He was aiming at £400 per annum, but was content to accept a fourth part of that sum the first year.

He began with a few pullets, and in the spring of last year he started to incubate. Naturally, he made mistakes, and the mortality among the baby chicks was twice as high as it ought to have been. But he profited by his experience. He had a trained business brain, and he used it. He did not repeat his mistakes.

It will, of course, take him years to see all the capital he has embarked converted into cash, but the assets are there, and he is undoubtedly successful. He has been lucky in keeping his fowls entirely free from disease, but it is not all "luck" that has done that. He has been painstaking and thorough.

The other man who made the adventure into the poultry world is young, keen and clever. Although a professional man he is handy with hammer and saw, and has constructed several magnificent poultry-houses. Fortunately he had no lack of capital.

But his very enthusiasm often led him astray. He wanted to create a perfect poultry farm in twelve months. It cannot be done; at least, it cannot be done by a novice. There are many pitfalls for the unwary in poultry-farming, and during his first season he found his share of them.

Incubators are ticklish things, especially to those without experience. A few degrees of heat too few, and the eggs do not hatch; a few too many, and they get roasted. Lamps occasionally play tricks, and a whole hatch may be destroyed in an hour. An incubator requires unremitting attention. I know of one man who has one incubator with a capacity for 5000 eggs. Imagine an accident with that number. This big hatch is watched day and night until the chicks appear.

And one may feed the chickens wrongly. An expert will say that it requires on an average two eggs to get a chick and three to produce the adult hen. Some people get a tremendous mortality among chickens between the ages of one day and one month. After that there need be few casualties.

Still, in spite of mistakes—some of them costly—the young professional man won through. He began with that little knowledge which is a dangerous thing. Now he has real knowledge and real experience behind it. Anyone looking at his farm as it is to-day, with its 1000 head of stock, soon to be swollen into 2000, would hardly believe that it was only twenty months old.

Out of a barren field and woodland he has created a first-class egg farm. He has spent money, lavishly if you will, but that

A PROUD MOTHER

Photograph by Mrs. Hedley Symons

REARING CHICKS IN COPPICE

Photograph by Mrs. Hedley Symons

money will come back. A little is coming back now. Next year the farm will not only be self-supporting but it will support him and his family as well.

Despite the price of poultry food, and it is unconscionably high, there is money in eggs. But let those who mean to make a start be warned that it is not a business for a lazy or a careless man. Only the industrious and the persevering can make it pay. The beginner must do all the work himself until he approaches a thousand adult birds. Then, and not till then, must he pay an assistant. He must work hard and work long hours.

The Summer Time Bill will not help him. He must borrow light from the stars.

It is a great responsibility to advise anyone to start a new business, and yet I am constantly being asked by correspondents whether they should take up poultry-farming.

Failures are more numerous in poultry-farming than are successes—not because it is really a difficult business, but because everyone—everyone who has not tried it—thinks it is so easy and so simple. If people would only realise that egg-production and the rearing of chickens require far more attention, more skill and more knowledge than, say, the running of a grocery business—if aspirants to poultry-farming only realised this, there would be less danger of failure.

With this proviso I may proceed to deal with the letter of a correspondent, who writes :

“I am anxious to get a little advice about poultry-farming. I am seriously thinking of starting a small farm, in which I want to get a living for myself, wife and two children—a girl of 15 and a boy of 14. I have been in London some 15 years, but was brought up in a Midland village. I have a small sum of money—about £200. Can I start on this amount with a fair prospect of making a living ?

“I have thought I could run 200 fowls with this sum, say, 100 White Leghorns, 50 Minorcas, and 50 of another good breed.

I have the offer of a small house and garden, and $2\frac{1}{2}$ acres of paddock and outbuildings, for a rental of £20. It is a few miles from Colchester.

“My manner of living is very moderate. We seek no pleasure outside our work. My wife’s people are successful farmers. I should be greatly obliged if you could give me your advice and opinion as to whether I ought to be able to make a living (say, £1 per week).”

ADVENTUROUS SPIRITS

I have an idea that hundreds of others besides my correspondent are similarly thinking they would like to take up poultry-farming, but hesitate to make the plunge.

My advice to every one in a similar position is that if making a decent living elsewhere they should stick to it. A bird in the hand, etc. At the same time, there are adventurous spirits—not always to be discouraged—who will probably make the effort, and if I can assist any such by advice, I will gladly do so.

If any reader with £200 capital has made up his mind to try poultry-farming, there is no good reason why he should not go on. My correspondent does not say so, but I assume that he knows enough about the rearing and feeding of poultry to justify the venture. His idea to run 100 White Leghorns, 50 Minorcas, and 50 of another good breed is a good one (I suggest Rhode Island Reds as the third class). But where is he to get them?

With his £200 capital, out of which he must live for the greater part of a year before a profit begins to loom in sight, he can hardly afford to buy 200 pure-bred fowls, with sufficient housing accommodation. At the present prices of food they will cost at least £2 per week to feed.

To begin poultry-farming with 200 adult fowls is quite impracticable on £200 capital. If he were to wait till January, and buy, say, two pens of White Leghorns, one pen of Minorcas and one of Rhode Island Reds, he could begin to breed almost at once, and rear his own stock of 200 pullets (400 fowls), which would be ready

to lay in the following October. The sale of the cockerels would, to some extent, repay him for the rather heavy food bill.

By Christmas he would be selling 30 dozen eggs per week, provided everything went well, and that he made few mistakes. It is a mistake to think that eggs are all profit. A man may be selling £10 worth of eggs per week at a profit of only one-fourth of that amount. No doubt 30 dozen eggs per week from 200 fowls at Christmas would yield a very handsome profit, but the difficulty is to get a full supply in the winter months.

If my reader goes into the poultry business, he might begin as I suggest, and on the land that is not in use for poultry he should grow as many cabbages, swedes and mangolds for chicken food as he can pack into the ground.

CHAPTER VII

HOW I BEGAN AS AN EGG-FARMER

I HERE give for the first time the true story of my own beginning as an egg-farmer. While it is a remarkable record it is by no means unique. I link it up with the story of another "Man of Kent," Mr Hall of Grove Hill, West Peckham, Maidstone. I do not know Mr Hall, have never spoken to him, but when his balance-sheet was published in *The Journal for the Board of Agriculture*, I got into communication with him and he sent me the balance-sheet in detail, which I reproduce at the end of this chapter. The difference between Mr Hall and myself is that he had kept chickens for years while I was a mere novice at the business. Our methods also were different. He used the ordinary old-fashioned wet-mash feeding, while I used the dry-mash method from the beginning, and I am so convinced of the labour saving in the latter method, apart from anything else, that I mean to stick to it to the end. The comparative value of the two systems is dealt with in the chapter on Feeding.

My capital was strictly limited, but I reasoned that to make sure one ought to buy one's original stock from a reputable man and pay the full market price for it. There is no business on earth where the cheap and nasty element is so common as in poultry-farming. There is, I regret to say, a section of the poultry world that lives by fraud. There is more downright swindling in the poultry business than in horse-dealing. You may buy a horse from an advertisement, but never buy a fowl excepting on approval. When I began the business I bought my birds from a reputable man and paid a lot for them. My Leghorn pullets—70 of them—cost 10s. each, my Leghorn hens—40 of them—cost 6s. each. I have not regretted the deal. By a stroke of luck I bought 40

Buff Orpington pullets locally at 3s. 4d. each, and these did exceedingly well.

I also bought the best houses that money could buy and I determined to give the fowls the best food possible. I had a common-sense idea that if you do not put the best into them you will not get the best out of them. And it proved correct.

To run egg-farming successfully does not need a great deal of technical knowledge. The study of disease is not essential. The most successful egg-farmer in England does not know anything about the ailments of fowls and does not want to know. If a fowl is really ill he kills it at once, and by so doing frequently prevents the spread of disease. After all, a bird costs only a few shillings, and while you are spending time and money in trying to cure it, the sickness may spread to the rest of the flock and involve them all. Common-sense says "kill it."

High technical skill in treatment of disease is rather a hindrance than a help in egg-farming. It is far more necessary to know the elements for the prevention of disease. These may, ninety times out of a hundred, be expressed in one word—cleanliness. This means also the use of disinfectants. Keep your houses clean, keep your birds free from parasites, and the rest may be given out with the washing. If a bird "goes light," becomes consumptive or captures chronic diarrhoea, it will pay you to kill it and burn it. Leave nothing to chance, or chance will leave nothing to you.

MY METHODS

If anyone were to ask me what was the most vital matter in egg-production I would say feeding. One must, of course, assume that the stock comes of a deep-laying strain, but the good strain and the moderate strain, and even the bad strain, will only do its best when properly fed. While one must try to feed as economically as possible, this does not mean that the food is to be stinted. On the contrary, the most economical feeding is usually an ample feed of the best quality. In a recent egg-laying competition, where 300 birds yielded an average of 175 eggs in ten months, they each

consumed 3 oz. of grain and $1\frac{1}{2}$ oz. of soft food per day, at a cost of $3\frac{1}{2}$ d. each hen per week.

If you give your birds the proper sort of food they will rarely overfeed. Underfeeding is the common cause of poor egg-production. Of this I am convinced. Mr Hanson, of Basingstoke, who is the model egg farmer, gives his fowls two ounces of grain per day, and leaves his dry-mash hoppers open twenty-four hours per day. His birds get as much as they can eat and they never get fat. Too much soft food will make birds fat and lazy and prevent egg-laying. Why then give soft food?

The majority of those who fail to get eggs from their fowls give too little food, or give them food of the wrong kind. To produce eggs a hen must be supplied with the requisite egg-forming material. Albuminoids must be in the relation of about one to five of carbohydrates. The former makes eggs and flesh, the latter creates heat and vital energy. Fowls are not by nature strict vegetarians. They can exist on vegetable matter, such as wheat, oats and cabbage, but on this diet they will not give the proper yield of eggs. To give their best results they require a mixed diet of grain, meals, meat and vegetables. Meat meal, green bone or fish meal is a necessary stimulant for egg-production. No doubt if the fowl could get plenty of insects it could dispense with meat, but excepting for a short time in spring and summer, on a free range, hens cannot pick up sufficient natural meat diet. Therefore we must supply it.

A formula used by some of the most successful men is one part (by weight) bran, one middlings, one maize meal, one fish meal. If soya-bean meal can be bought at a fair price one part may be added. This diet may be given either as dry mash or moist food in the usual manner. If supplemented by not less than two ounces of grain per bird per day, fed morning and evening, the feeding will be complete. I recommend a hopper for dry food to be open all day. The birds eat very little, if any, more than if left open only for a few hours, and then one is certain that the shy feeder will get her chance. When food is served moist, it is difficult to say just what is enough, and the greedy ones gorge, to the detriment of

the shy ones. With warm moist food many fowls stuff themselves and go to sleep instead of remaining active and keeping in condition for laying. With dry food a hen cannot take more than a few mouthfuls at a time. She has then to run away to drink, and is thus kept active. Mixing wet food is a tricky and delicate problem. One may easily make it too moist or too dry. To be right it must be "just so." It is better, easier and cheaper to allow the fowl to mix the food to her own liking. Feed it to her dry and she will do the rest. One can mix enough dry food to last for a week. Place it in a hopper and the feeding is done for seven days, excepting for the scattering of grain in the litter night and morning. If poultry are kept on a large scale the labour saving is simply enormous. At least one man's wages will be saved on every thousand birds.

It is not much use feeding well if one does not house the birds comfortably. Feeding and housing are complementary and interdependent. To feed a bird well and to place her in a cold, draughty house is to take away with one hand what you have given with the other. The purpose of food is to supply the necessary elements for the wear and tear of the body, for the creative impulse—which means eggs—and for the proper supply of heat. The blood heat of fowls is 104° , or fully 5° above that of the human body, and therefore a steady supply of fuel is necessary to her health. If you put her in a cold house she will spend her vital energy in trying to keep warm instead of conducting the natural process of laying eggs. To get a full supply of eggs the fowl must not have to contend with the disturbing elements of cold and draughts. She should be encouraged to devote all her energies to egg-production. In other words, she should be kept in conditions that render her bright, happy and healthy. How often does one see fowls sitting around huddled up, feathers all raised in an attempt to keep warm. A sad, miserable hen will not lay eggs. Therefore give her a snug, warm house, of ample proportions, with plenty of clean litter where she may scratch and prosper. Make her winter conditions—we have eight months of them—as comfortable as her summer conditions and she will

respond by giving you a supply of eggs all the year round. But do not give her artificial heat. Fowls do not mind dry cold if they are sufficiently fed. Give them a large, well-built scratching shed to protect them from wind and rain and they will be perfectly happy. To accommodate 100 birds a house 16 feet by 24 feet is about the minimum accommodation. The house should have an open front, protected from storms by canvas shutters, which exclude the rain but not the air and light. Roof ventilation or small holes bored through the wood close to the roof at the back of the house are equally good. Mr Hanson runs 400 pullets together under one roof with short subdivisions of wood and wire to accommodate 100 in each compartment.

I began with a house 30 feet by 16 feet, in which I kept 120 Leghorn pullets, and another house 16 feet by 9 feet, in which I kept 40 Buff Orpingtons. Mr Hanson's houses are 180 feet by 9 feet for 400 birds, and seem to do remarkably well, but I prefer a house 24 feet by 12 feet for 80 to 100 birds. I think a grass run better than arable land. If one uses arable land it has to be ploughed and planted with vegetables every year to keep the ground sweet and clean. Alternate winter and summer runs are necessary if the ground is not to get foul.

No flock of birds should be kept more than twelve months continuously on the same land, but if the ground is allowed to rest and recover for the same period, it will be found perfectly healthy.

Foul ground, which means poisonous ground, has been the undoing of many a poultry-farmer. He may have done well for one year, or where well drained, for two, or even three years, but invariably it only needs the lapse of time to find him out. A bird's head is on the ground most of its waking moments, and if it is eating off a poisoned surface it will inevitably be poisoned too. My birds run on a large area of lucerne grass, which is an excellent food for them. In the winter I turn them out on the south side of the house and on the north side in the summer. I have so far suffered from no form of disease whatever. The few birds I have lost—less than six per cent.—have died mostly from ovary troubles inseparable from laying pullets.

MY RECORDS

My pullets were rather young and undeveloped when I got them and eggs came very slowly at first. It was towards the end of January that the figures began to rise, in February they jumped, in March they leaped and in April they overflowed.. From 110 pullets and 50 eighteen-month-old hens I got only 16 eggs on the first of January. On the last day of the month I got 54—the total for January being 1224. On the first day of February I got 58 eggs, on the last day 77—total 1682. On the first day of March I got 88, on the last day, 108—total 2760. On the first day of April 110, on the last day 104—total 3194. It may be remarked that my best days were on 4th, 10th and 14th April, when I got 128 eggs per day. May saw a slight decline. On the first day 100, on the last day 78—total 2832. June 1st gave 75, 30th June, 70—total 2191. July, 62 on the first day, 68 on the last—total 2074. August, 68 on the first, 35 on the last—total 1446.

September was a very uniform month, but there was a gradual decline, and the total was 1191.

The month of October reached the low-water mark. Many of the birds were still moulting and few had fully recovered the annual visitation when feathers and not eggs are produced. Still, I just kept over the four-figure mark, with a total of 1054.

November saw an improvement, with a return of 1281, and the figures gradually increased during December, till the total reached 1463.

The following, therefore, were my records month by month :—

January	.	.	.	1224	August	.	.	.	.	1446
February	.	.	.	1682	September	.	.	.	.	1191
March	.	.	.	2760	October	.	.	.	.	1054
April	.	.	.	3194	November	.	.	.	.	1281
May	.	.	.	2831	December	.	.	.	.	1463
June	.	.	.	2191						
July	.	.	.	2074	Grand Total	.	.	.	.	<u>22,390</u>

Excepting for 1200 eggs laid by young pullets, this was my record from 160 laying hens. It gives an average of 132 eggs per

bird for the twelve months. When one considers that during ten weeks of the best part of the laying season as many as 28 of these 160 hens were hatching eggs and rearing chickens, it will be seen that the record is quite satisfactory. Taking the Leghorns by themselves, I find they laid 142 eggs per bird, while the Buff Orpingtons, that did all the hatching, worked out at 124 eggs per bird for the year.

It ought to be taken into consideration that my 160 fowls were kept in two flocks of 120 and 40. Large numbers together do not give quite the same generous results as when pens are divided up into groups of 10 to 20 each. Why this should be so is a problem that has never been satisfactorily solved, but possibly with smaller flocks the birds get more individual attention.

It is acknowledged that any figure approaching 150 eggs per bird per annum in large flocks is not merely a paying proposition but a thumping good result. In laying competitions with selected birds, kept in pens of six, and each bird nursed by an expert, it is possible to get averages at or over 200 eggs per bird, and that ideal is what the commercial egg-farmer has to work for. In the meantime, flocks of hens that lay over twelve dozen each per year are already on a commercial basis.

In the twelve months I sold approximately 21,700 eggs, for £183, 15s. 6d.

I raised from eggs 241 chickens, of which only 109 were cockerels. Most of the cockerels I kept till they were six months old, when they averaged 4s. each—total £21, 16s. The remaining 132 pullets I valued at the end of the year at 6s. each, and I could easily have sold them for more—total for pullets, £39, 12s.

We can now state the Grand Totals :—

Eggs	.	.	.	.	.	£183	15	6
Cockerels	.	.	.	.	.	21	16	0
Pullets	.	.	.	.	.	39	12	0
							<hr/>	
						£245	3	6
Cost of food	.	.	.	.	.	127	16	8
							<hr/>	
Gross Profit	.	.	.	.	.	£117	6	10
							<hr/>	

It is now a question of what should be allowed for depreciation of stock and buildings. The stock, with the exception of eight deaths, is still intact, and the new pullets are as good as the old. I have the old stock to breed from next season, when the birds will be two years old, and the progeny should be better than ever. If I allow £10 for depreciation and loss it will be ample. The buildings are none the worse for wear, but a ten per cent. depreciation will leave them "free" in ten years' time, when they will have many years of usefulness. Ten per cent. on £60. is £6; therefore, if I deduct £16 from a gross profit of £117, 6s. 10d., we get a net profit of £101, 6s. 10d. for the twelve months.

Does anyone know of any other industry where a similar outlay will meet with a similar return? I cannot attribute my success to mere luck, because no matter how lucky a man may be other factors are demanded. He must work hard and patiently, pay great attention to detail, do most of the essential things himself, take the utmost care of his stock, buy in the cheapest markets, sell in the dearest and never spend a penny that is unessential. Had I been a handy man with tools I might have done a little better, but wherever it was possible I refrained from calling in outside aid.

DO LIKEWISE

If my experience in making over £100 during the first year were unique it would be necessary on the part of a second party to accept my statements with reserve, or at any rate to look upon the achievement as something in the nature of a freak result, but, as it happens, others have done equally as well, and several even a degree better.

In *The Journal of the Board of Agriculture* for August, 1916, will be found the balance-sheet of Mr Hall, Grove Hill, West Peckham, Maidstone, in which it is shown that he made a net profit of £104 during the twelve months from 1st November 1914 to 31st October 1915. Compared with my own experience Mr Hall did not produce nearly so many eggs as I did, but he bred far more birds and got a big slice of his profit in this manner.

If I had sold all my eggs and done no hatching, my gross profit

would have been £94, while if Mr Hall had sold all his eggs and bred no chickens his profit would have been just under £70. It should be noted, however, that as Mr Hall used less than £50 capital, he shows a larger yield on his money. Mr Hall was able to use considerably less capital than myself because, during his working year, fowls and buildings and appliances were very much cheaper than in 1916, when my experiment was made. He also informs me that he bought a good many of his houses second-hand, and judging from the figures he sets down he got them remarkably cheap. A number of his smaller appliances were made by himself.

All my fowl-houses were new, and made in the most substantial manner, two of them having brick foundations and two with wooden floors. I take it that my buildings will outlast those of Mr Hall, by many years, so that I need not have put down ten per cent. for depreciation as I have done to be on the right side. Mr Hall, as I said, bought his original stock at a very low figure, and he had the good fortune to buy his food-stuffs at least forty per cent. cheaper than I did, and he had the great good fortune to get nearly as much for the fowls he sold as I did. I certainly got a larger price for my eggs, but this hardly compensates for his cheap foods and the excellent market he found for the birds he sold. No doubt the reason why I got so many more eggs than he did was because nearly all my fowls were so much younger than his flock. While I sold £183, 15s. 6d. worth of eggs, he sold only £104 worth.

His actual number of laying birds, he tells me, was 138, and he had no fewer than 70 broody hens sitting for the better part of nine weeks, the average number of hens laying during the year, he thinks, not being more than 100. With such a large proportion of his hens being used as broodies, it is not of much account to work out his average, but if we include in 138 as I did the whole of my stock of 160 the average works out at 110 per bird. Where one half of one's hens are used for hatching it is, of course, quite misleading to quote an average for eggs. I was more of an egg-farmer and Mr Hall was more of a breeder, but in both instances the profits were very much alike.

The detailed statement of the balance-sheet which Mr Hall

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was good enough to send me is published here for the first time. I am giving the whole of the details for several reasons—to show the careful way in which Mr Hall kept his accounts. He gives the quantities and prices of everything bought and sold. Every egg and every bird is accounted for, and the whole statement is a model of what a balance-sheet should be. It is interesting to show that it was signed by Mr G. H. Garrad, Agricultural Organiser for Kent.

There is only one peculiarity in Mr Hall's food-stuffs that I wish to draw attention to. It will be seen that he used 81 cwt. of middlings and only 1 cwt. of bran. I use exactly the same quantity of bran as I used of middlings, though if I include maize meal, and bracket it with middlings, then I use one half bran to one of the other two meals. To all intents and purposes Mr Hall did not use bran at all, for an odd hundredweight bears no relation of consequence to 81 cwt. of middlings. Mr Hall's results show that bran is not a factor necessary to success, but it need not imply that bran is not a highly economical and efficient food. Bran and middlings are simply the outer and inner casings of wheat. Both have their special qualities. Bran, with its larger percentage of phosphates, is better for making bone, and middlings, with its larger percentage of protein, is better for fattening. Of recent years bran has come into great favour among egg-farmers, and I certainly think that it ought to be largely used.

Mr Hall did well, I think, to use wheat and whole maize in almost equal proportions. It has been demonstrated that maize can be fed much more largely than is generally supposed without causing liver trouble. It is only during the three or four hottest months of the year that whole maize should be discarded. From November to February, inclusive, few fowls—especially light breeds—would come to harm if whole maize formed their only grain diet. At the same time it is better to vary the diet, and I would feed, when prices permitted, oats, dari and wheat at all seasons of the year.

The following is Mr Hall's balance-sheet. It deserves careful study.

No rent is charged on this account, the ground being fully cropped with fruit and nut trees, the value of the manure being more than equal to any sum due as rent. In addition the birds work the ground and keep it free from weeds and thus a considerable amount of labour is saved. The cost of attendance has not been included. Audited and found correct.

G. H. GARRAD, *Agricultural Organiser for Kent.*

G. H. GARRAD, Agricultural Organiser for Kent.

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Since writing the above I have received from Mr G. H. Garrad, N.D.A., Agricultural Organiser for Kent, a second balance-sheet dealing with Mr Hall's poultry farm, which shows that even more profits are being made.

POULTRY-KEEPING AS AN ADJUNCT TO FRUIT-GROWING

By G. H. Garrad, N.D.A., Agricultural Organiser for Kent

The following figures and balance-sheet show the results of a year's working on the smallholding of Mr Wm. Hall, of Grove Hill, West Peckham, near Maidstone. Mr Hall and his son of twenty-one years of age work a holding of twenty acres of land on the Kentish Ragstone Formation (Lower Greensand). The land lies on the slope of a steep hill facing south, an ideal situation for poultry. It is cropped as follows :—

- 7½ acres Cob Nuts with Standard Apples as top fruit.
- 3½ acres Gooseberries with Half-Standard Plums and Damsons as top fruit.
- 3½ acres Gooseberries with Half-Standard Apples as top fruit, interplanted with Cob Nuts.
- 1 acre arable land for Potatoes, Mangolds, Oats, etc., for the pony and cow.
- 3 acres meadow land.
- 1½ acres pasture.

Total 20 acres.

Nearly all the ground is under fruit, and is kept cultivated and free of weeds. The fowls keep the ground well worked and the weeds in check, thus saving a considerable amount of cultivation.

Mr Hall took up poultry-keeping on a commercial scale for the first time in 1911, as the result of attending a course of lectures given by the County Council Instructor in Poultry-Keeping, and ascribes most of his success to the instruction and advice he has received from time to time from the same source. He usually wins the chief prizes at the annual county competition, and is one

of the Kent Station Holders under the Board of Agriculture's Egg Distribution Scheme.

In the following balance-sheet, which covers the year from 1st November 1915 to 30th October 1916, no rent has been charged against the fowls, the ground being fully cropped with fruit trees and nut bushes. The value of the birds' manure may be considered to be more than equal to any sum due as rent.

The cost of attendance has also not been included, as it is difficult to say exactly how much should be charged under this head. Mr Hall and his son work the whole of the twenty acres without any outside help, so that only a proportion of their time can be charged to the poultry. Feeding and general attendance occupies both of them for about two and a half hours a day—rather more during the hatching season—and a whole day about once a fortnight would be occupied in cleaning out the houses, etc. When sittings of eggs have to be sent away, the packing of them is usually done in the evenings after dark. Charging 6d. per hour, £40 would appear to be a liberal allowance for the cost of attendance for the year. A pony is kept to take the fruit to the station and to work on the holding, as well as carry the eggs to market. The nearest station is Watlingbury, four miles away, and Maidstone is about nine miles distant.

The hens are confined in permanent runs. The position is not moved from year to year, but the runs are large and the ground is kept cultivated. At the time of writing (10th December) there are 334 adult birds, and the runs occupy altogether six acres of ground cropped with cob nuts, with standard apples above. The chickens, of which there are 200 at the present time, have a fresh piece of ground each year, and have a practically unlimited range on gooseberry plantation and grass land.

No expensive appliances are kept, most of the houses and runs being made at home. There are no incubators or foster-mothers; all the eggs are hatched out under hens.

The following explanatory notes on each item of the balance-sheet will be helpful. The accounts have been carefully kept and every item has been checked and put into place by the writer.

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EXPLANATION OF THE BALANCE-SHEET

1. 18,142 Eggs sold for Domestic Purposes

The details under this heading may be classified as follows:—

Month	No. of Eggs sold	Average price per dozen		Income		
		s.	d.	£	s.	d.
November	922	2	8	10	5	7½
December	1,200	2	8½	13	12	5
January	950	2	0	7	15	9½
February	1,698	1	7	11	5	5
March	2,538	1	7	17	2	0
April	2,495	1	5	14	12	3½
May	2,998	1	5½	18	9	11½
June	1,814	1	8	12	16	5
July	2,141	1	10	16	9	2½
August	1,011	1	11	7	16	11½
September	249	2	5	2	11	9½
October	126	2	9	1	9	8½
	<u>18,142</u>	<u>1</u>	<u>9</u>	<u>£134</u>	<u>7</u>	<u>7</u>

The extremes of prices for the eggs during the different months were as follows:—

In November from 2s. 6d. to 3s. per dozen.
In December „ 2s. 3d. to 3s. „
In January „ 1s. 6d. (Small) to 2s. 3d. per dozen.
In February „ 1s. 6d. „ to 2s. „
In March „ 1s. 6d. „ to 1s. 10d. „
In April „ 1s. 3d. „ to 1s. 6d. „
In May „ 1s. 3d. „ to 1s. 6d. „
In June „ 1s. 6d. „ to 1s. 9d. „
In July „ 1s. 7d. „ to 2s. „
In August „ 1s. 10d. „ to 2s. 6d. „
In September „ 2s. „ to 2s. 9d. „
In October „ 2s. „ to 3s. „

At eight to the lb. the above eggs would weigh 2268 lb., or 1 ton 28 lb., and would cost £137, 10s. per ton.

2. 2131 Eggs sold for Setting

Nearly all these sittings were sold at 3s. 6d. per sitting, but twenty were sold as low as 2s. 6d. The average price was 3s. 4½d. per sitting.

A sitting consisted of 12 eggs if to be dispatched ; 13 eggs if called for. Altogether 163½ sittings were sold, infertile eggs usually being replaced free of charge if returned.

3 and 4. Board of Agriculture's Scheme

The Board of Agriculture gave a grant of £7, 10s. on condition that not less than 100 sittings were sold at 2s. per sitting. With the grant, the price realised per sitting works out at 3s. 5½d.—i.e. a penny per sitting more than the sittings sold privately.

5. 80 Infertile Eggs

The results of home hatching were as follows:—

Month	No. of Hens set	No. of Eggs set	Infertiles	Hatched out	Percentage of Fertile Eggs hatched
February . . .	5	58	5	33	62
March . . .	37	438	35	282	65
April . . .	27	329	19	233	75
May . . .	20	258	14	191	78
June . . .	1	10	0	10	100
July . . .	3	42	5	27	73
August . . .	9	114	2	85	76
September . . .	8	101	0	72	71
Total . . .	<u>110</u>	<u>1350</u>	<u>80</u>	<u>933</u>	<u>73</u>

Nineteen chickens were lost through stoats and four through rats.

Up to the end of May 89 hens were set on 1083 eggs as follows:—

261	eggs were Buff Orpingtons, of which 188 hatched out—72%
311	„ Salmon Faverolles „ 205 „ —66%
198	„ White Wyandottes „ 112 „ —57%
104	„ Black Minorcas „ 75 „ —72%
94	„ Black Leghorns „ 71 „ —75%
115	„ White Leghorns „ 88 „ —76%
<u>1083</u>	<u>739</u> „ —68%

No Black Minorca or White Leghorn eggs were set until March. The eggs set after the end of May were not classified.

6. 159 Hens sold

The hens were all sold between June and September at prices varying from 2s. 6d. to 4s. 3d. each. The average price was 3s. 4d.

7. 397 *Various Birds sold*

Details of this item are as follows:—

4 Chickens sold between July and October at from 1s. 4d. to 1s. 6d.	£0	5	6
132 Chickens sold in November and December at from 2s. 5d. to 2s. 9d.	16	8	8
79 Table Chickens sold in September and October at from 2s. 9d. to 3s. 6d.	12	7	0
81 Cockerels sold between July and October at from 2s. 8d. to 5s.	12	14	5
2 Fat Cockerels sold on 7th December at 7s.	0	14	0
60 Mixed Cockerels sold on 3rd October	6	8	4
15 Pullets sold in August, September and October at from 2s. 3d. to 4s. 3d.	2	7	0
24 Chickens sold in May, June and July at from 8½d. to 1s. 2d.	1	3	3
<u>397</u> Birds at an average price of 2s. 8d. each	£52	8	2

Receipts

1. 18,142 eggs sold for domestic purposes . . . £134 7 7
2. 2131 eggs sold for setting . . . 27 10 11
3. 1206 eggs (103 sittings) sold under the Board of Agriculture's Scheme at 2s. per sitting . . . 10 6 0
4. Grant received from the Board of Agriculture for the above . . . 7 10 0
5. 80 infertile eggs used at home at 1d. each . . . 0 6 8
6. 159 hens sold at average of 3s. 4d. each . . . 26 8 0
7. 397 young birds sold at average of 2s. 8d. each . . . 52 8 2
8. Birds bought (see Item 27) and resold on 10th October :—

22 hens at 2s. 11d. . .	£3 3 10
22 pullets at 3s. 11d. . .	4 6 0
7 cockerels at 3s. 3d. . .	1 2 9

9. 28 fowls killed for home use
10. 14 hens let on hire for setting
11. Value of food in stock, 31st October 1916
12. Value of 12al in stock, 31st October 1916
13. Value of birds in stock, 31st October 1916 :—

71 hens at 3s. . .	£10 13 0
241 pullets at 5s. . .	60 5 0
35 cockerels at 2s. 6d. . .	4 7 6
23 cockerels at 5s. . .	5 15 0
52 chickens at 2s. . .	5 4 0
120 chickens at 1s. . .	6 0 0

14. Value of houses, appliances, etc., 31st October 1916

92 4 6
27 11 1½

£400 11 3½

Expenditure

15. Value of food in stock, 1st November 1915 . . . £14 12 0
16. Value of birds in stock, 1st November 1915 :—

60 hens at 3s. . .	£9 0 0
30 hens at 2s. 6d. . .	3 15 0
50 pullets at 5s. . .	12 10 0
12 cockerels at 5s. . .	3 0 0
256 chickens at 1s. 6d. . .	19 4 0

17. Value of houses, appliances, etc., 1st November 1915

20 0 0
147 18 9
0 19 6
0 1 0
0 10 0
9 11 1½
1 9 7
1 12 6
3 11 0

18. Cost of food bought during the year
19. 3 cwt. oyster shell at 6s. 6d. per cwt.
20. 12 china eggs at 1d. each
21. 12al, camphor and permanganate of potash
22. Appliances bought
23. Non-returnable egg boxes and carriage
24. Advertisements, postages, etc.
25. 287 eggs bought for setting
26. Stock purchased :—

4 White Wyandotte cockerels	£1 2 6
10 Buff Orpington pullets . . .	1 8 0
66 day-old chickens . . .	1 6 0
1 hen . . .	0 3 0

27. Stock bought to resell (see Item 8) :—

22 hens at 2s. 6d. . .	£2 15 0
21 pullets at 2s. 1d. . .	2 4 0
15 cockerels at 3s. . .	2 5 0
9 chickens (all pullets) at 9d. . .	0 6 9

PROFIT

£259 4 8½
141 6 7
£400 11 3½

No rent is charged in this account, the ground being fully cropped with fruit and nut trees, and the value of the manure being more than equal to any sum due as rent. In addition the birds work the ground and keep it free from weeds, thus saving a considerable amount of labour. The cost of attendance has not been included, but would approximate about £40.

A profit of £141, 6s. 7d. is left to pay for cost of attendance. Allowing £40 for attendance and supervision, there is a net profit of £101, 6s. 7d., a return of 123 per cent. on the capital invested (£82). It is evident that the poultry have proved very profitable.

CHAPTER VIII

THE BROODY HEN

JUST to show that the incubator has not entirely superseded the old style of hatching, Nature has insisted that at certain seasons of the year certain hens will become broody. It is then that the old mother hen begins to utter her "Cluck, cluck, cluck," and declines to leave the nest. She tells one as plainly as possible that now is the appointed time, now is the hour for the hatching of chickens. I yield to no one in my admiration of the incubator as a useful invention. On large poultry farms it is indispensable and even the broody hen has to take second place, or no place at all.

But it will be long, I hope, before the broody is quite forsaken as a mother or foster-mother. She fulfils her function admirably, and although she can only act on a small scale her day of uselessness has not yet come into view. If she could understand the process of the 5000 egg incubator all under the control of one man, what would she think? Here is a gigantic instrument made by human hands for doing what the mother bird was created for. It would require 500 hens sitting on ten eggs each to perform the operation that one machine can do in the same time.

By the amateur or the smaller farmer the broody hen is by no means despised; indeed there is one very large egg-farmer who, notwithstanding the extra labour involved, hatches the bulk of his chickens by means of broody hens. He has as many as 300 sitting at one time. If it can pay the commercial egg-man to use the broody hen for hatching, how much more is it likely to pay the amateur who wants to raise a dozen or two of chickens.

Speaking for myself, I may say that I did all my hatching by Nature's methods during my first year in business, and was successful in raising about 241 healthy birds from some 400 eggs.

To work an incubator successfully needs some skill, and there are times when any amount of skill will not prevent an "accident," and an accident with large incubators is an expensive amusement. I know of a pupil on a poultry farm, a keen business man with plenty of intelligence, who hatched 16 chickens out of 390 eggs because he failed to control the heat properly. There have been worse disasters even than this. No less than 100 per cent. losses have been recorded before now. I am not, of course, blaming the incubator. It is a most perfect instrument in competent hands. I merely point out that no incubator yet invented is fool proof, nor is it half so simple or half so safe as dear old Biddy the broody.

Anyone can handle Biddy and see her safely through her hatch. She will do the rearing without any help. If left to her own devices she will hatch her eggs perhaps under a hedge and walk in one fine day as proud as a peacock with her brood behind her. But it is better on the whole to keep her under control. There are such things as rats and stoats in the open which will take toll of the baby chicks without protest on the part of the mother. It is rather a strange omission on the part of Nature that the mother hen should not show fight to a rat, especially as she will, during the incubating and rearing periods, defend herself against much bigger animals, including the dog. I have seen a rat sitting on the broody coop preparatory to attacking chickens, with the mother making no move to defend her charges.

It is wise, therefore, to choose your own place and your own time for setting Biddy on the eggs. I found nothing better than orange boxes placed in a shed for the purpose of hatching chicks. Each compartment of the orange box held a broody hen and I put twelve eggs under each. The Board of Agriculture recommends only ten eggs to be under each hen, but if one gets a large broody a dozen eggs will hatch out right enough.

But first of all you must make sure that your broody is broody. She had better be observed on her nest for a few days before using her to incubate. Meanwhile you had better be making a nice soft nest, made preferably of hay, in the orange box compartment, and be sure that it is with a depression in the middle and the edges

raised like a saucer. Having completed the nest, you will then place your eggs in the nest. The eggs should be from twelve to twenty-four hours old, and if possible not more than seven days old. Eggs a month old will probably hatch out, but they will do better when from one to seven days old. And the eggs should as nearly as possible be of the same age. If they are all laid on the same day so much the better, because they will all be likely to hatch out on the same day, but if you have to keep the eggs for a week or two before setting, put them in a box of bran, small end downwards, and see that the temperature is kept somewhere between 45° and 60° Fahr. Eggs kept in this way do not require turning and will keep quite well for three weeks.

WHEN IT IS DARK

With the eggs in the nest you will then wait till dusk before removing Biddy from her resting-place to the nest you have prepared. Hens are quite quiet if lifted carefully in the dark, and they seem not to notice their transference to a distance. If you have a true broody you will have no trouble with her.

Before actually setting the broody to her work make a careful inspection to see that she is free of the parasites that often prey upon her, especially if she comes out of an insanitary house. The parasites are fleas, lice or mites, and of these three the latter are probably worst, but in each instance they depend upon the hen for their livelihood, and consequently diminish her vitality. Lice are perhaps the most common of pests, and some fowls are never free from them. They may not be so injurious to the health of the hen as, say, the "red mite," which is a blood-sucker pure and simple, but they keep her in a constant state of irritation, and as a result make her a bad foster-mother, since she is always fidgeting and getting partially off the eggs in her effort to rid herself of the pests.

Therefore be sure you examine Biddy before putting her on the eggs. Under the wings is a favourite resting-place for lice, and if there are none there it is unlikely you will find them elsewhere.

MR. HEDLEY SYMON'S COMMERCIAL EGG FARM

THE FIRST OF THE SEASON

Whether one finds them or not one ought as a precautionary measure to "dust" the broody round the neck, under the wings and round the vent with some special insect powder, which can usually be obtained at the corn-chandler's.

Having dealt with the insects, place the broody gently on the eggs, wish her luck and close the door of the shed quietly behind you. To make quite sure that all is well, return in a few minutes, and without disturbing her see if she is sitting tight. If she is not on the nest give her another chance, and indeed it will not matter much if you wait till next morning. If she is sitting then all is well, but if not you will have to try another hen. Nine times out of ten she will take quietly to her work.

Every morning, then, you will return, lift her off the nest and feed her by scattering grain, or for preference maize. Maize is the more heating, and will assist in keeping up the "fever" called broodiness. You will also, of course, let her drink. She may wander around a few minutes before returning to her nest, but if she takes too long you can gently shepherd her back. Nature has ordained that the eggs be slightly lowered in temperature once in twenty-four hours, and this the hen does by coming off the nest for from five to ten minutes. It is usually at this interval too that she "turns" the eggs, as she settles down on them again. In the incubator the eggs must be cooled by being exposed to the colder air a few minutes, and the eggs must be turned by hand or other mechanical arrangement. The broody hen saves you all this fuss. She turns the eggs, and as a rule those on the outside of the nest to-day will be found on the inside to-morrow. A very wise bird!

Every day for twenty or twenty-one days you visit her and go through the same performance. I had a dozen broodies sitting in one shed and I lifted them all off their nests at the same time. Sometimes they made a mistake and returned to another nest, but I did not disturb them, and it made no difference in the end. There is nothing to be alarmed about if two hens swop nests. If about the sixteenth day you lift an egg, put it to your ear and listen, you will hear the heart beating of the young chick inside. Perhaps I ought to have told you that about the sixth or seventh day you can

tell the infertile eggs from the fertile by holding them up in a dark room to a concentrated light. If the eggs are fertile they will show a small dark mass on one side. This is the nucleus of the young chick. The infertile eggs will be just as clear as the day you put them in the nest, and they can be used for cooking. They are quite good. If you are in any doubt about the fertility of the egg better leave it in the nest.

On the twentieth day, if your eggs were new, you may see the chicks beginning to appear. Some may be hatched. If you have two broods hatching at the same time it is better to give all the newly hatched chicks to one hen and all the eggs in the process of hatching to another. If there are not more than, say, fifteen young chicks in the two broods you can put them all under one hen. She will like it. The other broody you can put on a fresh nest of eggs or return her whence she came.

Occasionally a chicken will find it difficult to struggle out of the shell. Experts will tell you not to trouble helping it out, because if you do and it live it will never do any good. Perhaps. Anyhow I have helped out a few and they lived, and I know of no reason to suppose they did not thrive. My motto is "Give the thing a chance."

WHEN THE CHICKS ARE HATCHED

As the chickens are hatched clear away the eggshells and make the place comfortable. You ought also, as soon as possible, to remove the hen and her baby chicks to a coop with a run. The coop will be the nursery and bedroom for all and the run will be for the chicks alone. The run should be made of wire with a fine mesh to keep out birds and rats, or one made of wood with wire on top will do equally well.

ABOUT COOPS

If possible the bottom of the coop should be made of wood and should not be a fixture. In other words, it should be cut to the size of the coop and the coop placed on top. This arrangement

will allow the bottom to be cleaned easily. Everyone will tell you to clean out the coop daily, and it is sound advice, but very few are zealous enough to carry it out. If, however, it be cleaned out, say, three times a week the chicks will come to no harm. Sometimes I have been so busy that I have cleaned out the coops only once a week, but this only in dry weather. When wet and damp the coops simply must be swept clean several times a week. No hay or straw is necessary for the baby chicks. A thick layer of sawdust on the wooden floor, or failing that a good sprinkling of fine ashes, will be found a good sanitary arrangement. You need not fear about the chicks being warm enough. The hen will see to that.

CHAPTER IX

CHICKEN-REARING

FOR the first forty-eight hours at least give the baby chicks no food and no drink. It will not matter if sixty hours pass without food. Nature has arranged that the new arrivals have a store of the best possible food inside of them when born. This is nothing less than the yolk of the egg, which is absorbed by the chicken, and is calculated to keep it in the best of health for forty-eight hours. This is why it is not only possible but easy to send day-old chicks by rail, road or steamer for long distances. Day-old chickens will travel to London quite safely from the remote parts of Scotland or Wales, but nevertheless a twelve hours' journey is ample for the young travellers.

There are differences of opinion about the first food to be given to baby chickens. At one time one was supposed to put a peppercorn in their mouths when hatched. This is an exploded idea.

To-day, however, it is widely taught that a hard-boiled egg chopped up fine should be one of their first meals. Personally I think it a mischievous food for a forty-eight-hour-old chicken. If a hard-boiled egg is difficult of digestion by man, how much more must it be for the little ball of fluff that has lately emerged from the egg? The white of an egg hard boiled is not a bad substitute for rubber, and is just about as digestible. The yolk portion crumbled down is probably all right as a food, but I would not even give that hard-boiled before the chicken was at least a week old.

The very best thing and the safest for a first meal is what is called pin-head oatmeal, which simply means the coarsest ground oatmeal obtainable. Oatmeal is the most perfect of all chick foods. If the chickens are in a coop and run this is best fed either on a clean portion of the floor or on a very shallow wooden dish. Nothing but oatmeal need be fed for a day or two, but very soon

get the very best chicken mixture you can buy. It is composed of small seeds of various kinds, including wheat in minute proportions. If there is no fine grit among the chick food add a little yourself. Coarse sand will do. Strange to say, the chicks like sand, and tiny bits of flint. You see the chicken has no teeth—never will have—and it needs something hard, brittle and rough to grind its food to pulp with. The food picked up remains in the crop, where it is all churned up with the flint and then slowly digested. The crop is simply a large pouch low down in the neck of the chicken into which the food is shovelled, pending the process of digestion.

On page 96 is a rough and ready diagram of various parts of a chicken's anatomy, which will show better than anything I can write how the food travels on its way down the digestive track.

(1) The mouth; (2) the throat, through which the food passes to (3) the crop, which is a storage tank where the food rests until the gizzard (5) is ready for it. Between the crop and gizzard, where the food is ground, there is an enlargement called the stomach. At (6) is shown the small intestine, to which is fastened the unassimilated yolk (7). Through the little opening at (8) this yolk keeps passing into the intestine, where it is absorbed into the chick's system. Thus you will see that when food is given before the yolk is entirely assimilated you have food coming from two directions, each kind battling against the other. At (9), the cæcum, or lower intestine, you will note two tube-like extensions. These are the places where worms may lodge, and are the seat of many bowel troubles with the older fowls. Over-feeding crams the cæcum full, and this condition is generally indicated by a pasted-up vent (10).

Probably eighty per cent. of the mortality in rearing is caused by improper feeding, and the greatest cause of mischief is when you moisten the food. I believe I am right in saying that there would be practically no intestinal troubles if absolutely dry food were placed before the chickens. Place good clean water before them and let the chicks do the moistening themselves. They know exactly what is required. We don't. I am perfectly well aware

that chickens may be reared successfully with wet mash, but the care necessary is so great that only the very expert know how to handle the matter. I have heard of one poultryman, well known for his fat fowls in Smithfield market, who feeds his chickens mostly on milk and treacle. At least, so he says. I would not counsel any novice to try to follow in his footsteps. One reason why wet food is so dangerous is that when exposed to the air for some time it may ferment and turn sour. Nothing is more fatal to a young chick than sour food. Sour rhymes with scour, and it is cause and effect. Another thing, moist food is sure to be trampled up by the chickens, whose feet cannot be clean. Wet mash is easily contaminated, and though you may not see it, the birds suffer after it is eaten.

People are tempted to give chickens moist food because they seem to like it better. They will take dry grain leisurely, but they will gorge themselves on a wet mash. That is another reason why they should not have it. Give the food dry and they will eat as much as is good for them and you will not lose chickens by bowel troubles.

After a few days add a little biscuit meal to the food. This can be obtained at any corn-chandler's. After a week or so, bran in a suitable box can be always before them. Let them eat as much dry bran as they wish. It is an excellent food for bone-making and will fill out the frame of the chicken. And from the very beginning do not forget green food. This must be chopped up very finely, and for this purpose the purchase of a "crumbly cutter" is recommended. The green food may be of various kinds. Nothing is better than lettuce or newly cut grass. If these are unobtainable, a good cabbage will do. Any green stuff almost will be relished, provided it is cut small enough. At first I put mine through a household mincing machine and it served the purpose admirably.

It is amusing to watch the baby chicks eat their first meal. As you scatter the food they come out and look. The mother hen sets the example. She starts tapping with her beak, and like a good mother she rarely eats any herself till she sees the flock

well begun. As soon as the broody begins tapping the board the little chicks, one at a time, follow her example, and after a first lesson lasting only a minute or two they do not again need the example of the mother. It is the same with their first taste of water. They come out and look, and as likely as not walk into it. The mother will put in her beak and after a time the others will gather round and emulate her.

For incubator-hatched chicks all that is necessary is to sprinkle the food and tap the board with the finger, just as the hen does with her beak. In a minute or two the chicks will start to eat. The instinct is there, and no doubt they would learn without a lesson, but tapping the board with the finger encourages them to begin. All this time do not forget to feed the broody hen herself. She depends on her food for the supply of sufficient heat for the chicks. Whole wheat and maize are all that is necessary during the rearing period, which may vary from ten weeks in cold weather to five weeks in the warmer months. The temperature of a hen is about 104°, and a broody may go even higher, so that a good supply of grain is essential in the interests of the chicks and the hen herself, who, if kept fit and well, will lay all the sooner on being removed to the laying-house.

CHICK FEEDS

Of the various chick feeds I know nothing better than finely kibbled wheat, maize and coarse oatmeal in equal parts by measure. After a few days oatmeal, being expensive, may be dispensed with and its place taken by bran. The chicken "run" should, if possible, be on a level piece of good grass which should not be allowed to grow more than two inches high. The chicks will then soon be able to help themselves to all the green stuff necessary. When about six weeks old the chickens should be put upon a systematic diet of dry mash, which may be made up as follows :—(by measure), 3 parts bran, 1 part maize meal, 1 part Sussex ground oats, 1 part middlings, 1 part fish meal, and $\frac{1}{2}$ part linseed meal.

This dry mash should be fed out of a hopper or box, so arranged that the chickens can eat out of it without being able to scratch the food out on the floor. The hopper should be raised a few inches from the floor so that it will be clear of the litter. The chickens as they grow should be given greater liberty and, where possible, a large grass run should be provided. Where this cannot be done they must be given a plentiful supply of green vegetable food. The chickens, if the weather be mild, will now be separated from their mother and transferred to a suitable fowl-house where plenty of scratching work will be provided, and in addition to the constant supply of dry mash, kibbled wheat and maize should be buried in the litter twice or three times per day. On the dry-mash system the only attention necessary will be the supply of grain, water, green stuff, etc., twice a day. If wet mashers are given they must be fed at least four times in the twenty-four hours until the birds are three months old, when meals may be reduced to three a day.

It is important to separate the cockerels from the pullets as soon as they can be told apart. With some breeds—notably Leghorns—it is quite easy telling the pullets from the cockerels when a few weeks old, but in some of the heavier breeds it is sometimes a matter of months before one is sure. The young cockerel is most easily distinguished by its tail feathers and the length and thickness of its legs, but in the case of the Leghorn, the comb, which develops very early, is perhaps the best guide. Even if the chickens of both sexes should run together for three months no harm will be done, excepting, it may be, that the cockerels will bully some of the less aggressive pullets.

This rather detailed information may make it appear that chicken-rearing is a difficult and complicated matter. As a fact, it is about as easy and simple a process as one could imagine, especially if one brings them up on the dry-feed principle. Mixing wet mashers is more trying, more tricky and needs more skill. If it is desired to feed moist food after the first month, the same ingredients as in the dry mash may be moistened by hot water, but great care should be taken not to make the food too wet or sloppy. It should be made so that it can be stuck together by

pressure in the hand and will fall apart as soon as it is thrown into the feeding-trough. This is the consistency known as "crumbly," and if one is not quite certain it is safer to make it rather too dry than too wet.

Perhaps the great art of rearing chickens successfully is to keep them warm, dry and clean, and to see that in addition to the ordinary food they get plenty of green stuffs. With care the amateur should rear as successfully as the professional poultry-farmer ; indeed, my experiences go to show that on the whole the careful and intelligent amateur rears a larger percentage of his chicks than is usually accomplished by the commercial on the poultry farm where there is not the time and opportunity to see that each individual of the flock gets proper attention.

ANOTHER SYSTEM

The following system of feeding and management is that employed in the Chicken Rearing Demonstration at Morden Hall, where the birds were intended for table purposes.

Rearing (Total period 12-16 weeks)

The chickens are left in the incubator until the twenty-second day, when they are transferred to the brooders. For the first two weeks they remain in a portion of the rearing ground where they can be kept under constant observation. The brooders used at Morden Hall were each capable of accommodating 60 chickens up to the age of from five to seven weeks.

Each brooder is placed in a run enclosed by wire-netting 2 feet high supported by light stakes placed at intervals. These runs may conveniently measure 9 yards by 40 yards, and are used for the chickens up to the age of seven weeks.

