PROFITABLE POULTRY-KEEPING

WITH ORIGINAL ILLUSTRATIONS

PROFITABLE POULTRY KEEPING

BY

STEPHEN BEALE

EDITED WITH ADDITIONS BY

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AND

A CHAPTER ON AMERICAN INCUBATORS

By H. S. BABCOCK

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INTRODUCTION.

I ESTEEM it a privilege and a pleasure to introduce this excellent hand-book to all who are practically interested in keeping poultry. I would say to the veriest tyro, provided he had a modicum of common sense : " Here, take this book of Stephen Beale's, study it carefully in whatever it is applicable to your needs, and follow it. You will find it a safe guide, and you will almost surely come out well with your poultry the first year." Any old poultry-keeper may study it with profit, and if he finds some few passages to criticise, and opinions advanced with which he does not agree, let him consider that no two parts of the country are subject to the same conditions of soil, climate and surroundings.

English current literature is far richer than ours in the results of experience in poultry matters, and the systems in vogue there and in France among the most successful poultry raisers are very much superior to general practice in this country, so that Mr. Beale's obvious familiarity with the best practice in those countries, in connection with his own large experience, is a very great advantage to the book.

The author shows himself upon every page to be a practical man, fertile in expedients, gifted with rare common sense, with a knowledge of his subject in matters of useful and essential detail, and one can readily pardon a little verboseness of style and occasional repetitions. It is a business book, and as such it should be regarded. It was not written for fanciers, though no poultry book (and these are, gener-

ally, primarily fanciers' books) gives better instruction in regard to the successful rearing of fancy poultry. Yet, giving well-bred poultry of all kinds their true value, it is replete with instruction how to make the most money, or at least the most *profit*, by their use.

The public is familiar with the advantages derived from the employment of thorough-bred and pure-bred males in the breeding of all other kinds of domestic animals. We all know how that, with sheep and swine especially, grades and cross breeds of the first generation are much more profitable to rear for their useful qualities than full bloods are, for the reason that in such a first cross those high qualities which have become fixed by a long course of breeding and selection assert themselves with peculiar force. It seems as if poultry raisers had been peculiarly negligent of or blind to this natural law, and had neglected to practise that which in the rearing of other kinds of farm stock they consider of vital importance.

The chapter on "Cross-bred Poultry" puts this subject in a very clear light, but hardly dwells sufficiently, to my notion, on the fact that where it is difficult to obtain pure-bred poultry of different breeds, such as one desires to cross, grades may be reared in two or three years by crossing a pure male bird of the wished-for breed upon, first, a good flock of common females, the next year (changing the male) upon the pullets of the first year, and so on. By the time the second or third cross is made the grade birds will possess almost fully the useful qualities of the breed from which the cross is taken, and the hens may be used just as if they were pure in crossing with a cock of a different breed for market poultry or for layers, as Mr. Beale directs.

Poultry keeping for profit is the laudable ambition of the great majority of poultry keepers, and poultry are really kept to the profit of their owners, in the great majority of cases. Little account is made of them, and no account is kept of their expenses or of the income derived from them, and yet it is the settled conviction of the frugal housewife, who looks more or less after the poultry, and of the farmer, who sees how large a part of the store bill is settled by eggs; and who brings home from market or from the shipper who buys his dressed poultry at Christmas-time a satisfactory roll of bank-notes, that poultry is really a paying farm crop.

Then, too, when a regular debit and credit account is kept with the poultry, and a fair allowance is made for labor and interest, the profit always shows up to be something enormous—often one hundred per cent., or even more.

If there really is so much profit in poultry keeping, is it not strange that when undertaken on a large scale it is always a losing business? Few people consider that farm-yard fowls of all kinds, ducks and geese included, get a great part of their living, and in some parts of the year the whole of it, from what would otherwise be lost or wasted, and from insects, snails and worms, which are a positive harm to growing crops. Hence the conclusion is a just one that poultry, if well managed, are really most profitable as an adjunct to other farm and garden operations, especially as but little time is generally devoted to their care which would be more usefully employed.

This amount of, so to speak, wasted food is limited, and when fowls or other poultry are multiplied upon a single farm or circumscribed area, their care soon becomes sufficient to

require the entire attention of one or more persons. Thus the point is soon reached when it will be easy to see there is no hundred per cent. profit in the business.

Parallel cases are numerous. Twenty or thirty hives of bees may use all the bee-pasturage within the radius of the usual flight of the honey-gatherers, and, where this is the fact, the addition of a dozen hives would result in more labor to the bee-keeper and in the harvesting of a good deal less honey.

Thus it is every poultry keeper's province to study carefully his own resources and make the most of them ; and while Mr. Beale has carefully avoided advising the keeping of poultry on a large scale, and in fact discourages it, the person desirous of making the experiment will find the book replete with sound views and practical hints in regard to its successful accomplishment.

Mr. Beale can hardly be as familiar as I am with the wretched manner in which a great part of our poultry is sent to market, and the shocking condition in which it arrives. New York receives thousands of tons of poultry which must be closed out in wholesale lots at ruinously low prices, and which is then sold at a small advance at retail, to secure a quick sale and prevent total loss. If a reform could be instituted by which the common farmers of the interior and Western States would properly fatten, pluck, dress, and ship their poultry, somewhat after the system advised in this book, it would add almost inconceivably to the profits of poultry keeping to these people as well as to the general wealth of the country. I sincerely hope that this may be one of the results of its publication.

MASON C. WELD.

Closter, N. J., *March*, 1884.

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CHAPTER I.

GENERAL CONSIDERATIONS.

The Poultry Mania—Cochins Forty Years ago—Poultry Keeping often a Hobby—Recent increase of interest in Poultry Keeping—Farmers and Poultry—Farms in France—Consumption of Eggs—Prices of Eggs—Value of Fresh Eggs—Poultry in Paris.

THERE is an old adage, and one the truth of which is proved in our experiences almost every day, that "there is nothing new under the sun," and probably many of those who can remember the poultry mania of forty years ago, may have been led to think that the undoubted revival of interest in poultry which has taken place within the last few years, is simply a repetition of that mania. Then, as now, poultry sold for fabulous prices, and it was no uncommon thing to hear of a bird having realised $200, or a setting of eggs $25; and the fact that during recent years $500 has several times been paid for game cocks, and $250 for bantams, would at first sight appear to warrant such a conclusion as we have named. But on considering the matter a little further, we find a marked difference in every respect, save only the large prices paid for specimens. The mania of

forty years ago was almost entirely relating to one breed —the Cochin—whereas now all varieties of poultry receive a share of attention, although there are some greater favourites and more valuable than others. Then, the general belief was that the fowls named—which, by the way, were new, and had only recently been imported from China—were the greatest layers and best table fowls ever known, that their importation was of national importance, and that to obtain possession of some of these birds would be a sure road to wealth. How this delusion arose—for delusion it undoubtedly was, the Cochin then and now being the least profitable of all our breeds of domestic poultry—it is not our province here to inquire, except to say that we believe it was, like almost every other mania, due to designing men, who largely profited by it. At the present day, poultry fanciers, *i.e.*, those who go in for poultry breeding as a hobby, without caring much for the economic qualities of the birds, and who are the persons that pay such high prices for first class specimens, make no claim to be regarded as public benefactors, and neither deceive themselves nor any one else by posing in such a manner. They say plainly that they keep poultry as a hobby; it ministers to their pleasure when striving after an ideal standard, which may or may not improve the birds so far as their profitable qualities are concerned, but for that they care little. They claim the same liberty as the fox-hunter or the sportsman, and are willing to pay for their pleasure; and if they pay very high prices for birds, they do so in the same way as others do for fancy stock, and can generally get their money back again. Therefore, it will be seen at once that there is a very marked difference between the poultry fanciers of forty years ago and those of to-day, and there is very little probability of any repetition of the collapse of the present mania, if such it can

be called, for there is now no deception as to the end in view.

In considering the question of profitable poultry keeping there must be no mistake made by mixing up the poultry fancy, by which term we must be understood to mean those who breed for fancy points, and the revived interest in poultry, of which we have already spoken. The latter is due to an altogether different cause. Recent events have compelled agriculturists to turn their attention to matters which they have heretofore neglected, and perhaps regarded with contempt. Our State and county agricultural societies throughout the country have long been in the habit of offering prizes for poultry from a fancier's standpoint. This is well, perhaps, but they should not only not neglect, but should make especially prominent, the properly agricultural—that is, useful—breeds. It is, besides, a sign of the times, having an important bearing on the future of poultry raising, that some prominent societies have offered prizes for cross-bred fowls, shown with reference to their value upon the table, and one, at least, has conditioned the award of prizes upon a statement of the breed and sex of the parent fowls and the age of the chickens. But it is not the only sign, for all over the country more attention is being paid to poultry, both by farmers and cottagers ; and we think that the way in which the matter is now being treated proves that there is more chance of success than there ever has been before. Those who have the best opportunity of succeeding are now turning their attention to it—we mean farmers who have land at their disposal ; and there is little talk of establishing poultry farms pure and simple, which never have, and we do not think ever will, succeed. Buildings, food, and wages have cost so much that the managers of poultry farms in the past have been induced to over-crowd, in the hope of getting a larger return ; disease has crept in, with ruin and disaster as a natural result. Examples of this kind have

been numerous enough; but the tales which a few years ago were current as to extensive poultry farms in France, so plausible and theoretically sound as they appeared to be, doubtless tempted many to venture on such a speculation. These huge farms never existed, and were all a myth; and we have the testimony of Mr. H. M. Jenkins and of Mr. Sutherland, and my own observations in that country confirm theirs, that whilst almost every peasant keeps a large number of fowls, and derives a considerable portion of his income from them, they never saw what could in any sense be termed a poultry farm. There are some establishments where eggs are hatched in large numbers for the peasants of the district, but the latter provide the eggs in the first instance, and take the chickens when hatched; so that such places are simply hatching factories. Upon this phase of the question we shall have more to say later on.

Poultry and eggs are of such well-nigh universal production that it is difficult to estimate the numbers produced with confidence that we even approximate the truth. In regard to those received in the markets of some of our cities a fairly accurate record is kept, but this is accurate only as to those transported by railroads and steamboats, and probably falls short of the facts. Thus, in the city of New York the amount of poultry reported as received for the year 1883, ending November 30th, was 27,592,050 lbs., valued at $4,310,604—a little more than 15 cents a pound.

The number of eggs received within the same period seems enormous, and yet does not equal the demand, as shown by the number imported from Europe, and by the high prices paid in our eastern cities—often 40 to 60 cents a dozen in winter. The receipts of eggs in New York, for 1883, are reported as exceeding 534,000,000, valued at $10,018,000, or about 22½ cents a dozen. Of the total number, four million nine hundred and sixty-eight thousand (4,968,000) were imported from Europe at a cost of $82,800, which is 20 cents a

dozen after paying all expenses. Notwithstanding that eggs are admitted free of duty, there must be some sort of relation between the price of eggs and the price of feed upon which they are made, and it seems strange that, with our cheap grain and other "chicken feed," greaves, pork-scrap, etc., which we are constantly exporting, it is possible to import eggs with profit. Though the quantity is small, it shows that the demand for eggs is increasing faster than the supply.

In England a different state of things prevails, for, during the last four or five years, which are marked by a great increase in population as well as in the consumption of poultry products, there has been no appreciable increase of importations. It is clear that the English home producer is waking up to the advantage which he has over the foreign one. He is near the market, and can get his goods in to take advantage of its fluctuations; and with fresh eggs and poultry, in form to suit the trade, the highest prices can be realized, and it would seem that, unless the price of feed in England were very much higher than abroad, the home producer would soon be able entirely to shut out foreign competition in first-class goods. In America of course the producers have no excuse; they simply let that eighty-two thousand dollars slip through their fingers because of their neglect to see and act up to their own interests.

The prices now paid for fresh eggs, not only in the cities but in all great manufacturing centres would have been regarded as fabulous a few years ago. We can remember that thirty years ago fresh eggs could be bought at 12½ to 20 cents a dozen; but now these are never less than 2 cents each, and oftener 3 cents, 4 cents, and even 5 cents each. We have been informed by a lady who lives within two or three miles of a military head-quarters that during June and July she can sell about thirty dozen eggs per week at sixty cents a dozen. They are sent for to her own door, the cash paid down, and she could sell twice as many if she had them. This is undoubtedly an exceptional instance, but

only exceptional as to the time of the year, for the price is not an uncommon one for the winter season. Doctors, when ordering their patients to have eggs, nearly always insist upon their being fresh, as they know how much better they are than when even only a few days old. And cooks can tell the same story with respect to the way in which they use them. Only those who have kept fowls of their own, or been favoured by getting properly fresh ones, know the real pleasure of eating an egg; and there are many who cannot eat one if more than three or four days old. And when we consider how important an addition in its varied uses an egg is to the breakfast, luncheon, dinner, or tea table, it will be seen how the matter comes home to every one, apart from all economic questions. In the same way, but perhaps not to so great an extent, does the raising of chickens affect us. The prices which are demanded by poulterers for the miserable little things we see in their shops, are prohibitive to the great bulk of the population, and even those who can afford to get them do so reluctantly. The display to be seen every week in the Halles Centrals at Paris has no counterpart in this country; but in France the breeds are studied, and those encouraged which are the best for table purposes. They are fattened skilfully, and presented in an enticing manner, with the result that chickens are almost a regular article of diet with large numbers of the people, for in Paris during 1880 the average consumption of fowls was 25lbs. per head of the population. These are questions which require to be dealt with in detail, and cannot be more than mentioned in what is simply an introductory chapter. That there is much for our home producers to learn no one can doubt, and it shall be our endeavour to supply in a practical form the latest and best information upon so important a subject. Our object is to stimulate those who have the necessary space at their disposal to take advantage

of their opportunities, and not continue supinely to ignore, or from prejudice to neglect that which, well managed, must prove a source of profit. Farmers and villagers will find the help they need, but we shall not overwhelm them by too much of detail,—seeking to be practical first of all. We shall also show how suburban residents and others may supply their own tables, and, in fact, endeavour to make our remarks such as shall be valuable to all who may read them.

CHAPTER II.

WHO SHOULD KEEP POULTRY?

Who *may* Keep Poultry—Value of Eggs for Children and Invalids—Who should *not* Keep Poultry—Pleasure in Pursuit—Suburban Residents—Size of Runs—Cottagers and Poultry Keeping—Does Poultry Keeping Pay?

It may be questioned whether the title which we have placed at the head of this chapter is rightly worded, and probably there are many who will suggest that it should read, "Who *may* keep poultry?" This would not, however, give as much latitude as we require, for, although it is our intention to show who *may*, we go a little further and say that all who have the opportunity of doing so *should* keep fowls, whether the number kept be great or small. It is a direct benefit to the individual to have fresh eggs to place upon the table, and what is good for the individual must be good also for the nation, and where there are children in a household nothing can be better than eggs for them. The natural object for which eggs are laid is not to provide food for human beings, but to multiply the race, and the egg contains within itself all the material necessary for the formation of the bird and for its support during the process. Thus, there can be no question that eggs are, in the same way as milk is, most suitable for children's food, and it is impossible to find in any other substance of equal bulk nutriment so equably mixed. We indirectly intimated in the first chapter that as the egg gets older decomposition

sets in, though it may not be noticed, and much of the virtue is gone out of it after a few days. The fact that chickens hatched from stale eggs are never so strong as those from perfectly fresh ones, and that the fresher the egg the stronger the chick will be, is corroborative of this. We believe, therefore, that where eggs can enter largely into the food of children they will prove of incalculable benefit to them, that is, if given perfectly fresh. Thus it will be seen that, apart from any selfish motive or desire for pecuniary gain, where there are children in the household, it is very desirable indeed that fowls should be kept if there is accommodation for them. During sickness also, or for invalids, they are invaluable, and we well remember how a lady friend was kept alive through a long and severe illness by eggs we were able to supply her from our own yard. When appetite failed for everything else, she could always eat an egg; and the doctor said that she could not possibly have recovered had it not been for the support thus afforded.

This naturally leads us on to the question, "Who should keep poultry?" and perhaps we can best answer it in the first place by seeing who should *not* keep them. We have often known birds kept in the most unlikely places—in dark, damp cellars, in attics or rooms, in close unhealthy sheds, and on ground that is damp if not actually wet. The ingenuity of man is very great, and he often makes experiments in the keeping of live stock which may command our admiration because of their very audacity, but which we can see are doomed to failure. Certainly we should no more like to eat an egg laid by a bird living in such places as these, than we should care for milk from cows kept in close, badly-ventilated town sheds, or bread out of some uncleanly bakehouse. It may be assumed, therefore, that we do not advocate the keeping of fowls in

unhealthy places, and that unless there can be provided a reasonable amount of open space, a light, comfortable, dry, and well ventilated house, it is much better to do without the birds altogether, and trust to buying eggs from those who have more favourable opportunities for keeping them. Natural laws must be respected if success is to be attained, and we need to remember that fowls when wild are accustomed to live always in the open air, to have perfect freedom, and if we entirely reverse these conditions we cannot reasonably expect to do so without paying the penalty. Domestication undoubtedly means an alteration of the habits of the birds, but we must make this alteration as small as possible, and the less it is the more likely are we to keep them healthy and thriving. Some breeds are stronger and can stand the change in their natural habits better than others, and it is always well for the poultry-keeper to select such if his desire is to make his poultry pay. We shall show which breeds these are later on.

There is another consideration which will affect those who only wish to keep a few fowls, and that is the pleasure and healthfulness of the pursuit. How many there are whose occupations compel them to be indoors all day, and they know that exercise is necessary to preserve their health. They find it most difficult, however, to go out when they have no direct object in view. Walking, especially alone, soon gets wearisome; or perhaps every spot of the district around has been explored, and the result often is that the exercise is not taken. The keeping of poultry has been to many a very great boon in this way, compelling regular exercise in the open air, and we recently met with an eminent scientific man who had taken up the pursuit as a hobby, on this account alone. We know that in our own case it was so, and we found not only pleasure but renewed health and strength whilst attending to our feathered pets.

Commencing with those who only desire to supply their own table, there are hundreds of cottagers and suburban residents in the outskirts of our great towns, as well as in the country at large, who might keep fowls very easily indeed. Recent years have marked a great improvement in the houses built in both town and country, so far as open yards or gardens attached to them are concerned, and in a few years we hope to see all those dwellings done away with, where the back yards are just about the size of a decent scullery. Taking the smaller houses first, if the yard or back garden be a good sized one it will not be difficult to give a piece of it, say about 12ft. or 15ft. long by 6ft. wide, for the purpose of a poultry house and run, which will be amply sufficient for half-a-dozen fowls. How to build the house and prepare the run we shall describe in due course, the cost of which need not be very great, whilst the pleasure and benefit will be incalculable. Suburban residents have generally a good strip of ground behind their houses, and sufficient can often be spared to keep from half-a-dozen to a score fowls, or even more where the place is an extensive one. If economy is no object, then the houses and runs can be made ornamental, and will add much to the appearance of the garden or grounds. For these also, we shall have something to say in the way of instructions as to how the yard should be laid out and the houses built. Then again as to cottagers, there are few in country places who could not keep a score of fowls and rear half a hundred chickens during the year. Any man handy with tools can easily make houses and necessary appliances, or adapt existing outhouses for the purpose, and at a very small cost. Ground is generally to be had at a low cost, but there are more often fields near over which the birds can wander without doing any harm, and this more than doubles the accommodation without any proportionate cost. But that is not

all, for birds at liberty can pick up the greater portion of their living, and we are sure every cottager might make a considerable addition to his income by the keeping of fowls. In France the small farmers and cottagers are they who keep the poultry, and supply the vast numbers of eggs and chickens, not only sent to Great Britain, but consumed at home, for it is estimated that in Paris 160 eggs for every head of the population are used each year. A cottager can easily attend to the birds himself, without interfering with his other work, can feed his birds cheaply, can realise the produce quickly, for there is always a good demand, especially if large houses are at hand, or if in a thickly populated district, and he will find himself a happier and better man for his efforts.