Each Sussex ark is placed in a run measuring 40 yards by 20 yards, enclosed by wire-netting 4 feet high supported by stakes. Access is gained to the larger runs by an arrangement which permits of a short length of the wire-netting between two posts

being swung aside. When seven weeks old the chickens are transferred to these arks in lots of forty.

During the first week the birds are provided at frequent intervals with as much food as they will clear up. The food consists of the following mixture (by weight) :—

Chick Feed

Wheat (cracked)	50 per cent.	Best meat meal	10 per cent.
Millet	15 „	Maize (cracked)	5 „
Canary seed	15 „	Rice	5 „

An unlimited supply of pure water is always provided, and grit is scattered on the floor of the brooder, and is constantly available throughout the whole process of rearing.

During the second week the birds are fed in the following way :—

At daybreak	Chick feed.
At 9 A.M.	Hard-boiled egg, or bread and milk.
At 12.30 P.M.	Chick feed.
At 6 P.M. (or half-an-hour before sunset, according to the season)	Chick feed.

When the chickens are two weeks old they are moved to a brooder in the centre of the rearing field, and are confined for one day in a small wire run attached to the end of the brooder. This small run is then removed, and the chickens have access to the larger run in which the brooder is placed.

Three tins containing chick feed, and fitted with wire guards to prevent the birds scratching out the food, are placed overnight in the brooder so that the first feed may be obtained at daybreak. These tins are removed when the birds are let out of the brooder, and a tin of groats is provided for them. At 9 A.M. soft food is given, consisting of biscuit meal with 10 per cent. of meat meal. The biscuit meal and meat meal are mixed with boiling water and dried off with equal parts of sifted barley meal and sharps. The mixture when prepared should be crumbly, the utmost care being taken to mix the ingredients thoroughly and avoid the use of “sloppy” food, which is a frequent cause of trouble. At the same time any groats which have not been cleared up are removed,

At 1 P.M. soft food prepared as described above is given to the chickens. About 6 P.M., or earlier according to the season, the birds receive as much dry chick feed as they will eat.

At the beginning of the fifth week after hatching, and until they are seven weeks old, the chickens are fed as in the fourth week, but instead of the chick feed they receive a mixture consisting of 60 per cent. whole wheat and 40 per cent. chick feed.

When the chicks are seven weeks old they are moved to larger runs and are housed in Sussex arks, which are provided with slatted floors through which the manure falls. Wooden floors are placed on the ground below the arks in order that the manure may be collected and used.

At 7 A.M. the birds receive a mixture composed of 1 lb. meat meal, 2 lb. biscuit meal and $1\frac{1}{2}$ lb. bran.

This amount is soaked in $1\frac{1}{4}$ gallons of boiling water and dried off with a mixture composed of 2 lb. barley meal and 9 lb. fine sharps.

This ration is given to the birds again at 1 P.M. The evening feed consists of 90 per cent. of whole wheat and 10 per cent. of cracked maize.

An alternative system of feeding which has proved advantageous is as follows :—

- 7.0 A.M. Soft food (as described above).
- 10.30 A.M. A half feed of mixed grain.
- 1.30 P.M. A half feed of the soft food.
- 6.0 P.M. As much mixed grain as the birds will eat.

CHAPTER X

REARING FROM INCUBATORS

WHAT I have said about the rearing of chicks generally applies with a few modifications to broody or incubator hatched birds. A few hints about the incubator may not be out of place. There are so many excellent machines now on the market that it is idle to specify, but one may warn the public against buying an incubator that is too cheap. As a rule the very inexpensive machines, even if they are reliable in their fitments, are too insufficiently "packed" to keep the incubator at a consistent temperature, and protect the contents against the varying shocks of heat and cold. No absolutely compensating incubator has yet been invented, and by "compensating" I mean a machine which, once started, will keep at one uniform temperature no matter what the changes of weather and the readings of the outside thermometer, but practically all the standard makes of machines, if suitably housed, will keep a wonderfully even heat. What one has chiefly to guard against is not so much changes of outside temperature as the little "accidents" that make all the difference to the hatch. If oil is used as a heat supply it must be the best oil obtainable, and the lamp itself must be practically automatic excepting for the daily trimming of the wick. One must make certain of an ample supply of oil, for any deficiency in this respect is fatal.

Before the eggs are committed to the incubator it should first have been tested for, say, forty-eight hours, to make sure that it is in working order. Every make of machine has its own printed instructions, and these should be followed out to the letter. There is no mystery about an incubator, and its mechanism is now reduced to the simplest proportions. Some are worked by hot air and some by a hot-water tank. Both are equally good, and

the methods of working are practically the same. A study of the incubator will repay the time given, but a profound knowledge of its mechanism is not necessary to its successful working. If one gets hold of the principle that the oil and lamp are the sources of the heat supply, that the capsule regulates the quantity of the heat, and that the temperature must be kept steady within narrow limits, a person of ordinary intelligence can do all that is necessary.

The eggs should be tested in a dark room, with the help of a testing lamp, on the evenings of the sixth and seventh days. With a large machine it is best to make two testings on consecutive evenings, or the drawer may be kept open too long and the eggs become unduly chilled. Each egg put back into the drawer as fertile should be specially marked. The staler eggs may need re-testing on the evening of the fourteenth day, but this should not be necessary if all the eggs be of the same, or nearly the same, degree of freshness when first put in.

As far as possible, the room in which the machine is running should be kept at an even temperature, but free ventilation should be given at all times. Fresh air is a necessity if the chicks are to hatch out strong.

The eggs should be turned daily according to directions, but from the time when the first egg begins to chip in the incubator the machine should be closed and not opened again for twenty-four hours. During this time the temperature should be maintained steadily at 104° F. The chickens may remain in the incubator for thirty-six hours, when they should be removed to a "brooder," that is already prepared and heated to a temperature of 99° F. Great care should be taken to prevent them getting a chill. A basket lined with wool, flannel or soft dry grass should be used, and the birds should be covered up with a down quilt during the removal. Any crippled or weakly chickens should be destroyed at once.

Brooders that are sold to accommodate 100 chickens are rarely suitable for more than half that number. Perhaps 60 is a maximum number for a 100 brooder.

Overcrowding, whether it be in a brooder, coop or house, is a fatal mistake.

Any suitable form of coop may be used. One of the most inexpensive and convenient forms is the calico coop, described in *The Journal of the Board of Agriculture* for January, 1916. This coop has a floor space of 6 feet by 6 feet, and a substantial frame or skirting which surrounds its floor and encloses and supports the litter bed.

The litter board may consist of short, dry lawn clippings or soft meadow hay cut up as finely as the chaff-cutter will allow. Short-cut clover or lucerne is also an excellent litter for chickens. The chickens will consume large quantities of this litter, and it should therefore be regarded as forming a considerable proportion of their bulky food. This being so the litter should be changed directly it becomes tainted. A deep litter bed will often suffice for two flocks of chickens without becoming tainted, but its life will depend upon the dryness of the land, the weather, and the care expended in adjusting the roof of the coop so as to exclude driving rain. Any portion of the bed which may become wet should be at once changed.

The best position to raise chickens is upon a fine grass turf in which there is a good admixture of White Dutch Clover. The ground should, if possible, be dry and level, and the grass kept short.

The coop should be placed upon a couple of cross supports so that its floor just clears the ground. Each of the four sides of the coop has a small trap door, opening directly across the upper edge of the floor frame or skirting, and fitted with a short ladder board to allow the chickens to enter and leave the house.

The litter bed should be made level with the top edge of the floor frame—a depth of 9 inches—and the dry food should be evenly distributed throughout the litter. If this has been satisfactorily done a grain or two of chick food can be found within every square inch or so of the litter.

After the dry chick food has been added and the surface made

level, the birds should not be interfered with again until they have removed most of the dry grain.

The following chick feed has been found to give good results mixed thoroughly in equal parts by measure :—

1. Finely kibbled wheat.
2. „ „ maize.
3. Rolled breakfast oats or coarse oatmeal.

The smaller the particles of grain the longer the chickens must work for its recovery. In passing the grain through the kibbling machine a certain proportion of flour is produced. This fine material should be sifted out of the mixture and used in the dry mash, as it would not be recoverable from the litter. The wheat and oat flakes of this mixture will retain their positions in the litter far more evenly than small seeds and grains.

A portable hover should be prepared and placed upon a square board which rests upon the surface of the deep litter bed in one corner of the coop. The board should be just large enough to form a floor for the hover. Upon it should be placed a bed of long wheat straw of sufficient depth to keep the chicks from coming into contact with the board at any point. This long straw, if properly laid down, with the blades arranged more or less in a circle, will act as a filter for the droppings, which dry and fall through the straw on to the surface of the wood. The droppings can be removed every day or every second day according to circumstances. Straw so placed remains in position and cannot be scratched away by the chickens.

It is of great importance to regulate the temperature so that it meets the requirements of the chickens ; extremes of temperature should be carefully avoided. A thermometer cannot be regarded as a sufficient guide in itself and it is better to observe closely the action of the chickens themselves. If the hover is too cold, the birds will crowd towards the lamp, a practice which is very detrimental to their health. It is a habit easily acquired and, if once learnt, only eradicated with difficulty. If, on the other hand, there is too much heat, the chickens will pant, become restless,

and separate from each other, in their desire to secure a cooler environment. The conditions may be considered suitable when the chicks are sleeping quietly, more or less apart, and resting on the straw.

As the temperature of the hover rises when chickens are placed beneath it, owing to the addition of their body heat to the heat of the lamp, it is best not to make any alteration in the latter for about one hour after the chickens have been moved from the incubator. As a rough guide the thermometer should then read 90° F. From day to day this heat will tend to rise owing to the flock increasing in weight and heat-producing power; the instructions issued with the machine should therefore be followed and the condition of the birds should be carefully watched. As a general rule it may be stated that artificial heat should be gradually reduced until, at the end of about four weeks, the chickens no longer require it.

When the chickens have been safely transferred from the incubator to the brooder their movements should be very restricted for the first forty-eight hours. To effect this, a strip of match-board enclosing a small triangular space of litter bed is placed outside the hover. In this space a suitable chick water-fount should be placed, and also a shallow hopper containing dry mash.

The dry mash at this stage may consist of equal parts of dry wheat bran and rolled breakfast oats and should be kept continuously before the birds. If the chickens are placed once or twice within the hover, they will readily learn to go in and out seeking the mash when they require it. The exercising ground can then be extended by degrees until the whole bed is available for scratching.

After three days rolled oats should be omitted from the dry mash, for purposes of economy, but bran should be kept constantly before the chicks. Finely divided, fresh, and tender green food, such as lettuce or dandelion, should also be constantly available so that they may soon learn to eat it.

A supply of chicken grit should be placed in a small box, and a sanitary water supply at all times is absolutely necessary. To

'PREMIER' HOT AIR INCUBATOR, 400 EGG CAPACITY (PHIPPS)

guard against disease a few crystals of potassium permanganate should be added to the water. Once the solution in the water fount loses its characteristic light claret shade it should be changed without delay. An inverted water-bottle fount is an excellent appliance for very young chickens.

From the second to the fourth week the chief *requirements* of the chickens are suitable food, plenty of open-air exercise, heat to a decreasing extent, and protection.

If the weather is at all suitable, the chicks should have daily access to a limited area of good grass turf. It is waste of time and labour to place them on turf that is largely composed of coarse grass tufts.

To provide frequent changes to fresh turf, without moving the coop for some time, it is an advantage to have a trap door in each of the four sides. A wooden frame should be constructed. It should have a floor space 6 feet by 6 feet, and should be sufficiently high to cover the trap doors. The top and sides of this cage should be covered with one-inch mesh wire-netting in order to exclude sparrows and other vermin.

A tarpaulin made of unbleached calico (cheap grade), proofed with two coats of hot boiled linseed oil to which a proportion of gelatine has been added, may be placed in position to cover the roof of the cage, but not its sides. A few eyelets and light lashings are also necessary. The semi-transparent cover should be kept in position during showery or uncertain weather and removed when the weather is fine. The chickens should always be confined to the coop itself towards nightfall.

The cage can be moved to any given plot round the coop itself, until all four plots are soiled, when it is time to move the house to fresh ground. It is an advantage to place the dry bran hopper and water-fount within the cage.

Feeding.—The following foods are suggested :—

- (a) The dry chick food of the litter bed.
- (b) A constant supply of dry wheat bran.
- (c) Grit, green food, and fresh water.

In addition to this, from the second week onwards the birds should receive a small quantity of animal food, such as beef scrap, fish meal, or bullock's liver. The chickens should be given all they can eat up very quickly once a day—say at twelve noon.

About the end of the fourth week, if the weather is favourable, the chickens may be transferred from the heated brooder to fireless brooders.

About the sixth week dry mash, as already described, can be substituted for the dry bran, and kept constantly before them, the grain being fed among the litter twice or three times per day.

CHAPTER XI

HOW TO TREAT DAY-OLD CHICKENS

IF it is decided to rear stock from day-old chickens purchased at a distance, certain preparations should be made for their reception. On arrival the box should be carefully opened in a room before a fire if the weather be at all cold. It is absolutely necessary that the birds should be kept warm. If they are to be reared under a broody hen the chickens should be kept warmly indoors till the evening, when they should be introduced to their "mother." Occasionally a broody hen may not care to raise an alien brood, but as a rule there is no difficulty. If possible, therefore, another broody should be kept in reserve. We shall suppose that the hens have been properly dusted with insect-powder and are free from insects. They should also have been sitting on a few eggs in suitable nests. When darkness obscures the vision of the broody, and she is in a somnolent state, slip a few chickens under her and remove the eggs. If she sits tight for a short time one can safely place the remaining chickens under her. If, however, she appears restless, and refuses to sit, she should be rejected and another hen tried. If she is kindly disposed to the chicks, as is likely, she will probably croon to the birds and sit tight. There will be no further trouble.

If it be decided to bring up the chicks in an artificial brooder it must be clean and warm. About 90° is a suitable heat for the sleeping chamber. Care must be taken that there is plenty of oil in the lamp and that the wick is burning brightly. Test the brooder thoroughly before the chickens arrive and work it in accordance with the maker's instructions, which are usually printed on the inside. There is no difficulty about working a brooder. All that is necessary is to make sure that the lamp burns properly and that the temperature be kept reasonably steady. When the sun

shines on a warm spring day little or no artificial heat will be required, but, of course, one must make sure that all is cosy and comfortable for the night. Make a point of always visiting the brooder and examining the lamp last thing before locking up for the night.

A FIRELESS BROODER

To rear a small number of chicks without hen or brooder may be done, but it is not always satisfactory, and that only in warm weather.

Procure a box of the requisite size, with a few air-holes to allow the birds to breathe, and fill in to a depth of a couple of inches a layer of soft dry hay. The box should just be large enough to hold the chickens comfortably. A part of an old down quilt stretched on a wooden frame should fit inside the box and be supported by four jutting pieces of wood about six inches from the bottom. The quilt should just lightly touch the chickens on the back. Leave the birds for a time, remove the quilt and look inside. If the birds are spread out, breathing quietly and are dry and fluffy all is well. You can leave them for the night. If, however, the birds are panting for breath and moist with perspiration put on a lighter covering. A fireless brooder of this sort must be kept indoors during the night in all but the mildest weather. In the daytime the box should be taken out of doors, placed on the grass, and suitably guarded by wire. The chicks should be allowed to run in and out of a door made for the purpose. In extremely cold weather it may be necessary to keep the chicks indoors occasionally, but of course a fireless brooder is not adapted for a very low temperature.

A fireless brooder such as described may be home-made and need not cost more than a shilling or two. A hot-water bottle may be handy for a fireless brooder in case of emergency. If it is necessary to increase the temperature the bottle should be filled with boiling water and wrapped in a blanket before being put into the brooder.

CHAPTER XII

HOW TO GET EGGS

EGGs are the product of many anterior influences. Not to go too far back one may mention the fowl's parents and grandparents. In egg-laying heredity plays a big part. If the grandparent and the mother on the female side were good stout birds with plenty of stamina, and an egg record of 200 per annum or over, they will adequately form the foundation of a grand new stock of egg-layers. It is not always wise to breed from a hen with a phenomenal egg record, because it has been proved that some of those very exceptional layers have, in their very effort to reproduce so many of their kind, overtaxed their strength and depleted their vitality.

But on the male side one may with more safety breed from a cockerel whose mother had laid 250 to 280 in her pullet year. It is a known fact that the male bird inherits and transmits the factors which make up a deep egg-laying strain. The inheritance of fecundity finds its best expression in the male bird. If, for instance, a breeder mates a hen of great laying capacity with a cockerel whose parents were moderate egg-producers the chances are that the progeny will take after the male and also be moderate egg-layers. But if one reverses the process one gets a very different result. If a hen of moderate egg-laying capacity be mated with a cockerel whose parents hold a high record the chances are that the progeny will also take a high place in egg-production.

The old saying that the male bird is half the pen is little more than half the truth. The fact is, as modern experiments testify, the male bird is more nearly seven-eighths of the pen. The hen is a factor, of course, but not a predominating one. The male bird imposes his personality and his constitution on practically all the flock.

Even in outward markings, as well as in the qualities of inheritance, the male bird dominates his children. If you mate a Leghorn cockerel with a Buff Orpington hen all the pullets will be white with a faint tinge of brown on the neck or head, while the cockerels will also be white with deeper brown markings on the wings. One can practically tell the pullets from the cockerels the moment they are hatched.

It is important to remember, then, the importance of getting male birds from a prolific egg-laying strain. Even if your hens are only cross-breeds, your cockerel must be pure. No one knows just what a cross-bred cockerel will produce, excepting that the progeny will probably deteriorate from the standard of the parents. If the farmers of England—the general farmers—were to introduce regularly pure-bred cockerels of high pedigree into their farmyards, they would soon revolutionise their stock and increase the egg-yield from 50 to 100 per cent.

If more eggs are wanted it will be found infinitely cheaper and more effective to buy the best cockerel possible than to purchase a flock of pedigree hens and mate them with a second-rate male bird. Remember that you will get practically all the inherited ability to lay transmitted by the cockerel. It does not follow that the male bird must come from a totally different stock from your females.

NOTE ON INBREEDING

While inbreeding has been deprecated among the higher animals, a certain amount of it is no doubt beneficial when applied to birds generally. There can be no question that most of the best laying strains of fowls of the present day are largely the result of inbreeding, and are more or less related. One may say that Cam, Barron and Collinson fowls are to be found in every big poultry farm in England. These men have achieved a name and fame as breeders, and what more natural than that poultry-farmers wanting to improve their stock should apply to these breeding specialists for "fresh blood." The fact that the blood may be, and probably is, related to the farmer's own stock does not negative the new blood.

It is new blood although related some way back on the genealogical tree. If a few special breeders—and after all they only are a few—dominate the markets for prolific utility fowls it must follow that the bulk of our stock; in this country at least, is inter-related. There are, of course, importations from Australia, Denmark and the United States made from time to time, but it does not follow that the birds thus brought into this country are not part of our own original stock. The “unrelated cockerel,” so often advertised, seldom is unrelated in any sense of the word, although it may be some way removed from the advertiser’s own pullets.

What is known as line-breeding is practised with great success in this country. Line-breeding is simply a form of inbreeding that, pursued on right lines by capable men, has raised the productivity of our hens to its present efficient state.

But inbreeding as such is only for the specialist and not for the novice. It is a study in itself, and carefully carried out marks the evolution of the deep-laying hen. Prolificacy is added to prolificacy; care always being taken to preserve the health, strength and stamina of the flock. In the hands of unscientific men inbreeding, while it might be successful for a time on the side of prolificacy, would lead to the grave danger of rapid race deterioration.

One ought to know that what we call “pure breeds” in fowls are frequently types that have been recently evolved by artificial selection. The various Orpingtons, the Faverolles, the Wyandottes, and the Rhode Island Reds are all cases in point. These are merely cross-breeds that by inbreeding have been fixed into a type. They are, of course, “pure” in the accepted sense, but have been evolved out of cross-breeding from three or four different sources. It follows that all other “pure breeds” are also the result of “sports” of nature or artificial selection, or both, only in many instances they go so far back that we cannot trace their origin. All modern fowls in their infinite variety have undoubtedly been evolved from the one type commonly referred to as the “Jungle Fowl.”

So that there are cross-breeds and cross-breeds, and pure breeds and pure breeds. Fowls, and indeed birds of all kinds, can, by

processes of artificial selection—that is, man's selection—be rendered into new varieties most readily. When one can fix the type we call it a pure breed.

One occasionally gets a “reversion,” or return to type, from the mating of pure breeds, especially if the male and female be two distinctly separate inbred strains. It would seem as if a certain relationship—remote but true—were necessary to preserve the type in its purity.

What one must guard against is indiscriminate inbreeding with one's own stock. While new blood is essential at times to maintain vigour and health, it need not be a violent outcross.

For the amateur or the average poultryman it is only essential to know a little of the first principles of breeding. So long as he introduces good pedigree birds from the scientific breeders such as I have named, he cannot go far wrong. And while the pullet actually produces the eggs it is the male bird chiefly that determines the numbers thereof. No money within reason is too much to pay for a cockerel from a deep egg-laying strain. The voice of an expert should be heard on this important problem, and no one is better fitted to speak than Mr Duncan Forbes Laurie, an Australian scientist who wrote in *The Poultry World* :

“There are two methods possible and advisable in introducing new blood :

“No 1.—New blood may be introduced by means of a male bird guaranteed to be the son of a high laying hen whose eggs were large. Mate with your own single-tested hens. Then single-test all pullets to be used as breeders. Reserve sufficient cockerels while you test the pullets. As you had hens which were good layers to breed from, the cockerels from this new introduction will inherit laying from your own stock and will transmit this good laying to their pullets (daughters).

“No. 2.—Is by means of purchased pullets which are to be single-tested before they are bred from. Then mate all which satisfactorily pass the test with a suitable male bird from your own stock. The progeny, both sexes, will be reliable. Note,

keep to your chosen type as regards shape, size, etc. Do not have a collection of types and sizes. Select rigorously for character and stamina.

“BREEDING AND SELECTION

“In fixing any desired character recourse must be had to line-breeding, or, as it is sometimes called, inbreeding. Inbreeding is a term that always savours of indiscriminate, incestuous mating. Line-breeding may be just as close, but in my meaning refers to selective mating only. Brother and sister mating should be avoided as much as possible. In fowls mating sire to daughters or son to dam and dam's sisters is the approved method, and should be done in sufficient matings to give a chance of avoiding continued close mating. Many hold that close breeding is to be avoided at all costs. As regards poultry-breeding for egg-production, without initial close breeding, and careful mating afterwards, no permanent improvement can be expected. Crossing is always held to restore stamina and vigour, but what is the use of stamina and vigour if you have lost your laying strain—that is, if your birds have lost the character for high laying? The most competent writers can find no fault with inbreeding scientifically conducted. I have always held that you can breed delicate and non-productive stock, the result of crossing, if due care be not exercised. In all matings you must work under the following rules. Single-test your hens for twelve months and keep a daily record. You require fully that time in which to learn something about each hen. Reject as a breeder any hen which during that test fails in any direction or shows traces of any undesirable character. Exercise the utmost care in selecting the breeding stock from which your male birds come. The old idea of gradually accumulating alterations in stock as the result of generations of breeding has been discarded.

“You may feed and house ever so carefully, but unless your stock carries the character for high egg-production you will not breed layers. That is not to say, however, that good housing, food and methods of feeding have not a great influence on the egg-production

of a flock. As I pointed out in my book, *Poultry Foods and Feeding*, the stock must be bred as layers—that is, have the character for high egg-production, and must also have great stamina and strong constitution; without these they cannot elaborate their food into eggs in the quantity their breeding demands. There is an old saying that half the breeding goes in at the mouth. That is, to an extent, true. If the breeding stock is not right, and if the young stock are not properly reared, then you have some of the causes for failure even when the foundation stock was all that could be desired.

“Again, I would impress upon all that the foundation stone of the whole structure of breeding layers is the single pen accompanied by the most vigorous selection. Do not pay too much heed to high records unless stamina is assured. Just at present there is a rage for high records, most of which are gained by the use of too stimulating foods. Remember that as surely as you overstrain any part of the organism, so surely shall you pay in loss of stamina, fertility, etc.

“It may be remembered that when the then world’s record, 1531 eggs from six hens in twelve months, was made at the old Rose-worthy Poultry Station Laying Competition, many warnings were issued in England and we read of the dangers of forcing and breeding from forced layers. I agree heartily with the opinion of the ill results following forcing feeding. But, again, I point out that in all the laying competitions under my direction in this State no forcing foods were used. Where properly bred, healthy, vigorous stock are adequately housed and fed on a sufficiency of normal foods of the correct composition one can gain excellent results.”

CARE OF THE PULLET

Once you have evolved the pullets with the inherited tendency to lay large numbers of eggs, you are by no means finished. The pullets have to be carefully tended and reared till they reach the creative stage, and then they must receive the treatment that will bring the egg-laying tendency into action.

This means proper housing and proper feeding. It is axiomatic that pullets will only do well by their owners when their owners do well by them. The ground they run on must be sweet and clean, free from taint of the fowls themselves and open to the action of air and sun. Then they must be encouraged to lay. Their house must also be kept scrupulously clean, and their nest-boxes invitingly laid with fresh hay or straw. It is a mistake to think that these things don't matter. If eggs are to be found in dirty houses that is not an argument that more eggs are not got in clean houses. The birds must be kept free from the various parasitic pests that afflict them, and their comfort and well-being ought to be the first consideration of the farmer.

All this being attended to, there comes the problem of feeding, of providing the right sort of food in the proper proportions. There is, or need be, no mystery about this. Whether fed on dry or wet mash the ration of albuminoids to carbohydrates ought to be as one in five. The albuminoids go to make flesh, and incidentally eggs; the carbohydrates supply the heat and energy. The question may be worked out in meals as follows:—one pound bran, one middlings, one maize meal, one fish meal and one half clover meal. One of soya-bean meal may be added when not too expensive. As I have said, these meals may be given moistened with warm water or fed dry, just as they are, but in that case the dry mixture must be fed out of a specially constructed box called a hopper.

To bring a pullet on to lay quickly, green bone fresh from the butcher's should form part of the food—say one-third—on every alternate day. One must be careful not to give too much green meat, for while one can "force" a pullet up to a point one may overdo it and affect the health of the bird.

Sprouted oats or sprouted wheat are economical feeds and excellent aids to hen fruit. By placing the oats in shallow boxes and sprinkling with water, a little heat only is necessary to make the grain sprout.

GRAIN-SPROUTING

If you desire an economical home-made sprouter get shallow boxes and bore a few holes in the bottom for drainage and spread the oats (previously soaked in a pail of warm water for twenty-four hours) about $1\frac{1}{2}$ inches or 2 inches deep in the bottom of the boxes ; the boxes should then be placed in a warm sunny position (the top of the fowl-house will do very well) and well watered twice a day from a can with a fine rose attached. In cold weather the oats sprout better if the boxes are placed in a warm spot in the kitchen. On an average, in about a week (more or less according to the weather conditions) the oats will have put out roots long enough to form the whole contents of the boxes into thick sods with light green sprouts about two inches long ; this is the best time to feed them to the fowls. The sods should be cut out of the boxes in pieces as required, and given to the birds in lumps. If desired, an apparatus can be bought for sprouting oats at a moderate cost, according to size.

Full directions will be found in all grain-sprouting machines, which are so simple that a child can do all that is necessary. Boiled wheat is also a good egg-getter, and a nice change for the birds. Variety is no doubt of the essence of the contract between man and bird in the search for eggs, but it is astonishing what can be done with good plain food varied only in the smallest degree. Among vegetables, cabbages have a high feeding value, and, whether boiled or raw, stand out with lucerne among green stuff as an aid to egg-production. I have seen it asserted by those who knew what they were talking about that a good pedigree hen will do well for a considerable time on cabbage and bran. No doubt, but a little fillip of meat will hasten the arrival of the egg. If the housewife wants to use household scraps she should try as far as possible to make the meat or fish portions about one-fifth of the whole. If she has not enough meat she can always make up the difference with meat meal or fish meal, which can be bought from any corn-dealer.

W. Powell Owen says : " Every pullet, directly it is full grown,

has in its body several thousand ova (ova are very tiny unripe yolks, which will grow into eggs by and by). Thus equipped, the pullet presents herself to the poultry-keeper as if saying : 'Here I am, kind master, with 2000 eggs in my cupboard. Treat me well and give me the proper food and I will develop and produce those eggs. If the food you give me does not help me in that direction I shall *devour* the majority of my unripe yolks, for I shall be compelled to draw from the reserve that Nature has provided me with.' "

No one, I take it, will swear to the exact number of ova in the body of a pullet, but there is little doubt that the numbers are greater than any hen is destined to convert into eggs.

The great point to be considered is this : "How many of these ova—or potential eggs—can we assist the hen into making into 'new-laid' ?" Because there is no doubt the poultryman can co-operate with the hen in egg-production. The eggs are there ; it is his business to see that they are well and truly laid. The part played by the farmer is to get the hen into that condition which is most favourable to production. The bird will do her part if only we do our part.

THE WATER SUPPLY

Next only in importance to food for egg-yield is the supply of water ; indeed one cannot consider water less important, for without it there would be no egg and no fowl. But few householders, and only a few farmers, realise the immense importance of a copious and continuous supply of fresh water. The hen that has to wait to drink has to wait to lay, for it is certain that eggs cannot be produced without a sufficient amount of water. If the hen has to wait a long time the potential egg will probably vanish, and where two eggs would have been laid with ample supplies of fluid only one will materialise.

Only those who have had to carry water to large flocks of laying hens can realise the immense quantities of water they consume. There is nothing rouses my wrath more than to see the drinking vessels empty. I would a hundred times rather see the food cut

off for a spell than I would see empty water-troughs. A fowl can wait for a time for her food without any appreciable hurt, but I am certain that a laying hen suffers every time she goes to the water to drink and finds none.

Why should some people be so niggardly with water? As a rule it costs nothing—only labour. That is probably the reason why the supply is sometimes stinted. With the ignorant, things that cost nothing, like water, light and fresh air, are despised, or at all events relegated to a secondary place. A moment's thought will put the value of water to any live stock in its true place, and while water is vital to all stock, it is if possible more vital to the laying hen, who must pass an enormous quantity through her system in comparison with her size and weight. It is realised that a pullet weighing four pounds will lay her own weight in eggs every six weeks or so, and these, be it known, are roughly composed of three parts water. There is also the water required for the functioning of the various organs and tissues, not to mention the liquid required for the ordinary digestive processes. I have often said that I could tell the number of eggs laid per day by the amount of water consumed in the same time. One of these days the public will wake up to the extreme importance of water to the laying hen.

In a report issued from the Missouri State Experiment Station, Mr C. T. Patterson (Director) gives the following results of an interesting experiment :—

“A number of pens which had been furnished water at all times were given water only once each day, all they would drink, then the water removed. The results were that the egg-yield was reduced 50 per cent. This reduction was the same in the different varieties.

“A pen of 60 White Leghorns composed of old and young consumed $2\frac{1}{2}$ gallons of water daily during the warm weather. This would indicate that the average farm flock of 100 to 120 birds should be furnished at least 5 gallons of water per day. Laying hens frequently consume eight ounces of water daily. This means one gallon daily to 16 hens.

“From the hen’s view-point, water is worth just as much as feed, for she can’t make an egg with either one alone. Therefore, the man who furnishes high-priced feed but neglects the water supply is making a great mistake, and will have to be content with a limited egg-yield.

“THE VALUE OF WATER TO THE HEN

“The value of water to the hen is shown by the many uses to which it is placed.

“First, water is used to soften the food ready for digestion.

“Second, water in the form of blood acts as a common carrier and carries the nourishing parts of the food from the digestive organs to the tissues where needed, and carries worn-out or exhausted tissues to the different organs to be eliminated from the body.

“Third, water is important as a factor in egg-production, as it enters into the composition of the egg as well as the hen’s body, the egg being about 75 per cent. water.

“Fourth, water is important in equalising the temperature of the hen’s body, which is done in two ways. First, cold water lowers the body temperature, while warm water holds the temperature high. For this reason, we give hens cold water in summer and warm water in winter. The second method of cooling is by evaporation which is a cooling process. The temperature of the human system is reduced by the evaporation of sweat from the surface of the body, but with the fowl, the evaporation takes place principally through the breathing organs, which accounts for the hen holding her mouth open and breathing rapidly on a hot day.

“Observations of experiments conducted at this station lead us to believe that the first three uses of water are very much the same at all times, and that the wide range in the daily consumption of water is influenced by conditions of the weather.

“The two lessons which stand out prominently as a result of experiments are :

“First, water is just as important as feed.

“Second, once or twice each day is not often enough to supply the water.”

CHAPTER XIII

POULTRY-HOUSES

I HAVE already spoken in general terms of fowl-houses, and it now remains to enter more into detail. The three principles that ought to be kept in mind in building a house is that it should be water-tight, well ventilated and have plenty of light. Given these three qualities, and a reasonable thickness of timber for warmth, it does not matter much how houses are made. No doubt some designs are better than others, but all the essentials are included in the principles enumerated. Design is largely a matter of individual preference. If the house is made cosy, airy and dry, with sufficient light, one need not worry about the shape or the pattern. The house must also be adapted to the requirements of the owner. If the birds are to be kept strictly on the intensive system one type of house is necessary ; if on the semi-intensive there is a little variation, and if the birds are to be kept in the colony system a still different style of house is required.

One may say that for all urban and suburban poultry-keepers on a small scale only one type of house is necessary. Such a house may be of almost any shape or size, so long as there is a minimum of from ten to twelve square feet of *run* to each bird. If more space can be given so much the better. Where birds are confined to one house which has to do for sleeping chamber and scratching-shed the utmost cleanliness is necessary. The droppings must be cleared away every day, and the house frequently sprinkled with Jeyes' or some similar fluid. In the best laying competitions each house holding six birds is 10 feet long, 6 feet wide, 5½ feet high in front and 4½ feet at back. This is an ideal house for six fowls, and if one can approach this accommodation so much the better, but ten fowls are frequently kept to advantage in a house of these dimensions.

Where a scratching-shed is attached to the house so that the birds can spend the greater part of the day away from their sleeping quarters the number of fowls kept can be added to by anything up to 50 per cent.

I strongly recommend all intensive houses to be fitted with wooden floors. By this means the house can be kept in a much more sanitary condition than if the floor is composed of any earthy material. Earth floors retain and absorb the manure from the fowls, and even if dug up frequently and replaced with fresh soil the house never smells so sweet and clean as when a wooden floor is kept fresh with peat moss, sawdust or straw. Not only so, but the wooden floor is cheaper in the end. All houses with wooden floors should be raised six or eight inches from the ground on bricks. By this means a fresh current of air will keep the floor dry, while vermin in the form of mice or rats will be unable to find their way in. Cement is good enough for a floor, but compared with wood is hard and cold, and after all it is little if any cheaper.

As I have said, houses can be designed to meet the taste of the owner provided all the necessary points I have enumerated are included. In my opinion one of the best types of houses for small or large flocks are those that are air-tight at the back and sides and open in front with a lean-to roof. These houses are largely adopted in America and also among the larger poultry-farmers in this country, and while they have the advantage of being the cheapest type of house they are also among the most successful. I call a house "successful" that keeps the birds in perfect comfort and health and produces the largest yield of eggs. I know that houses of themselves will not produce eggs, but given the same birds some houses will return a larger percentage of eggs than others. I am certain that a light and airy house will conduce to egg-laying and that a dark and stuffy house will not. Light and air are in my opinion, next to food, the biggest factors in the production of eggs. If the house is more than eight feet deep I advocate windows at the back of the house as well as windows at the front. For smaller houses, say six to eight feet deep, the back windows should be under the dropping-board so that they will

light up the floor, and enable the birds at all times to pick up their food. I have a medium-sized house in which I keep forty laying birds semi-intensively. The dimensions of the house are 16 feet long, 9 feet wide, 6 feet high in front and 5 feet at back. I know that it seems on the small side for forty adult birds, but the proof of its excellence is in the results, which were everything that could be desired. In the winter months I occasionally have had to keep them in the house for three or four days at a time, nor have I ever experienced any bad results. The birds were always happy and healthy. They laid well, and the eggs when required were very fertile.

There may be other types of houses equally good, but there are none better, and certainly none more economical to build. They will stand wind and storms fully better than any other make, and if necessary they are easy to cable down to the ground in exposed positions. Some people prefer the roof of the house to be low in front and high at back, but I think it better to have the roof high in front to carry off the rain at the back. On entering the house also it is much better to have plenty of headway at the door. To have to stoop low every time one enters the house is a nuisance, and one needs only to forget once to get a nasty blow on the head. The house I prefer has woodwork in front $2\frac{1}{2}$ feet from the ground. Above the woodwork is wire-netting with glass sliding shutters that can be raised during wet or stormy weather.

I see nothing wrong with the gable type of house excepting that it needs a great deal more wood to make the roof. It is asserted by some that in a house of this type the sun cannot penetrate the large space above the windows and that it is usually filled by cold air. There may be something in this theory, but if there be an open ridge along the apex of the roof for ventilation the cold air should be continually passing away and being replaced with sun-warmed air.

I use a couple of houses of this type, and they answer quite well, but they are more expensive to build and give no corresponding advantage. This style of house is rarely open-fronted, being built with four small windows in front, two on the floor and two about

ELEVATION AND PLAN OF HOUSE FOR 40 PULLETS

four feet from the ground. The bottom windows are fixed and the upper ones are movable for purposes of ventilation. These houses are favoured in the north of England, where the climate is more severe, but I do not think they are necessary. My own farm is in a cold region, 600 feet above sea-level, and I never find that the open-fronted house is too cold for the birds. Of course in case of snow or extreme cold the windows can be closed all but a few inches for ventilation.

But success in poultry, though bound up with good and adequate housing, has nothing to do with a special design of house. Mr S. G. Hanson, one of the largest commercial egg-farmers in England, has all his houses made on the open-front principle, and they differ only in detail. A house that is good enough for a successful man like Mr Hanson should be good enough for the amateur, the backyarder or the small-holder.

In building a poultry-house one should see that the timber is sound and dry. Good seasoned wood should be used, so that there will be no shrinkage when the house is completed. The best wood to buy is matching, which is tongued and grooved so that the boards fit tightly into each other and present the appearance of a continuous board marked by slight lines. Matching is sold by the "square"—that is, with a surface of 100 square feet. If the boards are 6 inches wide a square consists of a 200 feet run of wood. The boards may be had at various thicknesses. No doubt it is best to build of one-inch wood, as experts invariably recommend, and if price was no object the advice would be all right. One-inch matching, however, is usually just double the price of, say, $\frac{5}{8}$ inch matching, and the latter may be used for small houses most successfully. The only proviso is that all houses built of anything under one-inch matching should be covered, back, roof and sides, with tar-felting. Tar-felting is a cheap substance that serves a wonderfully good purpose. It effectually closes all leakages of air or water; it preserves the wood and adds to the warmth-giving quality of the structure. I have a house made of $\frac{5}{8}$ inch matching, covered with tar-felting, that is as comfortable and durable as any house made from one-inch wood.

I am not sure but that in some sheltered spots in the south of England a house made of tar-felting stretched on a skeleton framework of wood might not give perfectly good results. The felting, of course, would have to be of the very best quality and thickness, and be without a flaw. One of these days I expect to see some poultry pioneer experiment with a house covered with tar-felting in place of wood. The cost both in material and labour would be trifling compared with one-inch matching at 30s. per square.

The internal fittings of a house should be as simple as possible, and capable of easy removal. Perches should be made of scantling—or quartering, as it is sometimes called—2 inches by 2 inches; with the corners planed off roughly. The perches should be fixed from 2 to 3 feet from the ground and about 1 foot above the dropping-board. In large houses, it is best to place the perches at right angles to the length of the house, so that too many birds cannot get on one perch. In this way “crowding” is prevented. In small houses, up to 12 feet long; perches are better placed lengthways. The dropping-board should protrude at least 18 inches beyond the outermost perch so that the floor of the house will be kept reasonably clean.

Nest-boxes, one to each eight birds, should be placed under the windows against the inside front of the house, making the structure itself one of the sides of the gangway leading to the nest-box. To prevent egg-eating it is better to keep the nest-boxes dark, and for this reason the entrance to the nests should run along the unlit gangway composed of the inside of the house on the one side and the nests on the other. The fowls themselves prefer a dark cosy corner to lay in.

It would serve no useful purpose to elaborate the various types of houses that are suitable for poultry, so long as the primary needs are kept in mind—light, air, warmth and ventilation.

There are, however, one or two special types for farmers that may be mentioned. There is the usual portable field-house on wheels. The idea is that the house may be moved from place to place on a farm, where the birds can pick up food and manure the ground at the same time. This method has the obvious advantages

of providing fresh ground for the fowls and cheapening the cost of their keep.

Another useful house is called the apex—getting its name from its shape—and can be used in a variety of ways. It will accommodate at a small cost a large number of young stock ; it can serve as a cockerel house ; it can be used for a hospital or an isolation camp. It is a most useful house to have as a reserve ; it is easily made and it costs less than almost any other type of building. I take specifications from a publication of the Board of Agriculture.

“In houses which must be moved frequently it is essential that the frame should be strong to stand the strain, or it may soon come to pieces. The joints should, in all cases, be tightly mortised, and where cross stays are used the ends should be cut and fitted into corresponding grooves in the uprights, as nailing does not afford sufficient resistance to the strain.

“An apex house on similar lines to that illustrated elsewhere may be 5 ft. wide, 6 ft. long, and 6 ft. high to the point of the gable, with side walls $1\frac{1}{4}$ ft. high and boarding in front $1\frac{3}{4}$ ft. high. The capacity is 15 adult fowls, or 20 growing chickens. Roof, sides and back are solid, except that a door is made in the last-named. The front consists of boarding $1\frac{3}{4}$ ft. from the ground with 1 in. mesh wire-netting above, and a triangular front. The roof may usefully be carried a foot beyond the shutter.

“*Material used.*—Scantling for frame, 2 in. by 2 in. ; to reduce weight, 2 in. by $1\frac{1}{2}$ in. may be used, but the heavier material should be used for the sills or bottom frame. Boarding, white deals, 5 in. by $\frac{3}{4}$ in., tongued and grooved. Wire-netting for front, 1 in. mesh. One pair of 9 in. hinges and lock or catch for door ; a supply of $1\frac{1}{2}$, 2 and $2\frac{1}{2}$ in. French nails ; optional, guttering and felting for roof (see p. 116).

“*Frame.*—Front : 2 lengths, 5 ft. each, for sill and cross ; 2 lengths, 6 ft., for roof ; 2 uprights from roof stays to sill, 1 ft. 3 in. each ; 1 cross tie, 2 ft., below apex. Back : 1 length, 5 ft., for sill ; 2 lengths, 6 ft., for roof ; 2 uprights, 1 ft. 3 in. ; 1 cross tie

above door ; 2 uprights, 4 ft. 6 in., for door space. Roof : 3 lengths, 6 ft. 6 in. Sides : 4 lengths, 6 ft. Floor : 1 length cross-wise 3 ft. from each end, 5 ft. Two perches, each 5 ft. long, will be required. The total is $116\frac{1}{2}$ foot run.

“Match-boarding should be firmly nailed upon the frame. Allowance has been made for the roof to project 3 in. at either end, but a projection of a foot at the front end is better. The timber required will be as follows :—Front, boarded 21 in. up, $8\frac{3}{4}$ sq. ft. ; back, inclusive of door and cross pieces of the same material, $21\frac{3}{4}$ sq. ft. ; sides, 15 sq. ft. ; roof, 78 sq. ft. ; and floor, 30 sq. ft. ; total, $158\frac{1}{2}$ sq. ft., or with allowance of 24 sq. ft. for nest-boxes, $177\frac{1}{2}$ sq. ft. in all.

“To prevent the entrance of rain at the apex of the roof a cap should be made, planed and carefully jointed, from 6 ft. by 6 in. boarding cut down the centre ; or iron guttering can be bought cheaply and fitted upside down ; or if the roof is covered with felting, one length may be nailed over the apex.

“Where the door is placed at the back it must fit tightly to prevent draughts, otherwise it would be better to make the front into a door, either wholly or partly. An excellent plan is to nail a strip of wood outside all around the door, overlapping $1\frac{1}{2}$ to 2 in. on to the wall against which it closes.

“If the house has to be moved frequently wheels should be attached. In this case 3 in. by 3 in. wooden beams should be bolted right across the under frames of the house a foot from either end, to which the axles are attached, or stout iron axles 6 ft. long may be employed. The wheels should be not less than 9 in. in diameter with a 2 in. tyre. An alternative is to use runners fixed lengthways with ends curved upward. These should not be less than 6 in. broad. A horse is required for removal where runners are employed.

“The two perches should be fixed at the back 15 in. above the floor and 18 in. apart.

“The nest-boxes should be removable, 15 in. square, 12 in. high, and without bottoms, standing upon the floor or upon the ground under the dropping-board. If in sets the partitions and ends alone

need be solid, as strips of wood back and front keep them firm.

“Thorough creosoting or tarring outside will preserve the wood, and tend to keep down parasites. It is an economy to cover the roof with felting.

“Here are details of a useful house. If they are used for colony flocks and are to be removed occasionally, the better plan will be to erect them in sections—that is, the roof, back, front and sides should be made separately and bolted together. In that case 23 ft. additional scantling and the necessary bolts and nuts will be required. For moving purposes it is a useful plan to fit the house with axles from which the wheels can be removed when the house is in position, one set of wheels thus serving for several houses.

“A useful size is 8 ft. square, $6\frac{1}{2}$ ft. high in front, 5 ft. high at back; the roof, back, and ends solid; the front, in which is a door, boarded up $2\frac{1}{2}$ ft., with wire-netting above and a fixed shutter in front 2 ft. deep as a rain-guard. The capacity of such a house is 16 adult fowls, providing $3\frac{1}{4}$ square feet of floor space for each bird.

“*Materials used.*—Scantling for frame, 2 in. by 2 in.; boarding, white deals, 7 in. by $\frac{3}{4}$ in., tongued and grooved; wire-netting in front, 1 in. mesh; one pair 4 in. butt hinges for door, and lock or catch; a supply of $1\frac{1}{2}$, 2, and $2\frac{1}{2}$ in. French nails; 24 ft. run of felting for roof; and 9 ft. of guttering to be fixed at back of roof, with the necessary supports.

“*Frame.*—Front: two uprights, $6\frac{1}{2}$ ft. each; two horizontals, 8 ft. each; four horizontals, 2 ft. 9 in. each; two uprights for door posts, 6 ft. each; frame for door, $19\frac{1}{2}$ ft. Back: two uprights, 5 ft. each; three horizontals, 8 ft. each. Two ends: two to support roof, $8\frac{1}{2}$ ft. each; two horizontals, 8 ft. each. Roof: one cross tie, 8 ft. Two perches, each 8 ft. The total is $162\frac{1}{2}$ ft. run. A little allowance must be made for shaping the tops of the uprights for the slope of the roof, and for supports of the dropping-board under the perches.

“Match-boarding required will be:—Front, boarded up $2\frac{1}{2}$ ft., including door, 20 sq. ft.; back, 40 sq. ft.; two ends, 92 sq. ft.; roof (allowing to project over all round), $76\frac{1}{2}$ sq. ft.; shutter, 8 ft.

by 2 ft., 16 sq. ft. ; dropping-board, 7 ft. 10 in. by 2 ft., 16 sq. ft. ; nests, 30 sq. ft. ; or $290\frac{1}{2}$ sq. ft. in all.

“In this form of house a floor is not necessary. Where the house has not to be moved it is an excellent plan to place a course of bricks under the walls and fill in the space with sand, or gravel, or earth well beaten down.

“The perches and nest-boxes may be similar to those for the apex portable house, and the timber may be similarly treated.

“DUST BATH

“Where fowls are on range or in large runs and the ground is broken no provision need be made for a dust bath. If they are kept in small runs, however, a dust bath is essential in order to enable the birds to keep themselves free from parasites. An excellent form, triangular in shape, may be fitted into a corner of the house or run. Where used under cover it only requires to be boarded 6 inches high all round, forming a movable box with three equal sides. The cover prevents the birds roosting above. If used outside it should be made with solid sides, leaving the front open above the retaining boards. One or two sugar boxes, which can be bought for a few pence, contain enough material for making an indoor or outdoor dusting box as the case may be.

“COOPS

“Many and varied forms of coops are used. Simplicity is both desirable and economical. A useful coop can be made from a sugar box. The lid should be taken off. One side of the box will form a floor, and the other should be removed. Two of the lid strips should be cut into long sloping pieces, 3 inches at the front down to 1 inch at the back, and be fastened on to the open side by two pieces within at either side, so as to hold them firmly. The laths removed from the open side must be nailed across the sloping pieces, and with a strip from the lid will make the top, having the requisite incline to carry off the rain, although it will

be made water-tight by a piece of felting or corrugated iron nailed over. Enough of the lid will remain to cut into bars 2 inches wide, to be fixed 2 inches apart, for the front ; two bars should be loose for letting out the hen and cleaning. A coat of gas tar will preserve the wood."

CHAPTER XIV

EGG-LAYING COMPETITIONS

WHAT is the value of laying competitions ? The question is often asked, and it may be answered in many ways.

These trials have a definite value in this respect, that all the birds are kept under identical conditions, and the public can, therefore, be guided in their choice of profitable breeds by the results given in the report. Those who contemplate buying stock birds during the summer months, to be in readiness for autumn and winter egg-production, can with advantage study the comparative scores and values of different breeds represented in the trials.

The great object of laying competitions is to improve the egg-producing qualities of the domestic poultry in this country. The stimulating effects of competitions to breeders of laying strains are as great as the large shows are to breeders of fancy poultry or to the cattle, sheep, or horse breeder in their own particular spheres. Or another simile may be taken by comparing the means adopted for improving the thoroughbred horse, where the animals are judged by actual trials of speed and stamina on the race-course and not by their appearance in the show ring.

So in laying competitions only birds which show merit by actual egg-laying results are awarded certificates of merit, says the President of the Harper Adams Agricultural College.

An increased output of eggs is as important to the poultry-keeper as the increased yield of milk is to a dairy-farmer, and as the latter is prepared to purchase at a higher price a heavy milking cow, so it is to a poultry-keeper an advantage to obtain an improved strain of egg-producing birds which has been officially proved to be of a high standard.

This encouragement to produce a better standard is felt by the breeder, for immediately reliable records are available a higher price is obtainable for his stock, and instances of very high figures being realised have been brought to our notice where birds have done well in the laying competitions.

That the effect upon the poultry industry is very valuable is generally agreed, and the following figures will demonstrate the great improvements which have been brought about since competitions were inaugurated.

The first Twelve Months' Competition was held by the Utility Poultry Club in this country in 1907-1908, but subsequently only short winter competitions were held until the college commenced in 1912 to hold twelve months' trials.

	<i>Twelve Months</i>			<i>Ten Months only</i>
	1907-8	1912-13	1913-14	1914-15
Average yield per pen .	795·6	911·15	1123·6	1011·1
„ „ „ bird .	132·6	151·9	187·2	168·5
Average value per pen .	£3 9 9	£4 6 5	£5 14 2	£5 3 10
„ „ „ bird .	12 7½	14 5	19 0½	17 3½
Best pen of birds produce	£4 19 9	£7 0 3½	£7 6 7½	£7 0 0

As usual, White Leghorns were at the top, closely followed by the White Wyandotte. The fact that both are pure white birds naturally makes one wonder whether there is any necessary connection between colour and fecundity. In a recent laying competition in Australia the Black Orpington beat every other heavy breed. The chances are that the usual success of the Leghorn and Wyandotte is due to the fact that they have been the medium of patient selection through generations for egg-production only.