We have now seen that country and suburban residents, great and small, not only may, but should keep poultry, and next we come to the farmer, who may be regarded as the most important of all, for with him it will be a matter of business, and he may produce upon a large scale if he goes into it at all. He has advantages which no one else possesses, having plenty of room for the birds, food for them at first cost, means of utilising their manure which no one else can have, and can graft poultry keeping on to his other work without any great extra expense. He has also means of getting his produce to market at once, and can make contracts with large consumers, hotels, &c., such as a smaller man cannot. But, of course, the business to be really successful will require thought and attention, which many of our farmers have heretofore refused to give; but they are at last coming to see that "there is money in it," and it shall be our endeavour to help them in every way, so that they may succeed in their efforts.

We must not conclude this chapter without answering the question so often put, "Does poultry-keeping pay?" for

that is the kernel of the whole matter, at least so far as many persons are concerned, though we think rich folks who only wish to supply their own table make too much of it. They are willing to grow fruit, vegetables, and flowers, often at double what they could be bought for, and never grumble at the cost, and if they like to expend money on grand houses and runs, or on high-bred stock, they should not complain of what their eggs and chickens may cost. But to others we would say, "Yes, poultry will pay, if properly managed." Cottagers and private persons can generally half feed the birds by what is left from their own tables, and as an illustration of this, we know a gentleman who at one time was always grumbling at the cost of his wife's fowls, declaring that they did not pay. To prove this an account was kept during the next year, when it was found that the eggs cost actually only one cent each all the year through. Then as to farmers, we know a farmer who makes an annual profit of $500 out of his fowls, and his stock is by no means a large one, but he has been content to make his profit, and say nothing to any one. Everywhere there is a constant demand for the produce, and there can be no question that poultry-keeping does pay, and pay well, where it is managed in a common-sense manner.

We may here mention that it is a most desirable thing in all places where the poultry-keeping is regarded as a business, to keep a strict account of all expenditure and income, and of the produce of the fowls. It is a very wise thing for all poultry-keepers to do, even if they only have half-a-dozen birds for the sake of their eggs; but when it is a question of profit, then we regard such an account as absolutely necessary, not only as a satisfaction to the owner, but also as a means of checking expenditure and

preventing waste. Figures have a very deterrent effect, and many a man will refuse to spend, when he has to put it down in black and white, what he would be tempted to do if such were not involved. An account book need not be very elaborate, though it should be complete.

CHAPTER III.

LAYING-OUT THE POULTRY-YARD.

Gradual Commencement best—Selection of Ground—Separate Houses—Aspect of Houses—Walls of Houses—Dividing the Yard—Plans—Chicken Yards.

We do not assume that those of our readers to whom the present work is specially applicable are all non-keepers of poultry at the present time, for probably the great majority have already stocks of poultry. As we have no means of knowing the present condition of their yards—and if we had it would be impossible to show in every case how they might be improved, if they need improvement—we shall describe the best ways of laying out a poultry-yard, of erecting the houses or adapting existing buildings, and by this means it will be very easy for the reader to apply the hints given to his own needs and requirements. Of course, those who contemplate commencing the keeping of fowls, or of laying out a new yard entirely, will find it easy sailing to adapt the plans we shall describe. It must not be thought, however, that we advise any one to commence poultry-keeping upon a large scale, unless he has had sufficient previous experience, and even then we think it much better to begin moderately, and gradually extend the scope of operations. We say this, not only because improvements can generally be made in the later-built houses, and that the whole yard is thus more easily got in hand, but also that the stock can be bred and not bought,

which of itself will be a very great saving, as pure-bred birds cannot be purchased in large numbers. Therefore it is necessary to look ahead a little, and no one must expect to get into full working order all at once, as it will take twelve months at least to do this, where the intention is to keep large numbers; but of course those who wish to keep only a few for their own household purposes can buy birds and have all going on smoothly in a short time. As an instance of the erroneous ideas not uncommon, we once heard of a brick manufacturer who, through the depression in trade, had some of his kilns thrown out of use. It was suggested to him that if wooden partitions were placed in these they would make capital fowl houses. He at once seized upon the idea, and talked about buying five thousand hens at once. If he had not met with some one who pointed out that, apart from his own inexperience, his place was thoroughly unsuitable for poultry, the land being strong clay, very damp, without grass, and only half a mile from the sea, he would probably have carried out his plan, and his enterprise could only have had one result, namely, an entire and dismal failure. Those who by false statements deceive others deserve more than ordinary reprobation, and the injury done is not confined to the immediate sufferers, but to the nation at large, as many who might succeed are prevented making the attempt from these failures.

The first thing to do, whether the number to be kept is large or small, is to decide upon where the birds are to be placed, and the amount of ground that can be given to them. In many places this will be very speedily settled; for instance, in small suburban and cottage gardens, if fowls are to be kept at all, there will be little if any choice of position. But where the ground is more extensive, as upon farms, more consideration will be necessary. In the latter case it may be decided to scatter the houses all about the

farm, and as this is a plan we believe to be a most excellent one, we shall deal fully with it; but even then there will be some buildings required near home, perhaps for breeding pens, or, at any rate, for the chickens, and the ground thus required should be fixed upon. Much after trouble, expense, and annoyance will thus be saved, and the little forethought required will be repaid many times over.

It is not our intention to recommend that the runs for the fowls should be laid out before the houses are built, for this would be a most foolish plan, as the fencing, if any is needed, and the carefully laid out ground would be damaged; but before building it is certainly advisable to have a clear idea of where the houses are to be placed, and whether the runs will be the most suitable ones. Nothing is easier than to have a house built, to fence in a piece of ground, and to put a dozen hens in it; but whether it is in the best position will have much to do with the result, so far as the produce and health of the birds are concerned. So apparently slight a matter as the house facing south or east will make a very great difference in the supply of eggs; and hence the necessity for care in the selection of the ground and position of the house and run. Whenever anything else can be done, and there are very few instances where this cannot be arranged, the front of a house should never face north, north-east or north-west; or, at any rate, the doors and windows should not look in any of these directions. We all know how penetrating the winds are from these quarters, and whilst they are blowing the house will be cold indeed, thus acting unfavourably upon the laying and fattening qualities. A house with a southern frontage gets all the sun there is about—a most important matter in the late autumn, winter, and early spring, when every ray that can be secured is of decided advantage. It almost surpasses belief the difference in temperature between a house fronting north and one front-

ing south, for, whilst the latter will be comfortable, even on those days when but little of the sun has been seen, the former will be cold and comfortless. Practical experience has led us to make a strong point of this, as we know the value of having the house in a sheltered position, and this is one of the little things that needs to be thought of before a house is erected, as it cannot be easily remedied afterwards. Of course there are some places where it is impossible to obtain a southern or southerly aspect, and then the best must be made of existing circumstances. Even in such a case as this, by a little planning much can be done, and we some time ago visited a poultry yard, the grass run of which was in a cold and bleak place, with an aspect almost due north. Here a substantial stone wall ran down one side of the field, and the houses were built on the south side of this wall, the covered runs being on the other side, and the two connected by trap-holes in the wall. The effect of such a plan as this is very great, the temperature in the houses being several degrees higher than if they were on the north side, and thus much of the disadvantage of a north or east aspect can be overcome. If no other plan can be adopted, we would make the doors and windows at the one least exposed side or end of the house, having no opening on the other sides, but even when this is done the walls will need to be thicker than they would if in a more favourable position.

Whenever it is possible we should advise that a brick or stone wall should be made the back of the house, as this is a great protection and support to the erection, and also gives additional warmth, as well as being a saving in cost. If this wall be part of, or next to a stable, a cow-shed, a greenhouse, an engine-shed, or even a dwelling, the warmth derived will be highly beneficial. We have repeatedly known instances where large numbers of eggs have been got in the severest

weather, simply because the fowls' roosting-place adjoined a stable or cow-house. When it is remembered that the reason why fowls do not lay so well in cold weather is that much of the natural heat usually expended upon egg-production and flesh-forming is required to make up for the more rapid exhaustion of that heat, it will be seen that the value of such an arrangement as we have suggested is very great.

Supposing, therefore, that the place has been chosen in accordance with what we have already stated, then the amount of ground and the number of divisions into which it has to be partitioned out must be decided upon. If a number of breeds are to be kept, and there is not sufficient ground at command to scatter them widely apart, then the decision as to the number of runs to be given should be very carefully made, and it will be much better to limit the number than to cramp the birds. Birds which are only required for supplying eggs can no doubt be kept in confined runs, but breeding stock should have good large runs, or their eggs will not hatch so well, nor the progeny be so vigorous and strong. In many places a large grass field is allotted to the fowls, and on one side of this a row of houses and sheds are built, each having a gravel run—say twenty yards long by three or four yards wide—and the various flocks of birds are allowed in the grass field by turn throughout the day. This is a capital plan where it can be adopted, and we recommend it to our readers; but if runs can be given to each breeding pen twenty yards square, two-thirds grass and one-third gravel, they will do equally as well. The first-named plan is advantageous in one way—namely, that the houses can be all placed together, and if a passage runs behind, the birds can be seen at night, or the houses cleaned without going into the open air. And as they can also be used for chickens as well as for the breeding stock, this will be found a very great

advantage, as the early chicks require to be attended to late at nights, and very early in the mornings. The chief danger of this plan is the tainting of the ground resulting from the droppings of the fowls, which is in itself a sure cause of disease, but we shall show how this can be prevented.

In large yards it is advisable to have a proper chicken establishment, the house of which should always face due south, or nearly so, and as far as is possible be well protected on the north and east either by a wall or thick trees. We shall describe how this house is to be built in the proper place, but now mention it so that it may not be forgotten, as is too often the case. The run, which should be chiefly grass, requires to be large and roomy, and if it can be placed near the attendant's house, no matter who the attendant may be, it will be all the better. Upon this run the chicken coops will be placed in the breeding season, and the more room that can be given to it the better. The actual size can only be regulated by each in accordance with the special requirements of the case, but we should be inclined to set aside a quarter of an acre for every hundred chicks to be reared in this chicken run, in addition to which other runs will be needed to put the birds in after they leave the hens. Some of the ordinary runs will come in useful for this purpose after the breeding season is over.

CHAPTER IV.

POULTRY HOUSES.

Importance of Houses—Cost—Elaborate Houses not Needed—Good Houses Required—Size of Houses and Runs—Adapting existing Buildings—Cheap Houses—Sheds—Houses in Gardens.

Having planned the yard in the manner described by us in the last chapter, and arranged it in the way that appears to be most conducive to the well-being of the fowls, the next consideration must be that of the houses in which they are to be placed. This is a most important subject, and takes place in the front rank of those matters which will have an all-important effect upon the success or otherwise of the enterprise. Too often is it neglected; and we have known men, who thought nothing too good for their horses, their cattle, or their dogs, put their poultry into cold, damp, draughty buildings, and then grumble that they did not pay. Who could expect them to pay under such conditions? may be reasonably asked. But this is only a specimen of how the subject has been treated; and if any of our readers are resting under such a delusion, we must ask them to give it up at once, or, as the only alternative, give up the idea of keeping fowls. Without due regard to comfort, ventilation, and cleanliness, fowls will not pay; but where these things are attended to, and other things are favourable, they will pay.

Much will depend on the tastes, and length of purse

of the intending poultry keeper, as to the cost of the houses and runs. We have visited at various times some really palatial establishments, where hundreds of pounds have been spent in erections, and where everything is of the very best nature—planned and placed so as above all to please the eye. And we have, on the other hand, seen yards successfully carried on where the crudest and roughest houses and appliances are in use, the object being to secure the desired end with the least possible expenditure. The fact is, elaborateness has nothing to do with success or failure. So long as certain definable laws are observed all will go right; and whilst first-class houses may add to the pleasure of the owner, or to ease in working, they are by no means necessary to—nay, we should say almost a hindrance to—profit, as the large amount needed as capital outlay requires a greater charge for interest than should be laid upon the concern. This is, of course, addressed to those who regard the matter as one of profit. Those who do not, can freely gratify their tastes, and can easily make more ornamental any such houses as we shall describe, and in all probability the additional cost will be amply repaid in the extra pleasure thus obtained. But there is as much care needed in the erection of grand houses as in smaller ones; and we have known hundreds of dollars spent in erections that were almost useless. In fact, there is in such places always a danger that utility shall be sacrificed to appearance, and against this we must utter a note of warning.

It must not be thought from what we have said that we object to substantial and well-built houses, for this is not the case, and we believe that often the putting of a few extra dollars into a building is a good investment, saving the expenditure of many more afterwards. Nor must it be imagined that we think any plan is a suitable one, for

while we encourage cheapness—that is, avoiding all needless expenditure—we strongly insist that every house, whether it be new or old, adapted or built for the purpose, made of wood or stone, shall be warm and comfortable, properly ventilated, and shall be large enough for the number of birds that are to be kept in it. Great injury is done for want of proper housing, both through disease resulting from it, and in that it is a great hindrance to productiveness. Fowls kept in a cold, damp atmosphere will neither lay nor thrive well. In the summer it may not make so much difference to them, as day and night is then almost equally warm; but in the late autumn, winter, and early spring, just when they will make or mar the balance sheet for the year, they are consumers without being producers; consequently they are most unprofitable.

The question of size of house deserves more consideration than it generally receives. It has been found by very many persons, from practical experience, that not more than fifty birds can be profitably kept together in one house; and though this does not necessarily mean that if it is thought advisable to erect a house divided into several compartments, not more than fifty birds may be kept under one roof, it does mean that they should be kept well apart with runs of their own, and for this reason we prefer the plan of having a distinct house for every fifty fowls, where the room is at command. A few breeding runs may be put together; but for layers the other is the better plan. Why large numbers together are not so prolific as when there are fifty and under, we cannot say, and any expression of opinion would be merely theoretical; but such is undoubtedly the fact, and we must urge our readers not to keep more than the number stated in one house. These should have half an acre of grass run, in order to keep them in health and condition, that is, if they are to be restricted

at all; and those of our readers who have only a limited amount of space at their disposal will be able to decide how many birds they can keep upon it.

The first thing for the intending poultry keeper to do is to see whether there are any existing buildings which can be adapted for his birds. This is, of course, more easily done by those who wish to keep a few than by those who go into the matter extensively; and cottagers or suburban residents will often be able to find an unused shed, an out-house, or a stable which, with very few alterations, can be made to meet all their requirements. In most of these the floor is the greatest drawback; but this can be remedied very easily, as we shall show in our next chapter. Failing such places as we have mentioned, other things can be "requisitioned" for the purpose, and where the cost is a most important matter, a little ingenuity will do a great deal. A hogshead can be made into a very good roosting-place for half a dozen birds, if it is raised on its side above the ground by bricks or stone, all chinks stopped up, well tarred outside and whitewashed inside, the upper half of the lid fixed, with a few holes bored in, and corresponding ones in the other end for ventilation, and the lower half made a hinged door, and a couple of perches and nests placed inside. A large packing case can be used in a similar fashion, if it has a sloping roof placed above the top of the box, so that the wet can run off easily, and in fact almost anything can be utilised, as we have seen old railway cars, discarded carriages, and summer-houses made to do duty. A short time ago we read of a large farmer in Essex who keeps several hundred head of fowls, and has bought up a number of old menagerie vans at a cheap rate, which have been made the houses for his fowls, and very comfortable ones we are told they are.

The objection to be brought against this kind of roosting places, is that they do not provide sheds in which the birds

have shelter during cold or wet weather. No matter how large and comfortable a house may be, poultry have a very strong objection to spend any portion of their time in it except when at roost or on the nest, and the result is that they often crouch about under bushes or even the lea of the house, sooner than go inside. This may be very stupid on their part, but there the fact is, and we must recognize it. Sheds should, therefore, be provided, and will be also useful for the dust bath—a most needful provision. In the case of any adapted out-house or shed, if large enough, the outer portion can be made into the shed, or if not large enough, a wooden erection about three feet high, and quite as large as the house itself, with open or a wired front, can be easily and cheaply erected. Where a hogshead or packing case is used, it should be lifted sufficiently high so as to leave a good space below. If the supporting bricks are built in the form of a U-shaped wall, they will be protection enough; but if not, folding flaps of wood should be placed on three sides so as to keep wind and rain from the birds below.

The small amateur who has accommodation for only a very few birds, and must confine them, would do well to so place his house that there will be a run on each side of it. In a suburban or cottage garden this will not be at all difficult, and the house and shed can be arranged according to circumstances. The object of the double run is to give the birds fresh ground, and thus prevent any tainting of it, so great a cause of disease in small yards. Only one run at a time will be used, and the other can be planted with vegetables, which will be found to grow amain on such a place, and be better and larger than any other in the garden, and at the same time clean the ground. If each run is thus used four months at a time, there need be no fear of disease. We know of an instance where this has been

tried most successfully, and on a fairly large scale, with very heavy crops, and the birds kept in perfect health, though the runs are smaller than we like to see. We do not see why farmers should not make poultry one of the series in the rotation of crops, as by this means the land would get well manured by the fowls, and before being used again for them would be sweetened by the produce grown thereon. This is a subject we shall return to again, as it is worthy of fuller consideration. If the small poultry keeper is unable to give these double runs, it will be better to lay down the one run he has in gravel, as it can be more easily renewed, and is less liable to contamination than earth. But as our subject is the houses, we must insist that if he uses an outhouse or any of the things we have already named, he will see that it is watertight above, dry below, properly ventilated, and comfortable. If he has to build a house he can follow the directions we give in the next chapter.

CHAPTER V.

THE ERECTION OF POULTRY HOUSES.

Material to be Used—Tenant's Fixtures—Too Large Houses Objectionable—Foundation—Saving of Timber—Frame-Work—Windows and Doors—Ventilation—Floors—Artificial Heating.

BEFORE the question of building can be entirely settled there is a matter requiring to be entered upon, which will probably have very much to do with the material of which the house will be built. There can be no question that for comfort and durability, a brick or stone house is best both for birds and owner, as it is much warmer, less liable to draughts, and more lasting than a wooden one. If the land be the property of the intending poultry keeper, or if the lease is sufficiently long to warrant a permanent erection, then we should certainly advise such being built; but if there is any uncertainty as to the length of time during which the ground can be retained, then it will be better to put up a wooden one, as this is removable, whereas a brick or stone erection becomes the landlord's property if the tenant leaves. Of course the rule we have laid down can be varied according to circumstances, as there are districts where timber is comparatively scarce and dear, and where bricks or stone are comparatively cheap, and *vice versâ*. But as a rule wood is the cheapest material, and as it is

easy to work with, as well as being capable of removal without much damage, if removal is necessary, there is no objection whatever to it, if sufficiently thick timber is used throughout, and the whole well and strongly put together.

The question of size is one that must of necessity be ruled by the inclinations of the owner. We do not mean the number of fowls he intends to keep, so much as whether he prefers to have only one house, or several scattered about. We must confess to having a preference for the latter plan, where there is sufficient room to allow of it, but at the same time there are doubtless advantages in having the birds all in one house, not the least of which is that they can be easily seen and are less liable to be stolen. Then it is also cheaper to build one house for two hundred birds than four houses to hold fifty each, and even where the question of cost is not regarded so closely, a much more pleasing structure can be erected than if divided into a number of small ones. Perhaps the best plan is that indicated by us in the previous chapter, namely, to combine both these systems, and to have the breeding, and chicken houses near at home, and the others more widely scattered about. However, these are arrangements which can be safely left to be decided individually, and our instructions as to building poultry houses will apply to small and to large houses equally. A house twelve feet long by six feet wide, and seven or eight feet from the floor to the eaves, will be large enough to accommodate fifty fowls, and we should not recommend that it be made larger than this. Too small a house is dangerous, as the vitiation of the atmosphere which naturally results breeds disease, but on the other hand too large a house is equally an evil, as the birds are exposed to a very large amount of cold air during the winter, which absorbs the heat from their

bodies, and they are chilled and miserable during the long nights. If the house be of a reasonable size, the natural heat of their bodies is not absorbed, but remains to support them against the severity of the weather. These are matters which may not be so easily regulated when a building is adapted, but when a house is built, then there is no more trouble in making it right than wrong.

In all erections the first thing is to get a good foundation, and even when built of wood it will be better to put down bricks first, these to stand six inches above the ground. If well tarred after they are laid they will prevent the damp rising, and also protect the wood. As much of the latter as rests on, or is sunk into the ground should be well tarred also. The timber used for the walls should be tongued, or feathered and grooved. The superiority of this over straight edged deals is very great, keeping out both wind and wet more effectually, and the cost is small. Upon no account should the boards be less than an inch in thickness, no matter how small the house may be, and where it is large it will be found much better to have them an inch and a quarter. Many persons commit the mistake of having the deals too thin, the result of which is, the houses are cold and easily penetrated by damp. A capital plan is to make the house in length and width twelve feet, or a divisible fraction of it, that is, four, six, or eight feet, or if larger, eighteen or twenty-four feet. The object of this is, that as timber is generally sold in lengths of about twelve feet, if any of the sizes named are selected there will be no waste whatever, every inch being used up. Of course the house can be twelve feet long by six feet wide, or twenty-four feet long by twelve feet wide, or any other size that will be convenient. The shed which we have already mentioned can either be a portion of the building, the same in height and width, or it can be a less lofty erection placed in front or at one end of the house

proper. Where a number of houses are placed together, it is better to have the sheds in front and part of the main building. Such sheds should be quite as large as the roosting house, and be separated from the same by a partition made of the same thickness of wood as the outer walls. The front of the shed should be of wood two or three feet up, and of wire netting above that.

Having laid the foundations, the next step will be to prepare the framework, which should be of scantling, three or four inches square, according to the size of the house and the strain which will be put upon the frame. An extra upright should be placed every three or four feet; but one horizontal crosspiece, in a wall six to eight feet high, will be quite sufficient. The framework of a door not less than thirty inches wide, and of one or more windows, must be fitted in, and these should face the south or east. The windows are better when made to open, and simply hinged to swing outwards. The boards when nailed on should be laid horizontally, tightly clenched down, and nailed firmly to the frame, so as to prevent any warping. French nails are the best, as they do not destroy the wood, should it be necessary to afterwards take the house to pieces. A small trap, fifteen inches high by twelve inches wide, will be required for the fowls; and this should have a sliding door, so that they may be kept in if necessary. The matter requiring greatest care in the erection of a wooden house is, to see that it is perfectly air-tight, except as afterwards provided, and all fissures or chinks stopped up. This is especially necessary with the door and window fittings, as draughts very often find their way in just at these places.

The roof may be of shingles, slates, corrugated iron, or wood, the two first named being the most suitable for permanent buildings. A tin roof really has many advantages, as it is reasonable in price, easily fixed, and perfectly water-

tight. But against these have to be placed the fact, that from its being so thin, and also being a rapid conductor of heat and cold, it is very hot in summer and very cold in winter, and unless lined out with boarding the house is subject to these unfavourable conditions. If it is boarded, however, this is counteracted, and then it makes a capital roof—one that will last many years if given a coat of paint every twelve months. When wood is used as a roof, it should be firm and well put together, and be covered with felting,

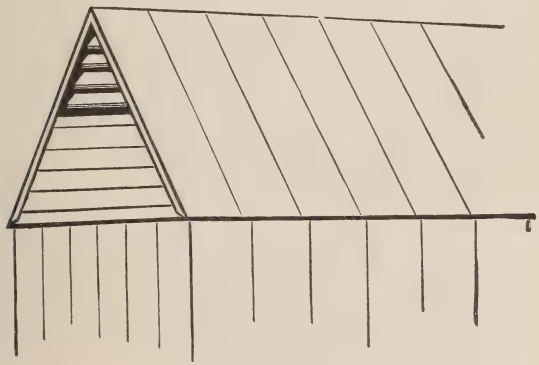


Fig. 1.—Ventilating roof.

which needs to be well tarred and sanded once a year, thus making a warm and substantial cover. It is important to have a good slope in a roof of this kind, so that the water may run off rapidly; and when this is done, a wooden roof is as good as anything else.

The question of ventilation is a most important one, and worthy of more consideration than is usually given to it. The way often adopted is to make a few holes in one end of the house, and let the air get in and out the best

way it can. We have actually known houses built with the boards left an eighth of an inch apart, in order to provide a current of air; but such a method partakes considerably of madness. The plan we are about to describe is a very simple one, and will cost very little, if anything; it is equally suitable to a single slope or to a gabled roof, but we shall describe the latter, and our readers can adapt it to the former. In the roof a small chamber should be formed, by nailing half-inch boards across the same, about midway between the eaves and the apex, and we give an illustration (Fig. 1) of the roof showing this method of ventilation. The crossboards forming the bottom of the chamber may either be closely nailed together, and have holes bored in them, or be left a quarter of an inch apart. At each end of this chamber, in the gables, louver boards should be inserted, or a ventilating trap, such as can be bought from any ironmonger, or a few holes bored into each end will do, but not so well. In addition to this, a couple of traps may be fitted about half-way up the walls of the house, but these are optional, and can be done without. If they are used, then a square wooden box, much larger than the trap, will need to be put over each one inside the house, having a very few holes in, it on the upper side only, so that when the fresh air comes in, it will be directed up to the roof, and not strike against the birds. The system of ventilation we have described is a perfect one; there is a constant current of air through the ventilating chamber, carrying off the vitiated air, and this prevents any draught whatever in the house itself; but, at the same time, the birds always have pure air to breathe; and go into their roosting-house at any time, day or night, it is fresh and sweet so far as the atmosphere is concerned. In winter some of the ventilating holes can be stopped up, as they will not be required, and the facility with which the current can be regulated is the advantage the trap ventilators

have over the holes or louver boards. No holes must be made near the ground, or anything done to create a draught upwards, as when this is done there is great danger of the fowls having to roost midway between two openings—a plan which sooner or later results in colds and other diseases. This done, the house itself is complete, with the exception of painting outside and whitewashing inside; two or three coats of the former and two of the latter will put it in capital order.

The next part we have to deal with is the floor, which if it be damp or cold will militate very greatly against the comfort and consequent success of the inmates. Such a subject as this needs to be specially dealt with, as there are many persons who appear to think that if the house itself is dry and well built the floor is of no consequence. Such an idea probably arises from the fact that the birds are almost always either on their perches or outside the house. But whilst this is undoubtedly the case, it must also be remembered that the nests are generally made on the ground, and what is of still greater moment, the atmosphere of the house is considerably affected by the floor, for if it is damp there is a cold, chilly feeling always present. In our own dwellings this is so, and all the efforts made to warm a damp house never succeed in making it comfortable; besides which there is the great injury to our health, and if this is the case where warmth and light can be freely given, how much more must it be felt in poultry houses.

The first thing to be decided upon is that the floor of the house shall be not less than six inches above the ground outside. The object is to prevent the water running into the house, which it will do if below or upon the level. Cement makes a capital floor, and if well laid there is no danger of water standing, or of a damp atmosphere resulting from it. It is cleaned very easily, and will not become charged with

moisture from the droppings; but it is very cold, and on this account, if used, should always be kept covered with two or three inches of fine soil or ashes. Bricks are often used, and if well drained below make a firm and dry floor. But they have one very decided drawback, consequent upon their porous nature and the interstices which must exist between them, namely, that they absorb the moisture from the droppings, and in time become impregnated with ammonia, which reacts upon the atmosphere in the house, and is very unhealthy for the birds in it. Were it not for this, bricks would make one of the best floors that could be desired. Wooden floors also are not to be recommended, except where the space is limited, when it is necessary to raise the floor of the house, in order to provide a sheltered run for the fowls below, or wooden floors may be used where movable houses are adopted. In either of these cases only such a floor is possible; but of course it must be kept thickly covered with coal ashes, or fine soil, to be renewed constantly, and thus kept fresh.

Of all the floors which may be laid down in a poultry house, we have proved the following to be decidedly the best:—In the first instance, dig the ground out to a depth of twelve or fifteen inches, and then fill up half of this with broken bricks, gravel, burnt ballast, coarse stones or slag, which must be well beaten down. A compost of coal ashes, fine gravel, quicklime and water must next be made, well mixed together, and spread over the other so as to raise the floor to the required height above the ground. This, when hardened, will be a perfectly dry floor, one upon which water will not stand, and yet it will be hard and firm in its nature, as well as warm and comfortable. It is easily cleaned, inexpensive, and in every way the best floor we know of. Of course, ashes or soil must always be spread thinly over it, as they should be upon every kind of floor, and

renewed every day or two. In some places the floor simply consists of a few inches of fine, dry earth; and where the ground below is porous and warm there is no objection to this, but it must be raked over every day, and entirely renewed every few months, or the air will be vitiated. Any one with a sensitive nasal organ can, however, very soon tell when there is anything the matter in this way, so that will be of itself a protection; but we do not approve of the plan some people adopt, of using carbolic powder and other disinfectants so freely, that their smell may overpower any other one. This is not the way to do. By cleanliness a house should be kept sweet, and whilst the articles named are most valuable to the poultry keeper, yet they must not be made substitutes for, but assistants to, cleanliness.

Perhaps it may be as well, before we deal with the question of fittings, to say a few words with respect to the much debated question of heating poultry houses. The arguments adduced in favour of artificial heating are very plausible indeed, and there need be no wonder that many are misled by them. The reason why hens do not lay so well in winter, is because the natural heat or reserve force of the body is more rapidly exhausted in winter than in summer, and there is less surplus to go to the formation of eggs or flesh. Thus it would appear very reasonable to suppose, that if, by supplying artificial heat, this rapid exhaustion can be prevented, then the birds would be as productive at one time as another. The fallacy of this is in the fact that birds cannot always be kept healthy indoors, and if there be high temperature, then when they go out, the sudden transition is very great, and disease results. So that for this reason, it will be seen that artificial heating is likely to do more harm than good, except under such conditions as we shall presently mention. Fowls cannot put on an overcoat when they leave their houses, and we know the danger ourselves of going from a heated room

into the cold air unprotected in this way. But in addition to this there is a very grave objection to the burning of oil or gas in a house, as they vitiate the atmosphere greatly, and the birds having to breath air charged with impurities, must be injured thereby. This injury may not declare itself at once, but will do so sooner or later.

In addition to the methods of heating already mentioned, which are more used for isolated houses than those in blocks, hot water pipes have been employed, but though these are much better than stoves of any kind, it is only a question of degree, and the use of them is to be equally condemned. We do not say that a gentle artificial heat is not beneficial, if it come from outside the house, and, for this reason, we recommended in a previous chapter that, where possible, the house should be built adjoining "a stable, a cow-shed, a green-house, an engine-shed, or even a dwelling," but this is altogether different to placing a stove inside a house, as the heat is then evenly diffused all over the house, without in the slightest degree vitiating the atmosphere. Even in such a place as this, care must be taken to keep the temperature from rising very high, and the ventilation requires to be well looked after.

It is often found convenient, where large numbers of fowls are kept, to have the buildings in large blocks, and when this is so artificial heat may be introduced without much danger, especially if there is a centre compartment into which all the others open. Here a fire-stove can be placed, and if the ventilation is so arranged that the fresh air can be supplied through this compartment, then the fowls will get warmth without danger of any great excess of it. But we may as well say at once, that, in a well built and properly ventilated house, there is no need of any artificial heat what ever, and even though the eggs are not quite so numerous as might be the case were it employed, the prevention of

future trouble, and the hardiness of the birds, will more than compensate for this deficiency. In very severe weather the houses may be lined out with straw, but this is only needed where the walls are thin, and it will be found that good substantial food and free range, will do more real good than any artificial heat, however carefully applied.

CHAPTER VI.

THE FITTINGS AND RUNS.

Perches—Nest Boxes—Sheds—Unfenced Runs—Space to be given—Fencing.

THE perches should be regulated according to the kind of birds kept. For heavy ones, such as Brahmas, Cochins, Dorkings, Langshans, Wyandottes, and Plymouth Rocks, a foot above the ground is quite high enough, as birds are often injured in flying down from high perches, or, what is equally as bad, roost upon the ground and are cold and starved all the night through. Some time ago we saw a capital perch for Brahmas, made of strong wood, about four inches wide, and in the form of a huge T, the three ends resting upon cement blocks built into the walls, and of course lying lengthwise parallel with the floor. We also give from Mr. Tegetmeier's Poultry Book an illustration (Fig. 2) of a capital frame for heavy fowls to roost upon, which has the decided advantage of being easily moved. Perches should always be made so that they can be got out of, and into the house without difficulty. As a rule, for lighter birds, where the perches are placed higher, fir poles sawn in two make the best ones, but when these cannot be got, oval shaped bars, about three inches in diameter and sawn in two, are most suitable. Or if flat ones are used they should not be narrow, but have the edges taken off. In small houses it is best to get thick bent iron or wooden supports, made in the form of the

letters U or J; the former are the best, as the perches are not so easily knocked out by the birds. One of these rests must be fixed at each side of the house, and the perch ends made to fit them, taking care that the poles are not too short, or they will drop out when the birds get on to them.

In large houses it is much better to make a hen ladder, which consists of two stout planks laid at each end of the house, at an angle of about forty degrees, the top resting

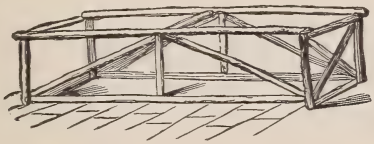


Fig. 2.—Frame for Roost.

against the back wall and the bottom on the ground, or, of course, by making a back upright to hold the planks spoken of, it will not be necessary to rest the same against the walls. Or, again, the latter may be made double, like the letter A, with perches at both sides, though, for a reason about to be given, this is not to be recommended except where there are windows on both sides. At a distance of about every two feet, notches are made on the upper side of these deals, of course, corresponding with each other, and into these the perch ends are dropped, and then the ladder is complete. This ladder should face the window, wherever this is placed, as fowls always roost with their heads in that direction, and then the droppings fall on the floor without touching the birds on the lower perches. If the birds are allowed to roost the other way, each row will receive the droppings from those on the one above. Fine soil or ashes should be laid on the floor below the ladder, and raked over daily, as by this means a most valuable manure is made.

and can be removed weekly. Whether the house is a large or a small one the perches should be made removable, so as to facilitate cleaning, and once every month the ends can be dipped in petroleum or carbolic acid, by the doing of which insects are kept away easily. Many people would be surprised at the myriads of insects which swarm over birds when they are roosting that are not so protected, but dipping the ends effectually prevents their reaching the fowls.

Nest boxes will, of course, require to be fitted into the house, and in numbers sufficient to prevent any crowding of the hens, or they will fight for possession, and perhaps be thus led to lay away. These nest boxes can be made in a variety of ways, and if the house is a small one a couple of bricks, a box, or a basket can be used. Perhaps the first named is the best, as it is most easily cleared away, and can scarcely be neglected when the house is cleaned out, for the nest must be renewed constantly to keep it supplied with straw. In such a house as this, where room is not over plentiful, the nests may be arranged with a shelf above them, and if the perch is above that, then the hens will be quiet and retired, and no droppings can reach them. But, of course, such an arrangement necessitates great attention to cleanliness, and for this reason it is most important to have shelves removable, and to see that they are taken out at least every week. We have found in practice that if this is not done the nests below get neglected, and the backs of the shelves become harbours for insects, and dirt of all kinds.

It may be taken as a standing rule, that one nest will be required for every three hens; and in large houses, where forty or fifty birds are kept, a different plan to any yet spoken of will have to be adopted. We do not like nests in sets as usually made, because there are no facilities provided for easy cleaning, rather the reverse; but the following plan is one that can be adopted with safety:—In a house for fifty

hens we should make three rows, of five or six nests in each, every nest to be twelve to fifteen inches square, according to the size of fowls by which they will be used. The nests should have no bottoms, backs, or fronts, save only a strip of wood, three inches wide, nailed along the lower part of the fronts, and another exactly like it at the back. The top of each row will have to be entirely covered, and each of the two bottom rows have a ledge of about six or eight inches wide standing in front. This will complete the nests, and they will, therefore, consist simply of the partitions between each nest, the ends, the tops, and the strips, back and front. When put together the bottom row will stand on the ground next to one of the walls, the second row above it, and the third row above that. In order to prevent the fowls pulling the nests over when jumping on to the ledges, strong iron catches should be fixed to the end of each row with staples in the wall, so as to keep them firm and secure. As will have been seen, the top row will have no ledge, as one is not needed there, but it will be necessary to have a sloping top, or the birds will roost upon it, and thus constantly make it foul and dirty. These nests can be taken to pieces in a couple of minutes and re-erected as speedily, the great advantage being that, having no floor, the moment they are removed everything inside falls out, and there are no corners where dirt or vermin can congregate. They should have a good lime-washing inside and outside once a month, and this will keep them perfectly sweet and clean.

Heavy fowls, such as Cochins, Brahmas, and Dorkings, will require some other arrangement, as the flying up and down to the nests would injure them just as much as when high perches are employed for them. This can be overcome by placing all the nests on the ground, and having a sloping board above the same the whole way round the house, or, what is still better, make the top of the nests sloping

from back to front, which will effectually prevent the birds roosting on it. In this case, we should make the nests in sets of two or three each, as they will then be much easier to handle when cleaning. We have also seen hanging boxes made, not unlike a very large sink soap tray, but with wire bottoms; and, where there is enough room in the house to allow of these being hung on the walls, about eighteen to twenty-four inches apart from each other, no better system can be adopted. They must be a foot or more above the ground, and the nest itself should be about six inches in depth, so that there may be no danger of the hen knocking out the eggs when getting out herself.