To breed only from hens that have laid large numbers of eggs, and to employ male birds from prolific mothers, is a sure means of increasing the egg-yield. Of course, one must also consider stamina and vitality. It would be better to breed from a bright,

healthy bird with a 200 egg-record than to attempt to produce a race of egg-layers from a weakly hen that had laid 250 eggs in a year. Numbers are important, but they are not everything.

SCIENCE OF BREEDING

The science of breeding is now fairly well understood, but it should be emphasised that the male bird is by far the more important of the two ; it is, in fact, more than two-thirds of the pen. Any farmer with good ordinary hens will improve his egg-yield enormously by employing a male bird that comes from a deep laying strain. It is better to give a guinea for a high-class cockerel and to mate it with ordinary hens than to buy half-a-dozen expensive pullets and mate them with an ordinary cockerel.

The first prize in the Harper Adams Competition went to Miss Bell, of Ightham, Kent, whose six Leghorns laid 1302 eggs in ten months. The lowest Leghorn record for the ten months was 887, so that while there is a vast difference between the first and last pens, the latter figure is probably on a paying basis. The Leghorn is much the safest bird for the amateur.

In the Wyandotte section, Mr Edward Cam, of Houghton, Preston, was awarded first prize with a score of 1272 for six birds for ten months. The lowest pen score of the Wyandotte was 827.

Perhaps the most surprising feature of the whole competition was the fine showing of a pen of Barred Rocks that were immature during the first months and yet scored 1157 for the full period. They beat all other breeds in Section 3, including Buff Orpingtons and Rhode Island Reds. The best Buff Orpington pen produced 1124, and the most successful Rhode Islanders scored 1093.

The following table gives a summary of results for the ten months, and shows a comparison of pen and bird averages, of the average over the whole flock, and also contrasts the results of the heavy and light breeds :—

GOLD MEDAL WINNERS WHITE LEGHORNS (PEN 13) THAT LAID 1302 EGGS IN 10 MONTHS. SENT BY MISS BELL OF IGHAM, KENT

VIEW OF MISS N. H. BELL'S SEMI-INTENSIVE HOUSES

Breed	Average of Pen (6 birds)	Average per Bird	Value of Eggs produced per Bird
White Leghorns .	1054.9	175.8	£ s. d. 0 17 8½
White Wyandottes .	1005.3	167.5	0 17 5
Buff Orpingtons .	961.3	160.2	0 16 7½
Barred Rocks .	1157.0	192.8	1 0 3½
Rhode Island Reds .	986.3	164.3	0 17 3½
Sussex .	935.2	155.8	0 16 4½
Salmon Faverolles .	880.0	146.6	0 13 11½
Totals . .	1011.2	168.54	0 17 3½
Heavy Breeds . .	948.48	164.08	0 17 0½
Light Breeds . .	1054.9	175.8	0 17 8½

Amateurs may be interested to hear that on the average each bird consumed 4½ oz. of food per day, and the cost was just under 2½d. per week of seven days. This was more than double the cost per bird in the competition held in 1912-1913, which is a sure proof of the rise in the price of food-stuffs.

By the above it will be seen that, with the exception of the pen of Barred Rocks, which was only represented by six birds, the only breed to surpass the total average was the Leghorns, while the Wyandottes and Rhode Island Reds followed very closely. The results, however, in every case are highly encouraging and show that good progress is being made in the improvement of our utility leading breeds.

In addition to comparing the merits of the various breeds, the report contrasts by tables the laying of the light and heavy breeds, also the Wyandottes and Leghorns. Another point of interest to poultry-keepers is the relationship between the period of laying and total eggs produced in a given time, and the conclusions arrived at in compiling this report from the records available should be of value to poultry-breeders in selecting birds which are likely to do the best.

The report shows again that birds doing best in the first four weeks are invariably the best layers throughout the whole year.

The question of the size of the egg is fully dealt with, as is also the date of hatching, and as the result of careful observation certain conclusions are given which should be of great value to poultry-breeders.

Another point of interest is that of the relationship of weight of the bird to the total number of eggs laid. A careful analysis of all the records shows that, all else being equal, the best layers are those of medium weight, and it will be remembered that this was borne out in a lesser degree by the two previous years' trials. It would appear, therefore, that any abnormality in a laying bird is detrimental to egg-production.

These egg-laying competitions are undoubtedly doing a real good work in the country and are assisting British poultry-breeders to prepare for after-war times, when it will be of such vital importance to this country to retain the home egg market. There are tremendous possibilities of developing the poultry industry, and it is to our poultry-yards that we look to provide the public with the best strains of utility birds. With eggs at 4s. a dozen in winter, surely this should offer some inducement to producers to increase their stock of laying birds and to maintain same at its best until we have sufficient birds to make us independent of the foreigner, on whom in the past we have relied too much.

The reports of these competitions are of national importance, as they show reliable egg returns from the 700 birds of various breeds of utility poultry. All the birds are housed and fed alike, and it follows that the merits of each breed and strain are put to a real test, the results of which can be taken when choosing birds to supply eggs for home use.

The following table may be of interest, and shows at a glance what returns might be expected in ten months on the basis of the results from, say, one hundred birds of any of the five specified breeds.

[TABLE

Breed	No. of Birds	Total Eggs in Ten Months	Value of Eggs in Ten Months	Average per Bird	
				Eggs	Value
White Leghorns .	100	17,580	£ 88 8 9	175·8	17 8½
White Wyandottes .	100	16,750	87 1 8	167·5	17 5
Buff Orpingtons .	100	16,020	83 2 6	160·2	16 7½
Rhode Island Reds .	100	16,430	86 11 3	164·3	17 3¾
Sussex	100	15,580	81 19 7	155·8	16 4½

The returns given in the above table allow for variation in size of eggs and the time of year at which eggs were laid, as, of course, these factors play an important part in marketing eggs. For instance, while the Leghorns show an increase of 880 in the total eggs laid as compared with the Wyandottes, the total value is only £1, 7s. 1d. more, which shows either that the Leghorns laid smaller eggs and were valued at a lower rate, or that the eggs were laid at the time of the year when eggs were cheaper in price.

To have an average of 150 eggs or over from one hundred birds in ten months must be considered very satisfactory.

Special mention should here be made of the results attained by Pen 19 (White Wyandottes), belonging to Mr E. Cam, of Glen Poultry Farm, Houghton, near Preston, which during the ten months produced a total of 1272 eggs, valued at £7. For the four winter months, 31st October to 19th February, this pen yielded 523 eggs, at a value of £3, 14s. 11¾d., which gave an average per bird of 87·17 eggs, valued at 12s. 6d., and constituted a world's record. The reserve bird in this pen also had the remarkable score of 80 eggs, valued at 11s. 9¾d., to its credit for the same period.

HEAVY *versus* LIGHT BREEDS

A contrast of the light and heavy breeds might here be noted with advantage, although the light birds were confined to one breed (White Leghorns) whereas the heavy birds included six distinct breeds. The most striking point about the light breeds is that their absence of broodiness must have a direct effect upon egg-

production during the time of year when this natural habit prevails among the heavy breeds. In addition to reducing egg-laying, this feature of the birds involves extra labour in attention, as is borne out in the Poultryman's notes.

The following table of average pen yield and value will demonstrate this difference between the two classes and shows the yield during the winter, spring and summer months, and it will be noticed that from 28th November to 19th February the heavy breeds averaged about 17 eggs per hen per month :—

Period (4 weeks)	Date, 1914-1915	Heavy Breeds 31 Pens		Light Breeds 19 Pens	
		No. of Eggs per Pen	Value	No. of Eggs	Value
			s.		s.
1	October 31–November 27 .	46·8	7·9	47·6	7·8
2	November 28–December 25 .	82	13·5	66·5	10·8
3	December 26–January 22 .	98·8	12·7	77·0	9·9
4	January 23–February 19 .	105·0	11·8	90·6	10·27
5	February 20–March 19 .	115·9	10·2	119·6	10·1
6	March 20–April 16 .	118·6	9·1	124·1	9·6
7	April 17–May 14 .	108·6	8·3	124·6	9·57
8	May 15–June 11 .	93·9	7·7	113	9·2
9	June 12–July 9 .	82·1	7·3	108·4	9·6
10	July 10–August 6 .	73·7	7·1	105·1	10·06
11	August 7–August 30 .	59·6	6·4	84	8·97

ANALYSIS OF LAYING

An analysis of the individual scores in the various pens will be interesting for the purpose of drawing conclusions from the foregoing tables.

It must be remembered in comparing the percentage returns in the following table with those of previous years that the present figures are the returns of ten months only, while those given in the last report covered a period of twelve months. With this fact in mind the figures show very satisfactory results.

The number of eggs laid by individual birds in the trials is always an interesting point irrespective of the other birds in the same pen,

and for the purpose of illustrating the point the following table has been drawn up. The lower part of the table gives the percentage yields, by which it will be seen that 65 per cent. of the birds laid over 160 eggs, while 19 per cent. laid over 200 eggs during the ten months of the trials.

	No. of Birds	Number of Birds							Total
		240 and over	220 to 239	200 to 219	180 to 199	160 to 179	140 to 159	0 to 139	
240 Eggs and over	5	5							5
220 Eggs to 239 Eggs	20	5	20						25
200 Eggs to 219 Eggs	32	5	20	32					57
180 Eggs to 199 Eggs	71	5	20	32	71				128
160 Eggs to 179 Eggs	67	5	20	32	71	67			195
140 Eggs to 159 Eggs	41	5	20	32	71	67	41		236
0 Eggs to 139 Eggs	64	5	20	32	71	67	41	64	300

	Percentage of Birds	Percentage of Birds							Total
		240 and over	220 to 239	200 to 219	180 to 199	160 to 179	140 to 159	0 to 139	
240 Eggs and over	1·66	1·66							1·66
220 Eggs to 239 Eggs	6·67	1·66	6·67						8·33
200 Eggs to 219 Eggs	10·67	1·66	6·67	10·67					19
180 Eggs to 199 Eggs	23·67	1·66	6·67	10·67	23·67				42·67
160 Eggs to 179 Eggs	22·33	1·66	6·67	10·67	23·67	22·33			65
140 Eggs to 159 Eggs	13·67	1·66	6·67	10·67	23·67	22·33	13·67		78·67
0 Eggs to 139 Eggs	21·33	1·66	6·67	10·67	23·67	22·33	13·67	21·33	100

RELATIONSHIP OF EGG-PRODUCTION TO TIME OF COMMENCEMENT OF LAYING

To poultry-keepers the relationship of egg-production to the time when egg-laying commences is highly important, and it was pointed out in the first College Competition Report that all birds which laid ten eggs or more during the first month of the test gave a higher average than any others in the competition. The conclusion then drawn was that with other conditions as to time of

hatching, rearing, housing and feeding being the same it was possible to arrive at a bird's capacity as an egg-producer if hatched in March or April by the end of the same year.

The point may now be further demonstrated by separating out the birds laying 1 to 9, 10 to 19, and 20 and over, eggs during the first three periods where each month commencing with November represents a period. Thus it will be seen from the following table that of the birds which laid in the first period those producing 20 and over, 57 per cent. of these laid over 200 eggs during the competition, while of those producing 10 to 19 eggs only 26·6 per cent. laid over 200 eggs.

In the second period only six birds laid 20 eggs or over, and of these only three produced 200 eggs, and the average of the birds which laid 10 to 19 eggs in this second period was 164·4 although four birds laid 200 eggs in the ten months.

Of the birds which commenced to lay in the third period, only two birds reached the 200 score, while the average was 151·92, and subsequent to this period the average yield per bird was only 105·64.

RELATIONSHIP BETWEEN DATE OF FIRST EGG AND NUMBER PRODUCED

Egg-Production	No. of Birds	Total No. of Eggs	Average No. of Eggs per Bird	No. of Birds laying over 200 Eggs	Percentage of Birds laying over 200 Eggs
20 and over during 1st Period	35	7,136	203·88	20	57·34
10 to 19 " "	90	16,549	183·88	24	26·66
1 to 9 " "	50	7,855	157·1	3	6·0
20 and over during 2nd Period	6	1,184	197·3	3	50·0
10 to 19 " "	32	5,262	164·44	4	12·5
1 to 9 " "	30	4,765	158·83	1	3·33
Laid during 3rd Period .	39	5,925	151·92	2	5·13
Laid after 3rd Period . .	17	1,796	105·64		
Never laid at all . . .	1	0			
Unrecorded Eggs . . .		90			
Totals . . .	300	50,562	161·87	57	19·0

The figures relating to the different breeds are interesting, but as the number of pens in the competition representing different breeds varied so considerably (*i.e.* Leghorns, 19 pens and Light Sussex, 3 pens), the figures are shown more clearly by taking the percentage and not the individual number of birds.

All facts, figures and tables as above are extracted from the official record.

CHAPTER XV

COLONIAL COMPETITIONS

IN order to compare English and Colonial egg-laying competitions I give a report of the most recent held in Queensland and in Victoria.

“The twelfth egg-laying competition of the Queensland Agricultural College was brought to a successful close on 31st March 1916. Fifty-three pens competed. As usual, Leghorns predominated, there being forty pens of White and one of Brown Leghorns. Of the other breeds there were seven pens of Black Orpingtons, two of Silver Wyandottes, two of Rhode Island Reds, and one of Plymouth Rocks. With few exceptions, the results are highly satisfactory. Many of the pens laid a total closely approximating the winners’, and it can justly be claimed that, with a little luck, any one of the leading pens might have taken first place. It must be recognised that luck plays a part. Incidental troubles with warts, moulting, etc., may prevent a pen from gaining first place, and so winning a prize. Hence to be among the leaders in such a competition is a guarantee of high egg-laying capacity equal to that of the actual winners.

“Certain features require recognition. Many of the Leghorns are getting very small and weedy. In this there is a grave danger that the stamina of the breed will be undermined through breeding too exclusively for egg-production. With the Black Orpingtons some of the pens are not so true to type as could be desired. That these competitions have done a great deal to improve the egg-laying capacity of the various breeds is undoubted. But it is important to preserve the type of the breed ; hence in the conditions for our 1917–1918 competition more exacting conditions will be imposed as regards trueness to type. As these egg-laying competitions have demonstrated that the lighter Mediterranean breeds

MR. E. CAM'S HOGHTON'S LADY ON RIGHT AND ENGLAND'S SUPREME ON LEFT,
THAT LAID 300 AND 311 EGGS RESPECTIVELY IN 12 $\frac{1}{2}$ MONTHS

MR. E. CAM'S WHITE WYANDOTTES (PEN 19) HARPER-ADAMS 10 MONTHS'
COMPETITION, 1914-15, BREAKING WORLD'S RECORD

are the highest layers, it is unfair to ask the heavier Asiatic breeds to compete on equal terms. One of the 1917 conditions, therefore, will be separate classes and prizes for the light and heavy breeds. This, we think, will do much to preserve such a good breed as Black Orpingtons.

"The six-hen pen competitions have served a good purpose, but their usefulness at present is mainly confined to demonstrating the quality of the flocks of various breeders. In view of this it seems imperative to insist that those accepted in the competition should be in a position to supply the market with both settings of eggs and young stock. That is, only *bona-fide* breeders should be admitted to the six-hen pen test. Another phase of poultry-breeding has been inaugurated at the college for this year's competition. One hundred and twenty pens, each to hold a single hen, have been erected. The object of this is to submit each hen to a year's test for the purpose of selecting the highest producing strain for breeding. This, we are convinced, will go far to still further improve the egg-laying capacity of the various breeds. The eagerness with which breeders seek inclusion in the single pen test is sufficient evidence of the importance of this innovation.

"In the competition recently concluded, the total number of eggs laid during the twelve months was 70,848, an average of 1336.75 per pen, or 222.8 per bird. The total value of the eggs laid was £441, 6s. 4d., while the cost of feed was £135, 12s. 5d., thus leaving a profit, exclusive of labour, of £305, 13s. 11d. This is the highest profit we have yet made in any competition, and is largely due to the very high prices at which eggs have sold during the year. Nineteen birds died during the year—one from enteritis, four from liver disease, and fourteen from heat apoplexy, or its after effects.

"As in previous years, great care has been taken to get the best results possible without unduly forcing the birds. For the benefit of beginners we are giving the average amount of food used each day. It must, however, be distinctly understood that these amounts must not be fed at all seasons of the year. For instance, say it takes $2\frac{1}{2}$ oz. of food per day to keep a hen in good healthy condition when not laying, it will take over 4 oz. to supply her

wants when laying heavily, so that you cannot lay down any hard and fast rule as regards the quantity to be fed. To keep the appetite good, without starving, is the fine art of feeding. The following is the average daily ration :—

“Morning : 20 lb. pollards, 11 lb. bran, 21 oz. Sunlight oilcake, 24 oz. desiccated meat or 18 oz. dried blood in place of the last-named. The above were all weighed dry, then mixed into a crumbly mass with water, cold in summer and hot in winter. At night : 48 lb. wheat, except once a week, when oats or maize were used to give variety. Oats or maize were also used on Sunday morning instead of bran and pollard mash. The morning meal would average a little over $1\frac{1}{2}$ oz. per bird or 10 oz. for the six birds, while the evening feed averaged 14 oz. per pen or $2\frac{1}{2}$ oz. per bird. At midday a little soup meat, one handful for six birds, was fed about once a week, also green lucerne daily one handful per pen.

“The feeding with green lucerne lasted until the beginning of December last, but since then we have had no green feed and were compelled to substitute lucerne chaff, about one-third of a kerosene tin soaked the previous night in boiling water. The latter, although it reduces the quantity of bran and pollard a little, is a poor substitute for green feed, and, in consequence, our records for December, January, February, and March were not up to those of last year. Fresh clean water was given every morning, while shell grit was always available. The quantities mentioned above were for the whole 318 birds.

“EGG-LAYING COMPETITION IN VICTORIA

“Several world’s records were broken in the 1914–1915 egg-laying competition held in Victoria under the auspices of the Department of Agriculture. The winning pen of six birds (White Leghorns) produced 1699 eggs, or an average of 283 eggs per bird, in the twelve months ; the value of the eggs from this pen at 1s. 2d. per dozen was £8, 5s. 2d. The winning pen of the heavy breeds (Black Orpingtons) produced 1562 eggs. The average number of eggs per hen laid by the 588 birds included in the competition was 207 ;

for the light breeds (414 birds) the average was 216 eggs, and for the heavy breeds (174 birds) the average was 185 eggs.

“Two feeding methods were tested: (1) wet mash, (2) dry mash. The wet mash consisted of 16 lb. bran, 4 lb. ground oats, 20 lb. pollards, 4 lb. pea meal, 4 lb. oatmeal pollards and 8 lb. minced liver. The whole was mixed together with liver soup and given warm, in a crumbly condition; about 2 oz. was given to each bird in the morning and 1 oz. at midday, mixed with green stuff consisting of chaffed green lucerne and silver beet. The evening meal consisted of wheat, oats, and crushed maize varied according to appetite and weather conditions; about 11 to 13 oz. was given to each pen of six birds. Cut onions were given once a week as a tonic.

“The dry mash consisted of 54½ lb. bran, 53½ lb. wheat pollards, 14 lb. lucerne pollards, 22 lb. pea meal, 11 lb. oatmeal pollards, 19½ lb. ground oats (with portion of hulls removed), 1½ lb. dry molasses or black sugar and (at 8 A.M.) about 3 oz. of cooked minced liver to each pen. One ounce of salt was allowed to 100 birds, and was mixed with the liver. The quantity of dry mash used per day per pen of six birds (light breeds) was 12 oz. including minced liver. Fresh-cut lucerne and silver beet were fed liberally at midday. More water was consumed by the dry-mash-fed birds. The quantity of grain used per day with the dry mash was 11 to 13 oz. per pen, and was fed about 4.30 P.M.

“The feeding results were as follows:—*Light breeds*: Wet mash, 219 eggs per bird; dry mash, 210 eggs per bird (the winning pen was fed on dry mash). *Heavy breeds*: Wet mash, 194 eggs per bird; dry mash, 169 eggs per bird. The results from the wet mash were unduly favourable in comparison as the competitors placed their best pens in this section. The dry-mash feeding led to a saving in labour, and the hens so fed were hardier and tighter in the feather, and handled better.

“In the four months' winter test the winning pen of light breeds produced 565 eggs, and of heavy breeds 502 eggs.

“In the 1915–1916 competition the wet and dry mash methods of feeding were again adopted. The wet mash was composed as in

1914-1915. The dry mash used was 20 lb. bran, 48 lb. wheat pollards, 33 lb. oatmeal pollards, 16 lb. pea meal, and 10 lb. ground oats (portion of hulls removed). To this was added 2 lb. of black or brown sugar. The whole was well mixed, and placed in an automatic hopper, to which the birds had access during the day. Animal food, generally consisting of boiled liver at the rate of 1 oz. to each bird, was given three or four times a week. Green lucerne, silver beet or clover, was chaffed and fed at midday. The evening meal consisted of wheat and oats, and during cold or rough weather maize was added. The winning pen of light breeds (White Leghorns) produced 1661 eggs, an average of 277 per bird. The value of the eggs from this pen at 1s. 7d. per dozen was £10, 19s. 7d. The winning pen of the heavy breeds (Black Orpingtons) produced 1507 eggs. The average number of eggs per hen laid by the 570 birds in the whole competition was 219½. The feeding results were—*Light breeds*, wet mash, 226 eggs per bird ; dry mash, 220½ eggs per bird. The winning pen were fed on wet mash. *Heavy breeds*, wet mash, 200½ eggs per bird.”

DRY-MASH FEEDING

It will be seen that the Australians get considerably more eggs per bird than we do in this country, but no doubt the more favourable climate has a good deal to do with the better yield.

An attempt was made to discover the virtues of dry-mash feeding as compared with wet-mash, but as the competitors placed their best pens in the wet-mash section the purpose of the test was defeated. While the egg average from the wet-mash pens was greater than the average of the dry-fed pens, it is a remarkable fact that in the competition the winning pen that created a world's record was fed on dry mash.

It should also be pointed out that as the dry-fed birds had presumably been reared and kept on the wet-mash system, the change from wet to dry feed would undoubtedly interfere with the egg-laying capacity of the birds for some weeks. A true test could

only be made where the fowls are reared on the two different systems.

I do not refer so much to the science of breeding in all its ramifications as to simple, matter-of-fact, everyday problems that ought to have been settled long ago.

Why, for instance, have not the Board of Agriculture taken up the food question—whether dry-mash or wet-mash feeding gives the best results? This is a matter that might be settled once for all in a single season.

It is conceded at once that dry mash is not a good feed for fattening purposes, but it is claimed in the more important matter of egg-production that dry mash is superior to the old warm, moist system of feeding. It is claimed to be better in every way; in labour-saving, in economy, and in effective egg-laying results.

But as far as I know there is no clear, well-established proof that it is so. This is where the Board of Agriculture could take the lead. If this branch of the public service could hold a trial of the two methods of feeding and publish the results the public would know exactly what were the merits of the rival systems. At present all one can say is that on all the largest egg farms dry mash is used either partly or wholly. Individual farmers have experimented, and where a complete and extended trial has been given I know of no one who has gone back to the old style of feeding.

But individual experiments are not enough. It will require a Government trial before any system gets an authoritative pronouncement. It has been suggested that they might go further and find by experiment the relative values of the intensive and semi-intensive system.

It appears to me necessary, if poultry-keeping for egg-production is going to be generally successful, to have it proved which is really the best method—semi-intensive or intensive. What I and many hundreds would like done would be to have a test carried out, under Government supervision, on something of the following lines. Take forty White Wyandotte pullets, bred from same

parents, and forty White Leghorns, and put them in pens of twenty birds, ten of each breed, and keep them as follows for a year :—

Pen 1.—Intensive and dry mash.

Pen 2.—Intensive and wet mash.

Pen 3.—Semi-intensive and dry mash.

Pen 4.—Semi-intensive and wet mash.

The following year the birds to be mated up anew and careful note kept of the stamina of the progeny.

I think nothing could be better or fairer than the above suggestion. Not only do you get the feeding systems tested, but the housing methods are dealt with at the same time. It will also tell us whether the rival systems are equally good for light and heavy breeds.

There are some critics who say that dry mash and intensive housing may be suitable for light breeds such as Leghorns, but quite unsuitable for heavy breeds such as Wyandottes, Buff Orpingtons and Rhode Island Reds. Speaking for myself, I am convinced that dry mash is the ideal method for Leghorns, no matter what the system of housing, and I can also add from my own experience that White Wyandottes and Buff Orpingtons do quite well treated by the same methods.

CHAPTER XVI

TABLE POULTRY

ALTHOUGH this work is primarily addressed to those who engage in egg-production, no book on poultry would be complete that did not contain a reference to table poultry, and more particularly to fatting. After all, the egg-farmer has to get rid of his old hens sooner or later, and while in some instances he may sell them as they stand for what they fetch, in other cases the farmer will prefer to fatten them before seeking a market.

There are still other poultry-keepers who prefer to run what are called general purpose fowls, birds that will serve the double purpose of eggs and table, and for this purpose he will breed birds that can lay eggs in the first place and put on flesh quickly in the second. He will not, for this branch of his business, choose any light breeds, but he may with profit cross a light breed with a heavy breed in his efforts to get layers and table birds.

I find, for instance, that a cross between a Leghorn and Buff Orpington results in a good layer and a handsome bird of some weight. Both Leghorns and Buffs are excellent layers and the progeny are noted for their good-sized tinted eggs and a certain absence of broodiness not usually associated with the Buff Orpington.

Having established a good layer with a big plump carcass, the poultryman will have something to work upon when it comes to the fatting process. I may remark that the Leghorn Buff Orpington Cross has a body of the make and shape of the Orpington with the white flesh so much desired for table. Like most crosses it is a particularly hardy bird, and the young are easily reared. They grow quickly, and as a rule the cockerels are fit to sell for the table in twelve to fourteen weeks, while the pullets will mature and lay in favourable circumstances in six to seven months.

It is a curious fact about many first-cross breeds that the young are bigger birds than their parents, and they are nearly always hardier and easier to rear. That is partly why poultrymen who devote themselves mostly to the table side of the business prefer to cross in seeking for the best results. But there are other reasons. Old English and Indian game birds are particularly good for imparting flesh to their progeny. The game birds are possessed of huge frames and chests made up of thick cushions of meat. It is obvious that the game bird crossed with other well-known table fowls will give great scope to the fatter, but it is well to remember that the game bird lays comparatively few eggs.

Some of the best breeds for table purposes are Dorkings, Faverolles, English Game, Indian Game, and Sussex, while there is no better fowl for crossing than the Buff Orpington, with the object of producing table chickens.

For general purpose fowls the Faverolles, Light Sussex, Wyandotte, Rhode Island Reds, Orpingtons and Langshans are the best.

Anyone breeding specially for the table should try to get them ready for fattening when from twelve to fourteen weeks old. This for reasons of economy. During the first month or more the cost of feeding is relatively small and the period of growth—natural growth—is greatest during the first three months of the bird's life. It is during the first sixteen weeks that a larger proportion of food will be turned into bone and flesh than at any other time in the career of the fowl. During the early months almost every bit of food goes to build up the body of the fowl and becomes absorbed into its system. For every pound of food at this period you will get a greater return in weight than can possibly be got when the bird has matured.

HOW TO FATTEN

Therefore pump the food into them liberally between the ages of six and sixteen weeks and without any special fattening process you will get big fine birds.

To specially fatten a bird it is necessary to shut it up in a coop

so that it can eat comfortably without getting any exercise. As a rule, "fatters" put their birds in coops to hold from half-a-dozen each and arrange them in rows in the middle of sheds where they get plenty of air without being exposed to rain and sunshine. The pens are about 18 inches high, 24 inches deep and 36 inches long. In order to give the birds an appetite for the new treatment they are given no food for twelve hours. They are then fed three times daily at regular intervals. For fattening purposes the wet mash is necessary. As a rule it consists of maize meal, pea meal, barley meal or ground oats. The Sussex ground oat is the staple food of the great fattening districts of Heathfield, Sussex. This is mixed with skimmed milk and the whole is fed in wooden troughs fixed along the front of the pens. Needless to say, the birds get as much as they can eat. At the end of seven days the chickens are then "crammed"—that is to say, they are subjected to a process by which the fowls have the specially prepared food crammed down their throats by means of an instrument made for the purpose. The food is composed of Sussex ground oats with skim milk and beef or mutton fat added. No water is required. The process is carried on from two to three weeks and the chickens are then ready for the market. The diet must not be continued more than three weeks or the chickens will go off their feed and fall ill. Flint grit is supplied to aid digestion, and all food is made fresh for each meal.

The majority of poultry-farmers do not trouble to go in for the cramming process, and for such the best method is to put the birds in coops and feed them on Sussex ground oats for a week or ten days. If Sussex oats are not available, middlings and milk make a fair substitute, and, of course, the addition of beef or mutton fat will assist in getting the necessary weight.

Regarding fattening as a profession I would point out that it is one of the most difficult of all industries and not only requires special training over a long period but there are tricks of the trade that remain a close secret with a few favoured craftsmen, mostly in the Weald of Sussex. No one would dream of taking up chicken fattening as a business without a most thorough training, and that, I may say, is almost impossible to obtain.

But as regards feeding up and fattening one's own surplus fowls there need be no difficulty about that. As a rule the "fatters" of Sussex do not breed or rear their poultry. They buy young and promising birds from "higglers"—men who scour the countryside, calling at all farms and cottages for young fowls that form the raw material for the fatters. I have never heard of anyone succeeding as a fatter of fowls who was not born and bred to the business. The weights of some fatted fowls run into big figures. Exhibited in couples such birds as Dorkings, Langshans and Buff Orpingtons will weigh over 20 lb., the cockerels as a rule weighing a pound or two more than the pullets. In normal times these fatted hens will fetch 20s. a pair.

A fatted fowl is, of course, worth much more per pound than a bird that has not undergone the process, because the same amount of bone and waste matter attaches to similar birds. In order to illustrate my meaning I give the results of an experiment. A specialist bought six birds as nearly as possible of the same weight. Three of these were immediately killed and weighed. The other three were fed up for thirty-six days. The fowls that were killed at once weighed $8\frac{1}{2}$ lb. with feathers off. The fattened birds weighed $16\frac{1}{4}$ lb. The edible portion of the first lot weighed 2 lb. 6 oz. each, while the eating portion of the fat birds weighed 7 lb. 6 oz. There was thus a clear gain of 5 lb. of edible matter; or in other words the fatted birds were worth exactly three times as much as the lean birds.

New markets have grown up in this country for very young chickens called *petits poussins*, or milk chickens, and for this purpose young Leghorn cockerels become at once a paying proposition. As a rule these *petits poussins* are wanted to weigh from 12 oz. to 14 oz. each, and the young cockerel is just discernible when he arrives at this weight. Carefully plucked these six-week-old birds will fetch about 1s. 6d. each.

OLD STYLE FATTING¹

To show that chicken-fattening differs very little now in the

Weald of Sussex from the methods of forty-five years ago I give a cutting from *Golden Hours* of 1871 :

“In the south-eastern portion of the Weald, taking the parishes of Heathfield, Warbleton, and Waldron as a centre, a large proportion of the labourers and small farmers keep from eight to sixteen brood hens, and breed chicken *for the fatters*. Their special aim is to obtain large broods early in the spring, in preparation for the London market ; the price of spring chicken being twice or thrice as much as can be obtained at other seasons. They live chiefly in remote places away from the villages and hamlets. The light dry soils of the commons, and higher grounds clothed with heather and fine short grass, are favourite spots both with breeders and fatters.

“The chicks are collected from the cottages by men called ‘higglers,’ who go about with large round coops on their backs, or sometimes in light carts, and are sold by them in quantities to the fatters.

“When bought by the fatters the chickens are from ten to twelve weeks old, and the process takes from a fortnight to four weeks.

“They are fed *naturally* for a week or ten days on oatmeal and water. For another week or ten days on oatmeal and milk and suet, and for the remainder of their imprisonment are crammed with the latter material. The mixture is made up into small sausages—each roll is dipped into some liquid oatmeal, and slipped down their throats by hand.

“A machine has been invented by which the operation is performed with tenfold speed. An iron cylinder, six inches in diameter, and eighteen inches long, is filled with the prepared food of the subsistence of oatmeal porridge. A long galvanised india-rubber tube is screwed into one end of the cylinder, tapering to the thickness of half-an-inch. The taper end is passed into the chick’s crop. A piston inserted into the other end of the cylinder is moved forward by an assistant. The principal official placing his fingers under the crop cries “hold” when the crop is full. Another victim is then submitted to the process, and one or two hundred

chickens are thus filled to repletion in an hour. The fatter who uses this machine kills about one hundred dozen a week, and in very busy times as many as thirty dozen a day.

"He is served with the 'raw material,' the unfatted chicken, by five or six 'higglers.'

"The fattening lodges contain two long rows of coops, one on each side, the whole length of the building. The structure is supported on poles, with rafters of the same material, and thatched both roof and sides with heather. Some, however, are enclosed and roofed with fagots.

"The length of these lodges sometimes extends to thirty or more feet, by six or so wide. On a large establishment there will be some dozen lodges, and in addition perhaps a hundred yards of coops under the hedges, or in sheltered spots in the garden. Six persons, men and boys, are wholly occupied in feeding, killing, and plucking. In smaller establishments the work is done by man and wife, with a certain amount of help from the children.

"One evil effect of the fattening process is that those employed in it are obliged to carry on their business on Sundays, and seldom are seen at church or chapel.

"The chickens, plucked and trussed ready for market, are packed in the 'market ped,' and called for by the carrier.

"Some idea of the importance of the business to the poor people who live in this part of the Weald may be gathered from the following statistics, furnished me by a friend to whom I am indebted for the whole of the information contained in this part of my paper.

"In 1864, 163 tons 5 cwt. 7 lb. of fatted chicken were sent up to London from Heathfield by one carrier, being 101,547 fowls fed and fatted in the three parishes of Heathfield, Warbleton, and Waldron. In 1867 and 1868 the quantity somewhat diminished; in 1869 and 1870 it rose to 181 and 191 tons, or 105,887 fowls.

"Between thirteen and fifteen thousand pounds has been paid annually to the fatters by this one carrier besides the sums received direct from the London salesman. The quantity this year, it is estimated, will reach 200 tons. To these numbers may be added

CANVAS BROODER FOR BABY CHICKS

A SUSSEX FATTENING SHED

about half as much again, sent up to London by a different route, besides the poultry sent to Brighton and Hastings. The estimated price of the chicken sent by both routes from Heathfield to London is £25,000 per annum.

“When we consider the high price of poultry in London, rendering it a luxury only to be enjoyed on festal occasions, and that no one now but the rich can think of such an extravagance as new-laid eggs for breakfast, it seems marvellous that chicken-breeding should not be carried on elsewhere as in these parishes. Why should not every cottager throughout the country add to his own wealth and that of the community by keeping fowls? They would not interfere, as allotments are sometimes said to do, with his regular employment, but could be managed entirely by his wife and children.

“In the Weald they are usually left to the sole charge of those who are at home, while the father is at work for his master, or on his own twelve or fifteen acres of land.

“The chickens have free run on the roadside away from the villages, where the breeding coops often stand on the green turf under the sunny side of the hedge; or a dozen coops may frequently be seen scattered about the corners of the many commons to be found in these parts, or placed in some warm nook in the garden.

“To industrious, enterprising men chicken-breeding affords a means of raising themselves in the social scale. Many of the fatters have worked their way up from the condition of small farmers, and a smaller proportion from that of labourers. Within the last few years a considerable number of the breeders have taken to fattening their own chickens, finding it more profitable than to sell them to the fatters; but the number of professed fatters has not diminished as the demand has steadily increased.”

CHAPTER XVII

DRY-MASH FEED

A CONTROVERSY—long and bitter—has been raging over the question of dry-mash feed for laying hens. Why the controversy should be bitter I am at a loss to know. Differences of opinion regarding the best and most effective method of feeding I can understand, but why one should allow one's emotions to enter into a purely economic discussion passes the wit of man. It is a question of experience and a question of fact.

For anyone to give an opinion who has not carefully and systematically given the system a trial is an impertinence, and to condemn it without experience is to write oneself down an ass.

On the other hand, anyone who pronounces against wet-mash feed without equal experience and trial is equally a fool. The wet or moist mash system of feeding is the old one—the method applied from “time immemorial,” and we know that these “time immemorial” systems die hard when they die at all. There is always this to be said for an older method: “It has been tried and it has answered.” True. Wet mash has stood a long and varied trial, and it has answered well, but it does not follow that the dry-food system is not equally good, or perhaps better. As a rule the opponents of dry mash will not allow that it possesses any virtues, excepting perhaps that it is labour-saving, but they scoff at that part of the system by saying it is the last refuge of the lazy man. As well might they say that the railway train, the motor car, the electric telegraph, the telephone were the refuge of the lazy man. If it can be proved that dry-mash feed saves labour—and that at least is indisputable—it only need be assumed that it is equal in other respects to the wet-mash method to make it the superior system. For, after all, what just does labour-saving mean? It means that

a man in the same time can increase his output without increasing his exertion ; it means that he need pay only one man where two were paid before ; it means that he can attend to double the number of fowls without any greater effort, and it therefore means that he can produce two eggs to every one he produced before.

Let us see where the labour-saving comes in. If one feeds hot and moist meals to his fowls—which is the wet-mash system—it means that one has to put on a fire and get the utensils for cooking—or partially cooking—the food. I may describe the method of wet-mash feeding as practised in many of the large poultry farms.

They buy an outdoor steam cooker, which costs anything up to £50. They have to fetch the fuel—wood or coal—and get the fire lit. Then comes the cooking. As a rule this takes from two to three hours. Sometimes they boil grain—wheat for preference—or they may cook meat or vegetables. Whatever is cooked in this manner has to be dried off with suitable meals—usually toppings. And it is no easy matter to dry off, say, a hundredweight of cooked food. It takes time and it requires skill. The mixture must not be too wet nor too dry, but “just so”—crumbly, they call it.

If the food is not thus laboriously steam cooked or boiled and dried off, the least that is necessary is to boil water to scald the mixture of meals that have to be reduced to a crumbly state. First the meals have to be thoroughly mixed, then scalded, then mixed again till they are of the proper consistency for feeding. It is not a difficult matter if care be taken, but if one is careless or leaves it to a servant to see to, there is always the danger of the mixture being too wet and bowel trouble ensuing. Again, just enough wet-mash may be fed at a time to satisfy the birds for one meal. One must not let moist meals lie about in troughs exposed to the air, where chemical action speedily turns them sour and there is more trouble. With wet-mash feeding all this cooking and drying process has to be gone through every day, and the food trundled about from fowl-house to fowl-house, no matter what the weather is like. Wet mash is not suitable for feeding inside the house, and one, therefore, has to bring the birds outside in rain, hail or snow.

As I have said, it is not very difficult, but it is complex, cumbersome, exacting and time-wasting.

Compare the preparing and feeding of wet mash with preparing and feeding of dry mash. I can and do mix the dry meals to last a week for any number of birds up to 1000 in three-quarters of an hour. Another half-hour will see it distributed in the large boxes—hoppers—in the various houses. Thus the labour necessary to feed 1000 by the old style runs into twelve or fourteen hours per week, while if one gets a hopper to hold a week's supply the whole thing can be done in seventy-five minutes. In one house I keep 120 laying birds. The hopper in this house holds 112 lb. of dry mash, and as each bird eats a little over 2 oz. per day the supply lasts for a week.

LABOUR-SAVING

For those who keep only a few fowls the labour-saving in dry mash may not make a strong appeal, but there are many instances where the owner of a small flock is at work all day. To such a one the dry mash is invaluable because he can give his feed of grain in the morning, leave a plentiful supply of water, with the dry-mash hopper open, and the birds will need no more attention till next morning. For those with half-a-dozen or a dozen fowls with plenty of time to spare there is not so strong a case for dry mash, and I know as well as anyone that excellent results from the egg-production standpoint can be obtained by the use of household scraps, boiled and otherwise. At the same time I believe that even for small flocks of birds dry mash will be found preferable to wet mash so far as general health, cleanliness and egg results are concerned. In such cases, however, where time is no object and great care in mixing the moist mash is exercised it matters little whether dry or wet feeding is adopted.

But in large flocks the average farmer simply cannot afford the time for all the work connected with the feeding of moist mashes. In the matter of economy dry mash is also to be preferred where poultry is kept on a large scale. In the most recent Harper Adams

Laying Competition the feeding of the fowls cost 2½d. per head per week. That was in 1914-1915. During this period poultry-keepers who favoured dry mash were feeding their flocks at 1½d. per week, thus was there a clear saving of 1d. per week per bird. Think of what this means in a flock of several thousand birds.

When food was at least 50 per cent. dearer towards the end of 1916, I was feeding my birds on dry mash at a cost of 2¼d. per bird per week, and I had to buy everything excepting the grass which the birds picked up in the runs. I reckon that dry-mash feeding costs from 10 to 15 per cent. less than wet mash in mere material, apart altogether from the question of labour.

But dry mash has still another and severer test—Does it produce as many eggs per bird as the wet-feed system ?

It is round this question that the controversy roars and rages. It is so difficult to get all the facts. One man's experience, too, may honestly differ from another's. Some may have tried dry mash and found his egg supply falling off. I am willing to concede that there may be such cases, although, personally, they have not come within my knowledge. It is quite reasonable to suppose that if hens have been fed on wet mash for a year or more and then suddenly given the dry feed, the egg supply may diminish. Fowls are not merely machines. They respond to the various stimuli presented, and a totally new method of feeding may temporarily, at least, upset their creative organs. In a few instances the new feed may actually result in fewer eggs. That much is possible, but again I must qualify the admission by the statement that I have not known of such instances. In nearly all cases where moderately young birds fed on the old system have been transferred to dry mash, the result after a few weeks has been to stimulate the egg supply. Just for a fortnight or so the fowls may not do quite so well, but they soon adapt themselves to the new conditions and eggs are at least as plentiful as they were under the old regime.

With older birds—say over two years old—it is not worth while making a radical change in their dietary. It is well known that a

fowl that has fed for a long time on wet mash develops a larger—or more extended—crop than the dry-fed bird. The reason is fairly obvious. With moist feeding the birds get their day's food put before them in one heap and they immediately stuff themselves to bursting point. They gorge till they can gorge no longer. Hens are greedy animals and they are afraid they will not get their share. Consequently some of them at least eat themselves into a state of coma, and instead of running about and scratching for more food, as they have to do in a state of nature, they retire to a corner lazy and satisfied, too stuffed up to move. The result is that the bird gets fat and lazy, and a fat and lazy bird does not lay many eggs. Now the old bird put on to dry mash tries to stuff and finds it impossible. Some of them with enlarged crops probably fail to get enough to eat, and too little food is just as bad as too much when eggs are wanted. Thus it is possible that old birds reared on wet food may not do so well when put to dry feeding. With them malnutrition is quite conceivable.

Dry mash gives its best results when the fowl is introduced to it early in life, say before the egg-laying period, or better still, perhaps, when it is reared on dry feed from birth. Such a bird will be harder, leaner, firmer to handle, more active and more vigorous—in other words, it will be in that physical condition which conduces most to egg-production. Dry mash induces activity. I have briefly described the condition of the average moist-fed bird. It is difficult to know just how much food it should have. One may allow two ounces (dry weight) per bird, but if put down before a hundred hungry birds some will inevitably get too much food and others will just as inevitably get too little. Most fowls are greedy, but there are always some shy feeders. One cannot feed them separately, and therefore with a moist mash presented once a day in one lot there are bound to be overfed and underfed.

It is not the case with dry feeding. Here is a hopper filled with food, open all day, or so many hours per day, so that every bird can get as much as it desires.

FOR THE SHY FEEDER

It is almost impossible for birds to overfeed with dry mash. I will explain. Supposing, instead of eating porridge and milk to breakfast you were allowed only dry oatmeal. At most you could only take a few mouthfuls before you would be compelled to drink something to wash down the dry meal. This is exactly what happens to the hens. They eat a few mouthfuls of dry meal, when they have to jump down from the hopper and run to some remote part of the "run" or house for a drink. If they are hungry they have to run back again to the hopper and back again to the water till they are satisfied. I take care that the water is as far away as possible from the food, and in this way the birds get exercise, and instead of their one meal per day (as in the case of wet mash) lasting five minutes, they can have several smaller feeds lasting half-an-hour each. Then there are intervals when no other birds are round the hopper and the shy feeder can then take what is required. The virtue of dry mash is that no bird gets too much and every bird can get enough. It is the rarest thing possible to see a fat dry-mash-fed fowl. They are almost invariably in that hard lean condition such as the egg-farmer loves to see. It is the busy active fowl that lays eggs and keeps on laying them. If you see a bird all hunched up in a corner with its eyes closed, that is a fat and lazy bird, and the farmer can dispense with its services.

Many of the largest and most successful egg-farmers in England are convinced dry-mash feeders and swear by the results. I give the opinion of Mr S. G. Hanson of Basingstoke in his *Commercial Egg Farming*.

Unfortunately no great public test of the two methods of feeding has ever been made in England, and the dry-mash system is so comparatively new that all the big laying competitions, as well as Government experiments, have been conducted on the old style of feeding. It takes time to convert most people to anything new, and it always takes much longer for anything revolutionary to percolate to an institution or a branch of the Government.

Hence one reason why dry mash has not been tested against moist mash in this country. There is another reason. Most of the poultry-keepers who send their birds to laying competitions are not commercial egg-farmers. They are all, or nearly all, breeders—that is to say, men who rear pedigree stock to sell at fancy prices, either as pullets or stock birds. In their clever hands pullets, and especially stock birds, will do exceptionally well on wet mash ; indeed they select only the birds that do well for the laying competitions. For making a stock bird grow big and powerful, such as we all like to see, a carefully handled wet-mash bird will fully hold his own with a dry-fed male bird. Naturally these pedigree birds are specially looked after and cleverly treated. One must also remember that until laying competitions give notice that they will accept birds fed on dry mash it would be folly for these scientific breeders to feed their birds otherwise than as they do. To a certain extent they cannot help themselves.

Yet some of the big pedigree breeders are firm believers in dry mash, and use it consistently to feed the stock they keep for egg-production, thus proving that in their experience dry mash is the better system for eggs. Jonathan Collinson, of Lingart, Lancashire, who has won many laying competitions at home and abroad, is a firm believer in the efficacy of dry mash, and uses it for his egg-laying birds.

In the absence of any official test of the two systems it is most difficult to prove which is the better for egg-production, but the fact that most of the leading commercial egg-farmers in the country use it consistently is a strong point in its favour. Numbers of smaller farmers have given up wet feeding in favour of dry, and I do not know of one case where the convert has gone back to the old system. These are what one may call strong circumstantial evidences in favour of dry mash, but it really requires a proper Government test over a long period to provide what the scientist would accept as proof, and until that is done the whole problem will remain in an unsatisfactory state.

Of what would such a test consist ?

In order to make the test thorough and conclusive it would be

DRY MASH HOPPER

necessary to get at least two lots of birds of the same strain and feed them from birth according to the best methods of each system. Better still if the birds to be dry fed had come from several generations of dry-fed stock. The same would also hold about the birds to be fed on the moist-mash method. But it would probably be difficult, if not impossible, to find the same strain of birds that had been reared from birds fed in the two different styles.

Thus it seems to me that to get the same strain of birds at the same age one must select them either from parents that had been reared on dry food or wet food. In order to make the test quite fair it would be necessary to get two lots of young birds from dry-fed parents and two lots of birds hatched from parents fed on wet mash. We would then have four lots of birds. Those reared from dry-mash parents would be divided into two and one lot fed dry and the other fed moist. The same would be done with the birds from wet-mash parents. We would then have two lots as follows :

Birds from Dry-Mash Parents

(a) To be dry fed ; (b) to be moist fed.

Birds from Wet-Mash Parents

(c) To be dry fed ; (d) to be moist fed.

The eggs produced from groups (a) and (c) would be added together and the eggs of groups (b) and (d) would be added together, and the numbers produced would determine the result. Thus, if (a) and (c) produced 90 eggs, and (b) and (d) produced 100, the latter would be winners. If, on the contrary, the figures went the other way the test would be equally conclusive.

So far as public competitions are concerned we have only one that I know of.

I find that in Victoria (Australia) the Board of Agriculture has taken the matter up and held an egg-laying competition over twelve months, in which there were two sections—dry-mash and wet-mash.

Unfortunately for the experiment the competitors had the choice

of sending their birds to either section, and as, the Board reports, "competitors placed their best pens in the wet-mash section the results prove unduly favourable to wet mash." The report goes on to say that "the dry-mash feeding led to a saving in labour, and the birds so fed were hardier and tighter in the feather and handled better."

On the face of this report, dry mash does not seem to have been such a success as its advocates would have liked, but the fact that "the best pens" were not included in the dry-mash section makes the test inconclusive.

It is noteworthy, however, that the winning pen of birds were fed on dry mash and created a world's record in the number of eggs laid. A pen of White Leghorns produced 1699 eggs in twelve months, or an average of 283 eggs per bird. Another world's record was created by heavy breeds by a pen of Black Orpingtons that laid 1562 eggs—an average of 260 eggs per bird per annum.

These are very striking figures, and it is needless to say we have never approached them in this country. No doubt the climate is responsible for a good deal, but one may doubt whether English laying birds have yet been bred to the same pitch of perfection as they have been in Australia, where the Government has spent much time and money on the encouragement of the laying hen. The difference in climate may be clearly shown by the fact that during the four winter months in Australia the light breeds of the winning pen beat the heavy breeds by laying 565 eggs to 502. In England we would probably have had the figures reversed during the winter months.

A later competition held on the same lines produced almost exactly the same results, excepting that on this occasion the winning pen was fed on wet mash, and laid 38 fewer eggs than the birds fed on dry mash had done in the first competition. The average number of eggs laid per bird by the 570 competing fowls was 219½. Needless to say, this average has never been equalled in an English laying competition.

In a third competition now being held at Burnley, Victoria, the birds fed on dry mash are a long way ahead of the moist-mash

birds, and one may surmise that the competitors are now sending at least some of their best pens to the dry-feed section.

For the benefit of English poultry-keepers I give the menu of the competing birds in the dry-mash section : 48 lb. pollards, 33 lb. oatmeal, 20 lb. bran, 16 lb. pea meal, 10 lb. ground oats, and 2 lb. of brown sugar. The whole was well mixed and placed in an automatic hopper, to which the birds had access during the day. Animal food, generally consisting of boiled liver, at the rate of one ounce to each bird, was given three or four times per week. Green lucerne, silver beet or clover was chopped and fed at midday. The evening meal consisted of wheat and oats, and during rough or cold weather maize was added.

It would appear that we have still a good deal to learn from the Australians regarding egg-production. Men of science have been specially retained to study and report on the subject, and the egg-farmers are reaping the benefit. It is surely possible for our Government to do something similar. Our efforts so far have either been made by those who have not made the matter a deep scientific study, or else they have been the work of mere theorists—those who have had no practical dealing with egg culture on a large scale. To get the best results we want the scientific man who is also a successful poultry-farmer. Is it too much to hope that our Board of Agriculture will take up the matter in this spirit ?

The following clever parody on the dry-mash controversy appeared in a poultry paper :—

SCENE, *a poultry yard, enclosed by walls of cyclopean masonry. In the background a mediæval gateway, through which may be seen a waving field of Solanum tuberosum. To the right an automatic feeder. To the left a mash tub.*

Enter the DUENNA.