In the chapter on "Poultry Houses" we mentioned the necessity for having a shed in addition to the roosting house. This should, if possible, be as large, if not larger than the house, but can be open or wired at the front. It must be perfectly dry, with good floor, which may be the same as the house floor, or be a foot in depth of fine sand. In one corner a hole should be dug, or a box placed, about two feet deep, and kept constantly supplied with fine dry ashes or soil. This dust bath is absolutely necessary to the well being of the birds, and must be given in order to keep down insects. Where large numbers of birds are kept we have seen a house or shed devoted to this purpose alone; and any reasonable amount of trouble is worth taking, as fowls cannot possibly thrive if they are troubled with insects.

The question as to how much space is required to keep birds in perfect health is somewhat difficult to answer, because there are some breeds which require more than others; and there are breeds which can live on a grass plot without destroying it, whilst others would eat it bare in a month. Of course, it is much better when freedom can be given, and birds can then be divided without the use of netting or anything else, thus effecting a large saving in first cost. It is

wonderful how close birds can be kept together without mixing one with the other. A short time ago the writer visited a farm where several hundred head of fowls are kept, comprising about a dozen pure varieties, and in one field of about ten acres two houses were placed, of course at the extreme limits from each other. In one were Dorkings, and in the other white Leghorns, and though they were in sight of each other, yet they had never been known to mix, nor even to

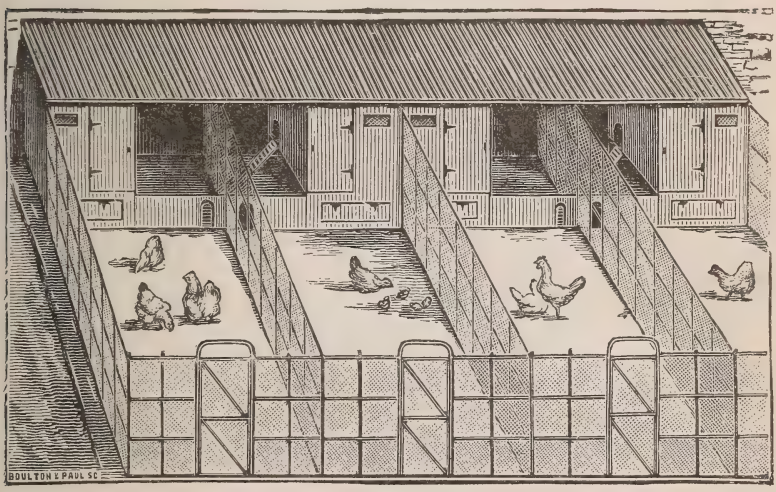


Fig. 3.—Range of Poultry Houses and Runs.

approach sufficiently near to quarrel. Probably each clan felt itself immeasurably superior to its neighbour, and that it would be derogatory to associate with the others; but whatever might be the cause, the effect was satisfactory to the owner. And under such circumstances, namely, where there is an abundance of room, for the farm in question was nearly a thousand acres in extent, the question of runs is easily settled, as even breeding flocks can be kept unpenned.

Where runs are at all restricted, and must be kept within certain limits, then it is necessary to know how much ground is absolutely required to keep grass fresh. Under such conditions it will be needful to give half an acre to every fifty fowls of the lighter kinds, but rather more than this will be required for the heavier breeds. But where houses are built in sets, such as is shown in Fig. 3, which is a capital range of houses made by Bolton and Paul, Norwich, Eng., we prefer the plan given by us in a former chapter, namely, to give gravel runs to the houses, and have a large field into which the birds can go in turns during the day. They in this way thrive just as well as if on grass always, and the latter is preserved and kept in good order. Nothing appears worse to us than to see grass eaten and trodden down, as then it does no good to the fowls, and is much worse than gravel, which is clean at any rate, and does not lead the attendant to suppose that the birds have all the green food they require. Grass is only beneficial when fresh and clean, and hence the importance of what we have said.

When fencing is necessary, the best material is wire-netting, which can be bought very cheaply, especially if in large quantities, and if it is galvanized it lasts a long time. That with a two inch mesh is fine enough, and it is as well to get it good and strong, as it will be found least costly in the end. Where something more showy is required, there is a wire fencing made in sections of three feet wide, and six feet high, fitted to iron standards in the ground by means of small bolts. These are made in straight lattice work, and generally have ornamental tops, so that they are pleasing in appearance. Another admirable fence is one easily made to order by any woven-wire works, like Figure 4, the bottom half of which is made of galvanized iron, and the upper half of wire, thus forming a complete division between runs, and being at the same time a first-rate shelter against sun,

rain, or wind. The height of the fences will need to be regulated by the variety of fowls kept. Heavy birds will be easily restrained by a three or a four feet fence, whilst most other breeds can be kept in only by one six feet high. Hamburghs, however, must have one at least ten feet, and often that is not sufficient, so that it is better to clip their wings. Gates must be provided, and it will be found advantageous not to have too few, as thus many a long walk may be saved —no small consideration on a wet or stormy day; and where

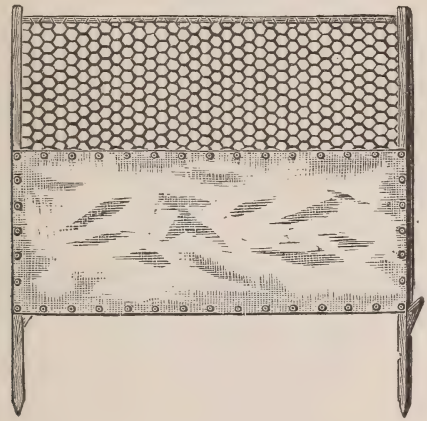


Fig. 4.—Poultry Fence.

several runs join each other they must be boarded up three feet above the ground, if the fencing just mentioned be not used, in order to prevent the cocks fighting with each other, which they will certainly do if this precaution is not taken.

CHAPTER VII.

MORE ABOUT HOUSES AND RUNS.

Effect of Confinement—Houses on Wheels—The Best Plan for Farms—Use of Fruit Trees in Runs—Kinds of Trees to Plant—Fruit Bushes—Other Aids.

We suppose that, as it is human nature, when restricted within certain specified limits, to get as near the outer region of those limits as possible, even though there is an abundance of room, and a more nominal than actual curtailment of liberty, the same instinct is shown in fowls, because, no matter how large a run may be given them, if it be fenced in, they will be sure to wear down the grass near the boundaries, whilst that in the centre will probably be untouched. On this account, where space is abundant, it may be the best plan to use movable houses, either small enough to be carried by a couple of men, or on wheels, so that a horse or pony can take them easily from one place to another.

Various patterns can be seen in the lists of poultry house builders, and we give illustrations of two of these, showing the ones which appear to us the best (Figs. 5 and 6). As is seen, one of these houses, for which we are also indebted to Spratt's Patent of London, who have made some of the best poultry houses we have seen, has a run beneath, and side flaps to afford protection, whilst the other, which is an admirable form for farms, made by Thos. Christy & Co., of Fenchurch Street, London, is without the run; but if the latter plan is adopted, a small shelter should be made so as to stand adjoining, and for convenience of

removal, it can be separate. The houses and shelters can be with, or without floors, as may be preferred, but if the soil is clay, or damp, it will be much better to have wooden floors, but even when it is dry soil we much prefer not to have them. Of course, in any case it will be necessary to see that the houses are not placed in hollows, or, when it is wet weather, they will be standing in pools of water.

Movable houses of this kind have many great advan-

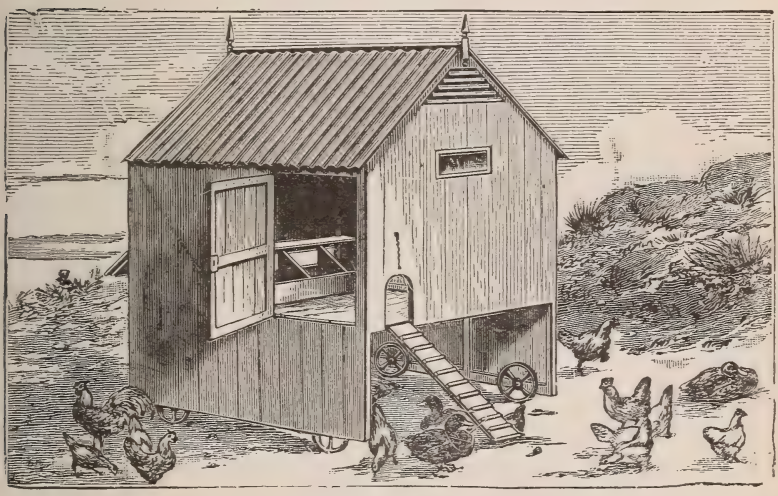


Fig. 5.—Portable House.

tages, but, of course, their use is limited to such as have plenty of ground at command. In the first place, a much larger number of birds can be kept than in a stationary house, as the ground is fresh, and they can wander about at their own free will. The fowls also cost less to keep, as they are able to find a great portion of their own food in the shape of worms, grubs, seeds, roots, and berries. There is less expense for material, as fencing is not needed, and

even though wire netting is very cheap, when it has to be purchased by the hundred or thousand yards, it adds a very considerable item to the capital account. Then, again, the fowls clean and manure the land, which is a specially valuable thing after ploughing or harvesting, and we know farms where the birds are kept on the pasture land during the early part of the year; but, as soon as the hay, corn or root crops are off, the houses are immediately moved thereon, and kept there as long as possible. On one farm we are acquainted with, the fowls are allowed to wander about among both corn and root crops, as soon as the plants are

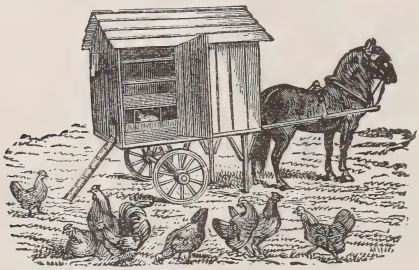


Fig. 6.—Poultry House for Farms.

about twelve and six inches respectively above the ground; and the owner informs us that the injury done is really nominal, whilst the benefit is very great. Fortunately, the time of year when the number of birds is greatest, is during the late summer and early autumn, when the land is most at liberty, and thus the poultry do not hamper or hinder the other work of a farm. Finally, there can be no question that birds kept in movable houses are hardier, thrive better, and lay better, than if in confined spaces; but, of course, there are some disadvantages, such as risk of the birds laying away, additional labour in feeding and attendance, and, in some districts, danger of

foxes. The two former can be overcome without difficulty, and the latter only needs greater care and watchfulness to be exercised, with the fastening up of the birds at night.

With such a plan as we have suggested, we are certain that there are few farmers who could not find room for one of these houses to every five or ten acres of his occupation, and the cost would very soon be repaid. The benefit would be great, and touch the part where every one is susceptible, namely, the pocket. We are not speaking from mere theory, as we know several instances where the fowls are a profit, both indirectly through the benefit to the land, and directly in actual cash. Houses can be built to hold about twenty-five fowls for $12 each, or to hold about fifty fowls for $20 to $25 each, without wheels; or with wheels, which must be broad and large to prevent their sinking in the ground, for a few dollars more; or, sometimes, various things can be adapted at even a less cost than this. We have seen old carriages, railway cars and many other things adapted to the purpose, and in one instance read of a number of old showman's vans being so used, and very successfully too.

It will have been seen, from what we have already said, that we believe in poultry farming more as an adjunct to an ordinary farm, than as a separate business, with land devoted to it, and to nothing else. But in some cases, there may be ground at command, just sufficient to keep going a fair number of fowls, and then it is imperative to make the best possible use of it. If rent has to be paid, anything which can be done to help the paying of it, will be a great assistance to making the concern profitable, and at the same time do away with the temptation to overcrowd the ground—a certain cause of disease and consequent loss. This, we believe, can best be done by the planting of fruit trees, which may not be a new suggestion, but it is one which

has not been brought very prominently forward of late. That it is a good suggestion few will be prepared to deny, for birds in a state of nature find all the protection they need in trees, as there are no houses or sheds to shelter them. But, of course, they are not restricted, and can keep themselves warm by exercise, whereas those that have not this liberty must have some artificial protection; and the plan of putting birds in open runs, where they are restrained by wire fencing, without any corner to which they can retire, so as to be out of the reach of wind and weather, is foolish in the extreme, and we cannot wonder the birds do not thrive at all well.

It is best as a rule, when planting runs in this way, to use large fruit trees, such as apple, pear, plum, and, in suitable places, cobnuts. These are generally regarded as a source of profit in themselves, for land is given up to them alone; but, when this is so, they are nearly always planted too closely to suit poultry, at least in wet weather, and thus ordinary orchards cannot be looked upon as more than occasional or extra runs. If there are these near to where the poultry are kept, they will be a great boon, as in such places there is an abundance of insect life, which is highly beneficial to the birds. They also provide shelter during very hot weather, and protection from storms, the chief drawback being that a closely-planted orchard or wood is nearly always damp, and therefore not suitable during the winter and late autumn.

We have recommended the planting of large trees, but as they take a few years to get into full fruit bearing condition, and cannot be easily removed, some may prefer to use bushes, such as gooseberry or raspberry. These afford a capital protection, as they are low, and thick near the ground, which is not the case with large trees. They, however, have one disadvantage, and that is, the birds pick off the fruit when they

are in the runs. A capital plan we recently saw adopted, was to lay the runs out in wide strips, say, about one hundred feet long and fifty feet wide. Between these the various bushes were planted, of course being separated from the fowls by wire netting. Here, the plan adopted, was to let the fowls run on the ground for two or three years, then transplant the bushes into the runs occupied by them, and give the birds the strips where the bushes had been. This doubtless would involve considerable trouble, but not so much as might be imagined, and the bushes got the benefit of the well manured, and the fowls of the clean soils. Some such plan as this, or the protecting of the bushes by tanned twine netting during the fruiting season, is necessary where small fruit trees are planted. Or, if there is plenty of shelter from other trees, runs which had been occupied by poultry for two or three years, could be planted with strawberry plants, fresh runs being given to the birds, and, we venture to say, that the quality and quantity of the fruit on the former, would lead to a still further extension of the system. The benefit, as we have already hinted, will be twofold. Not only will the profit from the fruit, which can easily be made to almost if not more than pay the rent, but the land will be thus kept perfectly pure and sweet, and consequently there will be much less risk of disease among the stock.

It is not necessary for us to go into any details as to the methods of planting, the number of trees per acre, and the kinds of trees to be chosen. These can easily be obtained elsewhere; but our readers having received the suggestion can adapt it in their own way. The plan can doubtless be considerably developed, and other things found to help forward the same end, if brains are set to work. For instance, in a yard where the pens are divided either by wood or wire, the appearance of these can be greatly improved by planting creepers about them, and for this purpose there is nothing

better than the ordinary scarlet runner beans. Near large towns or fashionable watering places, rose bushes would be a source of profit, as both buds and flowers find a ready sale; but each poultry-keeper must consider what will best meet the demands of the district, and what will suit his place, and the soil at his command.

CHAPTER VIII.

CHICKEN-HOUSES.

Early Chickens—Position of Chicken House—The Attendant's House—Gravel and Grass Run—The House—Floor—Provision Against Rats—Size of House.

In all large poultry yards, especially where it is intended to hatch early broods, a special chicken-house is required; and when we have described how it is to be built, then we have done with the subject of houses. The object of having a chicken-house is that the early birds may be protected from the bad weather generally found in the beginning of the year, and, when properly built, they can be kept indoors, if necessary. Consequently, such a house must be large and roomy; but, as it can also be used as a hatching-house, there will be no waste of space in it. If the birds are crowded they will not thrive, and in building, this must be borne in mind.

The position of a chicken-house must be facing south, south-west, or south-east, and to this rule there can be no exception whatever, as it is an essential that early in the year, when the sun's rays are few and far between, all of them be gathered into the house; for loss of this heat means more difficulty in rearing. Wherever possible, the back of the house should be a brick or stone wall; and, if there is any measure of certainty about the occupation of the place

upon which it is built, it will be worth the cost of building such a wall, if there is not one already which can be used. Of course, if the wall of a dwelling-house, stable, or cow-shed is available for such a purpose, so much the better; but upon no account must the aspect of the house be altered, even to obtain the benefit of a warm wall. Heat of this kind is good, but the sun's natural heat is far better; and for early chicks the latter is absolutely indispensable. If both can be obtained, well and good; if not, let the one we have indicated be taken in preference. Whenever possible, it is well to have the chicken-house as near to the dwelling of the attendant as possible. In a plan of the yard of Sir Henry Thompson, near Hampton Court, which appeared in one of the Poultry Journals, we noticed that the chicken run is directly in front of the poultryman's cottage, the house being only a few steps away. Of this we heartily approve, as the birds require very great attention during the first weeks of their existence; and, if the attendant has a considerable distance to go to them, he will be unable to give them the same amount of care, as when they are close at hand; whereas, if only a few steps away, he will often go, even though his presence by strict rule may not be absolutely required. As far as possible let labour be saved, and the saving will be far more than repaid.

It will be necessary, in selecting the site for a chicken-house, to arrange it so that there may be a good-sized run in front. The object of this is, not so much that the birds in the chicken-house may have plenty of space, when they are allowed to run outside, but that later on in the year, say in April and May, when the coops are placed outside altogether, as they should be, after the birds are a few days old, there will be room enough for them. This, we believe, to be a much better plan than scattering the birds all about the place, as, when the latter is done, they are not sufficiently under the

eye of the attendant. A quarter of an acre will be sufficient upon which to rear a couple of hundred chickens; and, perhaps, if more than this number is to be hatched, it will be well to divide both the house and run, giving a quarter of an acre for every two hundred birds. We do not mean that two hundred chicks with their mothers can be kept on this amount of ground at one time, for that would be crowding with a vengeance; but, as the older ones are deserted by the hens, they will be drafted off into other houses, and younger ones be coming on; so that probably there will be seldom more than fifty to eighty upon the ground at one time, and this only during four or five months of the year. One-fourth of the ground—that immediately in front of the house—should be laid in gravel, and the rest be in grass. The nicer and smoother the latter is, the better for the birds; and upon no account must the grass be allowed to grow very long, or the chicks, in wandering about it, will get at times damp and wet, and the result be disease among them. Many ladies who keep fowls upon a fairly large scale, place the coops out upon their lawns during the spring, and as the grass is kept short, the ground, generally drained, and in a sunny place, the chickens thrive well. No harm, but a considerable amount of good, is done to the grass, as the manure enriches it very much. We know poultry yards, where the grass in the chicken-yard is as carefully cut and rolled, as a lawn can be; but this is where feather-footed exhibition birds are kept.