Dry or not dry ? That is the question !
Whether it were better for us feathered folk
To take up seriatim, one by one,
Between the upper and the nether mandible,
The floury particles and cereal seeds
As they descend the valley of the Hopper ?
To seize the nimble granule, to gulp, to swallow,

And, as the grain and flint in conflict clash,
To feel—ay, there's the rub-a-dub !
To feel that inward penetrating joy—
That glorious, gritty grinding in the gizzard,
The precedent and happy prelude to digestion !
Then, when the circling process of the sun
Brings round the fulness of the fecund year,
Daily to drop upon the golden straw
The precious nugget—exquisite ellipse.
Russet, or amber-brown, or ivory-white,
Grand consummation, piously desired
By all those tribes, wearing or frocks or feathers,
That move on understandings twain.
Or were it best, perchance, to thrust the beak
Into a reeking mass of viscid dough,
Messy conglomerate of myriad meals,
Fish, flesh, blood, bones, beans, biscuit, clover,
With pollard mixed, or sharps, or bran, or middlings ?
Vile regimen ! Come rather instant death
By one fell wrench of the cervical vertebræ
Than a millennium of ignoble slops,
Sans eggs, sans chicks, sans quills, sans everything !

[Exit DUENNA in the direction of the automatic feeder.]

SOMERSET.

CHAPTER XVIII

FOOD VALUES

IT is not necessary to speculate on the probable food of the jungle fowl in its natural state in order to determine what is best for the modern domestic fowl, which is the product of many generations of artificial selective breeding and feeding by man. It is just possible that the original jungle fowl, from which all other breeds are supposed to have descended, would not have prospered if kept in captivity and fed on the diet of the domestic fowl of to-day. The jungle fowl would in all probability stand amazed—if not amused—at the extraordinary variety of foods presented to the egg-layer of modern times. But if one might hazard a guess about the food of the jungle fowl, one might with comparative safety say that it was partly animal and partly vegetable, and that the proportions would rarely be what we call a “balanced” diet, but more than likely a large choice of vegetable foods and a smaller selection of animal foods. Fortunately it matters little to us what foods the jungle fowl picked up, but one does know that none of it was cooked.

To-day the domestic fowl, like the human being, has been kept for many generations on a mixed diet of cooked and raw foods. A comparatively recent discovery shows, however, that the modern fowl, inured through countless years to cooked food, thrives just as well—if not better—on raw foods. That, however, is another story.

Where the domestic fowl is given full liberty—called free range—it will find a certain proportion of its food for itself. If it have both grass and arable land to roam over it will pick up not less than one-fourth of its food during some seven months of the year, and during the remaining months it will add to its daily menu in a smaller degree. From March to about the end of September the

fowl with free range will pick up heaps of vegetable food, especially grass, and in addition it will rout out all sorts of grubs and insects from the ground. It will clear wire-worm from the field, eat the young of field-mice and the eggs of several pests not unknown to farmers. It is possible that this "natural" food is best of all for the well-being of the birds, and it is certain that when a plentiful supply of insect life of all kinds can be obtained the fowl is usually in the full flush of health and vigour. There is, however, only a limited supply of "natural" food to be found, and one has to eke it out with grains and foods made from cereals, as well as a proportion of meat, fish or other protein-supplying substances. One may obtain a balanced ration from pulse alone, but it has been discovered by experiment that while birds can live and thrive on certain meals plus vegetables, they do better when animal food is added. Nothing can entirely take the place of a certain proportion of animal food.

For most purposes a fowl requires a food approximately made up of 15 per cent. albuminoids and 66 per cent carbohydrates ; in other words, a proportion of 1 to $4\frac{1}{2}$.

The food of a fowl has to fulfil a threefold purpose. It is necessary to replace wasted tissue ; it is necessary to enable the young bird to make bone, flesh and feathers, and in the older fowl to make eggs ; while in the third place it is necessary to maintain the heat and vital energy of the bird. The blood temperature of a fowl is 104° F., and it of course consumes a large amount of fuel to provide the heat.

If one would study the whole well-being of the fowl it is necessary to supply those food-stuffs that go to make up the chemical composition of the fowl's body as well as the composition of the egg. The body of a fowl is nitrogenous substances together with oxygen, hydrogen, carbon, sulphur, phosphorus, calcium and a few other substances in smaller proportions. The first three are used in supplying energy and heat, but the most important of all is the nitrogen, which is vital to all animals. The more active the fowl the more nitrogenous food it requires. An egg contains roughly 13 per cent. of albuminoid, 10 per cent. of fat, and 75 per

cent. of water with a little salts. It will thus be seen how very necessary are proteids (albuminoids), carbon and water. Nitrogenous foods, proteids or albuminoids—three names that cover one class of food—are found in a variety of substances, particularly in meat, fish, peas, beans, milk and cheese, but many vegetables, especially cabbage, also contain small proportions of nitrogen.

Fats and oils are termed hydrocarbons, and they provide energy and heat. If fats are not provided the albuminoids will be decomposed in the body of the bird and converted into hydrocarbons to make up for the deficiency of fats, but this is a tax on the bird and a waste of albuminoids, so it is desirable that the bird get a sufficiency of oils or fats. Just as hydrocarbons contain much carbon, so do the carbohydrates contain less carbon, the same proportion of oxygen and hydrogen as is found in water. But while the former form part of the body of the bird, the carbohydrates do not, unless where fats are deficient they may be chemically broken up to supply the necessary fat. They can to a certain extent take the place of albuminoids or hydrocarbons, although this is not their primary function. These three classes of foods are largely supplementary to each other, but only in case of default of any one of them, and it is most desirable that albuminoids, carbohydrates and hydrocarbons should all be supplied in their proper proportions. Where fowls have access to grass or arable land no special supply of salts and minerals need be given, excepting perhaps in the case of growing young birds, where bone meal will supply a great demand for phosphates and lime.

Enough cannot be said about a liberal and constant supply of water, for the bird's body, as well as the egg, contains about 75 per cent. of moisture. Water is the cheapest—and often most neglected—of fowls' food. Any neglect is punished by a lowering of the bird's health and a falling off in the egg supply. On all fowl-houses should be written in large letters : "Pure water makes eggs."

Here then is the way to arrive at the proper proportion of foods—called the albuminoid ratio :

The important nutrients in foods are albuminoids, fats and

carbohydrates. One pound of fat goes as far in heat production or fat formation as $2\frac{1}{2}$ lb. of carbohydrates. To express the fats in terms of carbohydrates they must be multiplied by $2\frac{1}{2}$, and the ratio of the albuminoid matter in any food to this carbohydrate value is called the albuminoid ratio of that food. If a sample of oats contains 8 per cent. of digestible albuminoids, 4.0 of fat, and 47.4 of carbohydrates, the albuminoids ratio is found, by multiplying 4.0 by 2.5, to bring the fat to carbohydrate value, and by adding the result to the 47.4 of carbohydrates, thus getting a total of 57.4. This figure is then divided by 8 (albuminoids), and the quotient gives the albuminoid ratio—viz. 1 to 7.1. The formula is :

$$(4.0 \times 2.5 + 47.4) \div 8 = 7.1$$

One can make up lots of different feeding-stuffs for poultry out of all sorts of grains, meals and animal food when the values are set out as in the table on the opposite page.

For egg-making and flesh-forming the albuminoids are imperative. Oatmeal stands out by itself as an almost perfect food, not only for poultry, but for horses and men. One remembers in this connection Johnson's sneer at the oatmeal-fed Scotsman. "It is food for horses in England and for men in Scotland," quoth the doughty doctor. "Yes, sir," was the reply. "And where will you get better horses than in England and better men than in Scotland?"

Oatmeal gives the ratio of 1 to $4\frac{1}{3}$, and it possesses the necessary salts. It is, however, quite easy to form a balanced ration when food values are known.

According to a high authority lucerne has high feeding value. This arises from its digestibility and its composition. Lucerne is rich in digestible protein. Protein is the substance in foods that goes to build up flesh and blood, to make nerve and brain. There is much bone-making material in lucerne also. Thus lucerne is a builder of tissue, of muscle, bone, nerve, brain. It is a food rich in nitrogen, the prime component of protein. It is because of its alliance with the bacteria that it is able to store itself so full of this nitrogen. We have no other forage so good, so rich in protein.

And protein in foods is what costs. Carbon is cheap enough. We get carbon, the heat-maker, the stuff that makes fat, in corn

Name of Feeding-Stuff	Nutritive Ratio	Per cent. digestible		
		Protein	Fat	Carbo-hydrates and Fibre
<i>Foods rich in both Protein and Oil or Fat</i>				
Ground-nut cake . . .	I : 0·8	45·2	6·3	21·1
Soya-bean cake . . .	I : 1·1	34·0	6·5	21·0
Linseed cake, English . . .	I : 2·0	26·7	9·3	30·1
Cotton cake . . .	I : 2·1	15·5	5·3	20·0
Distillers' grains . . .	I : 2·9	18·7	10·2	29·0
Maize gluten feed . . .	I : 3·0	20·4	8·8	48·4
Brewers' grains, dried . . .	I : 3·5	14·1	6·6	32·7
Palm-nut-kernel cake . . .	I : 4·5	14·1	6·1	48·9
Linseed . . .	I : 5·9	18·1	34·7	20·1
<i>Fairly rich in Protein, rich in Oil</i>				
Maize-germ meal . . .	I : 8·5	9·0	6·2	61·2
Rice meal . . .	I : 9·4	6·8	10·2	38·2
<i>Rich in Protein, poor in Oil</i>				
Peas, Calcutta white . . .	I : 2·1	23·3	1·1	45·9
Beans, English . . .	I : 2·6	19·3	1·2	48·2
Peas, English maple . . .	I : 3·1	17·0	1·0	50·0
Malt culms . . .	I : 3·6	11·4	1·1	38·6
<i>Cereals, rich in Starch, not rich in Protein or Oil</i>				
Barley, feeding . . .	I : 8·0	8·0	2·1	57·8
Oats, English . . .	I : 8·0	7·2	4·0	47·4
Oats, Argentine . . .	I : 8·0	7·2	4·0	47·4
Maize, Argentine . . .	I : 11·3	6·8	4·5	65·8
Maize meal . . .	I : 13·0	5·5	3·5	63·9
Wheat middlings . . .	I : 4·8	12·8	4·1	52·5
Wheat sharps . . .	I : 5·1	11·6	3·4	51·6
Wheat pollards . . .	I : 4·5	13·6	3·7	52·5
Wheat bran . . .	I : 4·7	11·3	3·0	45·0
Wheat bran, broad . . .	I : 4·7	11·3	3·0	45·4

(maize), in most sorts of hay, in lucerne also, as it has nearly enough of carbon or carbohydrates to make it a balanced ration in itself.

One can even use potatoes if the complete diet bears the proper proportion of flesh-formers and heat-producers. Potatoes contain

only $6\frac{1}{2}$ per cent. of protein and 41 per cent. of carbohydrates, therefore served with an equal weight of bran and a dash of fish meal the balance of foods is all that is required.

One does not advocate a constant diet of potatoes, but as an occasional feed, with the addition of suitable meals or meat, they may help to cheapen the menu. Of course where potatoes and meals form the soft-mash food, a good grain feed for the second meal of the day is imperative. Oats would be the best grain to give after potatoes and bran.

Of recent years bran has become an important poultry food both for wet and dry mashes, and it is difficult to say too much in its favour when fed in the proper proportions. It might always form at least a sixth of the mash and in the summer months anything up to a fourth. Bran can be bought in two forms—fine and coarse (or broad, as it is called). There seems to be a general impression that broad bran is much more nutritious than fine bran. This is a popular error, as a reference to the food table will show. The analysis works out as nearly as possible the same, excepting that the broad variety contains a little more moisture. There is generally a difference of from one shilling to two shillings per cwt. in favour of the fine bran, and it may be said that the extra price charged for broad bran is not justified by the feeding value. There are some poultry-keepers who like a bulky food, and to such the broad bran will appeal, but fine bran is quite bulky enough for all practical purposes. What is the value of bulk? It may have a value in so far as it will fill the crops of the birds and make them satisfied with a little less. If it be the desire that the fowls should eat less, then no doubt broad bran will suit the purpose, but no one need be deluded by the thought that a smaller weight of broad bran will supply food equal in value to a larger weight of fine bran. Weight for weight, fine and broad bran are exactly equal in flesh-forming and heat-giving materials. Bulk for bulk, fine bran is superior. What is called middlings, toppings, sharps and pollards is another part of the grain of a more floury character. These have a slightly better food value than bran weight for weight, and the difference is usually expressed in the price. Although bran and

middlings are closely related in feeding value and in character, middlings has a greater tendency to fatten the bird, and for this reason if for no other a mixture of bran and middlings is better than either fed alone.

Maize meal is also a fattener, in so far as it includes less protein and more carbohydrates than the other meals I have mentioned. Its nutritive value is considerable, but of itself it will not do a great deal as an egg-forming food. Yet American egg-farmers use maize and maize meal in great quantities with success, but in this country only active light breeds, such as White Leghorns, seem to do well fed largely on maize. Maize gluten feed, which has a high albuminoid character, is also largely used in America, but is only becoming known in this country. When better known and easier to purchase gluten feed will be a favourite food in Britain.

CHEAP FOODS

There are two cheap foods that for some reason or other are very little used. I refer to dried brewers' grains and to malt culms. As a rule the corn-chandler does not stock these cheap and excellent foods, but if the demand were great enough no doubt the corn-dealer would find it worth his while. Brewers' grains are usually a third cheaper than bran, and they have a higher feeding value. For those who desire bulk and good, sound food nothing could be better. The grains as one buys them are a trifle too large for dry-mash feeding. I have used them in moderate proportions in dry mash and found them economical and beneficial, but they would be much more popular if they were ground fine at a slightly higher price. They would not cost threepence per cwt. to grind, and users would be glad to pay sixpence per cwt. more. Malt culms can also be bought cheaply, especially if one is in the vicinity of a brewery. Besides having a fair feeding value, being rich in protein, malt culms have a digestive quality that is highly beneficial, and they can be used either in wet or dry mash. Wet brewers' grains, owing chiefly to their low feeding value, are not a desirable food for poultry. One could make up an excellent feed from, say, 4 lb.

of maize meal, 3 lb. of malt culms and 2 lb. of middlings. For birds kept on large grass runs grain alone will provide an effective food for the warmer summer months, but if grain only is fed, oats should form about one half of the diet. In the severe winter months I think all birds should get a certain proportion of animal food to compensate for the loss of insects, etc., that are picked up in spring and summer.

Science teaches us a great deal, but unless combined with practical experience we may occasionally be led astray. Certainly science does not approve of the heavy maize feeds given to poultry in America, but experience teaches that it is excellent for all the purposes required. Climate may have something to do with the different effects of maize in America and in Britain, although Mr Hanson tells us that he has fed his White Leghorns on maize to the exclusion of all other grain for a considerable time without any evil results. Certainly it will not do to give heavy breeds in this country an exclusive diet of maize.

All sorts of fancy menus may be composed, but excepting to give the birds a little variety a very large assortment of foods is not necessary. I know of one successful egg-farmer who has reduced his menu to simplicity. His dry-mash formula is three parts bran to one part blood meal. The albuminoid ratio in this menu is very high, but while hens are laying they rarely are any the worse for a copious supply of egg-forming material, and if the fowls get plenty of vegetables, or have access to a grass run, they will see to it that the proportion is restored. Elsewhere I have given an Australian dry-mash formula as well as a simple English mixture, and I now give two other dry-mash formulæ that are considered excellent :

Bran	1 part (by weight)
Middlings	1 „ „
Maize meal	1 „ „
Sussex ground oats	1 „ „
Fish meal	1 „ „
Charcoal	$\frac{1}{2}$ „ „
Clover meal	1 „ „

TYPE OF POULTRY HOUSE USED IN HARPER-ADAMS COMPETITION. LENT BY THE PRINCIPAL

Regarding the above formula, one might, during the warm summer months, reduce the fish meal to one half part, while an excellent substitute for clover meal may be found in lucerne, or alfalfa, as the Americans call it. Lucerne grass is quite plentiful and cheap in this country, but here again it is difficult to buy it ground sufficiently to include in a dry mash. For all kinds of stock, and especially fowls, green or dried lucerne is almost a perfect food. It contains a very high proportion of protein (or albuminoids), and is in every respect healthy and suitable for poultry.

Here is another dry-mash formula:

Bran	.	.	.	.	.	.
Soya-bean meal	.	.	.	.	.	.
Maize meal	.	.	.	.	.	.
Middlings	.	.	.	.	.	.
Fish meal	.	.	.	.	.	.
Clover or Lucerne	.	.	.	.	.	.

It is always understood that meat meal or blood meal may always be substituted for fish meal, and for the sake of variety this should be done when convenient. There seems to be a tendency to limit or cut down the proportion of albuminoids supplied in the food of laying hens, but provided the hens are laying, there need be no fear of a proportion of 1 to 4 during all but the warmest months, say June, July and August, when 1 to 5 would be ample. I am also convinced that growing fowls would also benefit by a larger proportion of flesh-forming foods. In this contention I have with me many of the most progressive egg-farmers in England.

For the benefit of the users of wet mash I give the menu of one of the most successful breeders in the world. The mash is composed of

posed of

4 parts bran	2	"	biscuit meal
	2	"	ground oats
	1	part	maize meal
	1	"	fish meal

If ground oats were found to be too expensive, good middlings would make a fair substitute, but it strikes me that under present conditions (I am writing when wheat is 80s. per quarter) both ground oats and biscuit meal are too expensive for ordinary farmers. As a grain feed the same breeder gives one part oats, one part wheat, one part dari, one part buckwheat and one part kibbled maize. This mixed-grain feed should be well raked in the litter to make the birds scratch sufficiently to give them exercise. Provided all the grain food is bought separately and mixed by the farmer, the above grain feed is excellent, but do not purchase what is known as mixed grain for chickens. As a rule it is mixed with inferior grains, and includes a percentage of dust and other rubbish, while it is no cheaper than the best grains if bought separately. In mixing wet mash, do not scald the food, unless the birds are fat and your object is to reduce the weight. Slightly warm water is best for mixing in the winter months, and cold water is preferable in the summer. Bulky food is also better for fat birds, since they are content with less of it, and the flesh-forming material is thereby reduced. Feeding, although somewhat of a science, is also largely a matter of experience. After a time every poultryman who studies his birds should know the quantity and quality of food that suits them best. If the flock is doing exceptionally well, make no experiment, but if results are bad or disappointing it is better to try a change of dietary, always with the balanced ration in view, even if one does not stick to it too slavishly. After all, science was introduced for the benefit of the birds and the birds were not made for science. There are heaps of egg-farmers who snap their fingers at the balanced ration and seem to do fairly well, for the fowl is a wonderful animal, and, provided the strain is a good one, eggs can be produced from the most unlikely-looking foods. Some boast that they can get a plentiful supply of eggs from a feed of cabbage and bran supplemented by oats for grain. No doubt it is possible to get eggs from bred-to-lay birds from this Spartan diet, but they would do better still if they were better fed.

CHAPTER XIX

WINTER EGGS

ACCORDING to some writers the plentiful supply of winter eggs is merely a question of breeding at the right time from the right stock. Perhaps it is ; but, though it sounds simple enough, the cruel fact emerges that very few egg-farmers indeed succeed in getting a generous supply of winter eggs. It seems so simple, and yet it is a most difficult problem. It is generally assumed that the heavy breeds are the better winter layers, and while this is the rule, it has many a disappointing exception.

When one speaks of winter eggs, what does one mean ? Not, as the layman would assume, January, February and March, when the frost is hardest, the snow most persistent and the cold most general. The worst months of the year for eggs, as will be seen from the published prices, are October, November and December.

By winter eggs, then, we mean really only the last three or four months of the year. Some people seem to think that the reason why hens do not lay in winter is because of the cold weather. That is not the real reason. If birds are warmly housed and properly fed the winter colds, excepting in very severe and long-continued frosts and cold winds, will not interfere with the egg-production. The reason why birds in their second year do not lay to any extent in the last three months of the year is that they have been moulting and have not yet got all the surplus vitality that leads to the creative impulse. Few birds lay and moult at the same time. It is quite impossible, then, to get a generous supply of early winter eggs from fowls in their second year.

It is necessary, then, to fall back upon the nine-month-old pullet for winter eggs. That, however, is easier said than done. One may breed, say, Wyandotte pullets in the middle of March, tend

them carefully and yet fail to get eggs in October. Theoretically one ought to get them, but in practice they often fail. Nature seems to abhor the theorist. On the whole it is safer to breed for eggs in February, and then, with ordinary luck, eggs ought to come late in September or early in October. If, however, one hatches in February and the pullet matures quickly, there is always the danger of an early moult.

My experience goes to show that if you hatch heavy breeds about the end of February, some of them will lay early in October (or before), and that they will be practically in full flood in November.

Some strains of Rhode Island Reds, for instance, will mature in seven months, so that the middle of March would be early enough to hatch them out. I frequently see the Buff Rock recommended for winter laying, and, indeed, it does lay well in winter if you can get it started on its laying career. My trouble has been to get the Buff Rock into its stride. I have bred in the early weeks of March and got no eggs before mid-December. That is distinctly too late. It means a very long unproductive period, with eggs only when they are on the eve of becoming plentiful.

SUCCESS OF FIRST CROSSES

I have never got better results for "winter eggs"—the three last months of the year—than from first crosses. I bred the following all about the same time:—White Wyandottes, Buff Rocks, Buff Orpingtons and Rhode Island Reds as pure breeds.

I also hatched White Leghorn-Buff Orpington and Wyandotte-Faverolles as first crosses. The two cross-breeds were first to lay—both were hatched on the same day, and began to lay during the same week, when just under seven months old. At eight months a few Buff Orpingtons began to lay, but in a fortnight they went broody, and took a long rest. The Wyandottes laid at eight months, the Rhode Islands at nearly nine months, and the Buff Rocks at nine and a half months. The first crosses laid all through October, November and December, the Wyandotte-Faverolles

being the most consistent layers of all. I do not care for winter layers to go broody in winter, so that I rule out Buff Orpingtons, excepting when required for hatching purposes. Purely for winter eggs I prefer a first cross, excepting when one is sure one possesses early maturing Rhode Island Reds or Wyandottes. My birds were all fed and treated exactly in the same way, so that their maturity was inherent and not forced.

It is a mistake to think that all strains of the same breed take the same time to mature. Some of them, as in the case of Rhode Island Reds, may be two months apart. Wyandottes as a rule will lay in their eighth month without forcing, but sometimes one will have to wait another month before the eggs begin to come. Buff Orpingtons mature quickly as a rule, but if they do you may count on a spell of broodiness within a few weeks of the first egg.

A good Leghorn-Wyandotte cross also makes a prolific winter layer, the birds maturing rapidly and keeping up a continuous supply when started. Another good feature of this particular cross is that they recover quickly from the moult and lay almost as well in their second year as in their first season.

Summing up the situation on the question of breeds for winter laying, I would recommend almost any Leghorn first cross with a heavy breed, but preferably Leghorn, Wyandotte, Orpington and Plymouth Rock. The pure breeds I have indicated are also excellent winter layers, but it must be remembered that most of them take about a month longer to mature. And perhaps another important consideration is that they all lay brown or tinted eggs, which the British public love so well.

There are, however, large egg-farmers who stick to the White Leghorn for winter and summer eggs, and if one is to keep only one breed there can be little doubt that the Leghorn holds its own against all comers for all-the-year-round egg-production. The trouble is that winter eggs alone, although a great desideratum, are not a paying proposition. One must get a fowl to lay at least eight months in the year to be a good investment; and, of course, if one can get them to continue for ten months, so much the better. I have heard of American pullets that have laid 330 eggs per year,

but one must remember that the story was American. Sensible people will not look for birds that lay 330 eggs per annum—at least not for many a long year, though the science of breeding and trap-nesting is gradually raising the average to unheard-of heights. A flock average of 283 in Australia is already an accomplished fact, while it is certain that many of our general farmers and a few of our back-yard poultry-keepers do not get 100 eggs per annum from their birds. What one may call the progressive egg-farmer is not content with anything less than an average of 150 per bird per annum, and I fear that those whose sole ambition is to get big supplies of winter eggs will hardly reach this average.

One must not allow oneself to be carried away altogether by the cry for winter eggs. It is imperative to remember that while it is manifestly desirable to get eggs when they are selling at top prices, it is also necessary to see that your supplies are not to give out when eggs fetch moderate prices, for it is certain that, however successful one may be in getting winter eggs, the supply ought to be greatly increased—doubled at least—in the natural laying months of February, March, April and May. Birds do not need any forcing to lay in the early spring, because Nature then imposes her demand, and the fowl responds cheerfully and frequently.

If one keeps heavy breeds only there is the difficult problem of broodiness to be faced. No matter what remedies be adopted, there are always birds that will defy every effort to get them back to the normal egg-laying condition. And there are fewer things more exasperating than a large proportion of broody hens. When your broody coops are full your egg baskets are usually empty, and the fact that you get some eggs during the three worst months of the year is little consolation for a dearth of eggs in the spring. For a continuous all-the-year-round supply of eggs there are few more successful methods than making one-third of your stock heavy breeds or first crosses, and the remaining two-thirds White Leg-horns. The latter are by no means bad winter layers, and they come along in the spring months with a perfect avalanche of snow-white eggs.

LAYING STRAINS IMPERATIVE

But, having settled on the breeds to be kept for winter laying, there are other considerations before one can meet with success. It goes without saying that one must make sure that all birds come from a proved laying strain. It costs just as much to feed and house a poor-laying fowl as it does to feed the 300-egg bird. Therefore money spent on getting the best possible material is well invested. Only proved laying strains will ever become successful business propositions, and until the poultry-keeper has secured suitable birds he has not got over the first difficulty of poultry-farming. Much the best plan is to buy from some egg-farmer whom you know and can trust. Failing this, there are reputable firms that will sell the nucleus of your prospective stock. It is not necessary to buy a large number of pullets or laying hens. Better far to expend most of your cash on cockerels of a proved pedigree, and these will influence even ordinary birds out of all knowledge. The laying strain is perpetuated mostly by the male bird, and three first-class cockerels are of greater value for egg-production than thirty first-class pullets.

One cannot prescribe the same sorts of fowls for all sorts of soils. Generally speaking, the breeds I have mentioned will do well anywhere, but where the soil is heavy clay or marshy the Buff Rock will flourish where other breeds will fail. This breed is an importation that came from America about 1871, and it is classed as among the hardiest of all breeds and especially well adapted for damp and low-lying lands. It varies from the Buff Orpington in having a deeper colour and yellow legs, with a lesser tendency to broodiness, but as a rule it takes a month longer to get into a state of maturity that means egg-production.

It is important to note that hens which lay a certain number of winter eggs—that is, in October, November and December—are also as a rule the best summer layers. In the most recent laying competition held under State support at the Harper Adams Competition it was proved that all birds which laid 10 eggs or more during November gave a higher average than any others in the

competition, whilst of those which laid 20 eggs and over during that period, 57 per cent. laid over 200 eggs in the ten months' test, but of those producing 10 to 19 eggs, only 26 per cent. recorded 200 egg average.

Another proof of the relationship between eggs produced in the first three winter months and the total laid in the ten months' trial is given. Dividing the 300 competing birds, irrespective of breed, into two groups, 220 and over, and 200 to 220, it is seen that (with but three exceptions) all those that laid 220 eggs and over had produced not less than an average of 58 in the period mentioned. It should be added that the date of hatching must be considered in conjunction with the parentage, as unless pullets are well developed and fully matured before laying starts, all efforts in strain and breeding will be of little avail. All the six winning White Leghorns which contributed averages of 253, 244, 263, 243, 240, 236 were hatched in April, whilst three White Wyandottes, laying 219, 218, 217, were hatched in March, one pullet laying 67 eggs in the first three months. The total weight of eggs obtained from the best-laying White Leghorn was 29 lb. 15½ oz. in ten months, the average weight of birds in the section being only 3 lb. 8 oz., which places this breed in the front rank of producers. White Wyandottes recorded 28 lb. 6 oz. of eggs, with average weight of bird 4 lb. 5 oz. It was found that medium-sized birds in all pens gave the best results, and in no breed did the heaviest bird in the section prove a heavy layer as compared with other birds.

Assuming that the birds are of the right sort, the other important items are suitable feeding and housing, and on these problems the Board of Agriculture has written some wise words.

WINTER FEEDING

“No matter how strong the inherent instinct to lay may be, the hen cannot produce eggs in winter if she is not supplied with suitable food, and the question is, What foods or combination of foods can be advantageously used to promote winter laying ?

The plan frequently followed of feeding with any grain or meal available, regardless of quality or constituent elements, and without consideration as to position, nature of the soil, or other natural conditions, cannot promote the production of eggs in winter. Unless hens are suitably fed they will not under ordinary conditions come into profit until the regular season, which is in the spring months.

“An important factor to which sufficient attention has not been paid hitherto is the bodily condition of the hens. To meet the demand upon the system in the colder months of the year, non-migratory birds are provided with fatty reserves, and until these are exhausted the ovaries are inactive. It is well known that fowls are naturally heaviest at the end of the summer, and that they are in their leanest condition at the commencement of the breeding season. To promote winter laying, therefore, the surplus fat must be got rid of. This can be attained (1) by feeding upon limited rations rich in albuminoids but poor in carbohydrates and especially fat ; and (2) by compelling the birds to exercise their bodies to the fullest extent. In corn-growing districts where the birds are at liberty to roam the stubbles, no food need be supplied for three or four weeks after harvest. In fact, there is frequently at that time more natural food available than can be consumed by a moderate-sized flock of hens, but the exercise obtained in finding such food compensates for any excess. Where the land is pasture, the hens will only need one feed per diem. This should consist of grain, such as small wheat and barley, and should be given in the evening. At this season, however, the greatest care should be taken to compel consumption of the fatty reserves by the methods stated, and thus bring the birds into such a condition as will be conducive to egg-production. To promote early moulting in yearling hens, an excellent plan during August and September is to add twice a week to the soft food about 20 per cent. of linseed, which has been simmered until it is in the form of a jelly, and to give in each quart of drinking water a teaspoonful of sulphate of iron. Unless moulting takes place early, laying will be delayed. But where the hens are of a sitting breed nothing

helps more than allowing them to rear a brood of chickens in the summer.

“As soon as the cooler weather approaches the older hens should be fed twice a day, not more. The morning meal may consist of barley meal 2 parts, toppings or coarse thirds 1 part, bran 1 part. On alternate days this may be moistened with liquor consisting of equal parts of blood and water, and mixed with about three parts of steamed clover hay, which is chopped fine, and added with its liquor ; if preferred, green bone or desiccated meat may be substituted for blood and water. Where possible, the soft food should be cooked or steamed, or, failing this, it may be mixed with boiling water, but the clover hay must be cooked, as it would otherwise be indigestible. At this meal adult fowls should receive only a small quantity, not sufficient to induce indolence, and they will at once commence searching for other food. Soft food should be given in troughs, but grain may be scattered on the ground where it is free from excrement. The evening meal may consist of wheat (small but good), barley, oats or buckwheat, and in very severe weather, when the birds have commenced laying, one-fifth of the meal may consist of cracked maize. An occasional feed of kibbled blue peas will not be amiss in cool weather.

“In the case of pullets approaching their first season of laying the same methods of feeding should be adopted, except that they may have a full feed of soft food in the morning instead of a half-ration. Young stock of every kind are more active, require a larger quantity of nutriment, and display much less tendency to lay on fat than do older birds. For these reasons they generally commence laying earlier, but to meet the demand upon the system they should be supplied more freely with food. It is true that they eagerly search for natural food, but, as they are still growing, the risk of a check would be considerable if they were insufficiently fed, and it is necessary to provide against any danger of this kind.

“When the ground is locked up by frost or covered with snow, and little natural food is procurable, the morning feed must be

ample, and an additional meal, consisting of green stuff, roots, and a little corn, is desirable during the day. Only, however, under such conditions is this necessary."

Where dry-mash feeding is adopted the food should be richer in winter and the hopper should be open all day.

CHAPTER XX

THE INTENSIVE SYSTEM

TO keep a bird confined under one roof is the essence of the intensive system. The phrase is not a particularly happy one, being evidently adapted from intensive gardening, which expresses something quite different, but once forced into the currency of our language the words "intensive system" have come to stay. In this system the birds are never allowed out of the house, and are usually kept on wooden floors covered with litter of some kind so as to take off the strain of the hard wood and to give them exercise in scratching for their food. As a rule such houses are built with very open fronts, protected only by wind and rain screens in the event of a storm. The idea is to give the birds all the fresh air possible without letting them out into the open. It may at first seem strange that anyone should think of keeping the birds in a comfortable prison-house when they might be running about outside picking up what natural food is available and enjoying the liberty that all animals seem to crave. Intensive houses in towns and crowded places may be a necessity, and we know that birds thrive and lay well under such conditions, but it looks like asking for trouble to coop up the birds where plenty of space and grass runs are available. Yet there are those who keep fowls in large numbers under intensive conditions in the country, and many of them are satisfied that the results are at least equal to any other system of poultry-keeping. No one can offer a word of criticism against intensive poultry-keeping in towns, and no one who has not some experience of it is entitled to attack the system anywhere. I have never kept fowls wholly intensively, but I know those who do, and so long as they are satisfied with the results, that is all that matters. Some farmers occasionally keep birds both intensively and semi-

‘TWYFORD’ INTENSIVE HOUSE SUPPLIED BY PHIPPS OF HAREBORNE

intensively, but as a rule it has not been found profitable to keep fowls on a large scale intensively so far as this country is concerned.

Let us examine what appear to be the weak points of the system, and then we will compare them with the stronger points and try to strike a balance. First of all there is the question of expense, of capital expenditure. Birds kept in strict confinement naturally need more cubic feet of air space and more floor room than fowls that use their houses mainly for roosting and shelter in bad weather. The difference in capital cost will not be denied. For every hundred pounds spent on housing by other methods, the intensivist will have to spend at least £150, perhaps £200. A much smaller number of birds per house means a much larger expenditure of labour. Double the number of houses will be required. Again, where the birds are always confined it is essential that the houses be kept scrupulously clean, and instead of removing the droppings, say, twice a week, they must be removed every day. The litter must also be more carefully examined and the soiled portions taken away and clean litter put in its place. As dry-mash feeding is almost universal under this system, the difficulty of feeding wet-mash indoors does not arise. Watering the birds, however, is more difficult, excepting an opening is made through which the fowls can drink from vessels placed outside. The difficulty of management is largely increased. That is all that need be said about cost of management. On the problem of feeding it is manifest that birds which are never allowed outside cannot get what we call natural food, while every scrap that they eat has to be provided. It is well known that birds with a grass run eat large quantities of grass with beneficial results. They also, during eight months in the year, find the best kind of food in worms, grubs and insects of all kinds. It is difficult to estimate precisely how much natural food a bird at liberty may pick up for herself, as it varies with her opportunities; but if one put down from one-fourth to one-fifth it will not be an excessive calculation. In addition, the free bird has access to grit and shell-forming material which the confined bird must have brought to her and placed within her

reach. There are doubtless other health-giving properties in vegetables and minerals that the fowl at liberty will pick up which is denied to the bird behind the barrier.

This being the case, it costs more to feed the intensive bird ; just how much more has never been properly worked out, but it will probably amount to a halfpenny per bird per week. So, what with double labour and an increased cost of feeding of about one-fourth, the intensive system will have to show largely increased egg results to justify its existence. It is not claimed that breeding can be carried on under the intensive system, and that, of course, is a defect that means a supplementary stock that has access to the land and the open air.

While it is no doubt true that there are several commercial egg farms on the intensive system, there are none on a large scale, a fact which is significant enough. I know of one small intensive poultry farm that paid moderately well in pre-war days. The owner went to serve his country and he has since told me that nothing would induce him to start again on the same system with wheat at 70s. per quarter and middlings at 18s. per cwt. Every increase in the price of food hits the intensivist more than it hits anyone else, since he has to provide the hen with the whole of her food, including grass and other vegetables. In the only instance of which I have had any first-hand knowledge of an egg farm on the intensive system the production of eggs did not exceed that of the same class of farm on the semi-intensive plan.

The intensivist, I know, claims a larger egg-production and especially a winter egg-production. If he did not, what would be the use of his more elaborate houses and his greater expenditure in labour and food ? His claims of more eggs are based largely on theory, but so far I have seen no public or private declaration of profits. No comparative results have been made public of the intensive and semi-intensive methods. And I am afraid it is the intensivist who is shy. Certainly balance-sheets have been published by large egg-farmers working on semi-intensive lines, but so far no intensive farmer has been equally frank with the public.

I have an absolutely open mind on the subject, and if anyone could show me a larger profit on the intensive side I would adopt it forthwith. I am also free to believe that a few more eggs may be gained by the intensive farmer, especially in winter, when eggs are dear, but I greatly doubt whether the slightly larger yield, supposing it to exist, compensates for the disadvantages I have enumerated.

No doubt it is good to protect the bird from storms, from rough, biting winds, from extreme cold and above all from damp and rain. Other things equal, there ought to be rather more eggs, but are other things equal? Is the bird that is kept indoors all day and every day, seeing only the sunshine through window or wire, breathing only as much fresh air as comes in through the open front, deprived of free exercise, robbed of its natural food, for which substitutes can only partially be found—I say, is it reasonable to expect a fowl so situated to maintain its vigour and persist in its creative impulse, as perfectly as the bird that is as well sheltered in bad weather and at the same time free to go abroad into the sunshine and select part of its food? It may be so, but we have no proof that it is so, and the fact that the intensive habit is not adopted on large egg farms is partly conclusive evidence that, whatever virtues the intensive system may possess, it is not so good a commercial proposition as, say,

THE SEMI-INTENSIVE SYSTEM

This system is a compromise between the wholly free and the wholly confined methods. It is now the almost universally adopted method of the large egg-farmer, and has proved beyond doubt to yield better results for large-scale farming than any other plan. Stated simply, it means that a house or scratching-shed is provided large enough to give the birds every accommodation necessary for their movements during wet and stormy weather. On a very cold, very wet or very windy day the birds remain indoors, just as we would do if we were not obliged to go out. Thus they have the protection of the intensively kept birds in bad

weather. When the day is fine the birds are allowed to go out to enjoy the freedom that fresh air, sunshine and a search for tit-bits of food invariably bring. Indoors during the wildest of the weather and out of doors on all reasonably fine days. The morning may be wet and cold and the birds are confined. By noon the sky may clear and the sunshine dry up the land, when the birds are liberated to enjoy the better conditions outside. The rush they make for the door when it is opened is a proof of their appreciation of the fresh air and boundless horizon.

It is claimed for the intensive bird that it is like the hot-house plant and will bloom and give forth its increase quickly and easily. The simile may be easily overstrained. A hen is not a plant, and its demand for oxygen and suitable minerals can only be suitably met with outside. Besides, a laying hen requires much more vigour and stamina than a flowering plant, which has a fixed base. A hen is a roaming animal; to whom exercise and freedom mean much. All the good points that are claimed for the intensive system, it appears to me, can be found when birds are kept semi-intensively. On a small scale; such as in towns; where space is limited; the intensive system is excellent, and answers well with half-a-dozen or a dozen birds, but where space is unlimited, and crisp, clean grass beckons the bird, it seems like banging the door in the face of Providence to shut the fowl up during its lifetime.

The intensive system is still on its trial so far as this country is concerned, and in spite of the balance of probabilities being against it I personally keep my mind open to report on it when more is known. If the day ever arrives when it is conclusively proved to be superior to any other method, on that day I will become a convert. But not till then.

CHAPTER XXI

LARGE FLOCKS *v.* SMALL FLOCKS

LET it be admitted that for egg-production the small flock defeats the large flock every time. By a small flock one means anything from half-a-dozen to twenty, housed under one roof and allowed to run together; by a large flock one means any number from fifty to five hundred, also lodged under one roof and intermingling.

No one has yet worked out the psychology—or is it the physiology—of the greater egg-yield per bird from small flocks. Some assert that it is because of the individual attention that may be given to birds kept together in small numbers, but while it is true that one may keep a stricter eye on a few birds than on a great many the fact in no way accounts for the disparity of eggs collected from small and large flocks. When so many birds are herded together one might argue that they would not all get their fair share of food, but this problem can be solved by the feeding of dry mash where a plentiful number of hoppers are left open all day.

Regarding grain also the shy feeders in the large flocks have quite as much chance of picking up their share where the food is scattered over a large area as with the small flock where a couple of greedy birds in a small house may intimidate the less aggressive fowls. I can see no reason from the feeding point of view to account for the smaller egg-yield per bird in the large flock. The explanation—if there be one—must be psychological or physiological, or both. Why large numbers kept together in one house should not lay so many eggs per bird as smaller numbers under one roof is one of those puzzles that are likely to defy the wits of man for some time to come. I have not even yet heard of a good guess at the cause.

If a man keep, say, 200 birds in pens of 6 each, or even of 12 each, he is quite likely to get an average of something like 180 eggs per bird per annum ; but if he put the same birds under one roof and allow them to run together he will be lucky to get more than 160 eggs per bird. At the moment that is pretty much how the matter stands. A few hundred fowls kept in lots of 6 each house averaged 200 eggs per bird per annum in England, and 280 in Australia, but I have never yet heard of a flock of 200 in one house that averaged more than 170. One may take it then that the large flock means a loss of, say, 20 eggs per bird per annum. At three halfpence per egg this is half-a-crown per bird, or £125 on 1000 fowls. The question, therefore, is whether it is more profitable to keep small flocks or large flocks.

If one were to keep 1000 fowls in pens of 6 birds each, one would require 166 small houses and 166 small runs. If kept in large flocks they might be divided into four lots of 250 each or ten lots of 100 each. One large egg-farmer finds it most profitable, he says, to keep them in lots of 400 each, and he does so without difficulty and gets what he considers a fair average of 150 eggs (or over) per bird per annum. We will suppose, then, that one man keeps 1000 birds in 166 houses and 166 runs, and that another man keeps the same number in four houses of 250 each.

A house to accommodate 250 fowls would cost approximately £50 for the materials, or, say, £60 if supplied ready-made by a reliable firm. It would have to be approximately 50 feet long, 20 feet deep, 9 feet high in front and 6 feet at back. This would give each bird 4 feet of floor space and 32 cubic feet of air. Four such houses would cost £240, and the runs, with posts and wire, would make another £20, say, £260 in all for the housing of 1000 birds.

If we divide 1000 birds up into pens of 6 each, that would mean 166 houses and 166 pens. A semi-intensive house to hold 6 birds would need to be at least 8 feet by 5 feet by 5 feet. Such a house of the same quality as the larger houses would cost, ready-made from a reliable firm, not less than £4, probably nearer £5. If we

take the smaller figure, 166 houses at £4 each amounts to £664. To make the same number of pens would cost, at £1 per pen—and it could not be done at that figure—another £166; total for houses and pens, £830, or £570 more than when housing in flocks of 250 each. The upkeep, repairs, etc., of the smaller houses would be correspondingly more expensive, with the 166 doors and locks to the houses and 166 gates to the pens, instead of 4 doors and 4 gates. Similarly with the never-ending adjustments of windows—4 large to 166 small would be a trifle. So much for the initial capital cost, which would run into £20 per annum in favour of the larger houses.

But it is not so much the question of cost of buildings, etc., as the cost of labour that tells when poultry-farming on a large scale. One could not place 166 small houses and pens on less than ten acres of ground, while one could easily put the four larger houses on three or four acres. A large house has the additional advantage of allowing all the work to be done under cover and the birds all fed in the dry, no matter what the state of the weather outside. With small houses this is impossible. But to return to the question of labour. How long would it take merely to open and shut 166 doors, say, four times per day? How long would it take a skilled man to feed the birds in 166 houses twice a day? Not less than three minutes per house with a walk of another minute to the next house, that is eight minutes per day to each of the 166 houses. It would take him just a trifle over twenty-two hours.

Cleaning out each house would take him about the same time, probably longer, say twenty-six hours. To feed 1000 birds twice a day distributed over four houses would take about forty minutes, and to clean them out would take about the same time. If houses are cleaned out every day there is a clear gain of fifty hours per day. In these two items alone, if we reckon an hour as worth 6d. in labour, we have a saving of 25s. per day, or, say, £8, 15s. per week. Even if one cleaned out the houses only three times a week the labour would cost approximately £1 per day more in looking after 1000 birds in 4 houses than in attending to 1000 birds in 166 houses.

One might, of course, somewhat reduce the difference of labour cost by keeping the birds in flocks of 12 per house, but even then the margin would be not less than £5 per week. To put the matter in another way, one man could easily feed, attend and look after the well-being of 1000 in 4 large houses, and he would not be so hard worked as four men would be looking after the same number of birds in 83 houses. It is the cost of labour that makes all the difference in the profits from large and small flocks. Paying each man 25s. per week per 1000 birds in large houses would cost £60 per annum, while the same number housed in 83 houses would require the services of four men at £240 per annum. If kept in flocks of 6 per house the labour would run into £400. If one reckon the gross profit of a fowl in large flocks at 5s. per annum, that would give a profit of £250 on 1000 birds. If we allow 2s. more per bird for those in small flocks, that will give £350 per 1000. The results may be set out as follows :—

Large flocks, gross profit	.	.	.	£250
Less cost of labour	.	.	.	60
				<u>£190</u>
Small flocks, gross profit	.	.	.	£350
Less cost of labour	.	.	.	240
				<u>£110</u>

If we deduct, say, £20 for the excess capital value of the small houses and runs the net profit is £90 against £190 for the large-flock system.

Small pens are excellent where labour is of no moment. If anyone wants to keep, say, 100 birds and attend to them himself there is no reason why he should not have ten houses instead of one, excepting that the initial cost is considerably greater. If a poultryman does not mind the extra work he will certainly get a larger profit if he keeps his 100 birds in ten houses, but for egg-farming on a large scale the small-flock system is not a paying proposition.

CHAPTER XXII

BREEDING

THE science of breeding for egg-production, although much better understood than it was a decade ago, is still in its experimental stages. No doubt a very great deal of valuable and solid facts have been elicited by men of scientific attainments in this country as well as in America, Canada and Australia, but while much is known there is still a great deal that is obscure; and even more that has not yet been investigated. The experts are still working out their problems, but the practical farmer has to go ahead season after season with the knowledge that is available. Fortunately enough is known to keep the practical man on safe lines, and while he leaves the speculative part of the problem to men of science there are plenty of solid facts to which he can turn his attention.

For the average egg-farmer a few simple facts known of all men will keep him from falling into error, and it is astonishing how successful some men are whose knowledge of breeding is perfectly elementary, but also perfectly correct. A little knowledge is only a dangerous thing when it is mixed with error. Real knowledge, even if limited in amount, is always to be preferred to ignorance.

A very successful egg-farmer actually goes out of his way to tell us that he is "not a poultry expert," but then his knowledge is founded on that safest of all guides, practical experience, which shows a profit at the bank.

Since Charles Darwin wrote his classic on natural and artificial selection the art of breeding has been transformed into a science, and where the breeder was groping in the dark he is now working with his face to the light. The foundation of Darwin's work was roughly that all animals in their primitive state undergo what

seems like a blind selection by Nature. The process as developed by Nature is slow and uncertain. What is called Artificial Selection—that is, selection by man—is much more rapid and much more certain. All animals undergo change—modification of structure, etc.—by change of environment, but they undergo a much greater degree of change by breeding. Artificial selection simply means that man has stepped in where Nature left off and by observation and experiment he can do in a few years what Nature accomplished in thousands of years. The modifications or changes that may take place in birds and fowls in a comparatively short time are perfectly wonderful.

It is a generally accepted fact that all the numerous breeds and varieties known to-day have been evolved from the original jungle fowl which is still to be found in India in a wild state. The *Gallus ferrugineus*, or jungle fowl, not only bears a resemblance to the domestic fowl, but breeds freely with it, so that while the two are far removed in time they are not essentially different. There is a doubt about the Brahma and the Cochin being descendants of the jungle fowl, but all other varieties can be clearly traced to the original Asian bird.

A clear proof of the ready modifications which fowls undergo in the hands of man by artificial selection may be seen in the fact that many of the best-known varieties are of very recent date, and their pedigrees—or foundation stock—are well known. To this purely modern breed of fowl belong the Wyandotte, the Orpington and the Rhode Island Red.

Before the time of Darwin another naturalist, Mendel by name, worked out a science of breeding applicable to plants as well as animals, but this system had more to do with colouring and with superficial changes than with structural modification, and it is of too technical a nature for discussion in a popular book. Well-known scientific breeders, however, like Mr Oscar Smart, of England, and Mr Duncan Forbes Laurie, of Australia, employ the Mendellian theory in working out their problems, and their nuggets of gold, translated into small change, gradually get into circulation among the rank and file of poultrymen.

THE MENDEL HEN

Mr Oscar Smart, for instance, has bred a new variety of fowl to which he has given the name of Mendel. It is claimed for this breed that it is a general purpose fowl, maturing early, with all the laying properties of the Leghorn and all the table virtues of the Orpington. It would, perhaps, be more correct to say that it had the virtues of both fowls and the faults of neither, but too little is yet known of the Mendel by the public to make any definite claim for it. In colour it is a dull white, and in shape it resembles a small-sized Wyandotte. Mr Smart, like several others, is also busily engaged on the all-important question of breeding to obtain a definite sex. From time to time we hear that American breeders have solved the sex problem, but so far no one has been able to place on the market birds that will definitely and consistently produce more of one sex than the other.

If it were possible to breed directly for sex, it would revolutionise not merely the poultry world but all live-stock industries, and incidentally a few other things, including the human race. While one remains sceptical about breeding for sex it would be unscientific to say it cannot be done. The method of procedure in breeding for sex is roughly that, when one has a pullet that produces an overwhelming number of one sex she is to be isolated along with the male. If any of the progeny again show a tendency to yield a preponderance of one sex these again must be isolated, and used again and again until what may have been an accident or "sport" becomes a fixed law. So far it is all a matter of speculation—perhaps of dreams—but one should never close one's eyes to possibilities.

Consider what would happen if the poultryman could breed for sex. If he were a purveyor of table poultry he would breed nothing but cockerels; which grow and fatten quicker than pullets. The egg-farmer would, of course, breed only pullets, double his supply of eggs and get rid of the troublesome cockerel question when trading in light breeds, that rarely fetch in the market what they cost to produce. If the day ever comes when one can breed

pullets or cockerels at will the lot of the poultry-keeper will be a much happier one, and incidentally eggs for the breakfast-table should be cheaper.

At the moment all that is claimed for sex breeding is that more cockerels are produced in the early months of the year than are likely later on. Some breeders hold the view quite strongly that you will get a larger proportion of cockerels in January and February than, say, in the next three months, and while I have no wish to insinuate a doubt about the theory I may say I have never seen it placed on a scientific basis. The claim is simply made from time to time, and it is tacitly agreed to, but so far as is known no one has taken the trouble to tabulate the results of early *versus* late hatching with regard to sex over a series of years, and until this is done we may respect the theory while we remember that it has no foundation in established fact.

But while science has not yet achieved anything so radical as the determination of sex it has added largely to the practical knowledge of every poultry-breeder.

Breeding for fancy poultry is largely a question of achieving special artificial and arbitrary characteristics of shape, size, feathering and colour, all of which are largely superficial. These are mainly arrived at by inbreeding, and are more the outcome of patience than of a deeply scientific scheme. Certain artificial markings, excrescences, etc., are required for the accepted "standard," and it is the business of the fancy to acquire them. If the purpose of the fowl is to please the eye or to conform to certain arbitrary rules, then the breeding of fancy poultry is a matter for the fancy. It is a question that can hardly be argued about any more than a system of æsthetics. All one can say is that for those people who like that sort of thing then that is the sort of thing those people like.

What the general public is more concerned about, and what the nation as a nation is intensely interested in, is that portion of the food supply which the fowl can provide, either as a table bird or as an egg-producer. Fortunately we are going rapidly ahead on these two points. The production of fowls for food has few

mysteries of breeding, for it is well known that certain pure breeds and certain crosses will yield large, juicy birds with tender white flesh. This question is dealt with elsewhere under the heading of Table Poultry.

It is when one comes to the question of eggs and their increase that the difficulties have to be faced. And yet these difficulties are quickly melting away. An insignificant number of years ago it was a rare thing to get any individual fowl to lay 200 eggs per annum. To-day it is so common that one pays no heed to it. A few years ago it was a problem to get an average of anything over 120 eggs per bird, but to-day averages of 150 are just ordinary, and in special cases, with selected birds, an average of 200 is looked upon as normal. At a recent laying competition in Australia the average number of eggs laid by the winning pen was the extraordinary one of 288 per bird. There are authenticated instances of individual birds laying just over 300 eggs per annum. What one bird has been bred to do all birds can be bred to do. It is only a question of time and careful breeding.

365 EGGS PER ANNUM

Theoretically a bird may be bred to lay 365 eggs per annum. It has been claimed that certain fowls have laid two eggs in twenty-four hours, but it has never been claimed that any bird has laid four eggs in forty-eight hours. Even the modern Ananias has stopped short of that. The installation of electric light in the laying-house was at one time going to work wonders. It was to cheat the bird into mistaking night for day and making it lay two eggs where it had laid only one before. Unfortunately light, artificial or otherwise, hardly enters into the problem, and certainly everlasting light would be more likely to lead to disaster than to a multiplicity of eggs. Just as you cannot get a quart into a pint bottle so you cannot get two eggs into the fowl's working day. Her internal economy may be speeded up to a certain extent by foods so that she will do in one year what she at one time took two years to accomplish, but you cannot regulate her like an

alarm clock to go off just when you wish, neither can you get two eggs into twenty-four hours—that is, with regularity and dispatch. The domestic hen some years ago laid, say, 150 eggs in two years, and we can now guarantee her to lay the same number in one year. According to the theorists, every pullet is born with 3000 potential eggs, but for practical politics one may take the first three figures as a working basis. If you can get your 300 eggs in one year you will save one year's food and labour, and afterwards you can turn the hard-worked fowl out to grass so to speak. If you "force" your fowl by special feeding to lay 300 eggs in her first laying season, it would be asking too much of Nature to expect her to repeat the feat in her second year. No doubt she will be well worth keeping, especially for breeding purposes, but we cannot expect to squeeze 300 eggs a year out of her for ten years until she has laid her last "potential" egg. No "dilution" of labour will do it.

What scientific breeders are doing now is to find out methods by which not one hen but all hens, so to speak, will increase their produce in the first year, or first and second year; of their existence. As an egg machine she will not pay to keep beyond her second laying year, or rather it will pay better to replace her with a pullet entering on her first season.

SPEEDING UP THE HEN

The invention of the trap-nest led to the era of speeding up the laying hen. She had been found guilty of procrastination in getting rid of her 3000 egg germs, or yolk sacs, and she was promptly sentenced to produce 200 per year for the first year and a few less the second. Anything over and above that number was to be accounted to her honour. The sentence was less a threat than an admonition, and she has responded nobly to the call.

It began in this way. A strict watch was put upon her. A special nest was made that closed softly behind her, and she could not get out again till the poultryman liberated her. He had placed a number on her leg, and for every egg laid he marked a corre-

GENERAL VIEW OF MR. E. CAM'S FARM, HOUGHTON, LANCASHIRE

MR. E. CAM'S LARGE INCUBATING HOUSE AND CONTENTS

sponding number on the egg chart. In this way an exact record was kept of her doings. If she laid, say, 30 eggs before Christmas she was acquitted of malingering, and if she laid 150 or more per year she was given a chance to reproduce her kind. Sooner or later in her second year she was introduced to a male bird that had come from a mother of her own breed with a high egg-record. The mating was termed "successful" if the female progeny equalled or surpassed the laying qualities of the mother. The process was repeated with the younger generation, and only the exceptional layers were kept to breed from. Changes in the male bird were made from time to time, always, of course, with the eye on the main chance of more eggs. It was found in the course of experiments that the male bird had a greater gift of transmitting the egg germs or laying qualities than the female bird, and therefore it was most desirable that he should come from a highly respectable; hard-working, vigorous family who devoted all their time and talents to laying eggs.

By selecting always the most vigorous birds and most prolific layers the puny figures of the pre-trap-nest days are left far behind and the hands of the egg clock are being gradually turned round to 365. This in very unscientific language is what is taking place in the breeding world with the laying hen.

The mode of inheritance may be stated in a form that can be easily understood. If a hen is a poor layer the cockerels from her will sire poor laying pullets. A male bird bred on both sides from a prolific stock will impart the laying faculty to pullets of poor stock. Again, if a highly fecund hen be mated with the son of a poor layer the pullets will be indifferent layers, while the cockerels will sire prolific pullets. The large egg is equally transmissible through the male bird, so that it is useless to mate a hen with a high egg-laying record of big eggs with a male bird unless the latter has a record on the maternal side of high fecundity and large eggs.

This, in a nutshell, is the finding of scientific breeding. Be it remembered that the highly tested hen mated with a poor pedigree cockerel will not produce highly fecund pullets, but the

cockerels of the mating will on the other hand sire high-laying pullets.

In introducing fresh blood beware of violent outcrosses—that is to say, the incoming male bird should be related in some degree to the stock. Otherwise there is a danger of sterility, or partial sterility. The “unrelated cockerel” so often advertised is a delusion and a snare. Fortunately it is almost impossible to get a wholly unrelated cockerel, as the main strain of blood flows through most of the egg farms of England. A severe outcross may also introduce broodiness where, by selection, it had almost been obliterated. The non-sitting hen is a production of artificial selection, and any in-coming of purely unrelated blood may cause a return to broodiness.

A popular fallacy is to regard the mating of two pure breeds (a first cross) as a uniting of the virtues of both breeds. Very rarely it is. Sometimes it is a mixture of the virtues and defects of both breeds and frequently it misses all the virtues and awakens the long-concealed faults of a remote ancestor. What we call pure breeds are the result of certain crossings that occurred either recently or remotely. These crossings have crystallised into a fixed type, with special characteristics, probably unlike those of their ancestors, but the moment you introduce alien blood you provide a key to unlock the latent characters of these remote ancestors, and more often than not those long dormant traits are of an undesirable kind. Thus it is that, if you begin to cross, the result of the mating may be birds having little or nothing in common with their parents but possessing much that was common to their very remote ancestors. If you double-cross you will get characteristics further away and further back in ancestry, and this repeated will land your stock in the condition of the early fowls that laid only two clutches of eggs per year. The first cross, if well considered, is safe enough as a rule, but the plunge into the past which a crossing brings about should never be carried further. The male birds of a cross should always be killed and not bred from, while the pullets may be mated again to a pure breed of the same variety as the male parent.

What is known as "line" breeding, or breeding between related birds without having recourse to brother and sister, is the system adopted by many important breeders. This system simply means that the parents must have somewhat of the same pedigree and that the relationship must not be too close. Parents and offspring may be bred from, but one must not carry this line further. It would not, for instance, be wise after breeding from parent and offspring to repeat the experiment in a direct line. Other relationships may be mated to a considerable extent, provided the offspring are all vigorous and healthy and show no signs of degeneracy. It is only at long intervals that one need go outside one's own stock-yard for fresh blood, and perhaps the best method of all is occasionally to interchange eggs with some other poultry-keeper whose stock is known to be sound.

While fully matured pullets may be bred from, the best results as a rule come from two-year-old hens that have laid well and proved their stamina by a clean bill of health and coming strong and well through the moult. The eggs selected for hatching should not be too small nor too large, but it is just as well to have them a little above the average size than below it. They should be well shaped (normal egg shape) and with no marks, rings or swellings of any kind—just good ordinary fair-sized eggs. If possible they should not be more than seven days old and not less than twenty-four hours old. Eggs carefully kept in a cool place for three weeks will hatch out all right, but may take a day longer than the eggs that are only a few days old. The great point is to aim at getting all the eggs of about one age, approximately from one day to one week old.

For those who breed on a large scale I may quote the system adopted by Mr Hanson as given in his *Commercial Egg Farming*, a book that ought to be in the hands of all purely egg-farmers who have not the time for a deep study of the problem of breeding. In his own way Mr Hanson gives a good working method of attacking the breeding problem. The principles of this system are :

1. I breed from constitutionally vigorous hens, pure-bred

White Leghorns for choice, that have completed their second year and shown a productivity of at least 144 eggs per bird.

"2. I mate these hens to cockerels, one-year-old birds, bred from trap-nested stock, whose mothers have in their pullet year laid not less than 200 eggs per bird. The cockerels which are used must be of good type and vigorous.

"3. The chicks from these matings are brought up entirely on dry food ; no wet mash of any kind at any period of their lives is fed to them ; they are not coddled ; any chick which looks weak is killed.

"4. No attempt is made to doctor or cure birds ; any bird not looking well is killed.

"5. The pullets are run in flocks of 400 birds, no cockerels being run with them.

"6. Infertile eggs alone are sold for eating.

"7. The breeding pens consist of 400 two-year-old hens, mated to 20 cockerels, run as one flock.

"8. Each house, 180 feet long, holding 400 birds, stands on one acre. The southern half-acre is used in winter, the northern half-acre in summer. Each yard, as it is vacated, is ploughed and harrowed, and sown with thousand-headed kale.

"9. Regularity in cleaning houses and disinfecting them is essential.

"10. Dry mash, in boxes attached to partitions in the laying-houses, is accessible to the birds at all times."

Mr Hanson strongly deprecates breeding from pullets in their first year. He uses only second-year hens for breeding, and he says :

"Too much stress cannot be put on this cardinal factor : that constitutional vigour is the first necessity of a successful egg farm.

"The birds must be mated at least ten days before the eggs are collected for incubating purposes. If 20 or 25 hens are in one pen, one Leghorn cockerel is sufficient ; if 50 birds, it is necessary to run three cockerels with them, because if only two cockerels were used, one would drive the other away. But one will not drive off the other two, even if he is boss of the pen. With flocks

of 100, 200 or 400 hens the proportion of cockerels is 5, 10, 20, or one cockerel to 20 hens."

For heavy breeds fewer hens must go to each cockerel. In the early months half-a-dozen hens to every cockerel are sufficient, and never more than ten hens to one male bird should be used. To make certain of fertility even smaller numbers of hens may be employed.

On the whole it is better to breed from small pens than from large flocks of birds. Six hens and a cockerel will usually give better results than twelve hens and two cockerels; indeed two cockerels in a pen is to be seriously deprecated, because of the fighting between the male birds. Three cockerels in a pen will generally behave very well and give good results; and any number over three will work quite satisfactorily.

Before leaving this subject it may be well to point out that eggs coming from a distance by rail will not hatch out nearly so well as eggs fertilised on one's own farm. The shaking and jolting of the railway journey seems to disturb the contents of the egg and to partially destroy their hatching virtues. I heard last season of some disastrous attempts to hatch eggs from a long distance. In one instance a very large egg-farmer, wishing to introduce fresh blood, sent for ten settings of eggs. He is an expert breeder but he got less than a dozen chickens from them, and a second experiment of the same kind was very little better. My own experience is that with railway-borne eggs a hatch of 40 to 50 per cent. is about as much as one can expect, and there are times when even these modest figures are not reached. I may mention that Mr Hanson is not at all afraid of introducing fresh blood into his stock if the new birds are purchased from reliable breeders. No doubt his success with new blood is due to the fact that practically all the best English stock in White Leghorns is interrelated.

CHAPTER XXIII

SALE OF NEWLY HATCHED CHICKENS

OF late years an enormous business has sprung up in newly hatched chickens, and there seems no limits to the demand. As a rule the man in the day-old chick trade has only to insert an advertisement in the poultry papers to be inundated with orders. The day-old chick trade is also one of the most profitable departments of poultry-farming. With a little extra labour one can usually get from three to six times the price for day-old chicks that can be got for eggs. With ordinary luck the profits are at least doubled, so that if one's egg-production, during the four months or so when this branch of the trade is brisk, is, say, 5000 eggs per month one can count on the natural profit of the egg and in addition not less than twopence each on each chick sold. At 5000 eggs per month for four months at twopence each this would yield approximately £167 additional profit over and above the normal profit of the incubated eggs.

There is no doubt that a large number of egg-farmers and others have made large sums out of the sale of newly hatched chickens, and there is still room for many more. It is only possible to engage profitably in this branch of the business by using incubators. Day-old chicks from broody hens are probably the best of all, but it is difficult to do anything on a large scale by means of natural hatching. The incubators used ought to be of the very best—not necessarily the dearest—and as there are now large numbers of reliable machines of different makes on the market there ought to be no difficulty in getting a perfect incubator at a moderate price. It is not possible, however, to get a good new incubator at a small price—material and labour will not permit of it. The wise farmer will therefore give a good fair price for the machine, on which almost all his success depends. No man, however skilful,

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will be able to produce a large percentage of healthy live chicks with a poor or defective machine. It is also imperative that the incubator be suitably housed. It ought, if possible, to be in a building that is absolutely free from vibration, that has a plentiful supply of fresh air and is not liable to sudden changes of temperature. A stone or brick building is always preferable to a wooden erection, and as a rule a large dry airy cellar is preferable to a house on the ground level. Some soundly built old stables have done good work as incubating sheds, and any decently built stone or brick building should be successful as an incubating house.

The capacity of the incubator should, of course, be in proportion to the business expected, and if it is found necessary to have a hatching capacity of 1000 eggs it is probably better to have four machines holding 250 each than ten holding 100 each. When one has acquired a perfect mastery of the instrument some may prefer one machine to hold all the eggs required. There are in this country at least two machines with a capacity of 5000 eggs, but it goes without saying that such an incubator involves an immense responsibility. No one dare take a risk with an incubator of this magnitude, and as a rule it needs the constant services of two watchers—one by night and one by day.

Anyone taking up the day-old chick trade will probably be well advised to begin in a comparatively modest manner until his experience and business justify his adoption of large-scale methods. It may be stated that women are frequently best suited by Nature and habit for the successful incubating of chickens. I have in my mind two instances in my own knowledge of women who with little experience incubated and hatched more successfully than any one man in a large poultry-farming district, and a great many day-old chick businesses are under the control of women. There is no hard manual work in connection with the trade, and woman's care and patience, combined with her deft fingers and light sense of touch, are qualities that tell in an industry of this sort.

A regular supply of fertile eggs will be necessary from January to June in order to keep the incubators filled, which requires a

flock of fowls or an organisation for securing reliable supplies. For a plant with a capacity equal to the production of, say, 1000 chickens per week from February to June, or twenty weeks in all, at least 30,000 eggs will be required. Assuming an average of 60 eggs produced by each hen during that time, 600 head of stock would be needed to meet the demand. The prime necessity is for the breeding stock to be vigorous and hardy, and they should be kept, therefore, on a free, open range. Eggs from hens highly bred, highly fed, or kept in confinement are found not to hatch so well artificially as those produced from breeding stock treated in a more natural manner, while the chickens produced from such eggs are less vigorous and do not travel well. A free range for the stock may, indeed, be regarded as essential.

A good business is done in cross-bred chickens, which are harder and travel better than some of the pure breeds, but the prices obtained for crosses are never so high as those for pure-bred chickens, while the cost of incubation and packing in each case is the same. For these reasons the trade is chiefly in definite breeds. Where operations are upon a smaller scale one breed only need be kept, provided an adequate demand can be secured. But in large establishments several breeds must be maintained, and these of the classes most saleable. Chicks of the heavier breeds are believed to stand travelling better than those of the lighter varieties.

Experiments conducted upon the Reading College Poultry Farm, Theale, showed that, assuming the cost per egg to be 1d., 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 approximately 1½d. Calculating 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 3s. 6d. per dozen chickens at the time of hatching. To that must be added the expense of a suitable box for packing the birds and of conveyance to the nearest station, so that the actual cost may be stated at 4s. per dozen.

MR. WATSON'S WYANDOTTE PULLETS (PEN 76) COMPETING AT HARPER-ADAMS
1916-17 COMPETITION

MR. WATSON'S WHITE WYANDOTTES, SISTERS TO CHAMPION PEN 98,
HARPER-ADAMS COMPETITION

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Prices vary considerably in accordance with the time of year and the class of fowls. Chickens, for instance, which are intended to be used as breeding stock command higher rates than those intended for killing or for farmyard purposes. But there is at present very little demand except for birds which are intended to be raised as breeding or laying stock. The popular varieties are largely in demand. Up to the present amateurs and smaller poultry-keepers have been the principal buyers.

The trade in selling day-old chicks to farmers is as yet in its infancy, as they have not fully realised the advantages of obtaining fresh stock in this way.

WHEN TO DISPATCH

The best age at which to dispatch the chickens is when they are twenty-four hours old, or as soon as they have dried off and overcome the strain of hatching. If sent away too early they would feel the change and be liable to take a chill, which would be fatal. When chicks are hatched; either by the hen or by the machine, it is generally better to leave them in the place of hatching for twenty-four to thirty hours before removal to coop or brooder, and the same is largely true when they are to be sent away. But their dispatch must not be too long delayed, for when once they begin to eat the supply of food must be regular. Chicks one day old travel better than older ones. Every additional day renders them more liable to feel the effects of transportation. When sent off at the right age, in suitable boxes, they will travel long distances by land or sea quite safely, even when the journey occupies as much as thirty-six hours.

The packages largely used are light wooden boxes, with several ventilating holes near the top of the sides and in the lid, and fitted with a handle made of thick cord, or tied round with thick string. Another useful form of box is made of cardboard with double sides to conserve the warmth and to provide ventilation without danger of chills. For a dozen chickens a box about 14 inches by 9 inches and 9 inches high is large enough ; for two dozen, 15

inches square. The floor should be thickly covered with cut chaff, among which may be scattered some coarse oatmeal, dari, and canary seed, and the sides, more especially the corners, lined with soft hay. The lid is better if lined either with cotton wool or with coarse flannel tacked at the edges, but loose enough to hang down in the centre. The box should be well made, and tied down, not nailed. There is much greater risk during very severe weather, more especially in cross-country journeys, when there is danger of exposure at open stations, and care should be taken to dispatch the chicks by fast trains making good connections, and if possible at night. The sale of these birds takes place generally in the milder spring months, when the risk is not so great as it would be earlier in the season. Boxes should be prominently marked "Live chickens—this side up."

TREATMENT AT DESTINATION

Not the least important point is the treatment of the chickens on arrival at their destination. It is to the vendor's interest to satisfy his customers by sending them hardy birds, but he has no means of controlling them when once they have left his charge, and the responsibility rests with the purchaser. There is nothing better than placing the chickens for an hour or two in a brooder heated to as near 100° F. as possible, and in the absence of such an appliance, excellent results have been obtained by putting them, in a flannel-lined basket, into an oven (leaving the door open) at a temperature not higher than that named; or it will be enough if the basket is placed near the kitchen fire. They should then be given a good feed of warm steeped oatmeal or biscuit meal, and have a little warm milk to drink. If broody hens are available, the best results will be obtained by rearing the chickens under them, if they have travelled a considerable distance. One or two only should be given to a hen at first, and if she takes kindly to these the remainder may be slipped under her wings. Where rearers are to be employed (and small, inexpensive appliances are now sold), these must be well warmed up, say to 100° F., and the

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chicks placed therein. The temperature should be reduced to 95° or even 90° in a couple of hours. Around or in these brooders, according to the class, cut chaff should be littered, and among it scattered what is known as dry feed. In an hour or two the chicks will begin to scratch and seek for food.

The same system may be adopted for the sale of day-old turkey chicks, a branch of poultry-keeping which is capable of great development, especially by farmers. Turkeys do not respond to artificial hatching and rearing, and they should be sent in a good roomy hamper, in which a nest is made, with the hen that hatched them. The mother should have a good feed before starting on the journey.

CHAPTER XXIV

CO-OPERATION IN EGG-FARMING

THERE are few industries where co-operation offers a more inviting field than in the collection and distribution of eggs. The advantages of co-operative buying, where large quantities may be handled and everything purchased at first hand, are also too obvious to be elaborated. In both buying and selling the egg-farmer will frequently find co-operation, whether in conjunction with a few neighbours, or in the organised efforts of a community of farmers, most helpful and profitable. Profits in most businesses, and especially in egg-production, are made up of a multitude of small things, and every saving that can be effected either in buying or selling has a potent effect on the balance-sheet.

There are instances where there may only be two to three farmers in the district. One of these may possess a horse and van and the other two may not. What more natural then than a combination between the three to utilise the services of the horse and van for taking their produce to the railway station or to a local market? I have known of co-operation between half-a-dozen egg-farmers in this way. One possessed a horse and they mutually arranged that all should send their eggs to market by the man who owned the horse. Later on, being a trustworthy man, he also became the distributor and sold the eggs of the little syndicate, and charging a commission of one penny a dozen for carriage and distribution he returned the full market prices, less commission, each evening on returning from his journey. He was also able to buy food-stuffs at wholesale prices and deliver them to his friends. By a small charge of threepence per cwt. he made it profitable for himself and equally valuable to his friends, who each got his goods at the net wholesale price plus the nominal charge for carriage.

As a rule a ton of middlings can be bought at least a pound cheaper than when purchased in cwt. lots, and what is true of this meal is true of all feeding-stuffs. Railway rates per ton are much less than in smaller lots, and thus co-operators save both in price and in carriage. Where a number of men are working together in this way there is usually one man (or more) who knows more about markets and prices and thus all get the benefit of the knowledge of the best-informed man. Co-operation, where faithfully carried out, each one doing his best not only for himself but for his fellow-members, is usually productive of a steady progressive movement in the whole community. The specialist will readily give his advice, and the smallest man usually knows something that the biggest man may be ignorant of. Co-operation in goods and materials often leads to co-operation in ideas and invention, and in this way the least imaginative gets the benefit of the most far-seeing member of the group.

At the present time the egg-farmers of Britain have a unique opportunity for improving their position, and making it difficult, if not impossible, for the foreigner to invade our markets with eggs and poultry as he has done in the past, and it is only by intelligent co-operation that the best results can be obtained.

The importation of eggs from abroad during the past thirty years has grown to an enormous extent, but since 1904 there has been a check in the quantities received. There is some ground for believing that this decline in foreign supplies may be more or less permanent, and as it has been accompanied by a rise in prices there is an excellent opportunity for British poultry-keepers to secure a larger share of the trade than has been the case hitherto. The fact that British payments for foreign eggs exceeded £9,000,000 annually shows that the egg business is not to be despised.

The value of an egg is determined chiefly by its freshness, so that where it can be sold near the place of production it should command a higher price than where it has to be transported over long distances. Owing to this the producers in this country have a natural advantage over foreign exporters. In order to benefit

by it, however, the eggs must be dispatched promptly to market and sold both rapidly and systematically.

The small consignments which each producer is able individually to supply are usually only sufficient for a retail trade and prevent him from obtaining a footing in the large markets. It is by co-operation that this difficulty can be overcome, and it is essential that the British producer should adopt the methods that have proved so successful not only abroad, but in many districts where they have been tried in Great Britain and Ireland.

EGG-COLLECTING CLUBS

The most elementary type of co-operation is an egg-collecting club. A club of this kind may be formed in any district where supplies have to be sent to a market town a few miles away but where the number of producers is not large enough to set up a regular co-operative society. In such a case the cost and trouble of conveying individual lots to market may be reduced, and better prices obtained, by making arrangements for one person to receive, pack and forward the eggs. In most districts women can be found who will undertake this work for a small percentage on the receipts.

The total sum received for the eggs, less this percentage, should be divided weekly or monthly among the members of the club in proportion to the number or weight of eggs supplied by each member.

Cottagers or allotment-holders living near one another may often adopt this arrangement with advantage in place of selling their eggs to higglers.

Unregistered clubs of this kind, however, do not exist in law. The responsibility of any trading operations may fall entirely on the secretary or other individual taking an active part in the business. Such clubs are unable to enter into contracts and, therefore, as a body cannot sue or be sued. The business is usually carried on by a secretary, and he has consequently to incur a certain amount of responsibility which would in the case of a

registered club or society be borne equally by the members. Particulars of the formation of registered societies are given below.

CO-OPERATIVE EGG SOCIETIES

In rural districts, where the local demand is comparatively small, but where a fair number of producers exist, an endeavour should be made to form a co-operative society through which all the eggs produced can be sold under conditions which will ensure absolute freshness and consequently high prices. The society should comprise all the farmers, small-holders and cottagers within a radius of a few miles.

A number of such societies have been established within the last few years, and have proved most successful. As a result of their operations, egg-production in these districts has much increased, and better prices have been obtained all round. It is claimed that apart from the profits made by the societies the prices obtained by members have averaged about twopence per dozen more than the prices received before the opening of these depots. One of the most successful of these societies sold over 8,000,000 eggs in 1916 for £63,000.

When it is proposed to establish such a society, it is desirable to obtain the advice and assistance of the Agricultural Organisation Society, Queen Anne's Chambers, Westminster, S.W., who will give all necessary assistance as regards the formation of co-operative societies in England and Wales. This society is an organisation for promoting the formation of agricultural co-operative societies, but does not itself engage in trade.

The next step is to register the society under the Industrial and Provident Societies Act of 1893, in order that it may have a legal existence and be able to enter into contracts. A small fee is charged by the Registrar of Friendly Societies for this, but by registration members obtain a security which an unregistered society cannot possess. The Agricultural Organisation Society has drawn up a set of model rules which has been approved by the

Chief Registrar of Friendly Societies, and a copy can be obtained on application to the Secretary of the Society.

In a district where either an agricultural or an industrial co-operative society already exists it may be possible to induce that society to add the sale of eggs and poultry to its operations, and it is desirable to adopt this course wherever possible.

In Van Nuys, California, recently taken into the city limits of Los Angeles by annexation, there is a colony of some hundred and fifty fanciers who, through circumstances, were brought up co-operators, and have grown to their present stage without having had to fight single-handed the battles that are part of every poultryman's life.

The birth of the colony came about under rather unusual circumstances some five years ago. At that time Van Nuys was mostly a new subdivision, with not much except future possibilities to attract. The soil, climate and water supply were sufficiently promising to invite investment in small tracts, most of these being five acres. The allotments were sold on the payment plan, with the result that when the lean years arrived there were buyers who found themselves with incomes reduced or shut off, without positions, and facing the loss of what money they already had invested.

Practical business men got together and talked things over a bit. They figured if they would get some quickly produced crop from the lands to provide a living during the lean period, threatened disaster might be averted. A meeting was held at which it was decided to investigate the conditions for poultry-raising, and it finally was decided to make the venture.

There were thirty-three agreed to begin with 1500 baby chicks each, but before a move was made every one of the novices took a trip of investigation to Petaluma, the largest poultry-producing point in the state.

The co-operative feature started with the bringing of the first chick into the brooders. It was realised that a saving could be made in contracting for the chicks in large quantities; in buying the grain feed and other needed supplies. The saving thus

effected, however, did not equal the co-operative feature that was inaugurated later, which was in the marketing. One of the principal reasons now given for the success of most of the members of the present association is in cheap marketing. "A man does not have to spend half his time trying to sell his eggs. He can put his whole work on his flocks" is the way they explain.

Some of the facts in connection with the colony as it is to-day must be of interest to other poultrymen. From the 1500 baby chicks allotted to the thirty-three pioneers, something over four years ago, there are now about 100,000 laying hens and pullets. Only White Leghorns are raised, and the eggs are depended on for the profits. The production averages about 25,000 eggs daily, with indications that this will be doubled in another year. It is significant that all of the thirty-three original members of the co-operative association are still in the game, although some have been more successful than others.

SUPPLY OF EGGS

The method of working adopted by a co-operative egg society may involve the establishment of a depot in a convenient position as near as possible to a railway station, and the making of arrangements for collecting, receiving, testing, grading, packing and selling the eggs on behalf of the members.

In order to secure a good reputation for the society's eggs, and to obtain the best prices, eggs should be sent to the local depot not less than three times a week, no matter how few there may be from each individual member. Eggs not more than three days old, which are sold as "new-laid," usually command 20 per cent. more than those which are five to seven days old, as the latter, though excellent for frying or poaching, have lost the quality desired for boiling.

A few eggs are received from France and Holland which are equal to English new-laid eggs, but the quantity is very small, and most of the foreign eggs imported from France, Denmark, Italy, Hungary and Russia are ten days old or more when received,

according to the distance they have had to travel. Consequently, the older an English egg is when marketed the more it has to compete with foreign eggs, and the lower its price will be. *The object of a co-operative egg society should be to supply eggs superior in quality and freshness to any obtainable from abroad, and thus to secure the best of the trade for its members.*

During the spring months of the year, when birds are broody, eggs should be taken from the nests twice a day, as if they remain under the hen for several hours they are spoiled. Every care should be taken to keep the shells clean by putting new straw in the nests, as washed eggs lose much in appearance and do not keep so well. Before eggs are sent in to the depot they should be marked with the breeder's number in the local society, by means of a rubber stamp provided for the purpose, so that the origin can be traced.

When received at the depot every egg should be tested for freshness by means of a special lamp. The trade requirements for new-laid eggs are that they shall be (1) clean in the shell and of good shape ; (2) full—*i.e.* have a small air space ; (3) bright—*i.e.* perfectly clear, without any spots or shadows ; and (4) from 2 to 2½ oz. in weight. Eggs which conform to these requirements should be selected, and all bad, stale or dirty eggs returned to the senders, while others which are not of first quality should be sold as cookers. The eggs should then be packed in special boxes and forwarded to their destination.

PAYMENTS FOR EGGS

In paying producers, the plan recommended is to buy the eggs at the ordinary local market price, the profits remaining after payment of expenses being divided at stated periods among members and shareholders in accordance with the number of eggs sent in to the depot. In some cases it has been found necessary to make dividends depend upon the relative number of eggs produced in the winter, in order to prevent members selling eggs elsewhere when scarce and to the depot when plentiful. *It is absolutely*

WHITE LEGHORN HENS MATED TO COCKEREL OUT OF 278 PEN

MR. EDGAR WATSON'S WHITE LEGHORN PULLETS

essential, however, that members of a co-operative society should recognise that the success of the society depends on their treating it fairly and supplying it with all the eggs they have for sale.

The most important subject for consideration by an egg and poultry society is that of direct trading with retailers in the consuming districts, in order to obviate intermediary profits and charges, and to reduce the period and cost of transit as much as possible. This applies especially to the marketing of eggs, as the better traders are desirous of obtaining a direct supply. Efforts should therefore be made to deal directly with retail traders. This may be accomplished by canvassing, or by means of introductions. It is here that local societies have a great advantage over individual producers, who could not ensure a regular or sufficient supply to meet the requirements of traders. The sale of small quantities to consumers is expensive, and has not proved satisfactory, or capable of more than a limited extension. In the case of poultry for table purposes it frequently happens that, owing to a more regular demand, better returns are obtained in the wholesale markets.

It is often the case that for a few weeks in the spring supplies are in excess of the demand, and in order to avoid throwing large quantities on the market at low prices local societies have found it profitable to preserve their surplus eggs. This can be done better by them than by individual producers, and marketing is also greatly facilitated.

Besides the sale of eggs for table use a co-operative egg and poultry society may be in a position to undertake the provision and sale of sittings of eggs from reliable strains of both pure-bred and cross-bred poultry and of high-class stock birds.

SALE OF POULTRY

In many districts a fattening station would be a very useful adjunct to a co-operative egg and poultry society, and would provide an outlet for poultry at enhanced prices. Larger premises would be required than for an egg depot, as the birds are kept for a

period of three weeks, and a skilled operator must be employed to feed, pluck and shape the birds. In order to make such a station remunerative sufficient birds should be available to keep the expert fully employed, for it is obvious that the greater the amount of trade done the smaller will be the expenses in proportion to the turnover.

A co-operative egg and poultry society may also find it advantageous to extend the business to other branches of trade. The committee could buy, for example, poultry appliances and food at wholesale rates for the members of the society.

The area covered by an egg and poultry society will vary in accordance with local conditions. It is essential that the area should not be so large that freshness is lost by collecting the eggs from long distances. A society can be formed for two or three adjacent villages, or for a still larger district. In the latter case, to minimise the cost of collection, sub-collecting stations should be established in conjunction with a central packing depot. As a rule, one central packing depot will make for economy and efficiency, and where preservation of eggs is part of the scheme it is then possible to establish a fully equipped plant.

An agricultural co-operative society which has been established for the purchase of manures, seeds, etc., may often undertake with advantage the sale of eggs for its members in the same way as a co-operative society established purely for that purpose, and it may be able to utilise to some extent the buildings it already possesses as an egg depot.

Industrial co-operative societies also might materially assist in the development of the egg industry by purchasing direct from their members and others in the vicinity instead of obtaining their supplies from wholesale dealers. This is particularly the case with co-operative societies in small country towns, many of whose members are poultry-keepers.

A successful instance of this is afforded by the Wickham Market Industrial Co-operative Society, which at the beginning of 1906 undertook the collection of eggs, a branch of business for which it had special facilities, as its carts were regularly engaged in deliver-

ing goods to members scattered over a somewhat wide area. These carts, in delivering groceries and other goods, also undertook the collection of eggs, while, in addition, a cart was sent out specially once a week to supplement the other rounds. The trade has rapidly increased, much better prices have been obtained by the members, and the society has sold its surplus supply through the Co-operative Wholesale Society and other agencies.

If this example could be more extensively followed it would be likely to lead to a substantial development in poultry-keeping in this country. Poultry-keepers who deal with a local Industrial Co-operative Society might urge that the society should systematically undertake to purchase eggs from them. The Secretary of the Co-operative Union, the Organisation Society of the Industrial Co-operative Movement, Holyoake House, Hanover Street, Manchester, will supply all necessary information when that method of disposal is desired.

CHAPTER XXV

EGG PRESERVATION

IT is only in recent years that egg preservation has been taken advantage of to any extent by the public, but even now the practice is by no means so general as it ought to be. As everyone knows, or ought to know, there is a season of the year when eggs are very plentiful and therefore very cheap.

Most of these eggs are thrown upon the market by poultry-keepers, and as a rule prices are reduced to a point when the housewife, mindful of the winter season, should preserve or pickle as many eggs as possible. By this means, if it were done in considerable quantities, it would tend to equalise prices both for the producer and consumer. Roughly speaking, the price of eggs in April and May are from one third to one half the price that they are during the last three months of the year and up to the end of February. In April, 1916, new-laid eggs were being retailed at about 2d. each, but in November and December of the same year the price rose rapidly till the best eggs were being retailed at 6d. each—a record price for this country.

Housewives who had the forethought to preserve a quantity of eggs in April were able to use them in the famine months of October, November and December at about one-third the price that they were then being sold at in the shops. For all purposes, excepting for boiling, an egg preserved in water-glass is just as good as when it was newly laid. An egg preserved in water-glass will poach and fry perfectly, and for all cooking purposes it will also be as effective as a new egg. Every household, large or small, ought, as a matter of ordinary economy, to preserve as many eggs as it will require during at least four of the winter months when eggs are at famine prices. It is practically impossible for most purposes to tell the difference during the first year between a preserved egg

and one that was laid twenty-four hours before. They taste precisely the same, and for all practical purposes they are the same.

If even one half of our households were to pickle four months' supplies it would confer a great benefit upon themselves and indirectly upon the egg-farmer, who would get a little more for his eggs when they were very cheap and a little less when they were very dear. The benefit to the consumer would be greatest of all.

If eggs were a non-perishable product, and could be kept in prime condition from one season to another, wide variations in supplies would be avoided, and the extremes of prices prevented. This is to some extent met by the process of preservation, and when the natural deterioration is retarded or stopped in this way, eggs can be sold, if in good condition, at rates which leave a sufficient margin of profit. Simple methods of preservation may also usefully be resorted to as a means of regulating the domestic supply.

The following are the methods of preserving eggs which, up to the present, have yielded the best results :—

LIME WATER

An egg pickle, composed of lime, salt, cream of tartar and water, was patented upwards of a hundred years ago, and a modification of this preparation is still used extensively both at home and abroad. The pickle as now generally employed is made by mixing four parts by measure of finely slaked lime with twenty parts of cold water, and afterwards adding one part of salt. This solution should be prepared by mixing the lime and the water a week before it is to be used, and stirring well together daily, adding the salt on the fourth or fifth day. The eggs should be placed in vats, barrels or crocks, and the cleared solution poured over them, care being taken to avoid adding any of the lime sediment, otherwise there is danger of the solution becoming a solid mass. Where large quantities are preserved it is more economical to place them in cement tanks, each holding 60,000 to 80,000. It is desirable not to fill the vessel with eggs, but to allow two or three inches of solution above the top layer. A little fresh solution should be

added occasionally, in order to provide for evaporation. An egg preserved by this method can be easily recognised by the roughness of the shell. When the egg is boiled the shell will crack, a result due to the effect of the lime upon the outer covering, causing it to be hard and brittle. Preserved eggs are not recommended for boiling, but, if it is desired to use them in this way, the cracking may generally be prevented by pricking the broad end with a needle when the egg is about to be boiled.

WATER-GLASS

Water-glass is a strong solution of silicate of soda in water varying in specific gravity, according to the amount of silicate dissolved. The strongest solution usually found in commerce has a specific gravity of 1.7 and contains approximately equal parts by weight of sodium silicate and water. A ready means of ascertaining whether the water-glass is uniform in different supplies would be to weigh a measured ounce of the water-glass. One ounce by measure of the concentrated solution of specific gravity 1.7 should weigh 1.7 oz., or nearly $1\frac{3}{4}$ oz. ; if it weighs less than this it contains less silicate, and more of the water-glass should therefore be used in making the dilute solution.

In preparing the water-glass for use, five or ten times its bulk of pure boiling water should be added to the concentrated solution according to its strength. The preparation should be quite cold before it is used. Experiments in America have shown that a 3 per cent. solution (*i.e.* 3 parts by measure of the concentrated solution to 97 parts of water) yields as good results as that generally recommended—namely, 10 per cent. A 5 per cent. solution may be used with safety, and with this strength there is less danger of giving the eggs an objectionable flavour than with the stronger solution. When the water-glass is added to the water the two must be very carefully and thoroughly mixed. The eggs may be dipped in the water-glass and dried off, leaving a film on the shell, and then stored upon shelves, or they may be kept in the liquid until sold or used. The latter method is to be preferred. When taken

out of the solution they are sticky, and before packing should be washed and dried.

It has been shown that the changes in eggs preserved in water-glass take place very gradually ; at one year old they are hardly noticeable, at two years they are distinct, but not so distinct as at three or four years old. Eggs which had been preserved for about six months tasted and smelt like well-kept eggs a few days old, but as the eggs in question were a few days old when placed in the water-glass, it did not seem that they were appreciably changed. At three or four years old the white became pink in colour and very liquid, but even at four years old the eggs had no unpleasant taste or smell, and the white coagulated in the usual manner in cooking. Practically no change was observed in the composition of the eggs, even after lengthened immersion.

COLD STORAGE

The methods already described are equally suitable for large and small quantities, and may be adopted either by the farmer or by the trader. Cold storage, on the other hand, in order to be profitable, must be carried out upon a large scale, and is consequently not available for small producers unless they have a cold-storage plant for other purposes. In America this system is extensively employed, and large plants have been specially erected for the business. Eggs require to be unpacked and laid upon shelves or in trays, and kept at an even temperature, not falling below 33° Fahrenheit, with a free circulation of absolutely sweet air. No other products should be kept in the same room, otherwise the eggs may be affected. By this method, provided that the eggs are new laid when placed in storage, they can be kept for many months in good condition, but great care is necessary in removing them for use, as a too sudden change of temperature causes rapid deterioration. In all cases they require to be used very speedily on removal from the cool chamber, and the evidence obtained in this and other countries shows that cold-storage eggs will keep for a much shorter period after they are taken out of the

chamber than if preserved in solutions of lime or of water-glass as described above.

For domestic purposes, and for short periods, eggs may be thinly coated with butter or glycerine as soon as they have cooled down after being laid. It is necessary to see that the shell is entirely covered to close the pores. When glycerine is used dipping is preferable. The eggs should be stored in a cool place and stood upright on perforated shelves or wired trays. If turned twice a week keeping will be improved. It is important that the atmosphere be pure, and that there be no strong-smelling products near, otherwise the eggs may be affected.

GENERAL SUGGESTIONS

1. Eggs for preservation should be treated as soon as possible after they are laid, but not until they have been cooled. If the egg is not absolutely fresh when placed in the preserving medium the final result cannot be entirely satisfactory. An egg twenty-four hours old is superior to one a week old.

2. Eggs should not be treated in a warm place, and where lime-water or water-glass is used the preparation should be quite cold before the eggs are placed in the solution.

3. Eggs from hens fed chiefly upon grain, and with full liberty, are likely to keep better than those laid by fowls in confined runs.

4. The general experience has been that infertile eggs keep in good condition longer than those which contain a living germ. Probably this is less apparent when eggs are preserved at a low temperature.

5. When eggs are preserved in water-glass or lime-water the vessels containing them should be stored in a cool place, at a temperature of not less than 33° Fahrenheit, nor more than 45°. A cool, well-ventilated cellar is excellent for this purpose. Exposure to a higher temperature, even for a few hours, will cause deterioration in spite of the preservative.

6. Eggs may be stored in large or small quantities, and may be

WHITE WYANDOTTE PULLETS RELATED TO FEN 98

REARING YOUNG DUCKLINGS

allowed to remain in the pickle for six months. Wooden, cement or galvanised iron vessels should be employed.

7. Eggs should be carefully tested before they are preserved, and again prior to sale. For this purpose a well-constructed candling lamp is to be preferred ; but a piece of black cardboard, eight inches square, with an oval hole in the centre rather smaller than an ordinary egg, can be used. Each egg should be placed against the hole, and held between a strong light and the eye, so that the condition of the contents can be observed. In the final test all dark eggs or those showing spots or black shadows should be rejected.

8. The best months for preserving are March, April, May and June. It has been found in many cases that summer eggs do not keep nearly so well as those laid before the hot weather.

9. Preserved eggs should be sold under that name, and not as "new-laid," "breakfast" or "fresh eggs."

There is nothing in the least difficult about the process of preserving eggs. Water-glass can be bought with full directions at any chemist or general stores, and it is practically impossible to make a mistake. It ought to be known that water-glass eggs if pricked with a pin before boiling will not crack or break.

CHAPTER XXVI

CHARACTERISTICS OF BREEDS

WHILE this volume is written primarily for the man who is keeping poultry for profit, there are doubtless many whose interests extend beyond the more utilitarian breeds of fowls. The popular fowls are those which prove to be the best egg-layers, and these may be noted in the following approximate order of merit :—White Leghorns or White Wyandottes, Rhode Island Reds, Buff Orpingtons (Black Orpington in Australia), Buff Rocks, Light Sussex, Anconas, Faverolles, Campines, Houdans, Minorcas and Langshans. For egg-farming pure and simple the two first-named varieties have so far proved the most profitable, but that is largely because the Leghorn and Wyandotte have been carefully cultivated and selected specially for egg-production. It is quite open for anyone to argue that given the same time and attention to other breeds, such as the Rhode Island or Buff Rock, equally good results would be got. The evolution of the egg-layer is purely a question of trap-nesting and scientific breeding, and so far our experts working for profit have found the Leghorn and Wyandotte to yield the best returns. If the Government were to establish a breeding establishment with the sole object of evolving egg-layers irrespective of immediate gain, it is quite possible that practically any breed could be diverted in time to depart from its present habits and become an egg-laying machine. No doubt one or two varieties are better suited for purely utility purposes, and it is on these breeds that the private breeder will naturally concentrate. In describing the various breeds I give, of course, their present-day characteristics.

THE ANCONA

The Ancona belongs to the non-sitting variety of light breeds. If one were to guess at its origin one might assume that it was a

“sport” of a Black and White Leghorn cross. The crossing of a White Leghorn with a Black Minorca gives a bird not unlike the Ancona in colour and temperament. While its origin is “wropt in mystery” the Ancona undoubtedly belongs to the family of the Leghorn, and while it unites in equal degrees the plumage of the Black and White variety, its main characteristics are that of the Black Leghorn. The Ancona is a restless, aggressive creature, “wild” in nature but not unamenable to kindness. I have had an Ancona follow me about almost like a dog, but it had none of the docility of the canine species.

It is a small bird mottled in plumage (black and white) and quite suitable for intensive purposes. It requires, however, a well-ventilated house and must be kept dry. Few birds mature so quickly; it is usually in full lay at five months and often earlier. Laying a white egg, it in many instances rivals the output of the Leghorn, and it does not confine operations to the summer months. The chickens are hardy and grow at a great pace, and while the adult bird is fair eating for the table it should not be bred for that purpose. Its weight varies from 4 to 6 lb.

ANDALUSIANS

This is a Spanish importation and has been known in England some sixty years. It undoubtedly contains a proportion of Minorca blood, but is a distinct type with characteristics of its own. Like all non-sitting varieties, the Andalusian matures quickly, and the precocity of its offspring is remarkable. Cockerels have been known to crow when less than two months old.

It is a useful utility fowl, although breeders have not yet done a great deal in the way of selection for egg-production. It lays a very large egg and can thrive in confinement, while its slate-blue colour marks it out as suitable for town life. Some strains have laid up to 200 eggs per annum, and this coupled with its large size makes it a good bird for the backyarder. Pullets, well looked after, often lay at five months. A good table bird; a cockerel will weigh up to 7 lb., and the pullets 2 lb. less.

BANTAMS

The Bantam is of infinite variety, and many of them are of beautiful plumage, while some are just oddities, like pug-dogs and their like. The bird, being too small for table use and not a prolific layer of eggs—too small to market—is mostly kept for sentimental reasons. The Japanese variety is a charming little fellow, and those who like fowls as pets cannot do better than cultivate the Bantam. They ought to be reared in warm weather, and May and June will be found the best months for hatching. The Bantam may weigh anything from 14 to 20 oz.

BRAHMAS

For a huge body and plenty of good white flesh the Brahma is difficult to beat. They will weigh anything from 7 lb. to 12 lb. and are much admired as a show bird. Winter layers of deep brown eggs, they easily transmit their laying qualities when crossed, especially with the Dorking, with which they have much in common. The Brahma was imported from Asia to America about the time that Cochins were imported into England, in 1850. The two great types are Light and Dark Brahmans, and a Dark Brahma cock is one of the most picturesque of birds.

CAMPINES

This pretty bird of Belgian fame is just coming into its own. How it should have been so long neglected in England is a mystery when its splendid qualities are considered. It is a beautiful bird in any of its variations, and while it lays large numbers of white eggs it has a small plump body greatly relished at table. It is a fowl of great antiquity, and has been known in Southern Russia and Turkey. The most popular are the Silver and Gold Campines, and the marking is not unlike that of the Pencilled Hamburgs. It is a single-combed type, does well in confined runs, and is very tame. The chickens are easily reared. The average weight of the pullet is just over 4 lb. The legs are dull blue.

COCHINS

At one time the Cochin fowl was the talk of England, and its appearance gave an immense impetus to poultry-keeping. No single bird has advertised itself so much, partly because of its massive size and partly because of its great feathered legs. When first exhibited in Birmingham they set all England talking and changed all poultry values. Even *Punch* called attention to the Cochin by pen and pencil, and thousands who knew nothing of fowls began to cultivate the Cochin. While the fowl was a Chinaman it was not known at Cochin China, a fancy name given to the fowl by its admirers. Had it been cultivated for its utility as much as it was for its fancy qualities the Cochin would probably have held its place at the top of the fowl kingdom to this day; instead it became the foundation of much of the absurd artificial standards of the poultry fancy, and while it may have become more pleasing to the eye, its reproductive qualities were allowed to languish. They share with Brahmas a passion for broodiness, and, like the latter, they weigh from 7 to 12 lb. The Black, White and Buff Cochins are suitable for urban poultry-keepers, but care should be taken to get a good laying strain, of which few are left.

DORKINGS

A real old English breed that probably came over with the early Roman host. It appears to have changed very little since it arrived in these islands. It appears that the old Britons did not eat fowls, and it is quite certain that the Romans did and brought their fowls along with them. If they had done nothing else, we ought to have welcomed them. The Dorking is a great table bird with a breast packed with delicious white flesh. As an egg-layer it is not a success, but it is hardy and will do well almost anywhere.

It is bred in five different colours—Dark, White, Silver-Grey, Red and Cuckoo. Full-grown males weigh anything up to 14 lb., and the pullets some 3 lb. less. The Dark Dorking is often the finest specimen of the type. The eggs are white, and the hen makes

a good mother. When crossed with Indian Game it makes a fast-growing, monster bird.

FAVEROLLES

This French-imported bird is of recent origin, and its ancestry may be traced to a few English or Anglicised varieties. Its excellent qualities as a general purpose fowl are only beginning to be understood. It contains much that is best in the Brahma, Cochin, Dorking and Houdan, and probably gets its splendid laying qualities from the latter. The Faverolles is a quaint-looking bird, being something like an owl and something like a pug-dog. But handsome is that handsome does, and the "bearded" Faverolles is a bird that will pay its way anywhere either for the table or for egg-production. It takes to any kind of crossing like a duck to water, and you cannot breed the owl-like look out of it. A cross with Light Sussex or with White Wyandotte is most successful. It is a most domesticated bird, and while it is rather inactive, it only rarely goes broody. It lays a light brown egg and winks at you out of the corner of its eye when you ask for more. A splendid table bird, weighing from 6 to 8 lb., it seems a shame to eat it.

GAME FOWL

No one has ever accused the old English Game bird of being a prolific egg-layer, but as a table fowl it has few equals. Associated in old times with cock-fighting, it presents the picture of a herculean bird. Long strong legs, on immense broad back, great chest, a dauntless head on a long noble neck makes the Game bird the ideal fighter. The "good old sport" has died out, but the handsome bird remains, not to make a Roman holiday, but to make a dish fit to set before a king. Not only do they surpass all other birds in flavour, but they carry more flesh in proportion to bone than any other breed. When not kept as a hobby they are used to cross with other fowls for table purposes only. The chickens grow fast and do not require to be fattened. On a free range they find most

SALMON FAVEROLLES

WHITE FAVEROLLES COCK

of their own food and show magnificent plumage without artificial treatment. The usual sorts are Black, Red, Brown, Spangle, Duckwing and Pile. The Indian Game (or Cornish) fowl is a large, big-boned animal, an excellent table bird but not much of an egg-layer. The chickens are not hardy nor are they suitable for the chicken trade.

HAMBURGHS

This is a fowl for show; and is much loved of the people. They are good layers of rather small eggs and they belong to the restless type that do not sit. The Hamburgs really include a class of fowls that once had different names—such as Dutch Everyday Layers, Creels and Chittiprats. The Spangled Hamburgs are products of Lancashire and Yorkshire, and have been known as Mooneys and Pheasant fowls. The Silver-Spangled Pencilled breeds and Blacks have been known to lay over 200 eggs per annum, but no one is advised to select any sort of Hamburg to lay this number. The Black lays a larger egg than the others and is a good bird for a confined area. The flesh of the Hamburg is excellent, although it is rather a small bird.

LANGSHAN

A black fowl of Chinese origin it was at one time believed to be a variety of the Cochin. There are now two distinct types—the Langshan and the Croad Langshan, the latter so called after the breeder who developed it. The Chinese regard the Langshan as a “sacred fowl,” but if they do not eat it they are poor judges of a succulent bird. The Langshan is a handsome fowl, lays large brown eggs, and plenty of them, besides furnishing a splendid repast for the table. The Langshan has caused no end of controversy as to whether it is a “pure breed,” which seems rather futile, seeing that many so-called pure breeds are the result of known crosses. In addition to the Black variety there is a White and a Blue Langshan. The cockerel weighs anything up to 10 lb.

LA FLECHE

A French fowl that has not been cultivated to any extent in this country, although it is a splendid table bird and a good layer of large white eggs. It is black in colour, with tight plumage that makes it look small.

LA BRÉSSE

In the Burgundy district of France this fowl finds its home. It is supposed to be an excellent layer of good white eggs, but the specimens I have seen laid small eggs, and only when they thought they would. It has a fine capacity for fattening and is an ideal table bird, excepting that it is not very large. It is bred in three colours, Black, White and Grey, and I have seen a Black one slowly become speckled like an Ancona. They are not good for a cold or damp climate.