The house itself will best take the form of a long and rather narrow shed. It need not be more than eight or ten feet wide, and any additional ground space had better be put into the length than the breadth, as there is in this way a larger frontage for the sun to play upon. Where it can be done, we prefer the slope of the roof to be to the back; the chief objection to this being, that if the back wall of the

house is of brick or stone, and only the height of the roof there, the roof itself presents a large amount of space for the north and east winds to play upon, so that unless it be very substantial the house will be greatly chilled in consequence. If the back wall is higher than the roof, then a spout will be needed to carry off the rain ; and the joint between the roof and wall will have to be very well made, or the water, and snow especially, will find its way through, and thus make the inside of the house damp. Another object in having the house this shape, is, that nearly all the front—that is from the roof to within a foot of the floor—should be of glass, the same as in an ordinary green house ; for, by this means, the birds inside will receive benefit from the sun, though it may shine only for a moment or two, and at the same time be effectually protected from the weather outside, no matter what it may be. Even on a winter's day, when there is no sun at all, a house facing the south, having a glass front, with a substantial back wall, will be many degrees warmer than one facing the other way; and birds will be quite comfortable in it, whilst they would be chilled and miserable in the other. If it is not thought advisable to have the slope to the back, but the other way, then the front must be of glass, as already stated ; and it will be as well to have glass windows (about three feet square) in the roof, at the lowest part of it, divided by, say, three feet of the roof itself, so that in a house twelve feet long there would be two windows in the roof. If the house faces south, a window can be inserted in each end, near the front ; if south-east, in the western end only ; and if south-west, in the eastern end only. Portions of the front of the house should be made to open, so that in fine weather the birds can get in and out quite easily. A large door will, of course, be wanted ; and it will be worth the extra cost to have water spouting put round the roof, as thus the drip-

pings from the same will not fall on to the birds, nor yet saturate the ground in front of the house.

The floor of the house should be dug out to a considerable depth, especially if the soil is at all clayey in its nature, and filled in, first with a few inches of rubble stones, and then levelled up with dry sand. If rats are troublesome they must be guarded against, or they will make great havoc with the chicks, as we have known them carry off fifty —even taking birds from under the hens—within a very few days. Two most effectual plans can be adopted, either of which will prove a sure protection. One is to get a large number of bottles, or thick glass of any kind, and break them up into moderate sized pieces, so that the rubble stones will be almost covered. The other is to get some very strong wire netting, not larger than three-quarter inch mesh, and lay this over the stones, bringing it up the sides of the house above the ground. Either of these must be done before the sand is put on, which can then be spread on as before described, and a sure preventive will be provided against the destructive rodents. The wire netting will only last about three or four years, as it then gets rotten; but the glass will not be affected in that way, and is probably both cheapest and best. A floor made in this way, supposing that the sand is about twelve to eighteen inches in depth, is warm, clean, and not easily contaminated, but it will require to be raked over every morning and all droppings removed, to be dug over twice or thrice each season, and be renewed every year or two. Sand is, however, inexpensive in most places, and hence there need be no bar to its use.

The hatching boxes and coops are placed on the sand (these are described in the chapters on hatching and rearing), and it is well to have a shelf at the back of the house, say about $2\frac{1}{2}$ or 3 feet above the ground, under which the boxes and coops, can be placed; this shelf can be

used for many purposes, such as for an extra row of hatching boxes, for a row of pens, if exhibition is to be attempted, and for surplus birds, or for a place upon which to keep coops and other things, when not in use. The size of the house is a question which must not be ignored. For a yard where a couple of hundred chicks are to be reared, that is, if many early ones are required, it should be twenty-four feet long by ten feet wide. In height it should be seven feet at the highest point, sloping down to three or four feet at the lowest part of the roof. If made of wood it must be kept well whitewashed inside, and painted or tarred outside, and have proper arrangements for ventilation. As the house will probably be needed in bad weather, the ventilating traps should be made to open and close, as suggested in the chapter on Building Poultry Houses. This done, the chicken house will be all ready for its inmates.

CHAPTER IX.

THE KIND OF FOWLS TO KEEP.

Choice of Breeds—Errors in Selection—Cross and pure bred Fowls—Breeds to be chosen—Confinement or Liberty—Hardy Breeds—Non-sitting Breeds—Table Fowls - Sitters and Mothers—General utility Fowls.

BEFORE commencing to describe the many varieties of fowls, it is necessary that we should show what kinds should be kept by different persons. Success in poultry keeping means, not only the proper feeding and management of the birds, but the selection of a breed that is suitable to the place where they are to be kept. In addition to this, the question of what is most in demand must be taken into consideration, for in poultry keeping, as in every other pursuit, opportunities must control circumstances, and circumstances adapt themselves as far as possible to opportunities. It would be folly for any one to select a breed that is most suitable for table purposes, in a place where eggs are wanted and chickens at a discount, or, on the other hand, to keep laying fowls, where chickens are sought for most of all and eggs very plentiful. And it is equally foolish to rear birds of no breed whatever, which, having no special characteristics, are neither suitable for one purpose or the other. This is a most important matter, and, as an illustration of the mistakes often made in this way, we may mention that we once knew a poultry farm commenced under most favourable

auspices, situated within a short distance of a large manufacturing town, where eggs could be sold in any numbers at high rates. The ground laid out for the farm was in many respects very suitable, and the houses and runs designed with a considerable amount of skill and foresight. The owner, however, who was thus careful in almost everything else, suddenly became negligent when he began to stock his yards, and, instead of buying a few birds of a good laying breed and breeding from them as many layers as he required, he went into the market and bought some hundreds of hens, paying no regard whatever to age or breed. It is true that he got them at a less rate than he could have bought pure bred stock, and he began to get returns from the sale of produce at once, which he could not have done had he bred his stock. But the returns were miserably small, the bulk of the hens soon wanted to sit, and more hens were bought in order to supply the demand for eggs, disease crept in through overcrowding, and the balance-sheet showed a very decided margin on the wrong side. Disheartened and disgusted, the owner soon turned up the whole affair, a sadder, a poorer, though perhaps not a wiser man. Such instances as these could be multiplied to almost any extent, and it has probably been more due to want of knowledge or thought, that the idea has taken root that poultry-keeping does not pay

There is an idea very prevalent, that cross-bred poultry are much more profitable to keep than pure bred ones, and, whilst there can be no question that it is a decided advantage to cross certain breeds one with another, in order to obtain specific results, that is, of course, if the crossing is scientifically and skilfully performed, having an end in view, this is altogether different to the breeding of mongrels, which is so common. In the former case there is method, in the latter there is none, and it is to this indiscriminate crossing that we owe the present degenerate races of farmyard or barn-

door fowls, small, subject to disease, poor as layers, equally as useless on the table, and certainly neither profitable nor creditable to the owner. The first cross may be useful, if properly made, but, it has been found as the experience of many, that if these are bred from, the progeny deteriorates, both in fecundity and size with every generation. This is a matter deserving fuller consideration, which shall be given at the proper time; but, we have mentioned it now, so that it may be understood that when we speak of cross-bred fowls, we mean the first cross only. Others we shall designate by the only term they deserve—mongrels. The basis of every yard should be pure-bred stock, but where there is room, these should only be used for breeding layers or table fowls. If only a few can be kept for home consumption, then we should advise that crossing be not attempted, but only pure-bred birds kept, unless there is some means of getting the cross-bred ones at a reasonable price, with the certainty that they are as represented.

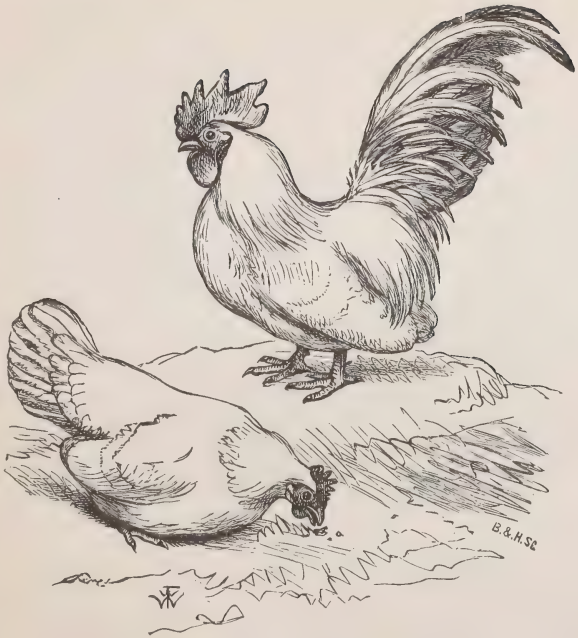
Perhaps the consideration we must deal with first of all, is the kind of soil upon which the birds are to be kept, as this will have a great deal to do with the kinds of birds that can be kept thereon. Any birds can be kept on a dry, sandy, chalk, or gravel soil, upon which they will do well; but there are many breeds which never thrive where the ground is cold, damp, or clayey. On wet, low-lying lands, we should strongly urge that no poultry be kept at all, except it be ducks or geese. These will do well in such places, and as there is always a demand for water-fowl, and at good prices, a considerable profit can be made where fowls would entail a heavy loss. We regard duck breeding as one of the most profitable portions of poultry keeping, and are surprised that more attention is not paid to it. Upwards of $100,000 is paid annually to the cottagers in the vicinity of Aylesbury, England, for ducklings, and they have no more

advantages or opportunities than are to be found in many other places.

As we have already stated, any breed can be kept on a dry, sandy, chalk or gravel soil, and those who have this advantage are unlimited in their choice of a breed. But on the clay this choice becomes at once restricted, and we should advise that in such a place the following breeds be altogether avoided ;—Dorkings, Spanish, Polish, Crèves, and La Flèche ; and, we may add, that it will be found Minorcas, Leghorns, Houdans, Brahmas, Langshans, Game, Andalusians, Plymouth Rocks, Wyandottes, Orpingtons, and Cochins will be best able to stand such a soil.

The next point to be settled is whether the birds are to be kept in confinement or given their liberty, because this is a very important consideration, as there are some breeds which never thrive unless they can have a large amount of space given to them. The worst of all in this respect is the Hamburgh, which scarcely ever does well in a confined space, and after it we must place the lighter varieties of the Spanish tribe. The hardier of these, such as Minorcas and Leghorns, are often successfully kept in small runs, but of course thrive better when they can have a reasonable amount of liberty. We need hardly say that every breed does much better when it has freedom than when cooped up, and it is a mistake to expect eggs to be very plentiful without liberty, except by very great care and attention ; and hardy chickens are scarcely to be hoped for in the small miserable pens so often devoted to breeding stock. Those who wish to keep about half-a-dozen fowls, simply to supply eggs for their own tables, may do so in a small run, but they must not feed them too well, or internal fat will ensue, and this will stop the laying as well as bring on disease. The birds so confined should never be bred from, and it will be found advisable to kill them off when about twenty-seven

CREVE-CŒURS.



JAPANESE BANTAMS.

WHITE BANTAMS.

months old. For such places as these we should recommend Minorcas, Leghorns, Houdans, Plymouth Rocks, or Wyandottes, the first three of which are non-sitters.

The majority of poultry-keepers have eggs as their primary object, and where this is the case they will do well to select one of the non-sitting breeds, for, not only are these the best layers, but they give no trouble in the way of wanting to incubate. Many are the sorrows of a poultry-keeper whose hens want to sit when he desires eggs, and it is hard work conquering a determined bird of this kind. These non-sitting breeds are Hamburghs, Minorcas, Leghorns, Scotch Greys, Redcups, Andalusians, Houdans, Spanish, and Polish, which are here given in rotation according to their laying powers. The Hamburghs lay small eggs, too small for ordinary market purposes, and the Spanish and Polish are rather delicate, so we should recommend that the choice be restricted to the other six varieties, which, whether they be kept pure or crossed will be found first-rate layers of good-sized eggs. They are also very hardy, and can be kept successfully in nearly every place, unless it is really a wet one. We do not recommend to have more than two laying breeds, but where there is sufficient room we should certainly advise two, as they can then be crossed one with the other, if that is thought desirable.

Coming now to those breeds of domestic poultry which are specially characterized for their table qualities, and which should be kept where there is a demand for dressed fowls, for in time quality must tell, we cannot but place at the head the Game variety, though they are rather too small for ordinary market purposes. Then come in rotation La Fleche, Dorkings, Creve-cœurs, Houdans, Langshans, Plymouth Rocks, Wyandottes, and Orpingtons. These are much larger than the Game, and will be found to excel any other breeds for quality of flesh. The Game crossed with

Dorking has been stated to have the smallest amount of offal, to be very deep in flesh on the breast, and is a cross which can be highly recommended.

In all large yards it will be necessary, unless the artificial method of hatching is adopted, to have a sitting breed, and as the table varieties are nearly all good sitters, one or two can be chosen to serve both purposes. Some breeds do not make good mothers, and others, such as the Cochin and Brahma, though the maternal instinct is very great in them, are so clumsy that there is great danger of their crushing both eggs and chickens. The best for this purpose are Dorkings, Games, Dominiques, Plymouth Rocks, Langshans, Wyandottes, and Orpingtons, or amongst cross-breeds the Brahma-Dorkings. Thus there will be no difficulty in selecting a breed, which will prove first-rate mothers and good table birds.

In more limited yards, where there is not accommodation for more than one or two breeds, and it is desirable to have such as are both good layers, table fowls and sitters, we should recommend Plymouth Rocks, Langshans, Wyandottes, or Orpingtons, or if sitters are not required, then there is no better breed for the purpose than the Houdan, which has been described as "one of the best fowls for ordinary purposes that we possess." We have thus rapidly shown the varieties of useful fowls, with the qualities for which they are noted, but in describing the breeds themselves we shall enter more fully into the questions here only touched upon.

DARK BRAHMA HEN.

DARK BRAHMA COCK.

CHAPTER X.

THE BREEDS OF POULTRY.

Andalusians—Aseels—Bantams — Brahmas — Cochins — Dominiques — Dorkings—French—Game—Hamburghs—Indian Game — Langshans — Leghorns — Malays — Minorcas — Orpingtons — Plymouth Rocks — Polish — Scotch Greys—Spanish—Silkies—Wyandottes.

We shall now proceed to briefly describe the various breeds, together with their leading characteristics, so that it will be easy to decide which varieties will be most suitable to the place where they are to be kept, and to the requirements of the poultry keeper. We shall put them in alphabetical order for easy reference, and do not intend to go into long descriptions, which can only puzzle the reader, but will content ourselves with a few particulars. Nor do we think it necessary to do much more than mention those breeds that are purely fancy, for, though perhaps very beautiful, they are of no use for commercial purposes. The illustrations of the various breeds we give are very correct representations, from which the reader will have little difficulty in recognizing them when seen. We would, however, advise the reader who wishes to see for himself the various breeds, to visit some poultry show, as he will then be able to verify and confirm his own ideas on them.

Andalusians.

This is one of the leading varieties of the Spanish group, and is sometimes known by the name of Blue Spanish. The

appearance of all this group has been well described as follows:—A close, compact, smallish-sized body, placed upon legs of a good length; the neck rather long, with a fine head; a large, upright-single comb in the cock, and in the hen also large, but falling over on one side: and the cocks have large sickle-shaped tails. Of course the colour of plumage, legs, &c., are different in the several varieties, but the general appearance is as here described.

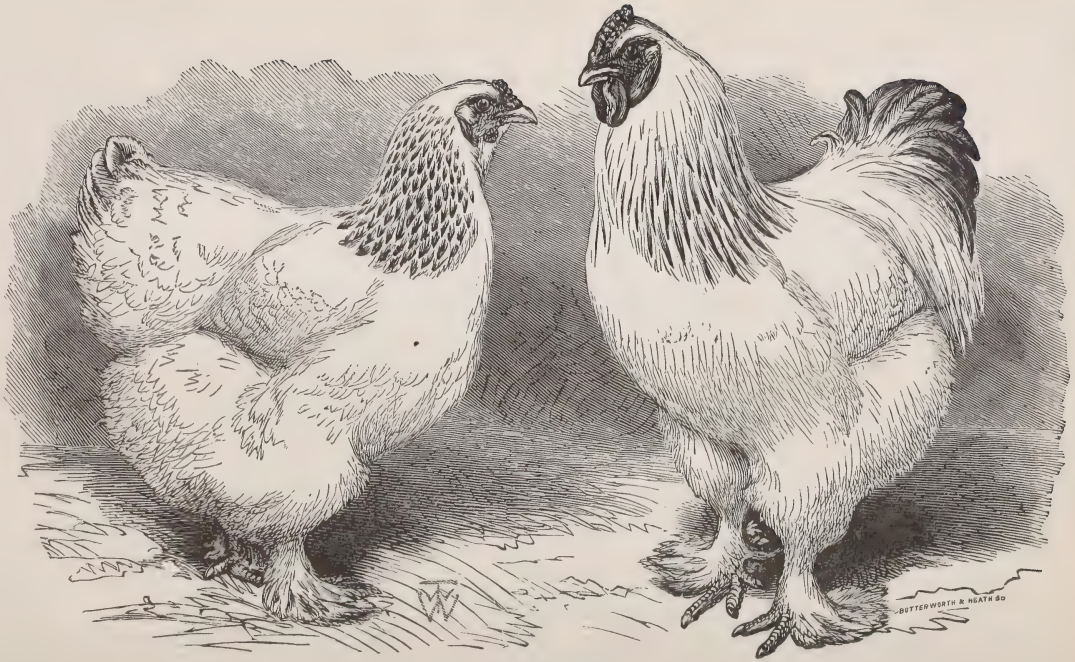
In Andalusians the plumage is slate-coloured, but on the cock's neck and back it is dark purple or nearly black. The birds are of a good size, are prolific layers of large white eggs, are precocious as chickens, very hardy, bear confinement well, are fair table birds when young, can be kept on all fairly dry soils, and are non-sitters. In selecting birds attention should be paid to size, to erectness of carriage; and any white on the face, which ought to be red, should be avoided, as this indicates a cross with the black Spanish.

Aseels.

These are Indian game cocks, used in that country for fighting purposes. They are good in flesh, but very poor layers, and so savage that they are not to be recommended, and, therefore, we need not say more respecting them.

Bantams.

The number of varieties of Bantams is very great, and as we anticipated in our first edition, the list is constantly increasing by the addition of new breeds. As a rule they are simply small specimens, though in some cases some differences can be discerned. We only give illustrations of two varieties, the white and the Japanese, as all Bantams are purely "fancy" fowls, being popular



LIGHT BRAHMAS.

chiefly because of their beauty, and that they can be kept in places where large fowls cannot, as well as from the fact that they make capital pets. In the Game section there are all the varieties known in large game, and in the other section we find Black and White Rose-combed, Gold and Silver (or laced) Sebrights, Japanese, Cuckoos, Pekins, Brahmas, Malays, &c., but as they have no commercial value we need not do more than mention their names.

Brahmas.

One of the most prominent of the breeds of poultry is the Brahma, and from an exhibitor's, or a fancier's point of view, once the most valuable. Two hundred and fifty dollars was no uncommon price for a really first-class bird, and eggs from certain strains were almost literally worth their weight in gold; but there has been a great decline in recent years. It is undoubtedly a manufactured breed, and for some years there was a great controversy as to its origin. At the first it was not very attractive in appearance; but this was in time remedied, and of late years it has been so carefully and skilfully bred, that its characteristics are firmly fixed and clearly defined. It is chiefly valuable for its great size and hardiness, and for laying well in winter, although the eggs are often small and disproportionate to the size of the fowls themselves, but they are rich in quality, next in this respect to cochins. They are buff in color, and with many purchasers this is a decided attraction.

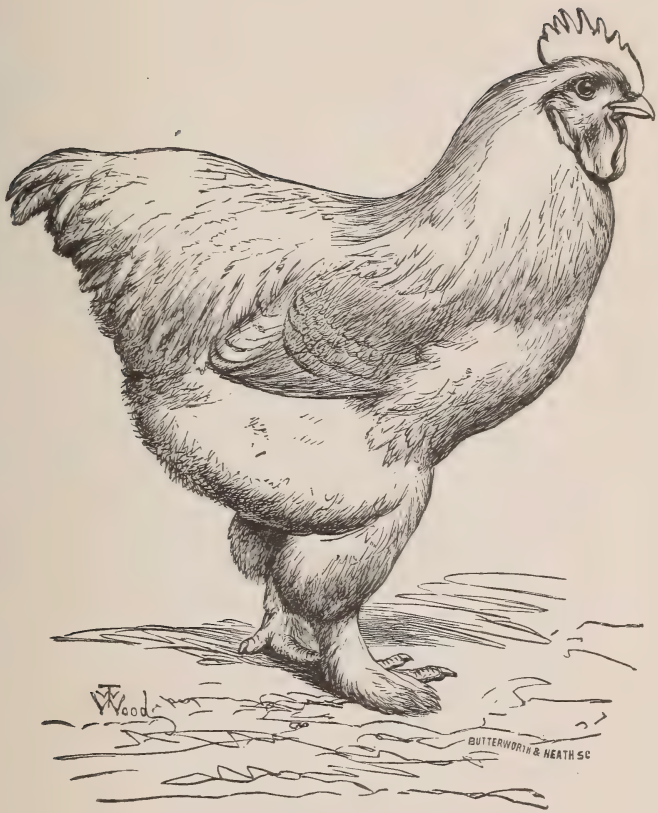
Brahmas cannot be regarded as first-class table fowls, so far as quality of flesh is concerned, having the flesh laid more on to the legs than the breast, which is always a disadvantage; but when they are young they are by no means to be despised, especially when their size is considered. For a family fowl they are unequalled, and a large Brahma

chicken is sufficient for the dinner of a moderate sized family. For crossing purposes they are very useful, when table fowls are in view, and we shall have occasion to recommend them for that purpose.

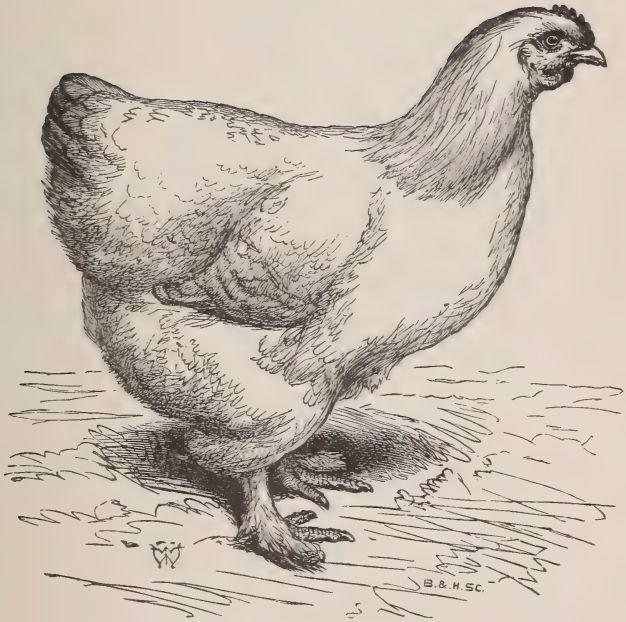
There are two varieties of Brahmas, the dark and the light, of which we give three illustrations. Both of these are alike, save in colour. The shape of a good bird is most pleasing, as they are well-proportioned and very handsome; the heavily-feathered legs, the deep massive bodies, the neat heads, with small pea-combs, all combine to complete the effect. They are capital sitters and mothers—though when old, rather clumsy and heavy for this purpose, are very docile, can be kept on almost any soil that is not absolutely always wet, are fairly good as layers, and whilst they should have a fair amount of liberty they do not require very extensive runs, and can always be kept within bounds by a three-foot fence.

Cochins.

At one time this was the most popular breed of all, and there are many now living who can remember the Cochin mania of thirty years ago. Fabulous sums were then given for both eggs and chickens, sums which are not exceeded by the high prices now obtained, and poultry shows were at that time crowded by the fashion and beauty of the period, and were mines of wealth to the promoters. It was expected that the hens would lay two or three eggs a day, and many persons invested their money in them in the hope of thus making a fortune. But the breed was never worth the fuss made about it, and soon subsided into the background, so far as its commercial qualities were concerned. Cochins somewhat resemble Brahmas in shape and appearance, but have more abundant feather, and are rather rounder. They are fairly good as winter layers, but



COCHIN COCK.



COCHIN HEN.

in the spring and summer are so continually broody that very few eggs indeed are obtained from them. In fact, they are the most inveterate sitters of all fowls, and on this account cannot be recommended; for sit they will, and when they will, choosing all kinds of unlikely articles if they cannot obtain eggs. They are clumsy, and often break the eggs, or crush the chickens given to them. They are very hardy and easy to rear, can be kept on any soil, are very docile, but make poor table birds, except so far as size is concerned, having coarse flesh and large bones. We give portraits of a fairly good pair of buffs, though the best exhibition birds are now bred higher in the tail and with more leg and footfeather than is here represented. There are four colours—buff, partridge, black, and white—all of which are very handsome, and look well in a show pen, or on a lawn, where appearance and not utility is looked for. But as commercial fowls they are of no use whatever.

Dominiques.

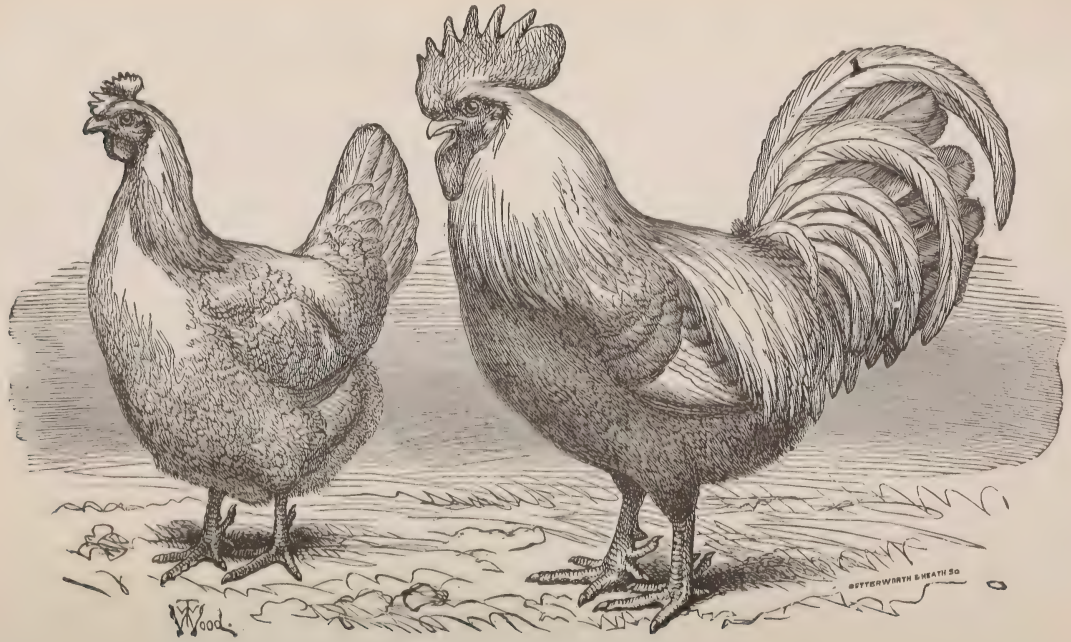
These are birds of American origin, and resemble Cuckoo Dorkings in shape and in some other respects, but have a rose comb. They have yellow legs, are very hardy, will thrive on almost any soil, are capital layers, fairly good table birds, good sitters and mothers, making altogether a most useful breed for general purposes. They have not, however, come into anything like general favour, and therefore are not very easy to obtain, but would, we think, amply repay any one who took them up.

Dorkings.

Dorkings and Games are, perhaps, the oldest and best preserved of all the English pure-bred fowls. The general

characteristics are, a square-shaped body, with a quiet stately carriage, the breast being put well forward. Some varieties have a single, and others a rose comb, but in all cases the head is large, yet neat. The wattles are large and pendant; the neck is short, taper and with full hackle; the body is large and deep when viewed sideways, almost forming a square; the breastbone is deep, the back broad, the tail full, and the thighs large and full; the legs are white in colour, straight, strong, and clean, have five toes; and the whole frame is large. Full-grown cocks weigh 10lb. to 11lb., and hens 8lb. to 10 lb.

This breed is the old-fashioned Sussex fowl, and takes its name from the town of the same name in that county. It has long held the pre-eminent position among English table fowls, and deservedly so, for its white flesh, deep breasts, white legs, and light bones make it one of the best fowls that can be placed upon the table. There are four kinds of Dorkings—white, silver grey, cuckoo, and coloured—all of which are equally good for table purposes, the last named being the largest. In England great size is attained, some cockerels weighing 8lb. to 11lb., and adult birds 10lb. to 14lb., which, unlike some other breeds, is not made up of heavy bones, thick shanks, and fleshy thighs. The great drawback to this breed is its tenderness. Whilst the birds can stand any amount of cold, as is proved by their being so largely bred in the north of Scotland, they cannot thrive in a damp place; and, consequently, unless the ground is of a dry, porous nature, some other breed should be chosen. Good housing and feeding will do much, but even these will not be sufficient on a heavy clay soil, which is always fatal. All Dorkings have five toes, and, as is generally found, this characteristic is generally accompanied by a tendency to "bumble foot," which is an enlargement of the joints there. To obviate this as far as possible, the birds should have low



DORKINGS.

perches and soft floors and runs. Dorkings are not very good as layers, being table fowls first of all.

French.

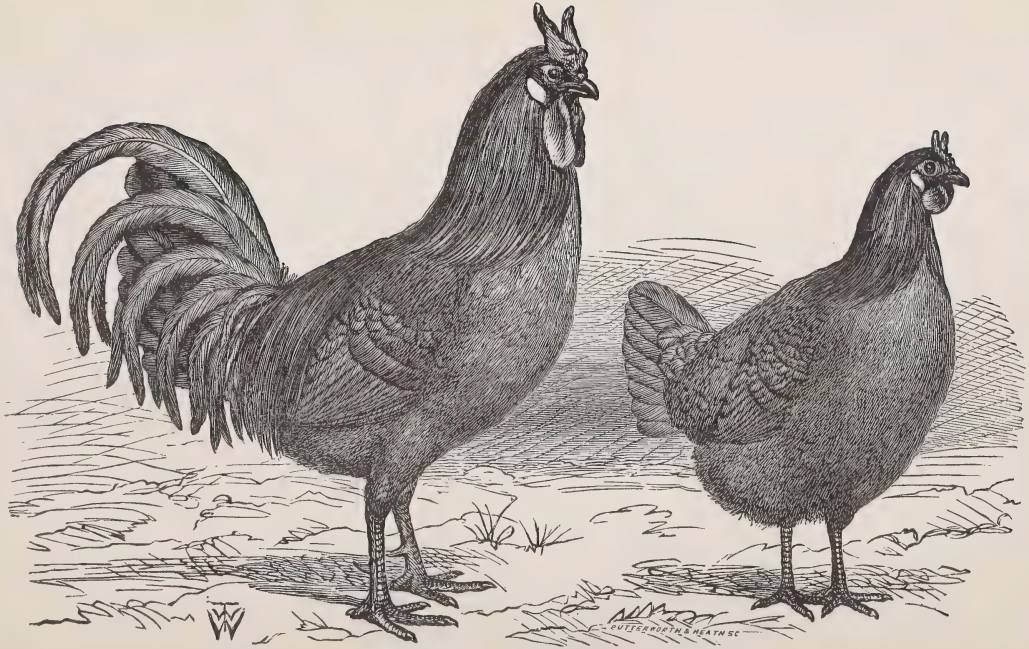
The French people have devoted considerably more attention to poultry than the English have,—at least so far as the economic qualities are concerned, and as a result their fowls are much superior in commercial characteristics, with one or two exceptions, to the English breeds. In all cases they have regarded egg laying and quality of meat before mere feather, but at the same time have bred to certain general standards, and avoided the production of mongrels, which has not been the case either in America or England. Many of the French breeds are remarkable, both for size, quality of flesh, and depth of breast, and, as those of our readers who have been in Paris can testify, are prepared in a much superior manner to the ones at home, and look much better upon the table. Upon this aspect of the question we shall have more to say later on, when our remarks will be more appropriate. Unfortunately, nearly all the French breeds have dark legs, and, therefore, are objected to in many places where there is a prejudice in favour of white ones. But we hope this prejudice will soon die out, and were it not for poulterers and cooks, it would have died a natural death already. They are the culprits in the matter, and if their influence was being rightly used in favour of quality and not mere appearance, their customers would very soon be reconciled to the change, for the legs, in spite of all that may be believed, are no criterion as to the colour of the flesh. We shall now briefly describe the chief French breeds, as known in this country.

The Houdan is one of the most useful breeds we have,

and is now thoroughly acclimatized here. It is especially worthy of the attention of those who have not a very dry or warm soil, but who desire a good layer, and, at the same time, a plump, large table fowl; or of those who have to fight against the black leg prejudice, and yet from the nature of their place cannot keep Dorkings. The breed has undoubtedly been produced in the first instance by crossing, but the same can be said of many of the other breeds, and it is no disadvantage to it, as it certainly breeds pure, and is one of the best farmer's or cottager's fowls we have. As will be seen from the illustration we give, the head has a small crest; the plumage is black and white spangled, the legs are pinky in colour, the fifth toe is present, as in Dorkings, the form is bulky and the size large. It bears confinement well, can be kept on any soil, is very hardy, lays well, its flesh is all that can be desired, and it is a non-sitter. We should not, however, advise purchasers to take birds simply because they have won in the show pen, but get them from some place where Houdans have been kept for years, and bred chiefly for economic qualities. They are then most valuable, and as Mr. Tegetmeier says, they "may certainly be regarded as the Dorkings of France. Large, heavy, short-legged, five-toed fowls, with small light bone, a remarkable absence of offal, and with irregularly speckled or mottled plumage, they strongly recall to mind the old-fashioned coloured Dorking, as it existed before any attention had been directed to uniformity of feathering by the poultry shows. Their merits as table fowl are of the highest excellence. No pure bred chickens mature with greater, or perhaps with as great, a degree of rapidity; they feather early, are extremely hardy, and consequently easily reared. The old birds are robust, and the eggs which are numerous, are remarkable as being almost invariably fertile."

Of all the French breeds La Flèche stands at the head for

HOUDANS.



LA FLÈCHE.

table qualities, and for the great feast of Mardi gras, held in Paris on Shrove Tuesday, it is no uncommon thing for one hundred francs to be given for a pair of these birds, weighing 10lb. each, plucked and dressed. The flesh is beautifully white, and there is plenty of depth on the breast. They feed well, but, unfortunately, have been found in America to be somewhat delicate, at least in damp situations, and where they have not full liberty. It was formerly thought that they were too delicate for England; but in the year 1882, Mr. W. B. Tegetmeier, when over in Paris, was so struck with the table qualities of these fowls that he purchased some for his own use. These he placed in his grounds at Finchley, on the north side of London, where the bed of clay is one of the heaviest in the neighbourhood of the Metropolis. The birds were given full liberty, and his experience has been that they are as hardy as any other breed when so kept. In confinement they are undoubtedly delicate, but with freedom can be kept by almost any one. They are large, tall, well-shaped birds, with glossy, green-black plumage: have red faces, white ears, and a horned comb, the last of which does not add to their beauty, giving them an almost satanic appearance. They are clean legged, the legs being dark in colour, are non-sitters, and in France are specially bred for table qualities.

The Crève-Cœur is a large bird, with metallic black plumage, but of a lower, squarer build than La Flèche. It is also much more attractive in appearance; its head is surmounted by a handsome crest, which, in young hens especially, is beautifully round and pleasing. The legs are also black but the flesh is almost equal to the best English or French fowl. It is hardy, easily reared on any moderately dry soil, is a non-sitter, and a fairly good layer, but the eggs are small. It is necessary to have a good shelter for Crèves, so that they can be protected in wet or cold weather,

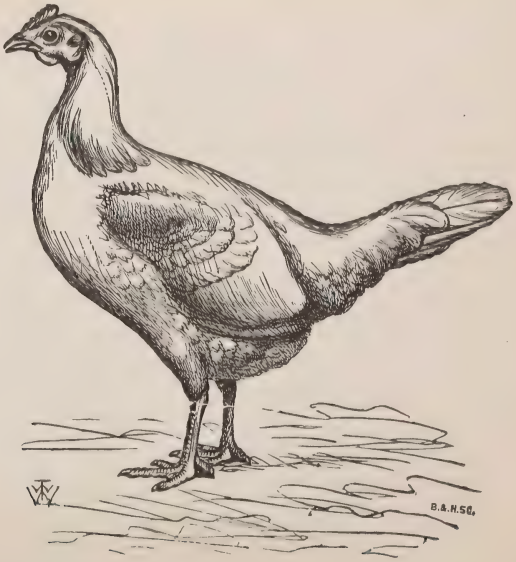
as they are rather liable to colds and roup if the crests get wet; but for this they would be oftener kept than they are.

There are, in addition to the breeds already named, several others, such as La Bresse and Courtes Pattes, but as these have no special characteristics more than we have already named in the others, and are not very easily obtained in this country, we need not do more than mention them here.

Game.

These are about the oldest of the pure English breeds, and have been bred for many generations with great care and skill. In olden times cock-fighting was a pastime almost national, and was indulged in by both rich and poor. Game fowls were bred for this purpose, courage and endurance being most sought after, and these were combined with great beauty of plumage. Some of the highest men of England thought it no dishonour to breed fowls for this purpose; and important "mains" were regarded with as great interest as are some of the chief race meetings now—this too within the memory of man, for there are many living now, and not old men either, who were accustomed to indulge in this cruel pastime. In modern times a higher standard of taste has done away with cock-fighting, except such as is carried on secretly; but the change has not spoiled this splendid race of fowls, though it is much changed from the old fighting days. Unfortunately, however, the pugilistic nature remains, and for this cause most people are unable to keep game birds pure. For crossing purposes, as we shall afterwards see, they can be utilised; and, as all kinds of games are fair layers, splendid sitters, attentive mothers, have the finest eating flesh of any race of domestic fowl, are very hardy, easy to rear, and can be kept on any soil when at liberty, if this crossing is judiciously done, these characteris-

GAME COCK.



GAME HEN.

cies can be largely retained, without the fear of constant warfare.

The chief kinds of Games are the black-breasted reds, brown-breasted reds, duckwings and piles, all of which are very handsome; and we cannot wonder at the popularity of the breed among those who have opportunities for keeping it, considering its great beauty, endurance and pluck.

The prices realized for high-class show specimens are very great, and over five hundred dollars has been paid for a single cock two or three times during the last few years. Of course good birds can be obtained at reasonable prices; but no one should attempt to keep this variety unless he has plenty of room, and, for those whose object is profit, we can scarcely recommend it except for crossing purposes.

Hamburghs.