THE LEGHORN

It is doubtful if any bird was ever so popular as the White Leghorn among egg-farmers. Its reputation was never so high as now. It is an egg machine pure and simple, and can be bred in April to lay in September. Probably no bird will give the same return for money, since it becomes productive long before any other prolific fowl, and is not a big eater. It is a representative of the Mediterranean type, a non-sitter, full of energy and pluck, and has a carriage that suggests pride and gracefulness. The small bird, weighing from 3 to 4 lb., is as a rule the best layer. The Dutch have a splendid variety, and the Australian White Leghorn is now cock of the walk as a record egg-layer, although recently the White Wyandotte, bred by an Englishman, in an American laying competition came so close to the Leghorn in its records that the position of the latter at the top of the tree is seriously challenged.

The Leghorn, with its close, pure white plumage, is a most attractive bird, and seems to thrive well anywhere. The Black variety is better adapted for town life, and it is an almost equally good layer. There are also Brown, Blue and Buff varieties of

Leghorns, but the White is the most popular. It makes fair eating, but is not adapted for table purposes. It is very hardy, and the chickens thrive and grow rapidly. The cockerels can be picked out when a few weeks old, and it is more profitable to sell them at once, excepting when they are to be kept for breeding purposes. Leghorns are the best breed for keeping on a large scale, and they do equally well whether kept intensively or otherwise. Most commercial egg farms specialise in the White Leghorn. Most writers overlook the fact that the Leghorn is a first-rate winter layer during its pullet year.

LINCOLNSHIRE BUFFS

This variety, a cross between the Buff Cochin and the Dorking, is by no means confined to the county whose name it bears, but is almost equally well known in the south of England. It lays well, and has the additional advantage of being easily fattened for market.

MALAYS

A prodigiously tall bird, standing 2 feet 6 inches high when full grown. It was probably the first of the Asiatic fowls to reach this country. Yet, though long and thin, there is plenty to eat on the Malay, which will never pay its way as an egg-producer.

MALINES

A Belgian breed that has more attractions as a table bird than as an egg-layer. It is, however, a good general purpose fowl, and may be kept in small runs or on free range. The Maline is usually white and is a nice domesticated bird that pays for fattening. Weighs from 7 lb. to 9 lb.

MINORCAS

This Spanish importation is deservedly popular, and is equally suitable for town or country. It is a handsome bird and lays a

nice large white egg, especially if well housed in winter. In the west of England and parts of Wales the Minorca is as frequently seen as is the Leghorn in other parts of England. It was imported from the island bearing its name about 1830. It is not quite so hardy as some of the other Mediterranean types and is not suitable for very exposed positions. Crossed with the Leghorn, it is hardier, and is a particularly perky bird, flying like a pigeon and poking its beak into everything. A cross with the Langshan, with which it seems to possess an affinity, is also very successful.

ORPINGTONS

One of the modern varieties of fowls, it is deservedly popular. It is a wonderful winter egg-layer and a finer brown egg one could not desire to see. As a rule it is very broody, and as such makes an excellent mother, though rather trying to the man who wants eggs. Where broodiness has been partially bred out of the bird it is a great egg-layer, doing its best in winter when other fowls are only thinking about it. The crosses that created the Orpington are well known, including the Dorking, Buff Cochins and Hamburgs for the Buff variety; the Black Minorca, Black Plymouth Rock and Langshan are at the root of the Black Orpingtons. The latter variety have taken a high position in Australia as prolific egg-layers, and no doubt they could be cultivated to do equally well in this country.

There are also White and Spangled types of Orpington. All make splendid table birds, being big, plump and white-fleshed. They do well crossed with almost any other breed.

PLYMOUTH ROCK

This fowl, of American origin, was probably bred from the Brahma, the Black Java and the Dominique, but is now a well-established variety. Like most American productions, it pays its way. A splendid winter layer of brown eggs, it is inclined to broodiness in summer. The plumage of the Plymouth Rock is

cuckoo-coloured, but there are also White and Buff varieties. The Buff is one of the hardiest of fowls, suitable for cold and damp, and second to none as a winter layer. All the Rocks are keen foragers and on free range will find a lot of their food. The chickens are very hardy, but take from eight to nine months to mature.

REDCAPS

A very old English variety, best known in the Midlands and Yorkshire. They are prolific egg-layers and are said to do as well in their second year as in their pullet year. They rarely become broody and they make excellent eating. Redcaps have exceptionally large rose combs, not unlike that of the Hamburg. March or April are the best months for hatching. The chickens are easy to rear.

RHODE ISLAND REDS

No variety has come to the front of recent years more quickly than the Rhode Island Red. It takes its name from the American island of that name, where it was first bred. This beautiful bird was the product of successive crosses between the Red Malay, Chittagong and the Shanghai, together with the birds already in existence at Rhode Island. It is believed that the Brown Leghorn also enters into its composition. Although it is only a few years since this bird became acclimatised in England, it has done extraordinarily well, and as a general purpose fowl comes next in popularity to the White Wyandotte. To prophesy is dangerous as well as gratuitous, but few who know the trend of things would be surprised were the Rhode Island Red to seriously challenge the popularity of the White Wyandotte. It is largely a question of egg-production. Let the Rhode Island once equal the Wyandotte as an egg-producer—and it is making great progress—and it would become everybody's fowl. It is a handsome bird, not too broody, taking to the eye, tame—almost domesticated—easy to rear, hardy, and the layer of rich brown eggs. It is also an excellent table bird, but that is the last thing one thinks about when talking

about the gentle Rhode Island Red. As a rule the small variety are the better layers.

SCOTCH DUMPIES

So called because of its extreme shortness of leg—about two inches or so. As the native of a rigorous climate it is very hardy, but could lay more eggs with advantage to its owner. Scotch Greys are another Scottish type of fowl, a good egg-layer and a good table bird.

SILKIES

A freakish-looking fowl that was originally a native of India and China. The name is obviously the outcome of its soft silky plumage. It is a very small bird, and either white or black; the comb wattle and skin of the body are bluish-purple, ear-lobes a paler shade of blue, and the legs blue-black. It is a picturesque bird and lays small tinted eggs. The Silky is used more as a pet than as a commercial fowl.

SPANISH

The original Spanish fowl, once so popular, has given way more or less to its more robust cousin, the Minorca. It is supposed that excessive inbreeding destroyed the vitality of the Spanish.

SUSSEX

A purely English fowl in several varieties, Light, Red, Brown and Speckled. The Sussex is a product of the fattener chiefly, for few fowls give him better results. Of late years it has been encouraged as an egg-layer, and there are great possibilities in this direction, especially with the Light Sussex. The Sussex is probably the best breed for early table chicken production. They make excellent sitters and mothers.

THE WYANDOTTE

Perhaps the only fowl that has held its own with a Leghorn as a prolific layer is the White Wyandotte. Unfortunately there

are lots of White Wyandottes that are anything but good layers, but when a good strain is found, and there are now plenty of them which lay good-sized eggs in abundance, they make an ideal general purpose fowl. Most egg-farmers concentrate on the White Leghorn, but it would probably be wiser to include the Wyandotte to the extent of at least one-third of the stock. It is a quiet, comfortable sort of bird, and does equally well in confinement or free range. Great care must be taken to get a prolific laying strain. There are a large number of varieties, including the Golden, Silver, Partridge, Buff Columbian, Silver-Pencilled, Blue-Laced and Black. Of all these the White has done best in England, where breeders have concentrated on their egg-laying capacities. The Wyandotte is originally an American bird, but it has been developed to its present condition as a great egg-layer chiefly in England. It may in time surpass the Leghorn as an egg machine, while it is much more valuable as a table bird.

SICILIAN BUTTERCUPS

This is one of the most attractive of recently imported pure breeds. It was only as recently as 1913 that Miss Blanche Stanton, of Stroud, Gloucester, brought the first pen to England, and they have captivated the fancy of the Fancy, besides adding to the ranks of the utility fowl. The bird is a small variety, eats very little and yet lays with gratifying frequency a good-sized white egg. It is possible that when developed along utility lines this breed may challenge the Leghorn for prolificacy. The Sicilian Buttercup gets its name from its large, cup-shaped comb. The plumage of the male bird is orange-red, with the back and wings bay-red, and willow green legs. The pullet has a dull gold shade of plumage, including neck and hackle, shading to lighter buff. The ground colour of the back is a golden buff. Parallel rows of black spangles mark their body feathers.

Sprightly, energetic birds, they are wonderful foragers, and on a free range will pick up half their food.

CHAPTER XXVII

ALTERNATIVE RUNS

WHEREVER possible two runs should be attached to each poultry-house. Even where space is comparatively limited two runs will be found better than one. Supposing that one has only half-an-acre available as a run for 200 birds. Manifestly the space is inadequate, but curiously enough it has in practice been found better to divide the ground up into two runs and allow the birds to use them alternatively at different seasons of the year. If I had only half-an-acre of ground for 200 birds I would divide it into two parts—not equal parts, as is generally done. It will be found that birds are much more frequently in the open in the summer than in the winter months. They are out oftener when it is mild and dry, and as these conditions obtain chiefly, say, from March to October, the fowls are out foraging for insect food and eating plentifully of the grass or other green stuff they may find. It follows then that the run will be used practically twice as much in the summer months as in the winter months. It will be heavily manured and hardly a blade of grass will be left.

It is therefore only in keeping with common-sense that the run to be used for the summer months should be larger than the little-used run of the winter months. One might not be far wrong if the larger or summer run occupied three-quarters of the available space, but in any case it should not be less than two-thirds. I find that from March till the end of September something like one half of my birds are out of doors, excepting in stormy weather. From the middle of October to the middle of March probably not one-fifth of them are in the run at a time, and on cold, windy days sometimes one may not see a bird out of doors. It follows then that the summer run is used to a far greater extent, and for that reason

ROSE COMB RHODE ISLAND RED COCKEREL

it ought to be considerably larger. Certainly 200 birds will be very crowded even in two-thirds of a half-acre in the summer-time, but we are here making the most of the available ground, and if it were to be cut into two equal parts, as is usually done, the overcrowding would be much greater.

With the grass all eaten up and the ground heavily manured, say about the end of September, the birds should be removed to the smaller run. The ground would then be dug over or ploughed, and either resown with grass or planted with cabbage or other green stuff suitable for poultry.

The smaller run during the cold months will not be so crowded as the large run was during the summer months, and it will be found that one-third of the available space will work out satisfactorily from October to the end of March.

It must not be supposed that I am advocating the keeping of a flock of 200 fowls permanently on a half-acre of ground. If a whole acre is available, so much the better, but even then two-thirds of the whole acre should be allowed the birds during the season when they are looking for natural food out of doors. One half-acre is the minimum on which 200 birds may be kept. One large egg-farmer has laid out his ground on the principle of 400 fowls to the acre, and has found it quite practicable when attended to in the manner I have suggested. He, however, divides his acre into two equal parts, one on the south side and one on the north side of the house. The south side is used in winter and the north side in summer. Small doors from either side of the house give access to the different runs. By these means one half the land gets a rest from the birds for six months out of the twelve, and during the "resting" period it is ploughed, harrowed and sown with a green crop. The ploughing allows all the manure to drain deep into the soil, and a strong crop of green stuff results. The growing of the crop sweetens and cleans the soil, and of course there is the green stuff waiting for the birds to eat. The alternative run therefore serves a twofold purpose.

The only other plan is to remove the houses to fresh land, and that, of course, is expensive and otherwise undesirable. It does

not matter how small a flock may be, or how big the area of land, there is no escaping from the fact that in time the land will become fouled and poisonous. In the immediate vicinity of the house it will be fouled more thoroughly, but gradually all land on which fowls habitually run will become unhealthy, and perhaps there is no cause of disease more frequent than the poisons generated by the action of the weather on the droppings of the birds.

It is strongly advisable, therefore, to make alternate runs which are used and cultivated in turn to grow crops. Exactly the same arguments and illustrations apply to poultry runs in urban and suburban districts, excepting that it may not be possible to plant crops on very small areas.

For urban runs it may be stated that the ground should always be thoroughly trenched, and where the soil is stiff cinders should be plentifully used. The great thing to aim at is proper drainage, and where stiff soils resist water they should be dug up a foot or more and a layer of broken bricks or gravel be placed underneath. Sand also is a fine substance to sprinkle on the ground as thickly as possible. The birds like the sand, and it keeps them off the cold, sodden soil. In gardens a run of 15 feet by 12 feet is ample for twelve fowls, and this should be divided into two parts. Green stuffs should be planted whenever one of the runs is vacant. Poultry-keepers large or small are particularly requested to pay great attention to the runs and see that they are always kept sweet and clean.

LITTER

The question of litter for the fowl-house is important, as it has a great deal to do with the cleanliness and health of the fowls.

Of the various kinds of litter one may mention wood shavings, autumn leaves, bracken, hay straw and peat moss.

All of these things are good in their way, and it is largely a question of economy as to which one should use. If fallen leaves are to be used it must be seen to that they are perfectly dry, else they will defeat the object we have in view. Damp leaves are

worse than no leaves at all, and mixed with the droppings quickly form into manure.

The dry leaves of hard woods such as hornbeam, oak, chestnut, maple and beech are probably best. If dry they need no preparation and can be transferred straight into the house, but as they will not last so long as many other kinds of litter, a large reserve stock is necessary. It is only when they are available without payment that one should use leaves, for they possess several disadvantages compared with other forms of litter. They are barely heavy enough to afford the resistance necessary in good scratching material, and if possible it will be better to spread them over a layer of sawdust or peat moss.

When the chaff or winnowings from threshing machines can be obtained cheaply it makes a very good poultry litter. It is warm and dry—two great essentials in all scratching material. Like leaves, they offer very little resistance to the hens, and hardly provide enough exercise, but on the top of peat moss they are excellent.

Straw is a most expensive litter, and while it looks nice and serves its purpose well, it may be pointed out that it offers splendid hiding quarters in its hollow stems to all sorts of insects and pests that prey on poultry. The same remarks apply more or less to hay. If straw is used it is better to change it fairly often, and a sprinkling of some insecticide once a week will tend to destroy any vicious life lurking in its depths.

Bracken when used as litter should be cut in its green state, dried and then stacked ready for use. Some poultry-keepers try to use it as cut, but it is much better to chaff it into lengths of two or three inches. It is easily broken down by the birds, and the particles help to absorb the manure, while, being a potash fertiliser, its properties are valuable in the garden.

Cedar-wood shavings have several valuable qualities as litter, the best being that they are prejudicial to the life of insects. Cedar wood has an agreeable odour, and makes the house smell better for the fowl and its owner, while it forms a very fair material for scratching purposes.

As an absorbent and deodoriser peat moss is easily the best litter for poultry-houses, and it seems a pity that the price should have gone up so rapidly in recent years. Even at a comparatively high price—say £4 per ton—it is, however, well worth the money. It is warm and dry without being musty, and nothing is better calculated to hold the ammonia of the droppings till they are transferred to the soil. It is best not to get it too fine and powdery, or the dust will become unpleasant. It must, however, be broken up into particles not much bigger than peas. I have seen it thrown on the floor in lumps and carted out again in the same condition. Needless to say, this is not the form in which peat moss should be used. It ought to be spread on the floor in a condition to absorb moisture to its core. Big pieces will take up only a very little damp, and are therefore virtually wasted. Peat moss may be purchased all ready to be transferred to the fowl-house, but in this form it is certainly expensive, and could only be used in economically small quantities. All the litters mentioned are quite suitable if reasonable care be taken, but peat moss is the ideal litter for the birds and for the resultant manure.

BROODINESS

All hens are more or less broody some time during the spring and summer months, even the non-sitting variety. Most light breeds are termed non-sitters, and as a rule a small percentage of light breeds will be found to go broody; even if they do they are easily cured without any drastic steps being taken. Those who require eggs only, and do not intend to use the broody hens for natural incubators, should keep light breeds only, preferably the Leghorn. Less than 10 per cent. of Leghorns will go broody during the year, and a few days' isolation in a broody coop will usually get rid of the fever of broodiness. For many generations broodiness has been bred out of the Leghorn, just as at the present day broodiness is being bred out of the Wyandotte, the Rhode Island Red and the Faverolles, with the result that the Leghorn is never used for hatching purposes even if she is broody.

Broodiness means fewer eggs, and during all the time a hen is broody she has got to be fed, watered and cared for just the same. If not used for hatching, she is a dead loss during this period. Among the varieties which are apt to fall broody and remain in that state is the Orpington, Buff, White or Black. My experience of the Buff Orpington leads me to believe that she is second to none as a sitter, and is therefore the most difficult of all to get out of the broody stage. Light Sussex are also good mothers and therefore stubborn creatures to get rid of the desire to hatch their eggs. But, generally speaking, all heavy breeds are prone to broodiness at certain seasons of the year, and if eggs are wanted a watchful eye has to be kept upon them. The broody state is not all loss, because if a bird hatches a brood she is giving her ovaries a rest, and the chances are that she will not be so long between her laying periods, but all the same the poultryman can only think of the potential loss in eggs while his bird hugs the nest and will not leave it.

Now the question is : What is the best and speediest cure for broodiness ? Some people aver that there is no absolute cure and that all one can do is to shorten the period. While there may be no absolute cure for the individual hen, there is no doubt that broodiness can eventually be bred out of the race. This can only be accomplished by never hatching the eggs of a hen that has shown signs of broodiness, but it will be a very long time before the majority of the heavy breeds have the tendency rooted out of them.

In the meantime we have to deal with things as they are. What is one to do when a hen goes broody ? A variety of expedients have been tried, but I know of nothing better than removing the bird at once to the open air and placing her in a coop of which the bottom and front is made of wire, say, with a one-inch mesh. By this means she has constant currents of cool air passing over her night and day. Nor can she sit comfortably on the wire. She will get up and fidget and change her position and generally do anything but sit still. This is precisely what is wanted. If she cannot " sit " she will soon recover from broodiness. It is better

also to place her in full view of the other hens, so that she may see them eat and generally enjoy themselves. Do not feed the broody at the same time. Feed her afterwards. She hates to see all the flock feeding while she herself is fasting. It will make her more uneasy and give her less desire to sit.

Whether to feed her well or starve her is often debated, but I do not think it will pay to starve her. On the contrary, I am inclined to think a very low diet encourages her in her broodiness. In any case if you starve her and cure her of her broodiness as well she will be in no condition to lay eggs for some time. A hen must be well fed and in good condition to lay. On the whole, it is better to feed her moderately well, and when she is liberated she ought to be laying again within a week.

The most important thing is to get the hen away in the first stages of her broodiness. If this is done, three to five days of isolation in the coop should cure her. If, however, she is allowed to sit for a week it may take another two weeks to cure her. All sorts of rough and ready remedies have been tried to cure a hen of broodiness, but the cool, uncomfortable coop is the most effective of all.

In recent laying competitions the practice adopted was to remove a bird at once on signs of broodiness into a spar-bottomed coop set in the gangways of runs close to the ground. In these coops, open at front, sides and bottom, the birds were fed with the same foods as those in the pens, and encouraged to feed, so that there should be no loss of condition during the period. The length of time taken by birds varied from three to ten days and averaged about five days in the coops.

The poultryman, by his constant visits to the trap-nests, is at once aware of the broodiness of any bird and can take steps accordingly. His object must be to overcome the tendency so that the bird may as soon as possible return to the productive stage. By suitable treatment and the use of separate coops the length of the broody period can be very considerably reduced, and the question of management and feeding during this period is therefore important. During the ten months the number of

periods of broodiness is shown in the following table, and it is interesting to contrast the figures with those of the previous trials, for in 1913-1914 the figures were :—Number of periods of broodiness: heavy birds, 767; light birds, 37; while in 1914-1915 heavy birds gave 602 and light birds 12 periods, which, even allowing for the two months' shorter period of the trials, shows a considerable reduction.

BROODER-HOUSES

Most large poultry-farmers have long since discarded the out-of-door brooder and adopted the more easily worked system of a brooder-house. The practice is, however, not universal, for I know of one large commercial farm where at least 30,000 birds are reared every year from the 100-chick size brooder. The disadvantages of the multiplicity of small brooders are fairly obvious. While the results in rearing may be equally good, the labour is enormous, and the amount of ground required is prodigiously increased.

I asked the farmer in question why he preferred so use, say, fifty 100-chick brooders to one brooder-house where all the work could be carried out under cover, and he replied that it was largely a question of risk. He did not like the idea of having so many young stock under one roof. I could see, however, that he was more than half convinced that his argument was not a sound one. If the truth were told I rather think he was loath to scrap all his old brooders and go to the expense of a modern brooder-house. He admitted the saving of labour and the saving of space, but he was a little afraid of accidents in a house with a couple of thousand chicks. Excepting in the case of fire there is no more risk in a large brooder-house than in a multitude of small ones, and I have never known an instance of a man with a well-equipped brooder-house going back to the old system.

Brooder-houses are of various kinds. There are some that resemble a number of small brooders in so far as they contain a number of hovers (or lamp-heated boxes) containing any number up to 200 chicks each. These hovers usually run down each side

of the house, divided only by wire, and there is a passage down the centre of the house with doors leading into each separate compartment. This type of brooder-house is the most common. The advantage over the old system is that one can do all the work under cover, while the birds have a double protection—the hover compartment and the house itself. The birds have the run of their compartment opening directly out of the sleeping-place, and in good weather they have access to the open air through an opening in the house itself to a grass run. It is a very simple and very convenient arrangement. Each compartment in the house has a wooden floor liberally covered with chaff, where the birds have to scratch for their hard food. A brooder-house, say, 48 by 12 feet is large enough to rear about 1000 chicks at a time, and those I have seen have been most successful. If necessary the brooder-house can be converted into a laying-house by the removal of the hovers and divisions, so that it can be made to serve a double purpose.

Various attempts have been made to get rid of the old lamp in brooder-houses. It is difficult sometimes to get perfect ventilation and fumes from the oil are unhealthy, if not dangerous, to young chicks. Besides, lamps in brooders or houses need a great deal of attention, and are apt, in spite of care, to go wrong. The most recent experiments have been made with anthracite stoves, and these have proved greatly superior to any oil stove or lamp yet invented.

One poultry-farmer has hit upon a simple and yet effective plan. He has an anthracite stove in the middle of a square brooder-house with an iron chimney going through the roof. Around the stove he has placed a circular canvas screen which prevents the birds getting within three or four feet of the stove. This arrangement prevents “crowding,” that most deadly of all brooder troubles. The young chicks spread themselves out on the chaff of the wooden floor just as if they were basking in the sun. I do not quite know how the outer circle of birds get the necessary heat, excepting the house is a comparatively small one. Of course one might arrange to get, say, four small stoves instead of one

LARGE BROODER HOUSE SHOWING ONE SIDE DISMANTLED

large one and in this way equalise the heat in the house. It seems to me that on some such lines the perfect brooder-house will be evolved.

Another and similar system of heating with the addition of hot-water pipes has been invented by Mr Hanson, of Basingstoke, who fully describes it in *Commercial Egg Farming*.

His brooder-house is 110 feet long by 12 feet wide. There is a four-foot passage running along the back of the house. The front is divided into twenty compartments, each 5 feet wide, with a capacity of 125 chicks. Ten compartments are on each side of the stove, which is in the centre of the building and occupies, with coal space, 10 feet. The stove is an ordinary water-jacket arrangement with fairly large coal capacity. Two-inch pipes run from the stove on both sides to the extremities of the house, and two-inch pipes return to it. Ordinary anthracite coal is used as fuel. If the fire is properly made it will last for twelve hours without attention and will keep the water in the pipes hot for quite young chicks. The pipes start from the stove at about 5 inches above the floor-level and gradually rise by 5 inches in each 50 feet, which is sufficient for the circulation. On the floor of the compartment is put coarse sand, and over that chaff is strewn. As the pipes rise, more sand is put on the floor underneath them to make up the level within 3 inches of the pipes. A board is placed over the pipes to keep the heat down on the chicks, and for the first week a sack is thrown over the board for extra protection.

About a week before the chicks are due from the incubator, the fire in the brooder-house is started and kept going in order thoroughly to dry the sand, which is spread in the pens some months before. When the chicks are ready to leave the incubator they are placed in ordinary chick boxes and taken to the brooder-house, where they are put under the pipes. There they remain for thirty-six or forty-eight hours without any food, but they can run about near the pipes, the side nearest the windows being blocked with a piece of board for two days, by which time the chicks are accustomed to their home. The board can now be removed, and they have the run of the whole pen. When first

allowed the full run of the pen, some attention must be given to see that all the chicks can find their way back to the warmth, and if it is noticed that any are standing about or lift their voices, these must be put under the pipes, and the operation is continued till all know their way back.

The first feed is given when the chicks cry out, and consists of "kibbled" wheat or an ordinary commercial chick food. But if the latter, see that you give a kind which does not contain "grit" nor too much maize. The coarse sand on the floor is quite sufficient for the chicks in the way of grit. Water, in which a very little permanganate of potash is put, is given at the same time as the first feed of grain, and thereafter during the chicks' life in the brooder-house it is given twice a day, the drinking vessels on each occasion being thoroughly cleaned and rinsed with disinfectant. This is most important. It is nearly impossible to keep water for chicks clean, and the cause of many chick troubles can be traced to an insufficient supply of perfectly clean water given in clean vessels. When the chicks have the full use of their brooder-house pen, sufficient grain is scattered in the chaff to last for two days, and a little ground charcoal is given in a tray. That is the whole attention required for the first week. The charcoal keeps the bowels in order and seems to prevent many chick disorders.

The second week the sacks are taken from the boards over the pipes, and a dish containing broad bran mixed with charcoal is left in every pen, enough grain is fed to last two days, water given as usual, and if the weather is reasonably fine the chicks are allowed out in the outside run which is attached to each inside run. There they find green food in the shape of kale or turnips or lettuce. During the first day or two of their new experience fairly constant attention must be given to them in order that none that are outside cannot find the way home. They easily get cold, and bowel trouble ensues.

The third week dry mash is given in place of the bran, everything else being the same as for the second week.

In the fourth week the chicks are given a rather larger sample of grain, for it is cheaper. The board is removed from the top of

the pipes, and a small door is opened at the end of the outside run which admits them into a half-acre field, where the chicks of one age mix and find their way back to any pen that suits them, some pens having then twice the number of chicks of others. The extra exercise, it is considered, more than balances the harm which might be caused by the extra number of chicks in some of the pens.

That is all the attention that the chicks get, and they do well on it until they are moved out of the brooder-house into the colony houses. If any chick does not look well or does not grow as fast as the others it is killed. A good many cockerels can be distinguished at six weeks of age. Some are sent to London and fetch from 9d. to 1s. each. Others are kept another month or so and sold for about 1s. 6d. There is no money in fattening Leghorn cockerels, and it is better to get rid of them at any price rather than have to give time, labour and house accommodation, which would be better spent on the pullets. There is, however, a house with alternate yards for cockerels only, on this farm, where the cockerels which are wanted for the following year's breeding season are kept over the autumn and winter, running together in one flock. No attempt is made to keep them from fighting, and the best birds amongst the survivors are then used in the breeding pens. A separate compartment and yard of this house is used for cockerels which supply our table with poultry.

No medicine or doctoring is given to the chicks. Those that don't grow well have to perish.

Such is a system that has proved itself eminently practical. No one need hesitate after the success of Mr Hanson to adopt the large-scale brooder-house with the central anthracite stove from which radiates hot-water pipes. This system gets rid at once of the great bugbear of "crowding" which brings about a huge percentage of mortality. The other method I described of central heating with screens to protect the chickens from direct heat seems to me to be equally worthy of emulation and experiment. For a very large brooder-house several stoves would be necessary, and would probably be more expensive than the system of hot-water pipes, which distribute the heat throughout the house.

CHAPTER XXVIII

IMPORTANCE OF EARLY HATCHING

ONE often wonders whether the poultry-keeper knows his business as thoroughly as men do in other industries. One asks the awkward question because one so often sees the average egg-farmer fail to do the right thing at the right moment.

There is, for instance, for three months of every year literally a famine in eggs. In October, November and December it is almost impossible to buy eggs, and when they can be purchased the price is out of all proportion—I will not say to their worth, but to what they fetch at other seasons of the year. So common, so recurrent has this annual famine become that most people, including, I fear, large numbers of poultry-keepers, have come to look upon it as something ordained by Nature. It is simply taken for granted that for one quarter of the year—the last three months—eggs cannot be got in quantities. Now this is exactly the reverse of the truth. For thousands of years Nature—with a capital N—has been impressing upon us the fact that eggs can be laid in October, November and December as easily as in any other three months of the year.

Most people seem to take it for granted that it is the cold and the wild weather that prevents the pullets from laying. Of course it is nothing of the kind. If it were so eggs would be scarcer in the first three months of the year than they are in the last three, for as a rule the weather is worst, the frost at its hardest, the thermometer at its lowest, the snow most persistent during January, February and March, when there is a perfect orgy of egg-laying. April is usually the best egg month of the year, and it is oftenest the wildest from a weather point of view. In 1916, when frost and snowstorms were at their worst in March and April, I got

more eggs than in any other two months of the year. It is not the cold that prevents the hen laying her egg. Nature lays no embargo on the laying pullet.

As a fact Nature has been trying to tell us for ages past that the pullet will lay readily in the last three months of the year—almost as readily as in any other three months—and that the egg famine is all of our own creation. By our own neglectful ways we make the famine and then try to cast the blame on Nature. That there should ever be a real scarcity of eggs is due to our own crass stupidity.

It seems to me a wonderful provision of Nature that at the very time when the yearling hen is beginning to moult and ceasing to lay, the six to eight month old pullet is just beginning. As a fact the two just overlap. As the hen ceases off in late September after her fruitful season, the young pullet is organising her egg supply and is ready to begin the output. It is all a question of "timing" the pullet for egg-production. If one were to hatch light breeds in February—say the White Leghorn—they would begin to lay in August, which is just two months too soon. It is too soon because the chances are that a bird that lays as early as August will go into a moult late in the year and take a couple of months to get over it. But there is no necessity to make such blunders. The facts are all perfectly well known. One can tell to a week or so the time which any given breed will take to mature and lay eggs. Why then, may it be asked, do we habitually make m stakes?

I suppose one must admit that the tendency to delay is to some extent inherent in human nature. Procrastination is not merely the thief of time; it is also the robber of our profits. And it is so easy to do the right thing at the right time! If only we register a vow never to delay hatching heavy breeds after the end of March and never to hatch light breeds after the end of April how much richer would we all be and how much better fed the nation.

HATCHING HEAVY BREEDS

My experience leads me to believe that February and March are the only proper months in which to hatch out all heavy breeds, including Orpingtons, Wyandottes, Sussex, Rhode Island Reds, Plymouth Rocks and Faverolles. There are some strains of Rhode Islanders that mature early and ought not to be hatched before March, but if any tendency to premature laying be observed it can easily be checked by feeding on grain only for a time. Personally I should like to see all my heavy breeds hatched during the last week in February or the first week in March, but a week or so either way will be found satisfactory.

No doubt the weather is as a rule more suitable for hatching and rearing in April and May, but in these days when brooders and brooder-houses are so perfect one need have little fear of the weather. Nine times out of ten the mortality among chickens is due to some fault of the poultry-keeper, and of course he looks round for a scapegoat and puts the blame on the weather. Personally I lose fewer young birds in the cold weather than during the warmer months. Possibly it is that I am more careful then, but it is also likely that as the chicks grow faster and more robust in the early months they can stand the cold better. A chicken hatched in May or June does not mature so quickly as the early born bird, and a cold, wet night will find out its weak places sooner than it will a bird hardened off in the winter months. My best birds in heavy breeds have invariably been late February or early March hatched.

A fowl coming on to lay about the last week in September or the first week in October will go on steadily through all the winter, spring and early summer, until, in fact, the new season's pullets are ready to lay. It is a complete cycle of twelve months' laying. The oldest birds, of course, take the rest during the last two or three months of the year and ought to be well on the way again in January or the beginning of February.

It is sometimes difficult to get all one's pullets hatched in the six or eight weeks when it is most profitable, but there is no excuse

for the man who neglects these critical days. And yet the difficulties are not nearly so many as they seem. If one is rearing on a small scale it is possible to fill a 100-chick brooder twice in eight weeks. If more chicks are required more brooders are necessary.

The newest and most perfect brooder-houses, capable of holding anything up to 2000 chicks at a time, are an invaluable help to the egg-farmer who must get all his chicks hatched and reared inside of two months. There is, of course, no difficulty about hatching. The modern incubator can turn chickens out by the thousand or the hundred thousand if necessary. Given twenty-one days and a sufficient incubator capacity and there is no limit to the number of chicks that may be hatched.

One of the best types of brooder-house is an American importation now being used in this country. Its extreme simplicity is its charm, and it is as effective as it is simple. One wonders why it has never been thought of before.

It is simply a square building—of wood generally—with a wooden floor. An anthracite stove is placed in the middle of the house with an iron chimney running up through the roof. Round the stove is placed a circular canvas guard to keep the chickens from getting too near the fire. The canvas is just a sufficient shield for the fiercer rays of heat and the chicks, perfectly protected in this way, spread themselves out over the floor without crowding. A house 10 feet square accommodates 500 chickens, and of course they are as safe as if under their mother's wing. All that is necessary is to see that the fire is kept up and the temperature at a uniform heat. A house to accommodate 2000 birds would be better to have three stoves distributed through the building, so that the heat would be more uniform.

Returning for a moment to the main subject—a supply of winter eggs—let me say that the poultryman who breeds at the right time and has his pullets laying at the precise months has an immense advantage over the man who does not. One may put it that eggs in October, November and December are golden, while eggs during the other months of the year are merely silver. Not only so, but the man who has a steady supply all the year round

need have no fear of taking on contracts. He can tell to a few dozens how many eggs he can produce at any season of the year. Most people are precluded from entering on valuable contracts by the fear that they may not have a sufficient supply of eggs during the winter months. If one breeds at the appointed times, such fears are groundless. The failure to provide eggs, and plenty of them, during the last three months of the year is a confession that one does not know one's business, or that, knowing it, one has neglected it. Nature, in this instance, has not been neglectful or niggardly. She has created the pullet to take to laying exactly where the older hen has left off. If we fail to take advantage of her largess all the blame is ours. There is no possible obstacle in the way of eggs all the year round excepting our own negligence and forgetfulness.

I look to the near future for the abolition of famine time for eggs. Like most of our difficulties, scarcity of eggs in winter is a self-created difficulty. It has no place in Nature.

BLACK MINORCA PULLET

CHAPTER XXIX

THE PSYCHOLOGY OF THE FOWL

SO low in the scale of creation is the fowl that its brain material is necessarily of a rudimentary order. The bird is only one degree removed almost in a direct line from the reptile. With a small brain, and that not of the best material, a domestic fowl is not a particularly intelligent bird. That may be taken for granted. I have heard it asserted, not without reason, that the fowl, of all animals, is the most stupid. This sweeping assertion has usually been made when the bird, by some silly manœuvre, has exasperated its owner. That fowls are stupid it would be folly to deny. Whether they are as bereft of brain as the hare or the sheep is a question that admits of discussion. We are so little acquainted with the psychology of the hare—being a wild animal and not under observation—that it is impossible to pronounce a judgment. Instinct is so powerful, so all-dominating in the sheep that there is very little room for what we call intelligence. Even the bee seems to belong to a vastly higher order, though there, too, it may be instinct and not direct exercise of intelligence that makes the bee appear to be among the thinking animals.

No doubt the lower animals, as distinct from the human animal, are largely dominated by instinct rather than by reason, and the angler who tells you tales of the artful ways of the fish is unconsciously endowing the fish with a reasoning capacity that belongs strictly to instinct, developed through countless ages to avoid its enemies, in the struggle for existence. Reasoning powers, as we understand the term, can be admitted to be in the possession of only a few of the higher mammals, such as the ape, the elephant, the horse and the dog.

No biped other than man is capable of thinking out a problem

even of the simplest kind, and one may put down at least seven-eighths of the actions of fowls to instinct and not to an ability to think and act accordingly. The strongest instincts of all animals are those which go to satisfy hunger, and in this statement I include sex hunger. If it were not so all animals would speedily become extinct. Instinct will take a duck to the water—not in search of water but in search of food. Nature has provided the newly hatched chicken with an internal supply of food, yet a bird a few hours old will eat if food is placed before it. Instinct does not tell it not to eat. The instinct to eat is more powerful than the feeling of satiety.

And this overruling instinct remains with the fowl all through life. Even when sick and ill the fowl will continue to eat so long as it is able to stand and pick up food. I have seen them continue to eat till a few minutes before they died. Of course there comes a time when, the crop being full and choked, the bird can eat no longer, but short of that period, a fowl as a rule will go on eating grain or any food to its liking. In its wild state the fowl, like most other animals, learned to eat as much as possible while food was plentiful. Instinct told it that it would have to wait long before it could again get a supply of food. A plenitude of food would be frequently succeeded by famine and for that reason the fowl learned to eat as long as the food lasted. Eating was the first law of life, because it meant self-preservation.

It is no surprise then to the keeper of the domestic fowl to see it meet him half-way at meal-times. If he is late it will meet him more than half-way. When he comes in sight with the feeding pail there is a cry and a clatter inside and outside the fowl-house. The birds inside know as well as those outside that feeding-time has arrived. If one is accustomed to feed inside they will all troop in to the very spot where one is accustomed to begin feeding. If the meal is given outside they will cluster round the spot where the feeding troughs are. They know all about food. Try them with sawdust in place of meal or grain and they are not having any. If it is not intelligence that has taught them what to eat and what to leave alone, it is an instinct that is safer than

intelligence. A child will readily eat a poisonous wild berry if it resemble an edible berry, but the fowl will make no errors of that kind. Perhaps there is no animal extant whose food is so varied as is that of a fowl, and yet while it will accept all that it needs for its growth and nourishment, it will reject all that would be harmful. A fowl will eat almost any kind of seed or grain that is not too large, but there are, of course, some sorts that it much prefers to others. It will eat any sort of meat or fish; it will eat all sorts of fruits and vegetables; it will eat flints, chalk, ash, broken bricks, stones, shell and soil. The fowl is not a dainty animal. It will catch and eat mice, frogs, slugs, snails, worms and insects of every description. It does not, it is true, always know precisely what is best for it, and will eat raw potatoes if it cannot find grain or other more suitable food. But its instincts are right. It prefers flies to potatoes as a rule, but it will reject worms when it has had a plentiful supply of albuminoid foods. As far as possible it goes for the "balanced ration." If it is kept indoors for a few days without green stuff it will rush at the grass or cabbages as soon as it gets near them.

A CREATURE OF INSTINCT

From the point of view of knowing what is good for it, the fowl is ahead of the human being. One may give a bird food that is unsuitable for eggs and it will eat it, but then the fowl is not thinking about eggs when it is feeding. At the same time, if you place before the bird during the laying season food that contains protein and food that contains none, you will find the former eaten first. Here again instinct is not at fault. The hen may not be endowed with mighty brain power, but in all that pertains to its well-being it has little to learn from its keeper.

In the matter of roosting its instincts are not so immaculate. Some fowls have to be taught to roost. If the young be left with the mother hen long enough there is no need to teach them, but when they are left entirely to themselves, some prefer to sleep on the floor to sleeping on the perches. In this case there is nothing

one can do but lift them off the floor on to the perches, and one has to repeat this nightly office quite a long time before the action becomes a habit with them. At night when the bird goes to roost it is like a young child so overcome with sleep that it is hardly conscious of what is happening to it when it is removed from the floor to the perch. One has therefore to repeat the operation again and again and again, until instinct, aided by art, forms a new habit and the perching becomes voluntary. But most fowls, perhaps all, if not kept in a house, perch instinctively. With some breeds it is difficult to get the birds indoors if there are trees about. And the higher the perch the better. As a rule Leghorns are great frequenters of trees at night, and if one allows them to form the habit it will be found most difficult to break them of it. While a fowl loves to be comfortable, it does not mind cold, or even wet, for a high branch of a tree.

Birds also prefer a dark corner to perch in. If they can find one place darker than another, such as a nest-box, there they will wend their way as the evening shadows fall. And, as showing the overpowering might of instinct, birds will immediately seek for the shelter of the house if the sky get overcast and darkness threaten. If it be dark long enough they will go to roost even in the middle of the day. In the same way lamplight or electric light will bring them from their perches in the middle of the night, and in this way some people who get home late give their birds the last meal of the day. The fowl is almost wholly a creature of instinct.

They soon get to know their keeper and sometimes the presence of a stranger will make them strangely disturbed. Even a strange child in the company of the owner may send the flock flying in wild dismay. If the owner be differently dressed, especially if he have any curious headgear, it will often be the signal for a wild stampede. Anyone carrying an empty sack will cause an intense commotion, and there are times when one may, by some unusual gesture, send the whole flock scurrying in mortal fear. It is amazing how quickly their alarms take place. No doubt they have their own methods of making communication, and it is all done instantly. Suddenly one will hear a sound of wild alarm

and the flock will stampede on the instant. Wireless telegraphy was not invented by Marconi. Fowl are a curious compound of fear and fearlessness. They are either fleeing from you or cheeking you. I have had fowls that flew all over me, pecking and thrusting their heads into the feeding-pail, eating the snow off my boots, sitting on my head or shoulder and acting as impudently as a street arab in the Strand. With the slightest attention fowls can be tamed and domesticated to a degree. I knew a lady who kept a couple of dozen and she had names for them all and spoke to them as she would to her dog. She declared they knew every word she uttered; she allowed them to invade the house, where the bathroom and her own bedroom were not unknown to them. No fowl is so utterly human as the Rhode Island Red. It will go out walking with you, listen to all you say and look up into your face with an intelligence that must be seen to be appreciated. I have a very big hen which lays very few eggs, but she makes up for the deficiency by accompanying me round the nest-boxes and rejoicing with me when the egg baskets are full. Her eyes are red, and one day when I was getting few eggs I could have persuaded myself that I saw a tear glisten and glide down her cheek.

Oh yes, I know that hens are stupid, if that word is strong enough. They upset their water, they walk with filthy feet among their food, they foul their own nests, they fight and quarrel, and when one is bleeding they all peck it. They have no fine feelings, and if one of their number dies, they will walk over it, tread on it with callous unconcern. They are practically cannibals, and woe to the weak one, which will quickly go to the wall. After all, are they not things of a day, born to extract all that seems good to them out of the little hour they strut upon the stage? They live their lives rapidly. Born within twenty-one days of their conception, independent of parents at birth, potential fathers and mothers at six or eight months, fully matured at eighteen months, aged at two years, and seldom allowed to see their third birthday. They are wonderful things, full of vigour, overflowing with vitality and capable of reproducing 500 of their kind. Man, the overlord, has domesticated them and dedicated them to his use. The fowl

has been through all the ages a source of food to man, and likely in the future to be even more serviceable and subservient to his uses.

The fowl is stupid but easily controlled. I have only possessed one bird that was fairly mad. It was its delight to break out of the wire run first thing every morning, and it invariably spent the rest of the day running up and down the outside of the wire enclosure trying vainly to get back again. Truly it was a vexatious bird, but it had one redeeming virtue—it laid an egg every day ! To such a fowl much may be forgiven.

CHAPTER XXX

WOMEN AS POULTRY-FARMERS

THE entry of women into so many professions and industries at one time practically dominated by men, and their success in a very large proportion of them, leads one to consider how far poultry-farming is adapted to the special talents of women.

General farming has even attracted a considerable number of educated women. At one time only labouring women were supposed to be useful on the land, and that only for certain of the light duties, such as hoeing, weeding, stone-gathering and some harvest work. Educated women trained at the various agricultural colleges have now taken up general farming in considerable numbers, and it seems likely that these numbers will grow rather than diminish. It has got to be proved whether women—especially those who have not been accustomed to hard, muscular labour—will be able to do all the work that at one time was undertaken by men. Individual instances of women successfully doing the hard work of ploughing are by no means isolated, but the great majority who take up farm work will probably be unable to perform satisfactorily the heaviest duties connected with the work of a general farm.

This being the case, what are the difficulties that women will have to overcome in poultry-farming? I may answer in a word by saying: "Very few, and none of them insuperable."

At the present time many women are running poultry farms with great success and easily holding their own in every respect with men. Two, if not more, of the most successful breeders in England are ladies, and dozens more are working their farms with a knowledge and thoroughness that will compare favourably with the work on any similar farms conducted by men.

One need only mention that Miss Bell, of Ightham, Kent, beat

all comers in the most recent (1915) laying competition held at the Harper-Adams College under Government auspices. In the same competition a Midlothian lady established a record with Barred Rocks, and but for sending in her birds in a rather immature condition, would probably have defeated all comers in the section for heavy breeds. Again, Miss Edwards, of Gloucester, has a world-wide reputation as a breeder of high-class utility fowls. When one considers that it is only within the last decade that women have taken up poultry-farming in earnest, their success seems to show not only that they are capable of competing on equal terms with men, but that they are by nature and training peculiarly fitted for the task. In the hatching and rearing sections particularly—and these are the bed-rock of the business—women have a real genius for the work. Woman's patience, her care, her quicker perceptions, her greater delicacy of handling, all give her an advantage in the creation and nurture of life. It goes without saying that all women are not equally fitted, just as all men are not equally suited, for this special work, but given an intelligent and trained woman she is likely to score over an equally intelligent and trained man in the matter of hatching and rearing young chickens.

I know a case in point. A young poultry-farmer enlisted on the understanding that an older man would be left to do the heavier work of the farm. His wife, quite a young woman, had previously assisted her husband in hatching and rearing, and in his absence, without any special training, she took the whole thing into her own hands. She had no help whatever. In less than two months she incubated over 3000 chickens and with an incredibly small percentage of loss she reared and brought them to maturity. Living as she did in the heart of a big poultry district, her work was watched with a jealous eye. She was the only lady poultry-farmer, and she was far and away the most successful. Not only were her losses trifling, but she produced so many more birds than she expected that she was able to sell a considerable number to her less successful male competitors. This is not an isolated instance, but is one that most recently came within my own knowledge and is only one more proof that in the most exacting—and will I say

the most profitable?—part of poultry culture a woman easily overcomes the difficulties and defeated all the men in the district. No doubt others know of similar cases, for it seems to me in the nature of things that women will make this branch of the industry peculiarly their own.

And how will they fare in the other departments? It has been pointed out to me that women will not build poultry-houses so well as men can build them. Perhaps not. I am quite prepared to concede that where big structures are concerned women on the whole may not take to building as readily as men. But is house-building rightly a part of poultry-farming? If it is, I know a great many of the most successful male poultry-farmers who never built a house in their lives and do not intend to. Personally I have never done more than assist in building a food-house, and I find, with others, that when it comes to dealing with big structures it is better in every way to leave the job to skilled men. It is enough for the farmer to design the building, or to indicate its size and requirements, and I have no doubt that women will accomplish this part of the business just as intelligently as the average man. Coming into the industry without prejudice and preconceived notions, women will adjust their ideas easily to what is best adapted to the requirements of the situation. She will look at things with a neutral eye and a fresh mind ready to accept that which has been proved and ready to try that which is likely to be improved.

WOMEN SUITED FOR POULTRY

In my opinion poultry-farming is one of the few great industries that are made for women, and it is quite likely that in the comparatively near future she will claim it for her own, by the simple process of beating her male competitor out of the field. Even if she does not entirely dominate the poultry world, she will occupy an important place in it. Suited by temperament, attracted by reason of its nearness to nature, its complicity with creation, woman was made for poultry-farming if it was not made for her. There is nothing in connection with it that she cannot do.

Joined in sympathy with the brooding bird, with the maternal impulse, with the laying hen, she is eminently fitted to carry out all the requirements of the business. She will revel in the day-old chicks, delight in the tending, feeding and care of the young, and rejoice in the matured pullet in its productive stage.

Many male farmers, perhaps the majority, are not so careful, so painstaking as they ought to be. Some of them, I speak with experience, are only too content to go by rule of thumb when exact science is required. In feeding there is more necessary than weight and measure, and not all poultry-farmers are exact in this respect. Many feed with the most perfunctory attention (or none at all) to the wants of the birds. A woman may or may not be more careful, according to her training, but if she is taught that certain things are necessary she is not likely to overlook them. Devotion to detail is more characteristic of the female than of the male. She is more cautious and will not take risks. She may not be more observant naturally, but training will do much for her there, and once she is taught what is necessary there is little of moment that will escape her.

The mixing of food seems such a small thing to the average masculine mind, but the whole super-structure of poultry-farming is built upon this most essential process. The wrong ingredients, the wrong proportions, the wrong quantity of moisture—all these things strike at the very roots of the poultry business. A large number of the failures in poultry-farming may be attributed just to these few considerations. There are a few things that are essential and the details of feeding is perhaps the most essential of all. Women, being Nature's nurses, are well calculated to realise the importance of feeding. No other detail of a poultry farm will make such a difference to the entire establishment. Feed well, feed accurately, feed regularly, feed cleanly, and you have won more than half the battle.

The care of poultry does not involve hard manual labour and there is no part of the business that an average healthy woman could not do. Even when food is bought in large quantities it is delivered in sacks quite manageable by an ordinary person. The

LIGHT SUSSEX COCK

heaviest sacks—240 lb. of wheat or maize—can be stored at once into iron or wooden bins and taken out in pailfuls as required. A sack of oats weighs 160 lb. and all other meal stuffs, such as bran and middlings, are delivered in one-cwt. bags. I never have occasion to lift anything weighing more than one cwt. and that only from one part of the food-shed to another.

Nor is there any very disagreeable work to do. Scraping the dropping-boards is a comparatively clean operation, and though it is the least agreeable of all poultry work it is an occupation that no healthy person would shrink from. I have known women of education and refinement do all the rough work of a poultry farm and think nothing about it, and I have in mind particularly one lady of title who for some years did everything with her own hands on a small poultry farm.

Taking the rough with the smooth, poultry-farming will compare favourably with general farming or gardening. With poultry the work is not nearly so hard as with gardening, and one is less exposed to the weather. Modern poultry-keeping on anything like a big scale means large fowl-houses that offer a protection to the worker as well as to the birds. Fully one half of the work is done under cover and one can often choose times of rough weather for the indoor occupation.

There is nothing in poultry-farming that a woman of refinement may not do, while all the time there are matters that will interest her and keep her enthusiasm alive. One does not need to be a lover of fowls to take up the industry, but those who are naturally attracted to the business will no doubt find it more agreeable. I have known many instances, however, where the beginner was absolutely indifferent to the work, only to find the interest grow until it spread into the enthusiastic devotion of the specialist.

When a farm grows big enough to need hired labour it will, of course, be the object of the owner to reserve to herself the more difficult and technical parts of the business and leave the rougher and less desirable work to the assistant. The most essential department of poultry-farming is the breeding, hatching and rearing, and all this a woman can undertake in a spirit of enthusiasm.

There is also plenty of room for scientific investigation, which the more advanced poultry-keepers ought to make part of their profession. In fine, one may say that there are few industries that offer a greater scope to the peculiar genius of women than the science of poultry-farming.

CHAPTER XXXI

THE MOULTING SEASON

LATE July is the season of the year when Nature in the form of a fowl begins to lag. Following a period of great activity in which the pullet, ever seeking to reproduce her kind, has laid great numbers of eggs, her vital energies become exhausted and she seeks a period of rest and recuperation.

In the first place she begins to lay fewer eggs, until she ceases to lay any more, and concurrently she sheds her feathers until the rounded, well-formed figure of the hen becomes but the poor pale figure of her former self. From a robust, well-nourished bird she becomes a lean, hungry-looking scarecrow. This is the process known as moulting, and may last from six weeks to three months. At this time her vitality is low, and if the weather turn suddenly damp and cold the fowl is in danger of her very life.

A good number of fowls are often lost during this period if they are not well looked after. It is the custom on some large egg farms to "encourage the moult" by starving the fowl for days together. The idea is to get this non-productive period over quickly and once more turn the pullet into an egg-laying machine. Let those who will take the risk. If, however, anyone cares for the future well-being of their fowls, especially for breeding purposes, he will not strive to improve upon the methods of Nature, which are slow but sure.