First and foremost among all laying breeds of fowls stand the Hamburghs, for they are undoubtedly the most prolific layers we have, and it is no unusual thing for hens to lay 200 to 230 eggs per annum. Unfortunately, however, their eggs are small, and the fowls do not bear confinement very well. They have, from their great beauty, come to be regarded as a fancier's fowl, pure and simple; and whether we look at the cock, with his neat head, beautiful plumage, close compact shape, and sweeping tail, ornamented by a well shaped rose comb, and pure ear lobes, or at the hen, neat and saucy as she appears, rich in colour and sprightly in carriage, we cannot but be attracted by them. As show birds there are five varieties now most recognized, namely, gold pencilled, silver pencilled, gold spangled, silver spangled, and black. Of all these the blacks are the most useful, they being much

larger than the others in body, lay larger eggs, and, either alone, or crossed with some breed that will increase the size of the egg, such as any one of the Spanish varieties, will be found profitable, if plenty of room can be given to them. Hamburghs must have space; if wired-in, a ten-foot fence is necessary to restrain them; but on farms where they are not at all restricted they will do very well. It must, of course, be understood that we are speaking of where they are kept in large numbers, when we say that they must have room. A few birds can easily be kept in a moderately confined place, as is done in hundreds of instances, and some of the very best birds bred every year, both in this and other varieties, are so bred, in places where the fowls have little more than moving room. When they have plenty of room most of the varieties of Hamburghs are hardy, easy to rear, and, as they are non-sitters, make most useful fowls, where the size of egg laid is of less importance than the number.

As already stated, the blacks are the best for commercial purposes, and the silver spangles come next in point of size and hardiness. In selecting such birds for stock purposes, mere show qualities, such as fineness of ear lobe and comb, should be ignored, and size of body, good shape and liveliness of carriage be looked for principally. The larger the fowl the larger the egg, as a rule, and by selection both can very materially be increased. There are other varieties besides those named, such as red caps, creels and pheasants, which lay good sized eggs, and can be recommended equally with the blacks as useful fowls.

Langshans.

About the origin of this breed of fowls considerable contention has taken place; but we have no desire to enter here into the controversy at all. It has only been a very few years

SILVER SPANGLED HAMBURGH COCK.

GOLDEN PENCILLED HAMBURGH COCK.

in America, being first introduced from China through England and vaunted by its sponsors as an entirely new breed; but, as it bears some resemblance to Black Cochins as they were at first, it is thought by many that the two breeds are very nearly allied. There can be no question but that they are vastly different now, resembling each other only in colour; for, whilst the Langshan is a splendid layer and a capital table bird, not too determined a sitter, and a most valuable fowl for general purposes, the other is just the opposite of all these. The Cochin is handsomer in appearance, but that is all. We are disposed to think the truth of the whole matter is, that the Langshan of the present day and the Black Cochin of forty years ago, are, if not exactly the same, very nearly so, but that the latter has been spoiled by the breeding for fancy points alone.

The Langshan is a large bird, standing upon somewhat long legs, which are only very slightly feathered. It has a single upright comb, beautiful metallic plumage, and has much of the Cochin Y shape. In addition to the qualities already named, it is very hardy, easily reared, can be kept on any soil, bears confinement very well indeed, and is a most faithful mother, but, as we have already indicated, not so constant a sitter as is the Cochin. It is, indeed, one of the most valuable additions to our list of fowls that has been made of late years, and its beautiful bright plumage makes it most attractive.

Leghorns.

This is a sub-variety of the Spanish type of birds, which originally came from the shores of the Mediterranean Sea, principally from Northern Italy, where it is the common breed of the country, and is known all over the continent as the "Italian" fowl. Leghorns were brought some years

ago to the United States, and their intrinsic merits soon made them one of the most popular breeds in this country for those poultry breeders who regard utility as of equal, if not greater, importance than fancy points. It was from America that Leghorns were originally taken to England; and although at first they were met with a great amount of prejudice, they have gradually overcome it, and are now very popular indeed. Originally there were but two varieties, the white and the brown, but now there are others, the black, the cuckoo, the pile, the darkwing, and the buff.

The chief characteristics of Leghorns are—a somewhat large-sized single comb, with deeply cut serrations, and the comb itself extending down over the back of the head; long pendant wattles, red face, with white ear lobes, yellow bill, and clean legs of the same colour, the hackles full, and a sweeping tail in the cocks. The body is smallish, but close and compact, and the whole appearance sprightly and pleasing. The comb of the hen is large, and falls over on to one side, in a single fold. So far as colour is concerned, in the whites it is that self colour throughout the plumage; but in the browns the markings are very like brown-red game, though not quite so bright. In the cock, the hackles are golden bay, striped with black; the back red, each feather having a stripe of brighter bay; the breast rich black, standing out full in front; the wings large, of a dark red, striped across with bars of bay and green-black; the sickles long, green and black in colour; and the legs yellow, as we have already stated. In the hen the breast is a light salmon brown; the neck hackle yellow, striped with brown; the back brown, with slight pencilling thereon; and the action sprightly and graceful. The blacks are self colour, and the cuckoos, black and white mixed, the piles and darkwings are as in game, and the buffs have yellow coloured feathers.

BROWN LEGHORNS.

Leghorns are splendid layers of fair-sized eggs, the whites being both the best layers and producing the largest eggs. They are very precocious and hardy (we have known pullets commence to lay at fifteen weeks old, and heard of an instance where the second generation was bred within five months), bear confinement very well, and can be kept almost on any soil, but they are not good as table birds. They are small eaters, and, when at liberty, splendid foragers. For those who wish to produce eggs for market, it is one of the best breeds that can be kept.

Orpingtons.

This breed has been manufactured out of the Langshan, the Plymouth Rock, and the Minorcas, owing most to the first named variety. In fact, it has been called a clean-legged Langshan. There are both single and rose-combed varieties, and the breed has a host of admirers for its splendid economic properties.

Malays.

The Malay is of East Indian origin, and was doubtless at first bred chiefly for fighting purposes. As a commercial fowl it is not to be recommended, for it is not only a poor layer, but also very quarrelsome. It can be used to cross with the Dorking for table purposes, as the meat is very richly flavoured; but, except for this, it is not worth keeping. It is tall, gaunt, and almost ugly, with huge shanks and bones, and a coarse head.

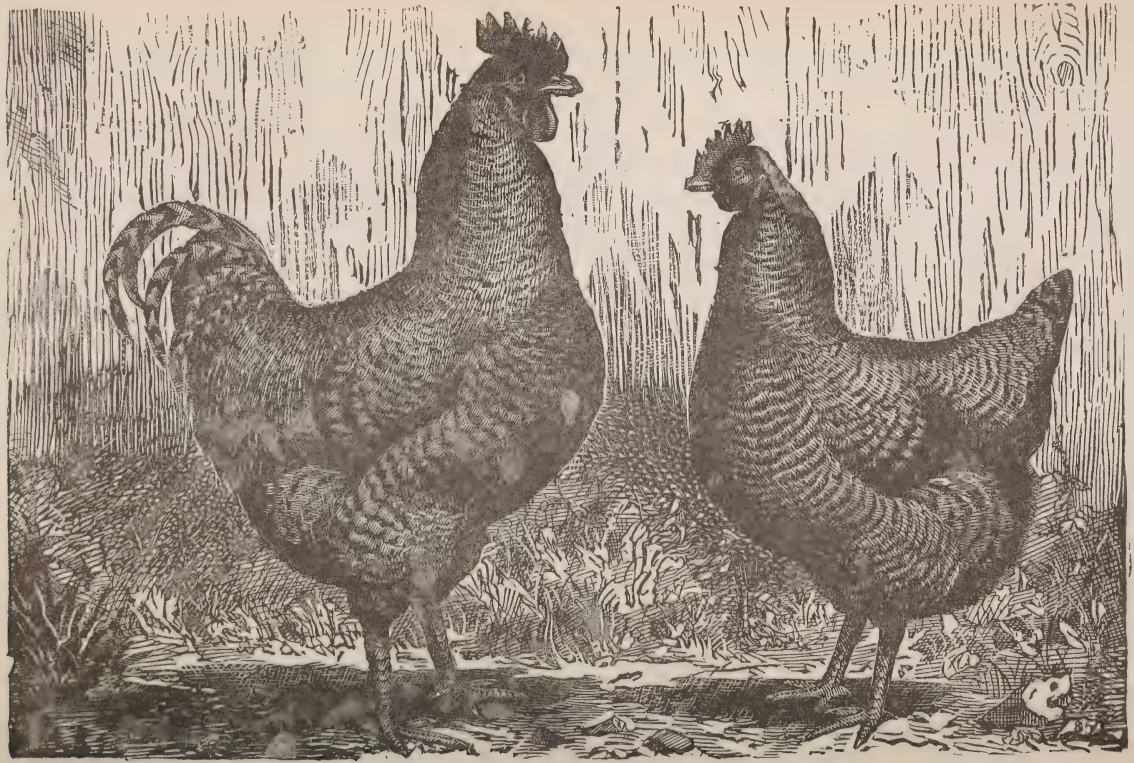
Minorcas.

These form another variety of the Spanish section, and have been carefully bred for very many years in the south-

western districts of England, outside of which, until some years ago, they were scarcely known. But now their great value as layers has made them very popular indeed all over that country, and they have become first favorites in this as well. Nor can we wonder at it, for their great fecundity, the large eggs they produce, their precocity and hardiness, their adaptability for all soils and places, whether confined or otherwise, makes them one of the most useful breeds we possess, and being non-sitters we must give Minorcas the first position among all the laying breeds of poultry.

The Minorcas are in many places known by the name of "Red-faced Spanish," and are the nearest, in shape and appearance, to the Black Spanish of all varieties of fowls. It is probable that the two races were originally one, and that the faces then were red, as the Minorcas now have them; but the Spanish have been bred with white faces, and spoiled by too fine breeding. The shape is not unlike the Leghorn, but the comb is much larger, and there is the red face, the white ear lobes, and the clean legs also. There are two colours, the blacks and the whites, but the latter are very little seen, and the blacks are the ones of which we have been speaking, being really splendid birds. Their metallic black plumage makes them very handsome, and they are for the same reason very suitable for keeping in towns, or in such districts as are not over clean, from the proximity of factories or works of any kind. As layers Minorcas are about the best breed we have at present; they can be kept on any soil, either at liberty or in confinement, are capital foragers, small eaters, and, were we about to commence keeping a large number of fowls on a farm, we should certainly select this as the laying breed, either alone, or to cross with some of the other Spanish varieties.

BLACK MINORCAS



PLYMOUTH ROCKS.

Plymouth Rocks.

This is a variety of New England manufacture, but is nevertheless a most useful breed for general purposes, and is wonderfully popular wherever it goes. The barred variety are cuckoo in plumage, and resemble a Cochin in shape more than anything else, as that variety has doubtless had much to do in the making them. There are three varieties barred white and black. They are large in body, adult birds being of ten and twelve pounds weight; have strong yellow legs; are very good layers, (but the eggs are small, though very rich in flavour); are capital as table birds, with a good supply of meat on the breast; are fairly good sitters and mothers; very hardy, can be kept on almost any soil, and bear confinement very well indeed. Throughout the United States they are great favourites, competing with Leghorns for first position, and are doubtless most useful for general purposes.

Polish.

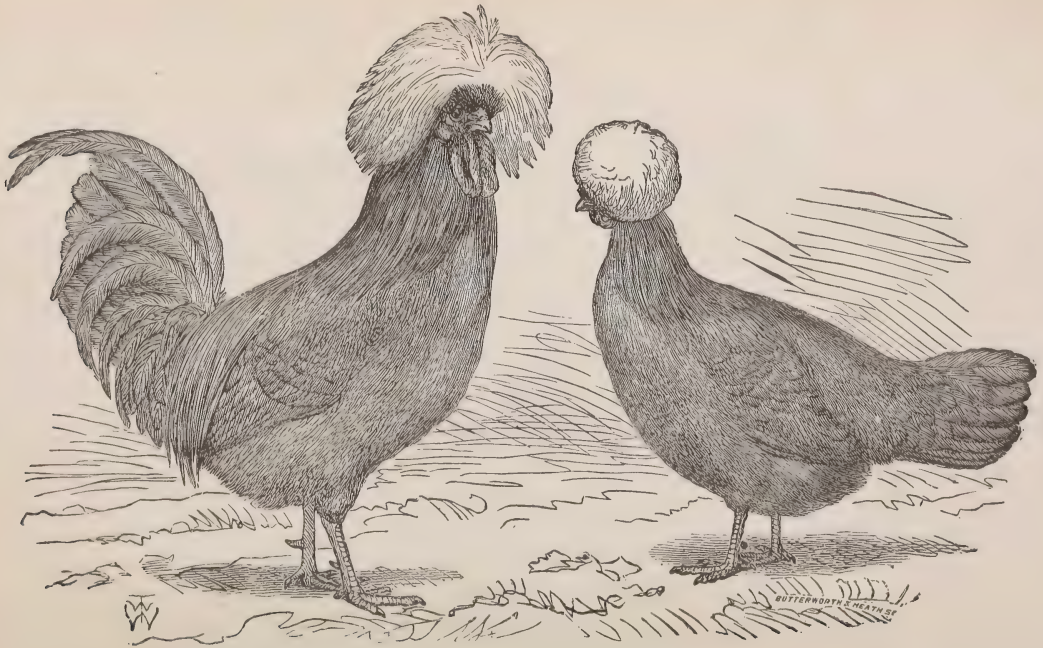
The Polish must be regarded as one of the most beautiful of all the races of poultry, but it is more suitable as a fancy fowl than for commercial purposes. In fact, it is not to be recommended for the latter at all. There are four principal varieties—the gold-spangled, the silver-spangled, the white-crested blacks, and the buff, or chamois, all of which are very beautiful indeed. Polish are of a medium size, with well-shaped bodies, very rich coloured plumage in the coloured varieties, clean legs, sweeping tails, but their chief glory is a large globular crest which surmounts the head. The illustration which we give is representative of a good pair of white-

crested blacks, which is about the most striking of all the Polish tribe. They are fairly hardy, but require to be kept where they can have plenty of shelter in wet weather, for they are very subject to colds and roup. They are good layers and table birds, are non-sitters, and most suitable in dry town runs, where they have not a great amount of liberty.

Although not generally placed under the head of Polish, yet as they are undoubtedly of the same origin, we now mention the Sultan fowl, which has several points in common with the Polish. It originally came from Turkey, and hence its name. The size is small, the plumage is pure white and very plentiful, the head is surmounted by a large crest, with heavy muffs below, the hock and leg feathers are well developed, and the birds are fairly hardy. They are good layers and non-sitters, but cannot be regarded as commercial fowls.

Scotch Greys.

Until a few years ago, very few of these handsome birds were to be seen in England and almost none in America. They have been long kept in Scotland, and the first Edinburgh show we ever visited was a revelation to us, for some two or three hundred birds were there exhibited. They are really a large, hardy, cuckoo Dorking without the fifth toe, and are capital layers, generally non-sitters; are first-rate table birds, hardy, and can be reared on almost any soil, though they do best in dry places. Having white or mottled legs, they can be used both for a chicken trade and as layers, and their economic qualities will doubtless insure them a welcome in many places, where they have heretofore been unknown, and where a hardy and large fowl is specially needed.



WHITE-CRESTED BLACK POLISH

Black Spanish.

This breed was at one time the most popular of all, and certainly merited everything that could be said in its favour, as it was a small eater, a prolific layer of large eggs, and bore confinement very well. But that was before it had been spoiled by the attentions of the fanciers, who, by breeding for fancy points, have almost ruined it; we mean by the foolish development of the white face, which has been at the expense of its stamina and strength. It is still a good layer, but the chickens are troublesome to rear, are very slow in feathering, and the adult birds get through the moult with great difficulty, and it is poor as a table bird. In a few strains, which have not been bred for show purposes, and in which the white face has not been unduly developed, these failings are not so much found, and the birds have all the old strength and value; but these are very scarce and difficult to obtain, and we should advise any one who wishes to keep Spanish for profit, to cross them with the Black Minorcas, as by this means strength will be secured, and without injury to the laying properties. As will have been seen from what we have said, Spanish need a warm, dry soil, and special treatment during chickenhood, and the moulting season. The plumage is bright black, the comb single (erect in the cock, lying over in the hen, as is shown in the illustration), the face white, the tail sweeping, and the legs black.

Silkies.

These are scarcely to be regarded as commercial fowls, but, as they are often used for hatching other eggs, for they are exceptionally good mothers, and as they are of great antiquity, they cannot be regarded as out of place here. They are small in size, have purple coloured faces and flesh of a

similiarly dark hue, but their great peculiarity is, that their feathers are not webbed, as are those of other fowls, but separate, and giving the appearance of a covering of silk or down.

Wyandottes.

The Wyandottes is another new variety of American origin, and one which has won great favor, promising to rival all others in popularity. It is the first large breed to carry the Sebright lacing, for which reason it is a bird of great beauty when in anything like perfection. The Silvers were first introduced, but since then there have also been Golds and Whites, the Golds being very rich in colour, and of a very pleasing appearance. The shape is Asiatic, but the legs are clean, and the comb is rose. It is a splendid layer, an admirable table fowl, and a good sitter and mother.

BLACK SPANISH.

CHAPTER XI.

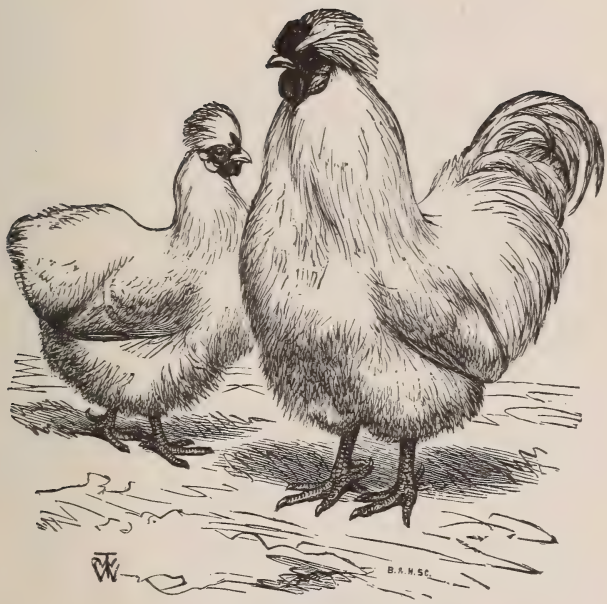
CROSS-BRED POULTRY.

Farm-yard mongrels—First Cross only to be Used—Value of Cross-breeding—Pure bred Fowls to be the Foundation—Sale of Eggs and Chickens—Methods of Cross-breeding—Some Crosses—Improving present Stocks.

CONSIDERABLE attention has been of late devoted to the subject of cross-bred fowls, and the real value of crossing, as well as the lines upon which it should go, have at last been agreed upon. The ordinary cross-bred poultry, such as we see on too many farms, are simply mongrels, crossed and re-crossed; but we do not mean these at all. When we say cross-bred, we must be understood to refer to a cross between two pure breeds, by which definite characteristics are to be obtained. Therefore, in using the term cross-bred, it must be remembered that we mean a first cross only, for if cross-bred birds be bred from, the stock rapidly degenerates, and loses those qualities for which the crossing had been made. It has been advocated by some writers, that, because the first cross is profitable, following ones must be the same; and, in one place, we read that poultry should be crossed "as much as possible, as you cannot have too many breeds mixed." This is simply nonsense, and it has been proved over and over again, that repeated crossing is positively injurious, and that where this system is practised, the birds get smaller in size, weaker in body, and less prolific. Crossing can only be beneficial when it is conducted with skill and foresight, both

of which can easily be attained, by any one having ordinary common sense. If crosses are made without relation to the characteristics of the birds so used, or without due appreciation of what is wanted in the progeny, or, again, simply made for the sake of crossing, then the result can hardly fail to be unsatisfactory.