It is true that during the early part of the moult fowls do not eat so much, simply because they are not then in a creative condition. To produce well a fowl must eat well. But that is no reason why we should starve the bird. There are writers who advocate the absence of all food for days together. By this means they hope to accelerate the moult, and probably they will do so, but who knows what mischief they are doing to the constitution

of the fowl and what troubles they may be laying up in the future ?

Everyone is naturally anxious to curtail the moulting season, so that eggs will begin to flow quickly and copiously, but one doubts whether we can, after all, cheat Nature with impunity.

Some hens that possess excessive vitality will continue to lay during part or even all the moulting period, and with such it would not be wisdom to interfere, even if we could ; but these are exceptions that are not to be held up to illustrate the natural order of things. Most of us poultrymen are always greedy for eggs. Like *Oliver Twist*, we always cry for more. But if our fowls are good enough to keep on laying for eight or nine months continuously, we need not grudge them the little interval for rest and refreshment that Mother Nature imposes upon them.

To me it is always an amazing fact that a pullet will go on laying, day in, day out, for nearly 300 days out of 365 without, apparently, getting tired of the creative habit. I often go to the laying nests saying to myself : "They cannot give me 50, 60, 100 eggs to-day," but, sure enough, there lie the eggs, white and brown, waiting to be collected. A careful selection of deep-laying strains has given man not merely a bird, but a laying machine.

The modern hen, developed through succeeding generations, has formed the diurnal egg-laying habit, and it would take nothing less than a miracle to choke her off. She lives to lay. And while the hen is moulting the six-months-old pullet is thinking seriously of beginning her life's work. Many January pullets are laying then, but it will be two or three more months before the March bird has seriously begun to fill the egg basket.

It is the aim of the poultryman to bridge over the interval between the moulting-time of the older bird and the beginning of the laying season of the six to eight month pullet. If this could be done successfully there would really be no scarcity of eggs and no winter problem. It is not so much the cold that prevents birds laying in winter. The great famine in eggs during the last three months of the year is due to the fact that while the older hens have ceased to lay the younger generation are not sufficiently matured

to compensate for the deficiency caused by their sterile seniors. Once pullets are properly developed no cold, frost or snow will prevent them laying. The moral of all the foregoing is to make sure that your pullets are hatched not later than March or early April of each year.

If the moult is too long delayed so that the birds will run far into the cold weather, it will pay to assist the effort of Nature by putting the birds on half rations for a week without any stimulating food. As soon as the moult begins in earnest plenty of good nourishing food should be given, including a small proportion of linseed meal—say a dessertspoonful per bird mixed in the mash. This will assist to loosen the feathers, and the abundance of good food will assist in building up the bird's system. It is dangerous to allow the moult to linger beyond September before making a start, because of the cold weather which the bird will have to endure before it is fully covered. The moult lasts from ten to twelve weeks and it is very rarely that the fowl will recommence to lay before that period. If possible the house should be kept clear of the moulted feathers, and where the moult has been assisted it is better to keep the moulting birds separate from the others. A little epsom salts twice a week in the drinking water will be found beneficial.

EFFECT ON EGG-PRODUCTION

There can be no doubt whatever but that the moulting period, or periods, in a bird's existence influences it constitutionally and, as a natural result, the egg supply is affected.

As a close record of the number of birds which moulted during the Harper-Adams trials was kept, some deductions may be drawn from these records.

It was particularly noticed that, during the first three periods—31st October to 27th November, 28th November to 25th December, and 26th December to 22nd January—in Section I. a much larger number of birds dropped into moult as compared with the other sections.

Light Breeds

During the 1st Period, Section I. included 31 birds

"	2nd	"	"	"	18	"
"	3rd	"	"	"	11	"
"	9th	"	"	"	3	"
"	10th	"	"	"	4	"
"	Last Period,	"	"	"	9	"

Heavy Breeds

During the 1st Period, Sections II., III. and IV. included 12 birds

"	2nd	"	"	"	"	1 bird
"	3rd	"	"	"	"	2 birds
"	9th	"	"	"	"	5 "
"	10th	"	"	"	"	11 "
"	Last Period	"	"	"	"	7 "

The intervening periods contained only one or two moulting birds.

There can be no doubt that certain conditions are conducive to moulting and that these conditions affect the light more readily than the heavy breeds. The effect of sudden changes of weather, especially a cold wind, is particularly noticeable, while a chill contracted on the railway journey and the change of conditions of housing and management which a bird experiences on entering a competition may each or all be sufficient to induce moulting.

The effect upon the total egg-production is visible by contrasting the scores of the birds which moulted during the first three months with those which did not do so, or only moulted at the end of the trials.

<i>Oct. 31st to Feb. 19th</i>	<i>No. of Birds Moulting</i>	<i>Average Score of Birds for 10 Months</i>	
		<i>Birds Moulting</i>	<i>Not Moulting</i>
Light Breeds .	53	166·9	189·6
Heavy Breeds .	18	135·4	167·0

CHAPTER XXXII

FOWLS THAT PAY

IN my capacity as a journalist I frequently get remarkable egg-laying figures from the humble backyarder. So splendid are some of these records that doubt is being continually cast upon them, not only by the poultry journalist, but by the commercial egg-farmer, for it is a surprising fact that in many instances the man who keeps from half-a-dozen to a score of fowls in a back-yard or small garden gets better relative returns than the professional poultryman.

For myself I kept an open mind on the matter, and I was always prepared to believe the sensational figures of backyarders when proof was forthcoming. It is very difficult to get proof in regard to these matters, for one can only hear of them when they are accomplished, and even the sworn testimony of the owner is not necessarily convincing.

The only real "proof" is to have all the facts in one's possession. One must live on the premises, as it were, to see the eggs from day to day as they are laid. Fortunately I am in that happy position.

One day my wife asked me to breed a dozen or so of pullets for her own use. It so happened that I had an odd half-dozen of Salmon Faverolles which I bought as pullets at four shillings each. They had laid very well without doing anything remarkable, but as they were to be placed in a small house in a cold, bleak, exposed position I thought it necessary to provide a good big, comfortable heavy breed that would stand the rigours of the winter on a hill 400 feet above sea-level. I mated the six Faverolles with a nice, spirited White Wyandotte cockerel. It is, of course, better to breed from two-year-old birds, but in this instance I bred from birds that were exactly one year old. I put twenty-six eggs under

two hens, and of the eighteen chickens that hatched out on 26th February ten proved to be pullets.

They thrived well from the beginning, and in three weeks they were such large, well-developed birds that I jokingly remarked to my wife that they would be laying when they were six weeks old. I took good care not to force them and simply let them run as youngsters with 200 pure breeds of various kinds. The Wyandotte-Faverolles always looked well, even among the pure breeds. In colour and conformation they bore all the characteristics of their mothers, excepting that they had no feathers on their feet and legs. Otherwise they might have been mistaken for Faverolles.

I took no special notice of them, nor did I anticipate that they would prove to be anything exceptional. When they were about six months old I removed the ten birds from my flock and passed them on to my wife with my blessing. She put them in a small house 5 feet by 4 feet by 4 feet, made of half-inch matching and covered all over with tar-felting. No doubt the felting kept them as warm as, say, another half-inch thickness of wood. At any rate they were happy and comfortable from the first, and while several of my own birds had colds the Wyandotte-Faverolles never looked back.

On the 17th September the first egg was laid. It was small and shell-less. The birds were then nearly seven months old. Three days later one more egg was laid, presumably by the same bird, and it had a good hard shell. No other egg save the first was shell-less. As eggs were now laid with some regularity I give the exact record:

September—					October—				
17th	1	egg	1st	4	eggs				
20th	1	„	2nd	4	„				
22nd	2	eggs	3rd	3	„				
23rd	2	„	4th	2	„				
24th	4	„	5th	3	„				
25th	4	„	6th	4	„				
26th	3	„	7th	4	„				
28th	6	„	8th	4	„				
29th	4	„	9th	7	„				
30th	9	„	10th	3	„				
Total	<hr/> 36 eggs		Carry forward	<hr/> 38 eggs					

FOWLS THAT PAY

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October—contd.

Brought forward	38	eggs
11th	8	"
12th	8	"
13th	9	"
14th	7	"
15th	8	"
16th	4	"
17th	8	"
18th	9	"
19th	3	"
20th	4	"
21st	4	"
22nd	6	"
23rd	6	"
24th	7	"
25th	10	"
26th	8	"
27th	8	"
28th	9	"
29th	7	"
30th	10	"
31st	8	"

Total 189 eggs

November—

1st	6	eggs
2nd	2	"
3rd	4	"
4th	2	"
5th	4	"
6th	6	"
7th	6	"
8th	4	"
9th	6	"
10th	8	"
11th	4	"
12th	10	"
13th	6	"
14th	10	"
15th	6	"
16th	10	"
17th	8	"
18th	6	"
19th	4	"
20th	6	"

Carry forward 118 eggs

November—contd.

Brought forward	118	eggs
21st	4	"
22nd	6	"
23rd	6	"
24th	8	"
25th	8	"
26th	7	"
27th	8	"
28th	6	"
29th	7	"
30th	6	"

Total 184 eggs

December—

1st	6	eggs
2nd	8	"
3rd	4	"
4th	8	"
5th	6	"
6th	5	"
7th	10	"
8th	6	"
9th	4	"
10th	8	"
11th	4	"
12th	5	"
13th	9	"
14th	6	"
15th	6	"
16th	5	"
17th	10	"
18th	6	"
19th	2	"
20th	5	"
21st	8	"
22nd	7	"
23rd	9	"
24th	4	"
25th	6	"
27th	8	"
28th	10	"
29th	3	"
30th	6	"
31st	5	"

Total 189 eggs

Total for September	36
" " October	189
" " November	184
" " December	189

Grand Total 598

It is said by those who trap-nest that any bird that lays thirty eggs or more before the end of the year is good enough to be bred from. Obviously then these ten first-cross breeds come well within the category. When we consider that the average per bird works out at nearly sixty before Christmas, it follows that several of the birds must have laid at least seventy eggs. They were not trap-nested, but they were kept under strict observation, and it is certain that all ten were laying by the 12th November, or earlier. The chances are that one of the birds laid approximately sixty eggs (or more) and that two others laid only a few less. The others, even those that began to lay as late as 12th November, must have laid from forty to fifty-five eggs each.

I may here remark that my own birds bred at the same time did not do anything like so well, although they were all managed alike. There was a slight difference in feeding, for my wife gave all her household scraps to the noble ten, but any difference in this direction, I am convinced, would not account for a single egg. Where the lady scored on this occasion was in keeping a small flock. My birds were in houses containing 100 head apiece, and it was not till January that my volume of eggs was proportionately anywhere near her November record. A strict comparison cannot be made between my fowls and my wife's, for the simple reason that all her birds were first crosses—Wyandotte-Faverolles—while mine comprised White Wyandottes, Leghorns, Rhode Island Reds, Buff Orpingtons and one first cross—Leghorn-Buffs.

One might argue that if I had taken ten of my best birds and treated them exactly as the ten Wyandotte-Faverolles were treated the results would have been similar. I do not think so for one minute. I admit that they probably would have yielded better results in small flocks of ten each, but the disparity was so striking that the small-flock theory will not cover the whole of the facts.

I can only conclude then that by mating a White Wyandotte cockerel to Salmon Faverolles I happened upon some hidden fecundity in one or other (or both) of the breeds. The White

Wyandotte cockerel came from a deep-laying strain, but its immediate ancestors had never accomplished anything like so good a record as the offspring has done. Unfortunately with a single experiment one can point to no general principle for mating and breeding, but I am strongly inclined to believe that there are some first crosses which, for egg-production, transcend either of the pure breeds from which they are directly descended. I have studied the problem from various points and I can come to no other conclusion. In the case under discussion the fine results of the happy mating was an accident pure and simple.

I have, however, no intention to leave the problem in its present nebulous condition, and I am again mating the original Faverolles with a Wyandotte cockerel, and I am also mating the young first-cross pullets with a Wyandotte cockerel. In the first instance the offspring ought to be similar (if not exactly alike) to the first-cross birds whose record I have given. If they are I must continue the first cross in the hope that the results will be correspondingly successful. If they are not, one will have to blame the cockerel. Regarding the mating of the first-cross birds (Wyandotte-Faverolles) the offspring will be two parts Wyandotte to one part Faverolles, but it by no means follows that they will be equal to or an improvement on the birds I first bred.

As I did not anticipate anything unusual in the first instance I did not keep any of the Wyandotte-Faverolles cockerels. Even if I had done so it is doubtful if I would have mated them with their own sisters, but it is my intention next season to retain a few cockerels of the second generation and mate them with their nieces. This is not direct inbreeding, but even if it were so that would not disturb me. I am not a theorist, and while I respect the advice of the books I am more inclined to trust to practical experience. I am hopeful, therefore, that the present season's mating of pure Wyandotte with Wyandotte-Faverolles will be productive of good results. If it should be so I will go on without any further outcrossing and try to develop a variety which, if "only a cross," may be the sort of cross that will outlay the pure breeds. Probably the sequel will show that the offspring will

revert to type, in which case no harm will be done and it will be only one more experiment to prove that a cross of the second or third generation is unlikely to equal in results the pure breeds from which it springs. On the other hand—— But why speculate with so many of the factors unknown ?

FEATHERS FROM A BARRED ROCK HEN

CHAPTER XXXIII

PROFITS FROM POULTRY

ELSEWHERE I have given proofs of profits from egg-farming on a modest scale—profits which put ordinary business profits to the blush. Such results are readily admitted because they are on a small scale, but, argue the critics, what may pay well on a modest basis may not show anything like equal profits when carried out as a commercial undertaking. It may be so with some businesses, that they do not show the same ratio of profits as the business grows, but in poultry-farming I have yet to learn that there is any falling off as the industry increases. If it were possible, the profits from poultry increase proportionately as the business grows. One may, for instance, keep 100 or 300 fowls on an acre of land. The rent and fixed charges are approximately the same for the smaller number as for the larger. The only thing that does increase is the profit. Much the same holds with numbers running from 1000 to 3000 head of stock. Fixed charges are almost always the same, and the only differences are in cost of labour and, of course, feeding. But even the labour costs considerably less per head. It will take one man all his time to look after 1000 birds, but two men can attend easily enough on 3000, just as two men working together invariably do as much as three men working as units. Under the best modern management it is simply astonishing to see how many fowls can be worked satisfactorily by a small staff. Under the old system of wet feeding and small houses the labour on a large poultry farm was out of all proportion to its results. Hence the saying that poultry-farming did not pay.

Put into the concrete of pounds, shillings and pence, it required an expenditure of £4 per week to look after 1000 birds. To-day with large flocks in one house and dry-mash feeding the cost of

labour would work out approximately at 30s. per week for the same number of birds. Here is a huge profit in itself. One might as well use the old hand-loom for weaving as adopt small houses and wet feeding for commercial egg-farming. To succeed one must move with the times and accept with thankfulness all labour-saving devices. If one does not do so, if one will adopt the methods of a quarter of a century ago, it is not fair to blame failure on the poultry industry. Success at any game or in any business presupposes an acceptance of the most scientific (say the most profitable) methods.

One would imagine that the opening and shutting of doors was a matter of no importance, but it can be shown that on a large egg farm, say, with 5000 fowls on the old style, there would be some 500 doors and gates to open and shut several times per day. Five hundred doors multiplied by four would result, in the opening and shutting thereof, in no fewer than 2000 actions per day or 14,000 per week. And doors have a habit of being troublesome at times. The wood swells with the wet weather, they fail to fit or the lock goes wrong and there is all the bother of getting things right again.

On a modern egg farm of the same size there would be from 50 to 100 doors and gates—even the larger number reducing the work to one-fifth for this apparently trivial matter. And everything else is on the same scale of labour-saving. But indeed there are now no very large farms where the small housing system is adopted. It has been found unworkable, but it is still adhered to by the majority of moderate-sized poultry-keepers. The cleaning of the small house also multiplies labour indefinitely. It is practically as easy to scrape the dropping-boards where 100 birds have slept for the night as it is to clean the place where 20 fowls have roosted.

But dry-mash feeding, the greatest labour-saving contrivance of all, is still repudiated by the majority of poultry-keepers, the majority being small men for the most part. As soon as the stock runs into thousands dry mash must be instituted if the concern is to be run to advantage. I know of one egg farm where dry mash, large houses and all other labour-saving devices are adopted as a matter of course, and in this particular instance the

profits are enormous. When I showed the balance-sheet to experienced poultrymen of the old school they were sceptical about the truth of it, and rightly so, because such results as I am about to disclose are quite impossible on farms run on any other lines. I put the balance-sheet before a great expert, who is also a progressive egg-farmer using all modern methods, and he said at once that though the profits relatively exceeded his own they were no more than any intelligent farmer using the right methods had a right to expect. He also added that to do so well as my friend had done meant that he had not met with any real bad luck, because there is always a slight element of luck where live stock is kept. What he really meant was that the successful egg-farmer had not been visited by serious illness or epidemic.

Before going further I give the profit and loss account (see p. 270), which intending poultry-keepers should cut out and frame and keep before them as an ideal to which they may also aspire :

Excellent as is this balance-sheet, I can see a weak spot that if properly strengthened would have greatly increased the profits. It will be noticed that his 750 pullets only produced 698 eggs in November, or rather less than one apiece during the month. This, of course, was a miserable result, and it is quite easy to trace the cause.

The reason why he did so badly in November was because he did not hatch his pullets early enough. It will be observed that they were hatched in April, May and June. April, of course, is the right month to hatch Leghorns. May is just one month too late, and June is just two months too late. He does not tell us what proportion of pullets were hatched in April, but there is strong internal evidence that very few were hatched in that month, else we would have seen nearer 6000 than 600 eggs in November. Note that one month later—in December—he did get 5898, so that he virtually lost 5000 eggs in November by the late hatching of his birds. His figures for January were 10,831, but had he hatched at the proper time he would have got the figures in December, when eggs were at their record price. Not only so, but he would in all probability have got more eggs. I reckon that by failing to

get all his pullets hatched in April he lost some 5000 eggs, which would have brought him an additional £50.

Record of number of eggs laid by flock of 750 White Leghorn pullets, together with monthly price of eggs realised in London, wholesale. The amount allowed for feed is approximate, but fully covers all charges for feed, labour, fixed charges and railway carriage.

750 WHITE LEGHORN PULLETS

(Hatched during April, May and June 1915)

1915		Eggs Laid	Price per Dozen		£	s.	d.
			Wholesale				
			s.	d.			
November	.	698	2	9	8	0	6
December	.	5,393	3	2	71	10	2
1916							
January	.	10,831	2	5	108	19	10
February	.	13,078	1	9	95	5	9
March	.	16,384	1	6	102	7	6
April	.	16,974	1	3	88	8	1
May	.	15,216	1	6	95	2	0
June	.	13,064	1	9	95	4	0
July	.	12,901	1	11	103	0	5
August	.	10,790	2	3	101	2	3
September	.	7,066	2	8½	74	12	6
October	.	3,246	2	10	38	5	0
					£981	18	0
Cost of feed, labour, railway carriage, upkeep of houses and yards, etc.					468	15	0
Net profit on flock of 750 pullets					£513	3	0
<hr/>							
Average per bird, 167½ eggs							
Average per bird, realised in cash					£1	6	2
Cost of feed, labour, railway carriage on eggs, fixed charges, etc., per bird					12	6	
					<hr/>		
Profit per bird					13	8	

All the same the profits are far above the average. His average per bird—167½ eggs—for large flocks is exceptionally good, and has probably never been exceeded for large flocks. Anyone who can get within 20 eggs of this number—say twelve dozen per annum—is doing very well indeed and will not die in the work-

house. The net profit per bird of 13s. 8d. after the payment of all costs of feed, labour, carriage, etc., is considerably more than any text-book leads one to expect, which is perhaps a good thing, for text-books should err on the side of moderation if they err at all. I was taught that 6s. 8d. per annum per bird was as much as anyone had a right to expect. Well, here is a gentleman that doubles this sanguine estimate, and does it, too, on a fairly large scale. A backyarder with his dozen or half-dozen fowls, with his house scraps and no charge for rent and labour, might conceivably make 20s. profit per bird, but, of course, the two things are radically different. One is a commercial proposition ; the other a fireside hobby, so to speak. If one in the future fixes 13s. 8d. per bird as an ideal to be worked for he will not err on the side of modesty, even if he is well on the side of possibilities. Feed, labour, repairs, railway carriage, etc., works out at 12s. 6d. per bird per annum. It is a pity that the sums were not given in detail, because feed has nothing to do with labour and carriage, and it would be interesting to learn exactly the cost per bird for feeding. Presumably it could not have been less than 2d. per bird per week, which works out at 8s. 8d. per annum. If this were the case it would leave 3s. 10d. per bird for labour, repairs, railway carriage, etc., which seems ample. One man should manage to look after 750 birds all right, and at 2s. per bird this would allow of a payment of £75 per year for labour. With the addition of a boy 3000 birds could be attended to with a little extra help in the rearing season.

A careful analysis of the egg yield and cash yield will show that with 10,000 eggs in January he received £108, while with 16,000 in April his cash receipts were only £88. This little fact only emphasises the need to get pullets hatched at the right time and in full lay before the end of the year.

The highest prices were made in December, 1915, when the wholesale price was 3s. 2d. per dozen and the lowest price was in April, 1916, when 1s. 3d. was made. In my opinion the latter price was too low. At any rate I had no difficulty in getting 1s. 6d. wholesale at the same time, and a difference of 3d. per dozen on

17,000 eggs works out at about £17, 10s. extra for one month. These little things are all worth considering. The small farmer with a local market or a retail clientele could increase these prices considerably, but it does not pay the man dealing in thousands of dozens to occupy his time with small packages. The big man must get rid of his produce in a big way, even if he take a little less for it. In addition to all the eggs accounted for in the balance-sheet there were, of course, numerous others, broken, chipped, and too small to be marketable in the usual way, so that the results are even better than they are made to appear. But for all practicable purposes the balance-sheet is a model for all to follow—if they can.

It goes without saying that no balance-sheet equal to the above has ever been presented with other fowls than White Leghorns. The Leghorn is the fowl *par excellence* for the large-scale egg-farmer. It matures at six months and thus requires less capital than a heavy breed to bring to the productive stage. It requires rather less housing accommodation, being a smaller bird, and it probably eats a little less than a heavy breed. Other light breeds may be capable of making like records, but so far none have done so. The only possible challenger for supremacy is the White Wyandotte, that grand layer, though this bird never has produced an egg average of 167 per annum in very large flocks.

The Leghorn is, then, the bird for the egg-farmer, pure and simple, and while I may claim to be one myself, my sympathies are wide enough to include White Wyandottes, Rhode Island Reds and a few first crosses among my lot. If in consequence I lose a few shillings per annum, I gain not a little in return. There is more than gold to be got out of poultry-farming!

Let it not be overlooked that a vast experience is not necessary to achieve such results as are given above. Few industries are so essentially simple as egg-farming. All the elements of hatching, rearing, housing and feeding can be acquired by anyone of intelligence in a round of twelve months, and one is just as likely

to score a success during the first year as in any subsequent year. The success of the novice in poultry-farming is by no means uncommon. Granted the requisite knowledge, one has got to bring to bear on the problem plenty of sound common-sense, economical habits and, above all, unceasing vigilance.

CHAPTER XXXIV

ON TAKING PAINS

GENIUS has been described as “an infinite capacity for taking pains.” While the definition seems to me almost the reverse of the truth—genius acting always with that ease which the mastery of a subject gives—there is no doubt that “taking pains” is a good substitute for genius. In any business the man who takes pains to do everything correctly, immediately and in order, is the man who is likely to succeed, and in no industry I know of is the genius of taking pains more likely to be productive than in poultry-farming. Indeed the more I see of it the more I am convinced that it is the infinite number of little things that count.

If one does not take pains to perform the thousand and one small duties that fall to the lot of the poultry-keeper, success is likely to keep darkly in the background. One may succeed in poultry-farming in the heroic scale provided it is all organised to perfection, but that very organisation implies just that meticulous regard for taking pains that I have been insisting upon. Whether one takes up poultry merely as a pastime, or as a means of earning a livelihood, the same devotion must be shown to detail if one is to make it yield a profit. One may, of course, be prepared to pay for one's hobby, and if poultry are kept simply for amusement the question of profit and loss may be disregarded, but on the assumption that poultry are to yield a return on the labour employed and the capital invested, the very small things claim our attention.

As a matter of fact poultry-farming is made up of small things, and if one does not take infinite pains to do them, one had better not enter the business. After all, a grain of corn is a small thing—yet the seed of the world's bread supply ; an egg is a small thing—yet the foundation of the farmer's fortune ; a chicken is a small thing—yet the basis of a huge and ever-growing industry.

So where is one to begin taking pains ? Everywhere ! And when ? All day and every day ! Yes, the work of a poultry-keeper is exacting. It is not difficult in itself, and that is where so many come to grief. Because the general management of poultry is easily learned many assume that it can be perfunctorily performed. Nothing could be further from the truth. Every detail on a poultry farm is important. It may be well to remind readers that one is dealing with live stock which, though as a rule healthy and hardy if kept under proper conditions, are, like other live stock, subject to illnesses and epidemics when they are not attended with scrupulous care. A crack in the wall of the poultry-house may cause a cold that will lead to that most dreaded of all poultry diseases—diphtheric roup. If there is a split board that causes a draught get it closed up at once. Do not wait till night, when you are likely to forget it—but do it at once.

EPIDEMIC COLDS

A cold is easily contracted and its epidemic effect on a large house of poultry may be disastrous. The same with a leakage in the roof. Nothing is worse for the laying fowl than damp, and especially cold damp. See that the house is kept bone dry and it will repay you a hundredfold. I find that a good plan to prevent draughts and leakages is to cover the whole outside of the house—roof, back, front and sides—with tar-felting. Even at war prices it can be bought at 5s. per roll of 15 yards and is the cheapest necessity in connection with poultry. One coat of tar per annum will make it everlasting, while the additional protection it gives to the birds against cold and draughts will more than repay for the cost in one season. Remember that if the birds are warmly—that is, comfortably—housed they will need less food ; or, to put it in another way, the food which would be expended—wasted—in keeping up the heat supply will be utilised in producing eggs. Tar-felting, or rubberoid, as an outside covering to the poultry-house will yield a larger percentage on money spent than any other single item on a poultry farm.

Then there is the matter of cleanliness. If you can scrape out your dropping-boards every day, do so ; it will all help to keep the birds bright and healthy ; but if you can only spare the time to do it once a week you will be taking a little risk. Many of the biggest egg-farmers clean the dropping-boards twice a week and some on every alternate day. Obviously they require rather more attention in the hot summer months than in the winter. Regarding the spraying of houses with disinfectants, once a month, in April, May, June, July, August and September, is not too often. Once every two months in winter will usually be found ample, but one must always have one's eyes open for pests of any sort. I spray the houses with a solution of sheep dip. It is non-poisonous as far as the birds are concerned, and a splendid insecticide in other respects. Lice and fleas are comparatively easy to deal with, but the "red mite," as it is called sometimes, calls for stronger measures. The "mite" is white on the boards and perches, and red after it visits the bodies of the fowls and sucks the life-blood out of them. Hens can endure a good deal, but there is a limit to their resistance, and the red mite is the most noxious of the parasites. To deal effectively with the red mite paraffin or creosote are the best specifics. The red mite as a rule hides in the cracks of the wood or in any niche it can find a refuge. The ends of the perches are favourite hiding-places. There they lie in wait for the bird till it comes to roost, when they begin the attack, and the fowl, in the half-dazed condition that sleep brings, is a ready victim. Take great pains to prevent the appearance of the red mite, and if it should come take infinite pains to get rid of it. No hens can thrive, far less lay eggs, when a blood-sucking parasite is weakening it day by day. Watch and spray.

Take pains with your feeding. Make sure that the proper proportion of ingredients are present. Don't be content to throw in a few handfuls at random ; don't be persuaded to "chance it." Chance nothing. Let your work be thorough, almost scientifically correct. Either weigh out the food in its proper proportions or use a reliable measure. Then see that it is properly mixed. If it be wet mash the need for careful mixing is very great, especially

as to the moisture. Never serve it in a sloppy state, but see that it is crumbly, so that if you roll it into a ball it will break up if you drop it on the ground.

And see that the birds eat it up. If they do not, remove it, and give them a little less next time. If they eat it all quickly, try them with a little more, and you will soon arrive at the exact quantity. Feed soft food in troughs; do not throw it on the ground which the birds have been manuring. Never leave food lying about. Never waste food. Tons of good food are wasted every year because people will not take pains.

KEEP YOUR EYES OPEN

Watch your birds well. Run your eye over them every day when feeding and see that nothing is amiss. If a bird is off its feed something is wrong. See what it is, and if you are not sure, isolate it, and pay special attention to its food. It may need a tonic. If a bird is troubled with diarrhoea take it away and place it by itself until it recovers. If a hen is moping with its wings on the floor it is in serious trouble—perhaps egg-bound. If it be egg-bound, hold it over the steam of boiling water and try it on a specially soft nest. Keep it under observation until the passage is working smoothly. A little olive oil poured down the vent will often give relief. If it be discovered that the egg cushion has slipped down, give the bird a chance to recover without interference. If in two days the bird does not recover, kill it and eat it. Watch your birds. One killed in time may save nine, or ninety and nine.

Take infinite pains in incubating and rearing. Try and test your incubator for a couple of days before you consign the eggs to its depths. And once the eggs are in, watch the thermometer and the lamp with unceasing vigilance. A single hour may destroy your eggs and weeks of labour. Take infinite pains also with rearing. When your chicks are hatched take care they do not catch a chill while being transferred to the brooder. See that they get neither food nor water for forty-eight hours. See that the temperature is always right day and night. Visit them

the last thing before retiring and first thing in the morning. Every time you see one of them dead ask yourself whether it could have been avoided and if you are responsible for it. Chicks will die, no matter what you do, but it is safer to assume that they should all live. If you can hatch 100 per cent. take infinite pains to do so. I have seen a man state in print that he loses less than 5 per cent. between hatching and adult life. He may be telling the truth. Assume that he is and try to beat his record. Some day it will doubtless be done. Why not you ?

Take infinite pains to keep down your mortality. Every chicken saved is profit, every one that dies is loss. Do not think that one chicken more or less does not matter. Why, your whole flock is made up of single chickens. It is the unit that makes the flock. Watch your chickens and your eggs will take care of themselves. See that the drinking vessels are sweet and clean ; see that the water is replenished twice a day ; see that it does not get warmed by the sun ; see that it is kept in a cool place. See that the chickens get shade and shelter ; see that their food is just right ; see that green stuff is plentiful and that they get plenty of exercise. Take infinite pains with the little chicks and the profits will take care of themselves.

RATS AND CATS

Make sure that the small chickens are protected from dogs and cats and rats. Huge mortalities have frequently resulted from the birds being exposed to stray dogs and cats. One day I found a dog, a notorious chicken-killer, entering a house of 100 young birds. Had I been a few minutes later I would have lost the lot. Where there are wild dogs and cats there is always danger lurking round the corner. If the birds are wired in with a six-foot wire there will be no danger from dogs and very little from cats. If there are boards a foot high along the bottom of the wire, rats and stoats will also be kept in subjection. Do not neglect any precaution. Take pains to keep your stock intact.

Watch the markets. Keep your eye on the price of food-stuffs

and buy what you require with ready money. Credit, and especially long credit, means higher prices. If possible have two millers or corn-chandlers to deal with. One may have something cheaper than the other ; besides the knowledge that you have two strings to your bow will make them compete with each other. Unless you have rat-proof bins for storage, do not buy big stocks. A shilling per quarter saved on grain will not avail you long against the depredations of the rat.

Watch the market for sales. Do not send all your eggs to one buyer unless you are certain you are getting top prices. As a rule it is more profitable to sell your produce at the nearest town than to send it to a remote market. When eggs are scarce give your regular customers the first offer and do not insist on the highest price. It is better to get a penny per dozen extra when you have a hundred dozen per week than to get threepence extra when you have ten dozen per week. If you provide a slightly cheaper egg when prices are at the top your customers will remember you gratefully when the market price is low. Take pains to please your customers. A clean egg looks bigger than a dirty one, it sells better and it commands a higher price. Send out your eggs clean. One very small egg in a dozen looks ridiculous and does you no good. Take out the smallest and sell them for what they are worth. It is worth your while to remember this. Do not sell double-yolked or any abnormally large egg. It makes all the others look small when they are not. Keep the huge egg for domestic purposes.

EGG PRICES

If in the height of the season when eggs are plentiful you have some for which you cannot get a fair market price put them in water-glass. You will be glad you did it in the gloomy months of November and December. Good water-glass eggs will fetch twice as much in Christmas week as new-laid will fetch in April. If you can market your eggs direct to the consumer you will save the profit of the middleman. It means more work, but it also means larger returns. Take pains to get the best prices.

Take pains to get your chickens hatched in good time for winter laying. It is a fact that this fundamental rule for success is systematically neglected by nine poultry-farmers out of ten. Few egg-farmers get anything like a decent number of eggs in October, November and December, when prices are at the top. The reason is always the same—late hatching. If you do not hatch your pullets in good time you cannot expect them to lay. Light breeds need six to seven months to mature ; heavy breeds eight to nine months. Therefore all heavy breeds should be hatched in February and early March. All light breeds should be hatched in March or early April. Even then the light breeds in many instances will lay first. If you farm light and heavy breeds begin early in February, and do not raise a chick (for yourself) after the first week in May. Cross breeds for table purposes may be hatched at any season of the year, but the early months are the most profitable. Chickens grow better in February, March and April than in any other months of the year. Take pains to have them hatched in time.

EXCELSIOR HOUSE AND SHED (HEBDITCH)

'THE STANLEY' INTENSIVE OPEN FRONTED HOUSE (HEBDITCH)

CHAPTER XXXV

SCRATCHING-SHEDS

IF capital expenditure were not to be carefully considered the employment of large, dry, airy scratching-sheds should be multiplied almost indefinitely. There is perhaps no single aid to eggs of such importance as an ample scratching-shed, well littered with straw, peat moss, bracken or sawdust, to give the fowls plenty of work in picking up their daily food.

The scratching-shed may be of two kinds. Either the sleeping-house and scratching-shed should be one large house or there ought to be a sleeping-chamber with a scratching-shed attached. Most intensive and semi-intensive structures are composed of one building with perches behind where the fowls roost at night, with plenty of floor space and an open front where plenty of light and air are admitted. It matters little which of the methods are adopted, but if I cannot get two large houses I prefer the one building where the fowls have the whole of the cubic content of air to breathe during their sleep. Fifty fowls may sleep comfortably in a house 8 feet by 8 feet, but it is better if they can get the benefit of a larger house—say 16 feet by 12 feet—which is also used as a scratching-shed during the day.

If one were keeping birds as a hobby, irrespective of profit and loss, two large houses would be the ideal arrangement, but such a system could only apply to a few moneyed people and not to the men who hope to earn their living from poultry. For a good working plan the single house that gives each bird a minimum floor space of 4 feet is quite practicable, and not too expensive. Such a house ought not to cost more than about 5s. per bird—say £12, 10s. for the accommodation of 50 fowls. In pre-war times a house 12 feet by 12 feet would have been procurable at about £8 to £10, and it may be that after the war there will

be plenty of old military huts in the market at moderate figures.

There is, it seems to me, a splendid opportunity for the inventor of a very cheap scratching-shed, not to accommodate the birds at night but contiguous with the sleeping chamber. Supposing we assume that the fowls have a roosting-house and a separate scratching-shed, which, as I have said, is the ideal arrangement. Could we, for instance, get a sleeping-chamber 8 feet by 8 feet and a scratching-shed 12 feet by 12 feet for anything like the same money as one could get the combined house—say £12, 10s. ? It is obvious that a house 8 feet by 8 feet would cost two-thirds (or a little more) of a house 12 feet by 12 feet. Supposing, then, we assume that the sleeping-house costs £8, 5s., there is thus £4, 5s. left for a scratching-shed 12 feet by 12 feet. On the face of it the problem does not seem very hopeful, but I am not so sure that it cannot be done. Such a scratching-shed obviously could not be so substantial as the ordinary poultry-house wholly constructed of wood. I would therefore suggest that there is room for a new type of scratching-shed, one of which the skeleton only would be made of wood, with three sides and the roof composed of some weather-tight material. There are a number of materials that might be employed, but most of them are not a great deal cheaper than wood.

There are, however, two or three weather-proof fabrics that might be largely utilised in the building of cheap scratching-sheds. First of all there is canvas, which can be treated to keep out the weather. One objection to canvas is that it is cold, or rather that it does not keep out the cold. This is not an insuperable difficulty, because it is only during the day that the canvas-covered structure would be used by the birds. They would retire at night to the roosting-place made of stout wood. Now during the day the birds only require a shelter from rain and rough winds, and the canvas would afford all the protection needed from sudden storms. It seems to me that there is a possibility of properly waterproofed canvas being used for at least three sides and the roof of a scratching-shed, in which case there would be plenty of light without putting in a window. For small houses, including brooders,

canvas has been successfully employed, and there seems no reason to suppose that it would not do equally well on a larger structure. In the event of canvas being used for three sides and the roof, a coating of cement would improve and strengthen it. It might also be advisable to stretch a wide-mesh wire just inside the canvas, to keep the fowls from picking it.

In addition to canvas there are such fabrics as tar-felting and rubberoid. The latter is fairly expensive, but would probably work out at one-third the price of $\frac{3}{4}$ -inch matching. In the Colonies tar-felting is used a great deal in the manner I have suggested as a substitute for wood, and if it is found suitable in Canada and other places it ought to be equally suited for our more moderate climate. At any rate the experiment is well worth trying, and I think it will be found that by utilising waterproof canvas or tar-felting it will be possible to erect a scratching-shed 12 feet by 12 feet for from £4 to £5. In this event one would then have a roosting-house, 8 feet by 8 feet, made of $\frac{3}{4}$ -inch matching, to cost £4 to £5, and a scratching-shed, made of wood and canvas, 12 feet by 12 feet, at a cost of £4, 10s.—the two houses together being about £9. This would give greatly increased accommodation for scratching, which is so essential in egg-production. The invention of the scratching-shed has been largely responsible for the greatly increased supply of eggs of late years. The two things have grown together. A busy, active fowl is a sure egg-layer, and the way to cultivate activity is to provide a large, airy scratching shed plentifully supplied with litter in which the grain will be buried twice or three times a day.

KEEP THE BIRDS BUSY

Fowls love scratching when there is anything to scratch for, and even the recovery of a few grains of corn is an ample reward. By keeping your birds busy you are preventing the accumulation of fat, so dreaded by poultry-keepers, and at the same time urging the fowl into that fine hard fit condition that is essential to egg-laying. When people fully realise the importance of the scratching-

shed as an aid to egg-production it will be an indispensable adjunct to every poultry farm. Fowls are kept fit by scratching, and it is the fit bird that lays eggs ; therefore a scratching-shed is essential to a large supply of eggs. Fowls that do not scratch will never pay their way and should be scrapped at sight.

CHAPTER XXXVI

THE WHITE LEGHORN

“**T**HE best bird in the world,” was the verdict of a poultry-farmer who specialised in eggs. No doubt this burst of enthusiasm was caused as much by the favourable complexion of his balance-sheet as by anything else, for in poultry-farming as in any other industry one is influenced, consciously or unconsciously, by financial considerations, and in any event one must bow to the truth of the epigram that handsome is as handsome does.

Apart from monetary matters, the White Leghorn is an engaging fowl. The cockerel is a fine, bold, sprightly bird, full of beans and capable of holding his own anywhere. His huge red serrated comb, his dandified walk, his masterly strut, his upright carriage are all part of his native equipment. He also has the instincts of a gentleman and will seldom touch food till he sees his harem well under way. His tail, with great flowing sickles, curving like sprigs of ivory flowers, adds to the picturesqueness of his appearance. A noble bird, full of the joy of life, crowing like a conqueror at three months of age and a potential father at four months, he is one of Nature’s quickest growths from infancy to maturity. One can tell his sex often within a week of birth, generally at a fortnight and invariably at a month. He is the sort who does not hide his light under a bushel. He seems to know that he is a masterpiece of nature, and he at once assumes his lordship over all. A pretty fellow, too, he knows his powers of attraction as he sidles up with wing trailing on the ground to one of the other sex. He is one of the lower animals that makes love gallantly. Never far away from the flock, he calls to them when he finds anything worth eating—a tasty tit-bit—and nothing pleases him better than to stand in the midst of his harem while they do justice to the good

things he has found. I am afraid, too, he is a bit of a rogue, for he will sometimes call his flock, who troop round expectant of something good, to find "nothing doing" in the way of a meal. Amorous to a degree, he will often try to entice the early pullet into the nest to make her lay. Whence this instinct? He has never seen an egg and yet at the appointed time he will enter a nest and call to his mate, for he has usually a favourite, a sort of queen of the harem. I have seen him lead an expectant pullet round a haystack searching for a suitable spot to lay, and when she has gone to the nest he will hover in the vicinity as if in conscious pride of the daily miracle—an egg.

The White Leghorn pullet is frequently referred to as a wild creature. No doubt she is much less domestic than some birds, such as the Rhode Island Red, who will sit uninvited on your lap, but she is not "wild" in the sense that she is fierce or even untamable. She is easily made friends with, nor is she so shy with strangers as are, say, Orpingtons. There is a prevailing belief that a Leghorn will fly over high fences, get into neighbours' gardens, and generally play the deuce, if she does not actually run amok.

In this respect the Leghorn is much maligned. She can fly, of course, and at times she does fly like a pigeon, uttering a wild cry all the while, but such ongoings are only pretty Fanny's fretful ways. As a rule, she is a model of good behaviour. By way of experiment I placed a dozen in a house behind a three-foot wire fence and they never attempted to fly over to join other fowls. If by any chance they were startled and flew over the fence in fear, they were never happy till they were safely back again. I can give the White Leghorn an excellent character. She is docile without being servile; she is proud without being haughty; she is self-conscious without being an egoist.

Like the male bird, she also has her points of beauty. She carries a large undulating comb, and her keen, bright eye is ever on the alert. She has the most graceful, swan-like carriage of any fowl. Her body sways and swings like a ballet dancer, and with long, low back, and fan-like tail rising almost vertically, one could

not conceive a more graceful bird. She is small and neat, compact of body and all quality.

But it is the Leghorn pullet as an egg machine that makes her the friend of man. She is a fail-me-never. Some writers who ought to know better say she lays a small egg. Indeed! My Leghorns lay a large egg, and if others get a small egg all I have to say is that they should introduce a new male bird. It is the cockerel that transmits size-of-the-egg, and there are plenty of excellent strains to be got that will yield the large egg. I find that a Leghorn lays as large an egg—by which I mean as heavy an egg—as a Rhode Island Red or an Orpington. It lays a larger egg than does the White Wyandotte or any other utility bird worth mentioning. No doubt poor feeding might influence the size of the egg, but given the right strain of male bird and decent feeding the Leghorn egg will turn the scale against any of the prolific-laying hens of the day. In her second year her eggs are far above the ordinary size of marketed eggs. In quality they are as delicate in flavour and as rich in taste as any of the much-advertised tinted-egg layers. To my mind nothing is more appetising than a large White Leghorn egg. It looks clean and fresh and wholesome, a dainty fit to set before a king.

And as for prolificacy, what is there to compare with the Leghorn pullet? A few special strains of Wyandotte begin to challenge her supremacy, but only a few. For consistency the Leghorn is unique. She is the world's everlasting layer. Originally a Mediterranean bird, she now holds sway all the world over. In far Australia she sweeps everything before her in laying competitions as well as in private pens. In America she is the great commercial bird, the dollar-maker, the layer of the diurnal egg. In South Africa she is allotted pride of place, and indeed in all countries where fowls are cultivated the Leghorn as a layer reigns supreme. In England she is the bread-and-butter bird to the egg-farmer, and without her help he would find it difficult to exist. She is hardy, easy to hatch and easy to rear, a wonderful bird to mature. In five months, if you wish, she will begin her great laying act, and she will rarely disappoint during her career. Other

fowls need at least two more months to mature and you have to foot the food bill. The Leghorn is self-supporting at five months and she will remain profitable for at least two years. She will lay from 150 to 250 eggs during her pullet year, and taking her weight at four pounds, she will lay her own weight in eggs from six to eight times in one season.

As a winter layer she is unexcelled during her first year. One is told that the best winter layers are certain specified heavy breeds. I have tried them all but have not found any of them to equal, far less to beat, the Leghorn during the winter months of her first season. If she is hatched in early April she will, as a rule, begin to lay in October and will keep on all the winter and spring months, when eggs reach their highest price, with an unbroken consistency that few, if any, other birds can equal. One may get a few more eggs during one or two of the winter months from some of the specialised heavy breeds, but if we take the six months from October to March inclusive—the real winter months—the Leghorn brooks no rival.

As a winter layer, as a spring, winter and autumn layer, commend me to the tiny Leghorn, one of the smallest and most prolific of birds. She is the money-earner, the food-finder, the true farmers' friend.

Others can swear by Russian 'Orloffs, Sicilian Buttercups, Rhode Island Reds, White Wyandottes if they like. These are all fine birds, capable of great things, but great as they are, permit me to commend the Leghorn to the commercial egg-farmer who values a bank balance on the credit side. I have tried and tested them, and they have never been found wanting.

CHAPTER XXXVII

DEAD IN SHELL

OF recent years the growing percentage of chicks found dead in shell has reached alarming proportions. Many remedies have been suggested and, no doubt, some of them have to some extent palliated the evil, but so far no one seems to have got to the root of the matter. That the trouble is modern, that it is growing, admits of little doubt. There always were a certain small percentage of dead in shell, but it was so small as to be negligible. Now, however, the poultry-farmer if not thoroughly roused is most uneasy about the growing tendency of the chick to die before birth.

It is easy to see that if the trouble is not checked it will develop to such an extent that the rearing of chicks will become so difficult that all the profits will be swept away, and one can almost guess at a time—fortunately in the far distance—when by reason of this modern curse poultry-rearing will cease because of its unprofitableness. Fortunately that time is not yet, and long before it happens no doubt sufficient remedies will be found to keep the evil within bounds.

To discover the cause is, of course, the most important matter, for when that is assured it would be comparatively easy to suggest the remedy.

Because it is a comparatively modern malady some people have attributed the growth of the dead-in-shell trouble to artificial hatching, but this theory is disposed of when it is pointed out that the evil is almost, if not quite, as great with the natural mother on the nest. The incubator is not to blame for the rapid growth of the trouble. No remedy will ever get a full hatch—100 per cent.—without a few cases of the chick dying in embryo, nor do we expect

any such thing. Many of the mishaps are due to the lack of good management.

Unsuitable or misshapen eggs, chills, jars, long-distance traveling may all tend to increase the number of dead in shell, and so far as these are due to our mistakes we can provide against them. But the root of the matter is obviously much deeper than that. Bad weather, in so far as it is a contributory cause, is of course out of our reckoning. It is also suggested that dead in shell may be due to the birds being penned up, but while the penned-up bird may produce more dead in shell than the bird that is at liberty, the latter gives us far too high a proportion of death before birth, if one may be allowed an Irishism. Bad feeding may also swell the volume of pre-natal fatalities, but bad feeding was always more or less prevalent, and is not accountable for the alarming increase of dead in shell.

It is sometimes said that the free bird that builds its nest away from the flock and the eye of the farmer is frequently the most successful with her brood. If this could be proved one would have to seriously consider the question, but no statistics are available on the subject. One thing, however, may be said about the free bird with the wild nest. She is hatching her young under perfectly natural conditions out in the open, when the eggs get plenty of moisture from the atmosphere, and probably more cooling than they are likely to get in an incubator. They are never subjected to the intense dry heat of an incubator kept in a warm room, and they have much more chance of pure air than if kept under a hen in a shed.

I had an experience lately that seems to prove the necessity of fresh air. All my houses and sheds were full of broodies sitting on eggs, and I put a couple of them in a wash-house with a cement floor. Thirteen eggs were under each hen. The weather was particularly cold, and I kept the door shut most of the day and all night. In one case I got four live chickens and in the other three live birds—seven out of twenty-six. A large majority of the eggs contained dead chicks. Even on this one little experience I came to the conclusion that dead in shell must partly be caused by lack

of pure air and moisture. When the chicks are alive in the egg they need an extra supply of oxygen, and if this is not forthcoming they either die quickly or become so enfeebled that they fail to break through the shell and ultimately succumb. Now chickens can put up with a great many troubles and inconveniences, and indeed the way they surmount difficulties borders on the miraculous, but there is one thing they cannot do without, and that is fresh air. The chick in shell has only the minute pores of the shell through which to imbibe its oxygen, and if that is not supplied in abundance the little flicker of life inside will gradually be snuffed out.

Since writing the above I have come across some notes by Elizabeth Hepburne-Scott that fully confirm my suggestion that dead in shell may be to some extent increased by lack of oxygen. She says :

“The reason for ‘dead in shell’ is probably something so simple that we go beyond it in our endeavours to establish some great theory which, when gone into thoroughly, cannot possibly apply to every case.

“My own idea is that we want more oxygen both in the incubators and in the room where the eggs are being aired. Pure air, not used-up air, where thirty or forty lamps are burning, and where the oxygen is absorbed as fast as it enters by the ventilators.

“Come back to nature. The hen makes her nest out of doors, under hedgerows and bushes, out of the wind, but exposed to the fresh air.

“How often one hears wonderful stories of deserted nests and cold eggs many hours before another hen can be found to cover the eggs—result, twelve chicks out of thirteen eggs ; or thrilling stories of a friend who was miles from home when he had remembered he had left out the incubator drawer, and yet the result of his hatch was a record. Then one wonders why the careless often have such good luck. It may be that unconsciously the best thing was really taking place, and the embryo was receiving a greater proportion of fresh air than would have been the case had the printed regulations sent out with the incubator been followed.

"To make a practical suggestion, I would like to see an experiment carried out by those who have the money, and manager who could give his time to the work, of using pure oxygen from a cylinder every day in the incubator-room, preferably just before the eggs were taken out of the machines to be aired. The chicken at all stages would benefit, but it requires the pure air more than any other period on the nineteenth day, when most of the 'dead in shell' can be traced as being alive up to that time. It is a critical day; the head of the bird is turning, and the air cell must be filled with pure air for the lungs to imbibe and so give strength for the final effort of hatching.

"Temperature, moisture and ventilation all play their part in the life history of the embryo, but as oxygen is necessary to life, it is probably of first importance. It is not so much a matter of airing for a long time, but that the air itself is pure.

"If I have not already written too much, may I tell a story of my personal experience which may amuse some, but, at any rate, prove that I have had this question of 'dead in shell' under my observation for some years, although I have never been situated where I could carry out my theories for very long.

"While poultry-farming in South Africa I was much bothered with 'dead in shell,' and I suppose it got on my brain, for one night I dreamt I was in a market town in Cumberland and a woman was standing at the door of the market hall selling a small bradawl, and calling out: 'No more dead in shell; pierce the air-cell on the nineteenth day!' I was so much impressed by this dream that for two or three seasons I used to prick a hole in the eggs with a strong needle, and I was quite convinced that I had better hatching results than I had previously."

While I am disposed to believe that the increase of dead in shell may be partly owing to lack of pure air, I can only look upon it as a secondary or contributory cause of death, and it is probably not the primary reason for the increased pre-natal mortality that we all so much deplore.

Another suggested cause is bad fertilising—known as weak germs—and while bad fertilising may account for part of the

increase, one may ask what is the cause of bad fertilising ? It may be due to a variety of causes, but more especially because of bad mating, breeding from young pullets, or immature cockerels.

But there is, I think, another and a deeper reason for bad fertilising, and that is the great growth of inbreeding in modern times. During the last ten or fifteen years inbreeding in the most direct manner has become so common that nearly *all* the commoner breeds of fowls in England are more or less closely inter-related. We talk about infusing "new blood" into our stock, but where are we to get it ? Certainly not in England, excepting by some remote chance that cannot be foretold. We are all up to the neck as it were in Cam and Barron, Hunter and Collinson blood, and it is almost impossible to get away from it. Even if we send to America or Australia or South Africa or Holland for the male birds there is no guarantee that they are not inter-related to our stock, although the chances are that they will be far enough removed in relationship from our birds that no physical deterioration will take place. The increase of dead in shell is contemporaneous with the passion for inbreeding that has swept over England like a plague. I do not suggest that a certain amount of inbreeding is not necessary to get the high fecund strains, but I think the time has arrived when the warning signal has been hoisted and that we dare not continue the practice without let or hindrance for any appreciable time.

If my argument be correct—and I only put it forward as a suggestion—the weak-germ theory is only a half truth, the real truth being that the weak germs, which result in dead in shell, are caused by a certain physical deterioration which is the result of excessive inbreeding.

CHAPTER XXXVIII

THE BEST FIRST CROSS

MOST writers are ever warning the poultry-keepers against crossing. Properly understood, the advice is sound enough, but it ought to be known that certain first crosses—that is, the mating of two pure breeds—will yield excellent results. Of all light breeds, the Leghorn stands alone as a male bird for crossing. He transmits prolificacy—number of eggs—as well as size of eggs, and leaves shape and size of body to the hen to transmit to the offspring. He is a sure fertiliser and all his progeny are hardy. He takes readily to any other breed, but the mating result, so far as eggs are concerned, is better with the Wyandotte hen than with other varieties. This is a common experience, almost universal, and the results are amazingly consistent, often resulting in an increase in number of eggs, and, of course, a much better table bird.

Another experience of mine which I deal specially with elsewhere gives wonderful results from the mating of a Wyandotte cockerel with a Faverolles hen. The offspring of this combination yielded over fifty eggs per pullet before Christmas, a figure rarely found in pure-bred stock.

A rather extended experiment made by Mr F. Whitelocke deserves notice in the public interest. This poultry expert used only the White Leghorn as a male bird with various other varieties and gives us most interesting as well as useful results. "In travelling about the country," he remarks, "one often hears poultry-keepers and farmers say: 'Oh, you talk a lot about your pure breeds and such-like, but just give me that old barn-door hen for eggs; why, we can always depend upon her, she lays twice as many as the pure-bred 'uns.' Now, to a certain extent, this is true in countless instances. I am therefore going

MISS BURTON'S BARRED ROCKS (GOLD MEDAL) THAT LAID 1,157 EGGS IN TEN MONTHS—
HARPER-ADAMS COMPETITION, 1914—15

to demonstrate in this article the reason for these frequent statements.

"Some eighteen months ago I thought here was a great opportunity for an experiment to prove or disprove the value of the cross-bred hen, as there never was such an age for pure stock as now, and I have always been a keen advocate for keeping the breeds pure.

"I once told a farmer, who said that he intended running a Croad Langshan cockerel with his Leghorns, he was undoing in one minute what had taken fanciers a lifetime to perfect.

"Let us now see what was the result of six crosses.

"I mated up in February last year six separate pens for the purpose of egg-production, selecting the White Leghorn cockerel in each instance to sire the chicken :

Pen 1.—White Wyandottes;	Pen 4.—Black Minorcas;
Pen 2.—Light Sussex.	Pen 5.—Houdans;
Pen 3.—White Orpingtons.	Pen 6.—Croad Langshans;

All the eggs were placed in the incubator on 1st March, and four pullets selected from each cross in August, those most resembling the Leghorn in type.

"Now for the test. Pen 1, the Leghorn-Wyandotte, jumped off first by laying the first egg on 10th September, about five and a half months from date of hatching. Pen 2, the Light Sussex, next, on 25th September; pen 4, the Leghorn-Minorca, on 30th September; pen 5, the Leghorn-Houdan, on 13th October; pen 6, the Leghorn-Langshan, on 15th October; and pen 3, the Leghorn-Orpington, last, on 1st November, at seven months and eleven days old; thus the Leghorn-Wyandotte gained just fifty-two days' start in the race.

"There appeared to be something in the old folks' sayings after all, for none of these breeds lay sooner, or even as soon, as this when kept pure.

"The next question to settle was which stayed the course the best. Pen 1 (Leghorn-Wyandotte) are still running without a sign of a break; pen 5 (Leghorn-Houdan) slackened rein in

December and January ; pen 4 (Leghorn-Minorca) in January ; pens 3 and 6 (the Leghorn-Orpington and Leghorn-Langshan) in February and March ; and pen 2 (Leghorn-Sussex) in April and May.

“ The egg test was closed on 24th October this year, and was as follows :—

Pen 1.—Leghorn-Wyandottes, 928 eggs, average 232 each;

Pen 4.—Leghorn-Minorcas, 816 eggs, average 204 each.

Pen 5.—Leghorn-Houdans, 796 eggs, average 199 each.

Pen 2.—Leghorn-Sussex, 640 eggs, average 160 each.

Pen 3.—Leghorn-Orpingtons, 592 eggs, average 148 each.

Pen 6.—Leghorn-Langshan, 344 eggs, average 86 each.

Thus pens 1, 4 and 5 put up the best performance. This, then, was the result of the laying tests, which was the primary object.

“ The other points to be considered were appearances, health, broodiness, weight and quality of flesh of cockerels and winter productiveness.

“ Pen 1 (Leghorn-Wyandotte) turned out some very handsome racy-looking birds, fairly even in size, shape and type, but varied in colour ; in fact I could only pick four pure dead-white ones out of the lot. Most of them had a quantity of buff across the shoulders and head, one all buff, two black, and a few splashed with black on wing butts and back. All were wonderfully vigorous and healthy and rapid growers. None died, and I have since heard from those I sold the off-colours to that they are perfect egg machines. The cockerels averaged $2\frac{3}{4}$ lbs. at three months, which was the age they were all killed off. The flesh was poor quality. None of them went broody, and they laid well through the bad weather a fair-sized egg, larger than the pure 'Dotte, and tinted.

“ Pen 2 (Leghorn-Sussex).—These came out more even in colour and markings but very indifferent in type, all white-legged but two. I chose four as near Leghorn type as possible—that is, with fine heads and plenty of substance behind the legs. They were not so hardy as pen 1, but grew very rapidly. Two died ; three out of the four went broody. Cockerels averaged $3\frac{1}{4}$ lbs.

and were the best quality of flesh of the lot ; very little offal. They laid well in bad weather (a large tinted egg), but badly in late spring, partly owing to broodiness.

“Pen 3 (Leghorn-Orpington).—Several of these turned up pure buff, and one, a cockerel, a very fair type of buff Leghorn. They all favoured the Leghorn in type. I selected four whites with yellow legs ; they were slow to mature and went broody very early, and continued to do so about every five or six weeks throughout the summer ; laid a rather small brown egg. They were very hardy ; none died. Cockerels weighed 3 lbs. Altogether I was disappointed with this cross, after what I had heard in their favour.

“Pen 4 (Leghorn-Minorca).—Strange to say, all turned out dead white but two, and very even in type. All had blue legs and large combs and wattles. They laid well until bad weather in January, a very large white egg. Cockerels averaged $2\frac{1}{2}$ lbs. ; only second-rate flesh, having poor breast meat. They were very delicate as chickens ; four died.

“Pen 5 (Leghorn-Houdan).—This pen produced some very taking pullets, all pure whites but three. They were very quick to mature, and none died. Laid the largest egg (white), did badly in rough weather, but perfect egg machines in summer. Cockerels scaled the best of any, averaging 3 lbs. 6 oz. Very excellent flesh and little offal. I selected four white pullets with yellow legs and tufts, very smart and alert ; they looked layers all over, and were very much admired by everyone who saw them. I could have sold hundreds if I had had them ; in fact, I never saw a cross so taking and uniform as these ; they were just the type one would select for layers.

“Pen 6 (Leghorn-Langshan).—These were very varied in type and colour, not two alike, so I chose those most resembling the Leghorn type. They were poor layers ; stopped altogether in the spring ; only a fair-sized egg, and not two alike in colour or shape. Very slow to mature. Cockerels only weighed 3 lbs., neither was the flesh good. Nobody seemed to like them, neither did I.

"Now for summary. Pen 1 scored the most points for number of eggs, evenness of size and colour, and consistency in laying. Pen 4 came second in number and size of eggs. Pen 5 third for number and size of eggs; weight for weight I think they would have beaten No. 1, which won on numbers, tint and value by laying in the winter months. Pen 2 were not consistent layers, although they laid well when eggs were dear, which brought up their value and placed them fourth on the list. Pen 3 were fifth, partly owing to broodiness. Pen 6 came in sixth, and were a bad lot.

"The results of my experiment proved that there was very little to be gained by crossing and a lot to risk. The one great advantage was hardiness and low death rate amongst the chickens, which was remarkable as compared with pure stock, and this is what commends it to novices and farmers. As for myself, I shall stick to pure stock as before.

"I need hardly remark that the chickens were all reared in foster-mothers, and the laying tests carried out on the semi-intensive plan, in houses 3 feet by 4 feet by 4 feet high, with open run 8 feet by 4 feet on grass, and moved every week to fresh ground. No trap-nests were used. The four birds were judged together.

"They were fed on wet mash composed of half Sussex ground oats, quarter bran, quarter fish and meat meal, dried off with sharps, alternated each morning; oats midday, wheat evenings, and plenty of green and root foods all the time."

We are all indebted to Mr Whitelocke for giving us the results of his varied experiment, even if one cannot quite subscribe to his conclusions. Personally I should have been amply satisfied with the results of his first three pens of first crosses which yielded 232, 204 and 199 eggs per bird per annum. How many of those who advocate nothing but pure breeds could take a half-dozen birds at random and guarantee the figures given by Mr Whitelocke? Not many.

My experience leads me to expect much better results with the Leghorn-Orpington, especially if it be the Buff Orpington. It is rather strange, too, that in this mating most of the progeny

were buff-coloured, while in my case the offspring were without exception white, with a slight shading of buff on neck or head. I can confidently recommend the crossing of the Leghorn and Buff Orpington, provided the male bird comes of a deep laying strain.

CHAPTER XXXIX

HOW TO TELL HENS THAT ARE LAYING

THERE are several ways of telling whether fowls are laying, but the most obvious, and indeed the surest, is the comb of the bird. If the comb be bright red, fiery red if possible, and of a fair size, that bird is laying or on the eve of laying. If the comb be pale and shrunken the bird is unmistakably not laying. These two indications of the laying and non-laying hen are practically infallible, but one may occasionally see a bird lay with a small red undeveloped comb, and perhaps one may on rare occasions see a hen continue to lay after the comb has turned from bright red to pale red. I have occasionally found pullets in their first season begin to lay with small undeveloped combs, but in such instances the comb is always red, if not very red.

Speaking generally, any experienced poultryman with an eye can tell at a glance what proportion of birds in any given pen are laying, and even the novice will make very few mistakes in this connection. Another method is to feel the pelvic bones. If they are close together the bird obviously cannot lay, but if they are wide apart the chances are that the bird is laying, or at any rate it is capable of laying. Many investigations have been made from time to time on the external characters that indicate egg-production, and Professor D. B. Keats of Cornell University contributed a paper to *The Journal of American Investigation in Poultry Husbandry* which summarises excellently the various external signs that go with egg-laying. Among them I should like to emphasise the fact that birds of the yellow-legged variety that lose the colour and develop almost colourless shanks are always prolific layers. I have discovered this for myself, and I note that Miss Bell, the famous breeder of Leghorns, has also stated that no better indication of a heavy layer can be found than the fading

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of the yellow colour on the legs. Yet how often do we see ignorant (?) dealers advertising year-old Leghorns guaranteed to have bright yellow legs as if this were a quality to be desired. According to Professor Keats, the external characters that indicate egg-production may be classified into four groups, depending on the way in which they manifest themselves. These groups are : (1) moulting, (2) pigmentation, (3) condition, (4) actions.

A study of some of the various periodicals shows that at least as early as 1876 a woman contributor to *The Cultivator and Country Gentleman* recognised that late layers are late moulters, and that late moulters moult rapidly. This fact seems to have been re-discovered several times before Bulletin 258, "The Moulting of Fowls," was published. Until that bulletin was published it seems to have been the general practice to strongly advise against using the late moulters as breeders, even if they were late layers.

Some observations that were recently made gave a correlation of over .50 with a probable error of plus or minus .02. The relation held true, regardless of whether it was the first, second, third or fourth year of production. None of the birds that were more than half-way through their moult about 1st October were high producers, and only a few late moulters were low producers. The distinction should be clearly made, that birds moult late because they lay late, and not that birds lay late because they moult late.

It is sometimes asked if the hens that moult late do not begin to lay much later the following year, due to their suffering from the cold because of a lack of feathers. On the contrary, the late moulters moult rapidly and begin to lay as soon or sooner than the early moulters. The observations taken in 1915 would show that the medium moulters begin to lay slightly ahead of the late or early moulters.

It has been known for some time that during production the yellow pigment goes out of the shanks, beak, ear lobes, plumage and skin. The woman contributor before mentioned, in an interesting article in *The Cultivator and Country Gentleman* for 1879, writes as follows :—"Towards fall there comes a change over the

birds. Their plumage grows rusty, and the bright orange legs fade out as the season advances for the second moult. Especially is this true of persistent layers. Often and again have I been disappointed in my fine yellow-legged birds of early spring, for, as the season advances, and they pile the eggs up, the legs gradually bleach out until they become by August a pale flesh, or, as generally termed, white. The bloom is washed off, and, in a Leghorn, is almost a certain indication of a good layer.

"In Leghorns, either brown or white, the whitest ear-lobed bird is apt to possess the palest coloured legs. Often a pale lemon that fades to flesh colour. The deep orange tint will fade with egg-production."

The same idea has come out several times since, and probably it came out much earlier.

The first station publication that I have found that refers to shank colour is Circular 54 of the New York State Department of Agriculture, published in 1912. This gives the results of the findings of some observations carried on in 1910.

From the work done in 1915, there is a very slightly better correlation between colour of shank and egg-production than between moulting and egg-production.

Connecticut was the first station to point out the relation between ear-lobe colour and egg-production. This seems to be more valuable in indicating immediate past production, rather than yearly production.

A method of determining whether red ear-lobed birds are laying was found by Mr Lynch in a series of observations taken as a serious problem. The ear lobes and face of a heavy laying bird tend to be much paler than that of a non-laying bird. This is apparently not as accurate a method, or at least not as finely graded, as determining the yellow in white ear-lobed birds.

It should be borne in mind that in addition to egg-production the yellow pigmentation is very decidedly influenced by the degree of pigmentation in the bird, by vitality, by feed, and by range.

Orange-coloured shanks do not fade out nearly as fast as light lemon-coloured shanks. Some birds will have pale shanks by

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the time they have laid twenty-five eggs. Other birds will not have as pale shanks when they have laid over 150 eggs. Some strains of show birds have practically white ear lobes before the birds begin to lay. Weak or sick birds frequently have white ear lobes. Male birds fed on oats alone have wonderfully pure white ear lobes. Birds ranging on sand bleach their shanks.

Yellow pigmentation is of value in indicating egg-production where birds normally having yellow shanks and ear lobes are of good vitality, are fed yellow corn, or other food containing yellow pigment, and then have grass runs. If all these factors are not provided, all the birds may be white. Pigment appears to go from the different parts of the body in the following order :—first ear lobes, then beak, shanks and, finally, plumage.

The health of the bird as shown by the condition of the comb is a fair indication of egg-production. When the comb is full-sized, red, pliable and somewhat slippery, the bird is usually laying. The comb shrinks, becomes hard, light coloured and rough as the bird stops laying. A series of observations made last October between pliability of comb and egg-production gave a correlation of over $\cdot 03$ with a probable error, slightly greater than plus or minus $\cdot 02$. The pliability of the comb indicates whether the bird is laying at the time. Late laying, of course, tends to give high egg-production.

The smoothness, pliability and oiliness of the skin are also indications of egg-production. A laying bird has a softer, smoother feeling than a non-laying one.

The abdomen is a very good indication of egg-production. This character has been used as a basis for several systems of picking out the laying hens. It seems to have been known for a good many years, if not centuries, although it has only recently been used as a basis for some of these systems. A bird, due to the yolks developing in the ovary, and the increase in size of the oviduct, swells out its abdomen in preparation for a laying period. It makes little difference whether the distance between the pelvic arches, or from the keel-bone of the pelvic arches, or from the keel-bone to the base of the tail, are used as a basis of selection.

These parts are very closely correlated in size. After a bird has stopped laying, or as it gets ready to stop, the abdomen shrinks. The actual distance between these parts depends on the size of the bird, and the size of her egg, as well as the number of eggs about to be laid. The system is of value in telling what the bird may do for the next two or three weeks, or by knowing that the bird is laying at certain times of year, it indicates high or low production. It does not eliminate sick birds with distended abdomens.

It has been known for a long time, and reported occasionally in the poultry Press, that the heavy eaters are generally the best layers, or are at least laying heavily at the time. Also the birds that are last to roost and first to get up are usually laying heavily, or, as a contributor to *Farm Poultry* in 1905 remarks, the non-laying hens are usually found at the back of the perches in the places that get dark first.

In addition to the four groups given, the question of type and egg-production is always one of much discussion. As yet, as far as I can learn, there isn't any part of the bird that can be measured in inches, and this measurement correlated with egg-production. A bird that is laying has a full abdomen, but the same bird has a small abdomen when she has stopped laying. Some birds with large combs have made high records, and so have some with small combs. The same thing is true of size.

I do not for a minute contend that it is not possible to go into a large flock of pullets and pick out a small flock that will nearly all be good layers, and another that will be poor. This selection, however, is based on maturity, health and vigour. If a selection were based on type it would be possible to go into a flock of pullets and tell not merely which are medium, good or poor producers, but by seeing or measuring how closely they conform to a certain type, it would be possible to tell how good they are—that is, just how many eggs they are going to lay. As far as I know, this has never been done, and I do not believe it is any more possible than it is to accurately tell the production of a dairy cow when she is dry.

Some poultrymen assert that they can tell a good laying hen

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from its shape, but while a good, compact shape without any abnormalities may be best suited for laying, the fact is that hens of all shapes turn out to be excellent layers just as others of supposed "good shape" are poor layers. Shape is an absolutely unreliable guide.

CHAPTER XL

EGGS AND EXERCISE

THE quest for eggs takes a variety of forms. Undoubtedly, the first and most important matter is to secure a hen that is bred to lay. What do I precisely mean by a bred-to-lay hen? It is the production of fowls whose fore-parents through many successive generations have been selected primarily for the large number of eggs the female birds have laid. All the male birds must also have been the sons, grandsons and great-grandsons of very prolific mothers. A bred-to-lay hen must have a long and honourable ancestry in which both males and females have descended from deep laying progenitors.

The utility laying hen is now regarded by the commercial world as an egg machine. The machine once secured must then be treated by certain methods to secure its maximum output.

First of all it is necessary that it be created at the right time. When a fowl is running wild it does not lay eggs as a rule before March or April, this being the mating season for the majority of birds. The egg-farmer has to steal a march upon nature and by getting the bird bred in the very early months of the year it comes on to lay when six, seven or eight months old, according to breed. We thus get a matured bird early in October, and if it has been properly fed and snugly housed it will commence to lay at once and thus, as it were, give us eggs out of season.

The foods that the bird picks up out of doors, even on a free range, are as a rule not all that are necessary to produce eggs. No matter how suitable cereals and other vegetable foods may be for keeping the bird in health, it is needful if we wish to produce eggs in abundance to supply protein in the form of animal food. The protein will provide the stimulus as well as the material for

the building up of flesh and the building up of eggs. The food question is specially dealt with elsewhere.

Let us now assume that we have secured the laying machine and supplied it with the necessary material for turning out eggs. At least one other thing is necessary to secure the full results of our labours. The one thing needful is exercise. You must feed a hen well if you wish her to produce eggs, and if you feed her well without giving her exercise she will produce fat rather than eggs. There are two ways of eliminating fat in the egg machine. One is to go in for underfeeding, but this if anything is worse than overfeeding. The other method is to make the hen convert the surplus fat into energy, and this can only be done by giving her constant exercise.

A lazy hen means a fat hen, and a fat hen means a semi-sterile hen. How then are we to give her sufficient exercise to get her into that hard, firm condition which is a prelude to continuous egg-production? There are several methods, including automatic grain distributors which make the birds jump for every grain of food they eat. While this system may be suitable for small flocks, it is hardly practicable for poultry-farming on an extensive basis. The best and simplest method is to provide large, well-lighted scratching-sheds for your birds to work in a good many hours of the day. Always make them work for their food. One should divide their grain rations into two or three feeds. The floor of the scratching-shed should be well covered with litter of one sort or another. If not too expensive, the ideal litter would consist of granulated peat moss to a depth of about two inches, covered over with another three inches of straw. But any kind of dry litter is better than none at all. The cheapest is perhaps dried leaves, which may be gathered on any country road in the autumn, but such things as bracken, sawdust and shavings are quite suitable. Anything in which the grain can be buried will do to make the hens scratch for their food.

Exercise and activity are almost as necessary as food and breeding to achieve a high rate of egg-production. It is often noticeable that the best layers are the most active birds, but

whether they are most active because they are the best layers, or whether they are the best layers because they are the most active, is a problem that is not easy to solve. It is probably a matter of action and reaction. The egg is in effect the result of the hen's labour for the day. If she misses a day it is merely a slight pause in the creative act showing that she has not yet achieved the maximum effort of the ideal hen, which is to lay no less than 365 eggs per annum.

It is during the short days of the winter months like November and December that the hen should be kept busiest. I have already shown how to feed grain in order to make the bird work hard for it. More important, however, than the grain feed, which will not occupy the bird more than one hour out of twenty-four, is the necessity of making her work for her soft food. The old way, which is still prevalent with the majority of poultry-keepers, is to mix various feeding meals with water and serve it up as a moist, crumbly mixture. This style of feeding enables the hen to gulp down her day's supply of soft food in a few minutes. She has not to work for it. The food is placed in a trough and all she has to do is to eat to repletion. As a rule this is exactly what she does. Weary of waiting, and hungry for her one big meal of the day, there is a wild stampede to the feeding-trough, where the strongest may gorge, while the less pushful hens are often left with short rations. But the chief injury done is to leave the hens satiated, lazy and in poor condition to produce eggs.

If dry mash has done nothing else, it is justified by making the birds work hard for their food. The exercise gained stimulates the circulation, and bodily heat is secured and maintained by this means. It thus fulfils a double purpose. It keeps the hen in good condition and it maintains her in heat. No artificial stimulus in the form of spices or otherwise could effect the same beneficial results.

By feeding dry mash the hen is obliged to be continually running between the hopper containing the food and the water supply which is placed at as great a distance as possible from the hopper. In very bad weather when the hens are kept indoors it is a good

plan to have the dry-mash hopper on a raised platform at one end of the house and the water supply also on a raised platform at the other end of the house. In fine weather the dry food is kept inside and the water at some distance away outside. A hen can only eat a few mouthfuls of dry food without having recourse to water. By this means the fowls are kept running about for a considerable part of the day feeding and drinking. It has been pointed out by authorities not interested in any special style of feeding that birds that are fed on dry mash are closer in the feather, firmer to handle and in better condition than those fed on wet mashes. There is therefore a vital connection between eggs and exercise.

CHAPTER XLI

THE POULTRY INDUSTRY IN 1916

By Edward Brown, F.L.S.

AN indication of the importance of the poultry industry is afforded by the consumption values of eggs and poultry. These, in spite of reduced imports, were greater in 1916 than ever before, owing to enhancement of prices. Below is an estimate of wholesale values of these two products in 1913 (the last complete year prior to the war) and 1916 respectively. The actual cost to consumers would be at least 20 per cent. higher, bringing last year's values up to a total of more than £33,000,000 sterling, or with imported liquid eggs to £35,000,000.

CONSUMPTION VALUES OF EGGS AND POULTRY

		1913 £	1916 £	Variations £
British	. . .	9,000,000	14,400,000	5,400,000 increase
Irish	. . .	5,000,000	8,000,000	3,000,000 increase
Imported	. . .	10,545,000	5,377,000	5,168,000 decrease
Totals	. .	<u>£24,545,000</u>	<u>£27,777,000</u>	<u>£3,232,000 increase</u>

The average declared values are shown later.

During the first year of the war the trend upwards of values was important. Although there was a great reduction of imports, it was accompanied by a lessened consumption, and as the cost of feeding stuffs did not advance to the degree expected, prices were not unduly high. Within the last eighteen months a great change has taken place. High quality eggs and chickens have attained rates which either mean that many households entirely abstain from their use, or restrict consumption almost to the vanishing-point. Further, prices would have gone still higher but for the fact that householders, with few exceptions, would not

'YANKEE' SCRATCHING HOUSE AND SHED
(HEBDITCH)

'DREADNOUGHT' HOUSE FOR SIX FOWLS
(HEBDITCH)

MAHOGANY RUSSIAN ORLOFFS

pay more. In many cases eggs and poultry are now in the luxury class, which is not to the interest of poultry-keepers.

The causes are manifest—namely, (1) higher cost of production ; (2) reduction of home supplies, owing to depletion of poultry stocks ; (3) large demand for hospitals, forcing up prices by competition ; (4) great advance in shipping charges ; and (5) reduction of imports.

Of these the three last-named have had the greatest influence. The needs of our wounded heroes must be met. At the same time, there appears to have been want of organisation in buying. Instead of sending eggs from this country to France, the War Authorities should have obtained supplies from Italy. Had the Government dealt with shipping in the early days of war in the same way as railways, the inflation of rates would not have taken place to the same extent, equally in regard to feeding stuffs and other goods.

Reduction of imports is, however, the main factor, as seen in the statistics recorded below. Here are the facts, comparing 1916 with 1913, so far as volume is concerned :

WEIGHTS OF IMPORTED EGGS AND POULTRY

		Eggs Tons	Poultry Cwt.
1913		179,833	278,465
1916		55,053	137,382
Reduction	.	124,780	141,083

Thus we find that in 1913 sixty-three eggs per unit of population were imported, and in 1916 only nineteen ; or a decline in supplies of forty-four eggs per head in Britain, as practically all these are consumed in England, Scotland and Wales.

As a result of war a very important development has taken place—namely, importation of dried and liquid eggs, mainly from China. In 1913 none were recorded, although a limited amount of trade was done. Last year the declared values were no less than £1,393,141. Prior to the war these went chiefly to Germany. They are used by confectioners and pastrycooks. The dried eggs

are remarkably good, and I am assured contain no preservative. As to the liquid eggs, considerable quantities have been condemned and destroyed as unfit for food. The question of their use demands rigid inquiry, and, if what I hear is correct, the Board of Trade would be justified in considering the question of total prohibition of their importation.

Spite of the greater cost of feeding stuffs and materials for equipment, there can be no question that smaller poultry-keepers and farmers, where right methods are adopted, have reaped great advantages as a result of enhanced prices, by reason of the fact that only part of the food required has had to be purchased. Consequently the advance in expense of production, though considerable, has been abundantly compensated by increased returns, leaving a greater margin as profit. Much more might be done by both classes to meet home requirements. The chief difficulty of farmers is that of labour. The growing number of women workers in agriculture should, however, speedily do something to overcome this shortage, affording a wider field of service. All the needs of our people in eggs and poultry could be abundantly met if poultry occupied their proper place on our farms. The coming year should see an addition of twenty millions to the hens kept as breeding and laying stock.

From the outbreak of war the section of poultry husbandry most heavily hit has been that of specialists, some of whom have, however, during 1916, been able to record successful operations, which is satisfactory in the extreme. Breeders of pure-bred stock at the outset suffered severely, owing to suspension of exhibitions and to absence of demand. Such as are able to supply utility stock have more than recovered their position owing to the huge demand for birds, and the prices these have realised, in many cases 100 per cent. above pre-war rates. That condition of affairs is likely to continue to an increasing extent when Continental countries are again open. Cost of breeding and rearing has been higher, but the prices realised have fully compensated and are likely to continue.

Efforts to increase production have been put forward in many

directions, and with a fair amount of success. Among these are the breeding centres established as a result of action by the Board of Agriculture, and the offering of land for allotments and poultry runs, chiefly in urban districts, which are all to the good. In this direction there is abundant opportunity for extension, as there is much land partly used or unused which could thus be put to productive purposes. More important, however, is the removal of restrictions in rural districts, which have been imposed upon those who might have done much to increase native supplies, and by the experience thus gained have been of special service in these days. Unfortunately, County War Committees have done very little to assist up to the present time. These bodies seem to think nothing of moment smaller in size of body than are pigs. The new Ministry of Food should be able to exert a vast influence in bringing about a more satisfactory state of affairs.

The most notable step taken during the year under review was by the Great Eastern Railway Company, the first in Europe on the part of a corporation of that class. Following upon an exhaustive inquiry into the opportunities presenting themselves in East Anglia, a commencement was made by running an egg and poultry demonstration train throughout that great area. The success in point of interest awakened was very great, and it may be anticipated that a large increase of production will follow, and that other railways will adopt similar methods, using to the full every medium of connection between producer and consumer.

Limitation of hunting has led to a great increase in number of foxes and to greater losses by poultry-keepers. Even more serious is the check to development. Many farmers refuse to increase their flocks of poultry because of the risks involved. At a time like the present, when food production is of supreme importance, every hindrance should be removed. Drastic measures need to be taken to get rid of predatory vermin of this type.

It is satisfactory to record that during the year 1916 steps have been taken to bring about greater unity in the poultry industry, putting an end to its lack of organisation. These are not yet completed, but signs are hopeful that a partial, if not entire, unification

of forces will follow, which, if rightly used, should make for more rapid progress than hitherto. Further, some societies have been founded which promise to perform notable and valuable work, a healthy sign of progress.

So far as prospects are concerned, the signs are that the policy to be adopted is for all who possibly can do so to keep even a few fowls for supply of their household requirements, for specialists to hold on to the fullest extent, for breeders to hatch a largely increased number of birds for stock purposes, and for farmers of every grade to extend their operations two to four fold. Prices of eggs and poultry will assuredly continue high as compared with former times, and ere long we may hope to see a marked decline in the cost of feeding stuffs, even though not reaching the level of past years.

In dealing with the Trade and Navigation Returns for 1916 comparisons are for obvious reasons made with 1913. The following tables show figures for the two years :—

TOTAL IMPORTS OF EGGS AND POULTRY

		Quantities of Eggs No.	Values £
1913	. . .	2,589,594,000	9,590,602
1916	. . .	792,769,320	4,741,401
Total decrease		<u>1,796,824,680</u>	<u>£4,849,201</u>
Percentage decrease		69·03	50·56

		Quantities of Dead Poultry Cwt.	Values £
1913	. . .	278,465	954,540
1916	. . .	137,382	635,986
Total decrease .		<u>141,083</u>	<u>£318,554</u>
Percentage decrease		50·66	33·37

Advances in relative values are indicated by the differences in percentage decreases between quantities and values. The following tables give details as to sources of supply :—

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QUANTITIES AND PERCENTAGES OF EGGS IMPORTED

	1913		1916		Percentage of +Increase -Decrease
	Quantities Gt. hds.	Percentage of total quantities	Quantities Gt. hds.	Percentage of total quantities	
Russia . . .	11,543,277	53'07	734,525	11'12	- 93'62
Denmark . . .	4,264,943	19'76	1,392,061	21'05	- 67'59
Germany . . .	513,740	2'38	None	—	- 100'00
Netherlands . .	977,350	4'53	84,737	1'28	- 91'33
France . . .	702,281	3'25	None	—	- 100'00
Italy . . .	845,789	3'92	None	—	- 100'00
Austria-Hungary .	883,651	4'11	None	—	- 100'00
United States of America . . .	5,869	0'27	779,716	11'8	+ 13,185'33
Egypt . . .	1,096,539	5'08	1,889,947	28'66	+ 72'35
Canada . . .	957	0'003	1,431,778	21'66	+ 149,551'07
Other Countries .	835,554	3'87	293,647	4'43	64'85
Totals . . .	21,579,950	100'00	6,606,411	100'00	- 69'03

VALUES OF EGGS IMPORTED

	1913		1916		Percentage of increase per gt. hd.
	Totals £	Per gt. hd. s. d.	Totals £	Per gt. hd. s. d.	
Russia . . .	4,745,229	8 3½	423,949	11 6½	39'19
Denmark . . .	2,296,843	10 9½	1,303,177	18 8½	73'5
Germany . . .	215,816	8 4½	None	—	—
Netherlands . .	490,717	10 0½	83,067	19 7½	95'22
France . . .	326,102	9 3½	None	—	—
Italy . . .	420,914	9 11½	None	—	—
Austria-Hungary .	375,943	8 6	None	—	—
United States of America . . .	2,894	9 10½	591,202	15 2	53'91
Egypt . . .	356,627	6 6	974,656	10 3½	58'65
Canada . . .	957	9 9½	1,173,788	16 4½	67'1
Other Countries .	358,560	8 7	191,562	13 0½	51'94
Totals . . .	£9,590,602	8 10½	£4,741,401	14 4½	62'11

Reduction or cessation of imports from belligerent countries requires no explanation, nor yet the increases from Egypt and America. The figures referring to Denmark and the Netherlands reveal the fact that, considering difficulties and cost of transshipment, it is evident higher prices have been obtainable in Germany than compensated by the great advances on our markets. The

American supplies will doubtless cease when normal conditions return.

AVERAGE VALUE OF ALL IMPORTED EGGS

		Per gt. hd.				Per gt. hd.	
		s.	d.			s.	d.
1898	.	5	10	1910	.	7	11½
1900	.	6	5½	1913	.	8	10½
1902	.	6	7½	1915	.	11	11½
1906	.	7	6½	1916	.	14	4½

It will be seen that from 1898 to 1913, in pre-war periods, the advance in average values was 3s. 0½d. per 120, or 51·78 per cent. ; and from 1913 to 1916, 5s. 6d. per 120, or 62·11 per cent. ; from 1908 to 1916 the advance was 8s. 6½d. per 120, or 146·07 per cent.

As an indication of high prices obtained, especially for better quality eggs, the declared values in December, 1916, were : Danish, 28s. 3d. per 120 ; Dutch, 27s. 7½d. per 120 ; and all imports, 18s. 2d. per 120. In the same period Egyptian were only 14s. 1½d. per 120.

QUANTITIES AND PERCENTAGES OF DEAD POULTRY IMPORTED

	1918		1916		Percentage of Increase - Decrease
	Quantities Cwts.	Percentage of total quantities	Quantities Cwts.	Percentage of total quantities	
Russia	119,944	43·07	11,763	8·57	-90·19
France	31,175	11·19	7,443	5·42	-76·12
Austria-Hungary	26,674	9·58	None	—	-100·00
United States of America	54,242	19·48	52,595	38·28	-3·03
Other Countries	46,430	16·68	65,581	47·73	+41·24
Totals	278,465	100·00	137,382	100·00	-50·66
Less re-exports	9,916	—	5,728	—	—
Net	268,551	—	131,654	—	-50·97

VALUES OF DEAD POULTRY IMPORTED

	1918		1916		Percentage of increase per cwt.
	Totals £	Per cwt. s. d.	Totals £	Per cwt. s. d.	
Russia	344,655	57 3½	57,695	98 1	71·22
France	142,256	91 3	48,023	129 0½	41·41
Austria-Hungary	96,733	72 6½	—	—	—
United States of America	211,429	78 0½	262,023	99 7½	27·62
Other Countries	159,467	68 5½	268,245	81 9½	19·47
Totals	£954,540	68 7	£635,986	92 7½	34·99
Less re-exports	45,344	—	30,017	—	—
Net	£909,196	—	£605,969	—	—

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In the month of December poultry imports were only 7684 cwt., as against 88,059 cwt. in the same period of 1913, a decrease of 91·27 per cent. Values were respectively : December, 1913, 74s. 4d. per cwt. ; 1916, 134s. 11d. per cwt., an increase of 81·5 per cent.

THE EXPORTS OF POULTRY PRODUCE IN THE UNITED KINGDOM WERE—

			1918		1916	
			Quantities	Values	Quantities	Values
Alive, number	.	.	54,249	£27,820	4,004	£5,532
Dead, cwt.	.	.	2,270	10,805	986	4,892
Total	.	.	—	£38,625	—	£10,424

The declared values of live poultry have always appeared to be greatly understated, so that there is an improvement in that respect. In 1913 these were 10s. per bird; in 1916, 27s. 7d.

Before the war we preached continuously the need for largely enhanced home production. Great though that was at the period named, the above statistics prove that the importance has advanced a hundredfold, especially in anticipation of after-war conditions, when it is improbable that we shall ever see the imports of eggs and poultry attain their former levels.

CHAPTER XLII

POULTRY DIARY

January

THIS is one of the coldest months of the year, and one must see that the fowls are all comfortably housed and in good condition. Pullets will be mostly laying by this time and backward ones can be brought on by a special diet of green bone fresh from the butcher's. The older hens ought also to be well forward, and breeding-pens should be mated at once with second or third year birds. In the early days five hens to one cockerel should not be exceeded, especially as eggs are expensive at this period, and one wants every one of them fertilised. The male bird should be introduced to the pen about three weeks before the eggs are required for incubating, and it is well to feed him heavily for a week or two before mating up. A male bird should never be allowed to run loose with pullets.

All birds not absolutely needed for egg-production or breeding should be culled out and sold. Be sure that the house be as warm as possible and free from draughts. Feed plenty of good, wholesome food. If you feed dry mash, let the hopper be open all day, and feed not less than two ounces of sound grain per bird per day. If wet mash is fed, let the birds eat as much as they can pick up in, say, half-an-hour, but afterwards clear away anything remaining until the next meal. Vary the grain food by giving wheat, oats and barley or kibbled maize alternately.

Get your incubators ready and give them a trial run to see they are in working order. If there are any frost-bitten combs apply a little camphorated oil gently rubbed in. Be sure that you do not get your hatching eggs frozen by leaving them exposed too long.

February

Another cold month, often accompanied by snow. But eggs are now coming steadily and the heart of the farmer is made glad. Continue to feed plenty of good food and keep up the supply of grain as well as soft foods. Turnips and mangolds may be fed occasionally now, and the birds will appreciate the change, but make certain that the frost does not get near them. Never feed any frosted vegetable to fowls. Swedes are generally liked, and they are safe to feed after Christmas. Anything of this nature assists digestion, and while it helps to cheapen the feed it may increase the size of the egg. Ground meat meal or bone meal should form a fifth part of the diet.

The eggs from pens you have mated are now fertile and you can set them under a broody hen or place them in the incubator. Make sure they are of normal shape and size and not more than ten days old. Better still if they are all under a week old. Do not set more than ten or twelve eggs under a hen in this cold season. Heavy breeds only should be bred during the first two months of the year. Early February is the best time to start breeding for table poultry. The birds hatched about the last week in February grow wonderfully fast and well.

Thoroughly disinfect and clean out the incubator, making sure that the lamp is burning properly and that the wick is all right, for the season.

Any chickens hatched out in February should be allowed out on every available opportunity when not too cold, especially when the sun is shining, but care should be taken to prevent them getting wet. See that the grass on which they run is cut down close to the ground. A covered shed near them will afford protection in an emergency.

See that the male bird is sufficiently fed: some will not feed when hens are busy and in that event must be fed separately. He should get plenty of oats and a fair quantity of meat meal.

Leghorns and other light breeds should be mated about the

end of the month, as well as all cross breeds with a Leghorn cockerel.

Be sure your broody hens are free from insects. Even if none are visible sprinkle Biddy with an insecticide powder and feed her chiefly on whole maize.

March

The tide of eggs is steadily rising, and what are not required for breeding should, when fertile, be sold for incubating purposes. A big business is done in eggs for hatching and the price will vary from twice to six times the figure got for commercial eating eggs. March is a very busy month between looking after chickens, continuous hatching and the disposal of surplus eggs.

Fertile eggs that go by post or rail require very careful packing. Special boxes may be bought for that purpose, and great care should be taken to see that the eggs are packed tight so that the contents will not be unduly shaken.

If the weather is mild let the chicks out of doors as much as possible, but never go away and leave them. A sudden storm of hail or snow might lose you the lot. Even a heavy rain-storm will kill young chickens. All your incubators should now be going in full blast and light breeds should be hatched from now onwards to the end of April. Be it remembered that it is now or never with the hatching of heavy breeds. Better also to be a fortnight too early than a week too late with light breeds. Time steals away like a thief in the night, you can never catch it up again. Do not coddle the chicks; it is wonderful how they can thrive in dry, cold weather, but do not allow them to get wet.

April

The last chance for breeding to advantage. Chicks bred after April will not lay during the late autumn months up to Christmas when eggs are most wanted and fetch the highest price. Nor do they grow so well. A May chick is a gamble with the odds against

APEX FIELD HOUSE

AMATEUR'S DOUBLE-DECKER FOWL HOUSE

the bird proving profitable. Owing to the Jewish festival taking place during this month there is a big demand for fat birds, and as prices rule high any of the unprofitable sort should be cleared out.

Keep a watch on the chickens for parasitic pests, and don't forget to spray your poultry-houses with a strong disinfectant. I have found nothing better or cheaper than a weak solution of sheep dip—about a pint of dip to a pailful of water.

You will now be able to separate some of the cockerels from the pullets, and these should be got ready for the market as soon as possible. With the birds being allowed their liberty and plenty of insect life about less fish meal or meat meal need be added to their soft food. They ought to pick up about one-fifth of their food and a little less grain will suffice. Hens that are laying heavily, however, should not be stinted. There is a big demand for day-old chicks during April.

May

Many people hatch in May, and if any accident has prevented you getting a full stock before this month, get your eggs down at once, on the principle that it is better late than never. Only light breeds are likely to pay if hatched during this month, but cross breeds may be hatched for table purposes. Very few if any farmers can make table poultry pay, and unless you have special qualifications better leave it alone. Make eggs your speciality.

Many heavy breeds will now be going broody. Watch them closely and deal with them at once. If allowed to sit a few days they are difficult to break off. See that the bottom of your broody coop is made uncomfortable, so that sitting will become a burden to the birds. The bottom may either be made of wire or strips of wood, through which the cold air will circulate to cool their fevered blood. Raise the coop on bricks a few inches from the ground, and place it in full view of the hens that are at liberty. Feed sparingly, but do not starve, else the birds will take long to get into laying condition again.

Once more sort out cockerels, and those you do not intend to keep for breeding purposes dispose of as soon as possible. As a rule people keep surplus cockerels far too long. Another Jewish festival will enable you to get rid of more of your fat birds. May is a month for growth, and see that your young chicks get all the food they can eat.

June

Shade will be required for chickens young and old in flaming June. If you have no trees, shrubs or natural shelter you must erect some. Four wooden posts held together by light framing about $2\frac{1}{2}$ feet high, with canvas stretched across, is as cheap a shade as anything. It will be more effective if you also cover one of the sides and move the shelter round with the sun. Hurdles will make a shade that is better than nothing.

Keep the drinking-water out of the sun, and give it fresh at least three times a day. Allow your birds out in the open as soon as they come down from the roost, for on hot days the morning is the best time for man and beast. Do not feed anything in the middle of the day in very hot weather.

The poultry-houses may be lime-washed or painted over with creosote to kill the insects. Look out for red mite in all the crevices of the wood. Creosote will deal them a death-blow. During all the very warm weather do all you can to assist your birds to keep cool.

It will now be possible to pick out all your Leghorn cockerels from the young pullets as well as many of the heavy breeds. Do not keep unwanted cockerels, as they will soon eat away the profits.

July

Still hot, and necessary to keep all the drinking-water in a shady place. With birds laying heavily they drink enormous quantities of water, and see that they are never a moment without it. Better stint them in food than in water at this time. The more water

they drink the more eggs they will lay, and you should rejoice every time you have to fill the water trough.

Feed fairly generously, so that the birds will not slack in the egg supply or begin to moult too early. Eggs are beginning to mount in price and it is essential you should get plenty for the market. With proper handling few birds should begin to moult just yet.

Keep a watch on your young stock, and keep putting food into them, but do not make it stimulating. Some of the birds—a small minority—may be backward, and these should be separated from the quick growers and specially catered for. In a month you will be able to tell which of them are to be any good. All the others get rid of, even if you have to give them away.

It is now a suitable time for doing odd jobs in the way of painting or repairs. A nail in time saves nine.

August

The young birds are now growing big and some are getting into the adult stage. If your early light breeds are getting too forward and their combs begin to redden, keep them on hard food for a time. You do not want any pullets to lay before the end of September. If you have any backward ones separate them and feed generously with a proportion of animal food. Nothing is better than ground green bone if you can get it fresh, but if not, better use meat meal or fish meal.

The moult will now be overtaking the laying hens and without doing anything drastic it will be well to feed them sparingly on hard grain only for, say, three days, when the feathers should begin to fall. A bird moults much better in the mild months than later on when it is cold. Once the moult is in full flood begin to feed well again, and after a week or so give them all they can pick up. You will now get a plentiful supply of feathers and a shorter supply of eggs, but if the birds have laid well you will not grudge them their well-earned rest.

All stock cockerels should now be in the cockerel pens and the

others should be disposed of. Do not keep one more than your needs demand.

September

Get all your young pullets into the laying-houses where they are to start their autumn work. Aim to get the bulk of them going at the end of the month or a little later. Eggs are now scarce and dear, and when pullets get a good start it is wonderful how consistent they are. Birds that have not been forced unduly should with slight pauses continue to lay all the winter and spring months. It is a pretty and heartening sight to see all the heads of the pullets showing the red flag which they hoist when laying. It is too early (nor is it desirable) to get many pullets' eggs this month, but it is encouraging to see them make a start. To know that the birds are matured and ready for the great reproductive drama is about as much as one requires in September. Give the pullets plenty of animal food.

The older birds are still undergoing the moult and laying fewer and fewer eggs. The pullet and the hen should always be made to slightly overlap the laying season so that the supply of eggs will be continuous. Happy the man who is successful in keeping up the supply.

Don't forget to spray your houses monthly up till September, and watch the red mite.

October

A dull month if your pullets are backward—a great month if they have got into the swing of laying. This is the month to crow over your neighbour if your pullets are laying and his are not. The price of eggs is rising steadily and from now till Christmas the man who has eggs to sell will make money. It is now you will regret that you delayed hatching a fortnight too long. A fortnight lost at the beginning of the season means a month late at the other and most profitable end.

Nights and mornings are colder, and it will be advisable to see that all the houses are weather-proof. Damp and draughts are

the greatest enemies to the laying bird. Dry cold does not matter. Keep your houses and your litter bone dry, and feed all birds, old and young, without stint. No insect life excepting a few stray earwigs is available now, and this must be made up in the form of animal food.

November

A dull, dark month outwardly, but a joyful one to the farmer who hears his pullets cackle in joy as they lay their diurnal egg. A terrible month to the man who has hatched late, is getting no eggs and has to pay out a heavy weekly food bill. It is the time to make pious resolutions about early hatching next season. A few of the older hens may be beginning to lay again, but as a rule do not expect eggs from the old hens this month.

The cold may be intense and the scratching-shed must be kept free from draughts, while maize should be fed every other day in place of wheat. Oats are also a fine feed for cold weather.

December

Something will be far wrong if you are not getting pullets' eggs now. Most of them should be approaching full lay and the egg basket should be fuller and fuller day by day. Eggs are now fetching fancy prices—three times as much as in April. What a harvest for the clever egg-farmer who has most of his stock in lay. Plenty of meat meal should be added to the mash, and maize meal will also contribute to the perfect dietary. Give the birds their biggest feed at night when they may be sixteen hours on the perch. Keep them all cosy, and see that all the cracks and openings in the boards are filled up and made draught-proof. If you do your part and house them suitably the birds will keep themselves warm enough. Do not allow them out of doors in bitterly cold winds or wet, but a fine frosty day will delight them. If all has gone well you and your poultry will have a happy Christmas and a prosperous New Year.

CHAPTER XLIII

TECHNICAL TERMS

BARRED.—Light and dark shades alternating on the feathers.

BEARD.—The cluster of hair-like feathers surrounding the throat of breeds such as Houdans and Faverolles.

BROODY.—To sit about quietly as if covering eggs, thus evincing a desire to incubate.

CHICK.—A young chicken still in the egg or newly hatched ; used till about six weeks old.

CHICKEN.—Generally applied to fowl of any age, but properly applicable up to the age of twelve months only.

COCKEREL.—A male bird less than a year old.

COMB.—The fleshy excrescence on the top of a fowl's head.

CREST.—A tuft of feathers on the head.

CROP.—The pouch-like receptacle (an enlargement of the gullet) in which the food undergoes maceration.

CROSS-BRED.—Produce of two breeds mated together.

CUSHION.—The mass of feathers over the rump of a hen.

EAR LOBES.—The folds of skin hanging below the true ears.

FACE.—The skin round the eyes.

FLIGHTS.—The primary feathers or principal quills of the wing.

FURNISHED.—Applied to a cockerel having full adult plumage.

GILLS.—The flesh under or about the beak of a fowl.

HACKLES.—Long, narrow feathers on the neck. Similar feathers on the saddle are known as "saddle hackles."

HEN-FEATHERED.—Applied to male bird having plumage resembling a hen's, sickles and hackles being absent.

HOCK.—The tarsal joint ; the "knee" joint.

KEEL.—The ridge of the breast-bone.

KNOCK-KNEED.—Having the hocks too near together.

- LEADER.**—The point or projection at the back of the “rose” type of comb.
- LEG.**—(1) The shank of the live bird ; (2) the thigh of a bird trussed for table.
- MEALINESS.**—Applied to buff-coloured birds when the plumage is flecked with white and not evenly tinted.
- MONGREL.**—Various breeds so intermixed that ancestry cannot be stated.
- PEA COMB.**—A type of comb resembling three crests side by side, the highest being in the middle.
- PENCILLING.**—Small straight or curved markings on the feathers.
- PRIMARIES.**—The flight feathers, or quills, of the first joint of the wing.
- PULLET.**—A young hen ; properly applied to birds less than a year old.
- ROACH-BACKED.**—Having the back arched.
- ROOSTER.**—Term for a cock.
- ROSE COMB.**—A broad comb, having a flattened top covered with small points, and ending in a spike or “leader” at the back.
- SADDLE.**—The hindmost part of the back, extending to the tail in the male bird.
- SAPPY.**—Applied to a bird having the “sap” in the feathers visible on the surface of its plumage.
- SECONDARIES.**—The quills of the second joint of the wing.
- SELF-COLOURED.**—Having the plumage of an unvarying shade.
- SHAFT.**—The mid-rib of a feather.
- SHANK.**—The part of the leg between the hock and the digits.
- SICKLES.**—The long curved feathers of a cock’s tail, especially the middle or upper pair.
- SINGLE COMB.**—A narrow red fleshy growth that rises straight up on the top of the head. Usually finishes in serrated points.
- SPANGLED.**—Having on each feather a spot or patch of different colour from the ground colour.
- SPUR.**—The spine (a horny modification of the skin attached to a bony core) on a cock’s leg.

SQUIRREL-TAILED.—Having the tail carried too far forward in a curve over the back.

STAG.—A cockerel (game).

TAIL COVERTS.—The feathers which cover the bases of the tail quills.

TAIL FEATHERS.—The straight, stiff feathers within the sickles and tail coverts.

THIGH.—The part of the leg between the hock and the body.

THUMB-MARKED.—Having a depression or indentation on the side of the comb.

WATTLES.—The fleshy red processes of the skin below the beak.

WEB.—(1) The flat expanded part of a feather, formed by the barbs on either side of the shaft. (2) The membrane uniting the toes.

WING BAR.—A marking of the lower wing coverts, extending across the middle of the wing.

WING BAY.—The part of the wing between the bar and the point.

WING BOW.—The upper or shoulder of the wing.

WING BUTTS.—The ends of the wing.

WING COVERTS.—The feathers which cover the bases of secondary quills.

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