It will be asked by those who have large numbers of fowls, which they keep for the sake of profit only, and who do not care or who have no desire for pure-bred fowls as such, whether it is better to keep the birds pure or crossed. We certainly prefer the cross-bred birds for profit, but there must be pure-bred fowls to supply the stocks of layers or table birds, and these will have to be mated together in a systematic manner. There are many advantages to be obtained by crossing, the first, and perhaps principal, of which is the greater hardiness of the birds so produced. The tendency of all high-class breeding is to develop some point or quality, which is generally secured only by the sacrifice of others, and thus, as these points or qualities are by no means general, a certain amount of in-breeding must take place; or, the strength and constitution of the animals are regarded as minor matters, and the result is a weakening of the system. A first cross remedies this, but, strange to say, the second generation begins to go back again; and the promiscuous crossing and in-breeding among farm-yard fowls is undoubtedly the great cause of their deterioration. There is a natural law for this, but we have not space here to enter into the details of it. Another great advantage is, that certain qualities can be bred for, which are only to be got in pure-bred stock after many years of labour, and not even then if feather is made the chief point. For instance, Leghorns are good layers, but only moderate table birds. To remedy the latter defect, without injury to the laying powers, if present outward characteristics were to be preserved, would be a long and weary task; but in one year,



SILKIES.

by means of a judicious cross, fowls can be obtained that will retain the good laying qualities of Leghorns, and yet be vastly superior for table purposes. Of course, the distinctive colour and shape would be largely done away with, and, therefore, if this were objected to, such a cross should not be made. As we have already said, there must be a certain amount of in-breeding among pure-bred stock, which naturally weakens the system, and reacts upon the commercial properties of the fowl. For profitable purposes, therefore, we strongly recommend cross-breeds, as they are much superior to the pure breeds, if properly mated. Hap-hazard mating of birds will do no good, but rather the reverse, and there must be an object in view in all that is done, or more harm than good will certainly be the result.

There is yet another advantage in having pure-bred fowls to breed from, and that is, there are many persons all over the country who have room for only a few fowls, say, half-a-dozen to a score, and who only wish to supply their own tables with eggs, and, in a few cases, with a chicken now and again. Many of these have not space sufficient to allow them to go in for breeding, and others only want to rear a very few chickens every year, say, one or two batches at most. Such persons do not care for showing, but at the same time like to have pure-bred fowls. They are generally willing to give two dollars for a good cockerel, and two-thirds as much for a nice-looking pullet; or, when they take a fancy to rear a few chickens, they prefer to obtain a few eggs from another yard, and will pay two or three dollars for a setting of eggs. There are some poultry yards where hundreds of settings of eggs, and hundreds of birds, are sold in this way every year; and we do not see why every farmer who goes in for poultry should not do a little in this way also. Of course, if every one did this, each one would make less out of it, than those who have it all to themselves now do; but, as there

is always a demand for birds to provide a change of blood, and there are probably fifty poultry-keepers, who have only a few fowls for their own household purposes, to every farmer who could go in for the business we have mentioned, there would even then be plenty of room for all; and we may reasonably suppose that the number of small poultry-keepers would increase as rapidly as the larger ones, if, indeed, not more rapidly. Not only is the demand for pure-bred stock greater for this purpose than for cross-breds, but the prices are much greater also. There is always a pleasure in looking at birds which have a decided individuality of their own, at least, where the keeping of them is made a hobby; and it is surprising how much greater pride is taken in fowls of this kind than is taken in mongrels. Cross-bred fowls will sell for very little more than killing prices, and their eggs, for hatching purposes, will only realize market prices per dozen; whilst pure-bred ones, even though the parents in each case may be of the same family, will bring twice and often three times the money. Thus it will be seen that the keeping of a stock of pure-bred birds is the best paying system of the two.

When commencing, the best plan is to purchase one or two pens of pure-bred fowls, if there are none that can be used for the purpose already in the yard, the cocks to be of a breed that will help the qualities of the hens. Each pen will require to be kept by itself, and should have a good run, or perfect freedom, as exercise has much to do with the hardiness of the chickens. If the houses are placed a good distance from each other, there will be very little danger of intermixing. Only the eggs from these pens should be hatched, and (calculating that half will be cockerels) in sufficient numbers to completely stock the yard with laying hens in the autumn, when the present stock of hens, if any, can be fattened and killed off, just before they go into the

moult. By this means a race of first-class birds will be obtained, and the difference in returns the following winter if mongrels have been previously kept, will show the wisdom of the course adopted. Layers can easily be got that will produce an average of 150 to 200 eggs per annum, and table fowls that will grow and fatten very rapidly. The breeding hens can be put among the young ones in the autumn, as they will be wanted again the following spring. In all well-regulated yards it is customary to kill off the hens when about nineteen months old, just before they go into their second moult, as they are still good for eating, or, at any rate, much better than they will ever be again; and, as every moult gets more severe and protracted, and the number of eggs laid fewer, it is much more profitable to supply their places with young hens. But the same breeding stock will do again, simply filling up the gaps, or introducing fresh birds as may be found necessary. As breeders of laying fowls we suggest the following crosses, the first-named of each pair being the cock:—Black Minorca—Leghorn; Minorca—Houdan; Andalusian—Leghorn; Andalusian—Minorca; or, Andalusian—Houdan. For good all-round fowls—layers, sitters, and table fowls:—Game—Houdan; Game—Langshan; Game—Brahma; or, Game—Scotch Grey. And for first-class table birds:—Game—Dorking; Game—La Fléche; Game—Crève; or, Dorking—La Fléche. These crosses will be found sufficient for those who wish to try the plan suggested, and we should recommend them not to keep too many varieties. One laying and one table-fowl cross, will be sufficient for most yards.

Doubtless there will be some of our readers who have a stock of hens which they do not wish to part with, and would prefer to improve these by obtaining some fresh cocks. We do not look upon this as the best plan, but at the same time give such information as will help those who prefer to adopt

it. The way to proceed is, to select twelve to fifteen clean-legged, close-bodied hens, known to be good layers, and not more than two years old, and buy a couple of Minorca, Houdan, or Andalusian cockerels, if layers only are wanted, and Langshan or Game, if both layers and table birds are desired. Mate these up with the hens spoken of, and the progeny will be vastly superior to the present stock, which can be partially, or entirely, cleared out in the autumn. The cockerels just named should be got rid of also, and the following spring a similiar number of the pullets bred should be selected, and a couple of fresh cockerels obtained, of the same breed as before, which will have to be repeated every year. By this means the fowls will gradually improve, and in a very few years the character of the yard will be entirely altered. Or, another plan, is to buy five cocks for every fifty hens, and let all run together, killing off the old hens in the autumn, and buying new cocks every spring. Both these methods are, however, slow, and the one we first named, will be found cheapest and best in the long run.

CHAPTER XII.

DUCKS.

Ducks very profitable—Water needed for Breeders—Not to be kept with Hens—Duck Farms—Housing—The Wild Duck—The Aylesbury—The Rouen—The Pekin—The Cayuga—The Muscovy—Ornamental Varieties—Keeping in Small Runs—Forcing—Breeding—Hatching—Rearing—Feeding—Preparing Rice.

Of all the various kinds of domesticated poultry, which can be kept by farmers or cottagers, there is no doubt that ducks are the most profitable; but they need a suitable place to be kept in, and are not so capable of adapting themselves to circumstances as are hens. They are, however, hardy, easily reared, feed up quickly, and can, at the proper season of the year, or in some places at almost any season, be sold very readily at good prices. Where there are towns within a reasonable distance of a farm, arrangements can be made to supply hotels, restaurants, private houses, or dealers, and we are sure the result will be a satisfactory one. Of course, water will be required, and a running stream is best of all, but the soil can be of any nature, though where it is gravel or sand, it is all the better for the purpose, as ducks require one or other of these to help them in the digestion of their food, and the more easily they do digest the food the better they will thrive. Ducks do not want good land, but can be kept on uncultivated ground, and it will be none the worse for them if they can have some good shelter, such as trees or bushes afford. They must not, however, be kept with hens,

or the latter will be found to suffer in consequence, as ducks thrive in dirt, and hens do not, so that, if there is not sufficient room to permit of their being widely separated, then hens or ducks should be selected, for which the place and soil is most suitable, and for the produce of which there is most demand in the district. As an instance of what is done in this way, we may state that the Aylesbury district, England, is great for ducks, and it is said that upwards of $100,000 per annum is paid to the cottagers around the town of Aylesbury for ducklings, which are chiefly reared for the London market.

Some time ago a description appeared in the *Field*, of London, of a duck farm near to Dunstable, in Bedfordshire, which has been found a profitable investment by its owners. A large house was built about a couple of years ago to keep and fatten the young birds in; and the object of the owners is to get the ducklings ready for market as rapidly as possible, for which purpose they are fed on boiled rice; to this meat is added for the older ones, during the two or three weeks previous to their being killed, and some hundreds are sent to market every week in the season. Since the above description appeared, a lady, who writes under the name of "Henwife," has given, in the *Live Stock Journal*, the results of her own work in this direction. She says:—"In the spring of 1881 I obtained from my own stock of Aylesburys, and from purchases of eggs, upwards of 500 ducklings. Of these I lost from rats, heavy rains, and an incursion of cattle, about thirty-five. The twenty birds which I set aside as breeding stock were hatched in March and April. Having set eggs in December, 1880, I had ducklings fit for the table in Februrary, which I sold at 16s. to 18s. per couple. I had a constant supply of Ducklings until August, 1881. On November 10th my reserve breeding stock began to lay, being then about seven months old,

and from these eggs fine ducklings were hatched on the 20th December. . . . . I never keep ducks over eighteen months old, as I find they eat idle food from the end of August to March, which is better bestowed on their young ones, at that time laying. I except from this rule any particularly large bird, or one remarkable for its laying qualities."

One great advantage in keeping ducks is, that they are hardy and easy to rear, in proof of which we may quote what was told us some time ago, by one of the largest breeders in the kingdom, namely, that he very seldom finds any eggs infertile, that the proportion of eggs failing to hatch is very small, and that the mortality among the ducklings is almost *nil*—so that the duck breeder has every chance of success. So far as the fattening is concerned, we have fed ducklings up to 8lb. and 10lb. the couple, in eight weeks, at a cost of about 30 cents to 40 cents each; and as the price to be got even at an ordinary time would be not less than 18 cents, and probably 25 cents a pound, whilst earlier in the year it would be much greater, there is plenty of margin for profit. Besides, ducks are most prolific layers, and there is always a good demand from cooks and confectioners for their eggs. Ducks are undoubtedly large eaters, but as the old birds kept need not be very numerous, this does not affect the matter; and there are thousands of cottagers and others, living near small streams, who might add very considerably to their incomes by keeping ducks, and without any great outlay in the first instance, or much time and money afterwards. But the place must be suitable if profit is to be made. We do not for a moment wish to say that ducks cannot be reared without water. In fact, in our early poultry days we hatched and reared every year sufficient ducks to supply our table for months, on a very small plot of ground; but we never attempted to keep adult birds, buying the eggs

for hatching, and rearing the ducklings, which had only a pool of water about six feet in diameter to disport themselves in. Had we attempted to keep layers we should doubtless have failed, for it is an undisputed fact that ducks which are to be used as breeders, must have a fair amount of water, enough to swim about in. And if this cannot be given, the plan we have adopted should be followed, or no ducks kept at all. Otherwise, failure will be the inevitable result.

So far as the housing of ducks is concerned, they require a comfortable house in the winter or late autumn. One low in the roof is the best, as they always lie upon the floor, which should be made in the same way as that already described for ordinary poultry houses. If the roof is three feet above the ground, that will be sufficient, but it must be properly ventilated, and dry both above and below. Clean straw should be kept on the floor, and bricks and straw used for nests, but no shed is needed if the house is of reasonable size, as the birds rather enjoy rain than otherwise. It is best to have an enclosure round the house, made of low wood railings, in which the birds can be kept until about ten o'clock in the morning, for if allowed out before that time they will lay in any out of the way place, where the nests will not be very easy to discover. Where plenty of water is at hand for breeding ducks, then one drake will be sufficient for five or six ducks, and, as they are peaceable in their nature, all the stock may be kept together, except there is an object in separating them, such as when there are different breeds, or there is a desire to keep families separate.

There are many varieties of ducks, some of which are purely fancy ones, whilst others are chiefly noted for their economic qualities; but it is generally admitted by naturalists, that the various breeds of domesticated ducks have all descended from the wild duck, or Mallard, as it is called,

which is to be found over all the continent of Europe, in most parts of North America, and has also been seen in portions of Northern Africa and Western Asia, though it is most numerous on the shores of the Mediterranean Sea. It is not much unlike the Rouen in its plumage, though more upright in shape; and, as is generally the case with wild birds, it is much more active in its habits. It is found chiefly in marshes and fens, and, in parts of the West and South especially, it is shot in very large numbers, but there are many other parts of the country where it is also to be met with. In a wild state ducks are monogamous, and thus the domesticated ones have been corrupted by civilization. Wild ducks are often tamed, which is done by obtaining the eggs and hatching them under hens, when the progeny do not appear to seek for or desire liberty. In two or three generations they begin to vary in colour; and, doubtless, if the experiment were continued long enough, the breeds we now have could all be produced again in this way. It is a strange fact, that it takes several generations to teach tamed birds the polygamous customs of domesticated duckdom, as they at first go in pairs, like their wild progenitors, but afterwards the descendants lose this trait of their nature.

The Aylesbury.—Of the many varieties of domestic ducks, probably the Aylesbury is the best known, and it is found, more or less, all over the country. This variety, as might be supposed, takes its name from the little thrifty English town, in the neigbourhood of which it is kept in such large numbers. It is perfectly white in its plumage, the slightest discoloured feather denoting impurity of breed, and being regarded as a disqualification for the show pen. The bills of birds of this variety are of a pale pink colour, and the nearer they are to the delicate tinge of a lady's finger nail, the better are they looked upon, whilst their legs are a bright orange. They are certainly the most easily acclimatised of

all the duck varieties, often thriving in very unsuitable places; and they are hardy, mature rapidly, and grow to a great size. The only difference between drakes and ducks is, that the former are rather larger than the latter, and have a curled feather in the tail, by which the sex is very easily distinguished. The average weight of these birds, when twelve months old, is 7lb. for the drake, and 6lb. for the duck; but, of course, by special feeding, such as is adopted for exhibition birds, and those for table purposes, these weights can be exceeded to a considerable extent; and the winning birds at the Birmingham show of 1882, were upwards of 20lb. the pair. Ducklings generally weigh, if properly fed, about 4lb. when seven or eight weeks old, which is the usual age for killing: for when they get older their adult feathers begin to form, and they are neither so plump, nor yet so presentable on the table. The nearest in appearance are Pekins, but it is not very difficult to distinguish Aylesburys from them, as the pure-bred Aylesburys are perfectly white, of a boat shape, with short legs and a long fine neck; and any deviation from these points denotes impurity. We often see so-called Aylesburys with a partially erect body, yellowish bills, or canary-coloured plumage, all, or any of which, show that Pekin blood has been introduced, too many of our birds being thus crossed now-a-days. We do not object to this cross, and it is doubtless at times very advantageous, but we prefer to do it ourselves, and not have others sell us as pure-bred stock birds that have been so adulterated.

The Rouen.—This may be regarded as the handsomest of all the larger varieties of the duck tribes, and, as we have already stated, is like the wild duck in its plumage. But domestication has resulted in its losing the more graceful shape of the latter, for it is decidedly thicker and heavier in build, but has the decided advantage of being more easily fattened. The drake has a clear yellow bill, with a slight

greenish tinge, and in shape, long and broad. The head is rich green, glossed with purple, which extends down the neck, where there is a ring of pure white. The breast is a rich deep claret brown, and the under parts are a delicate French grey. The back is a rich greenish black, and the curls in the drake's tail are dark green. The wings are greyish brown, and have a ribbon mark across them, this being of a bright and distinct blue, with a white edge on each side. The flights are grey and brown, and the legs orange. The duck has a brown head, with two distinct shaded lines on each side. The breast is brown, pencilled over with a darker shade of the same colour, and the wing has a ribbon mark like that of the drake. The weight of these birds is about six to eight pounds, and the heaviest pair at Birmingham show in 1882, was over twenty-one pounds, but once this has been exceeded by nearly two pounds. The Rouens grow to a greater size than the Aylesbury, but take a considerably longer time about it, and on this account are not so profitable for market purposes. We therefore regard the Aylesbury as being the better of the two, for a Rouen duckling at eight weeks is no larger than an Aylesbury at six weeks. They are, however, equally as hardy and as prolific, though their eggs are not quite so large; are as easily reared, and have one decided advantage, namely, that as their plumage is dark, they do not show dirt so soon, and consequently suit places where the white-feathered birds would always look filthy.

The Pekin.—The Pekin is a recent introduction, and, as the name implies, is a native of the Celestial Empire. It was first heard of in 1873, when specimens were imported into the United States, and they were hailed with great eagerness. Soon afterwards a few were imported into England, and, from their large size, splendid laying powers, great hardiness, and striking appearance, soon won favour,

becoming very popular indeed; but they have not maintained their position, for they are larger in frame than in flesh, and have an abundant plumage, which gives them the appearance of greater bulk than they actually possess. They do not mature so rapidly as the Aylesbury, and their flesh is not of the same rich and delicate flavour as is that of the Aylesbury, Rouen, or Cayuga. On the other hand, they are heavy layers of large well-flavoured eggs; the eggs are, as a rule, very fertile indeed, and the ducklings easy to rear, for which reasons they have been largely crossed with the Aylesbury, in order to counteract the evils of in-breeding in some strains of the latter variety. Many of the winning show Aylesburys are so crossed, the canary tinge in the plumage, yellowish bills, and the peculiar carriage being the best signs of this cross. The Pekin differs from all other ducks in the shape and carriage of its body, which is of a peculiar boat shape. The legs are set well back, and the bird walks rather upright or penguin fashion. The head is large, and the neck long; the legs and bill are of a rich yellow, and the plumage generally has a peculiar cream colour running through it, sometimes scarcely noticeable, but often so decided that it is really a canary colour. It is very graceful on the water, and for crossing with the Aylesbury is a very valuable variety. The progeny are easily fattened, and have good flesh, two most important matters to those who wish to obtain a rapid return.

The Cayuga.—This is a variety which deserves to be much more kept than it now is, for it is a most useful fowl, of capital size, and extraordinarily good as a layer. Cayugas are very hardy, mature rapidly, fatten well, and their flesh is of high flavour—said to be even better than that of the wild duck. The drakes weigh about nine pounds, and the ducks about a pound less, when matured; and they have a very good characteristic, namely, that they do not wander

away from home, but can be left at liberty without fear of their straying away. They are very similar in colour to the East Indian ducks, being of a brilliant black throughout, with lustrous green reflections on the head, neck, and wings; both males and females have a bright purple or claret brown tinge on the back and wings, but the secondaries are more blue than green; the drake also is more strongly tinted with green than the duck. The drake's bill is greenish yellow, but not so yellow as the Rouens, and it has a clear black bean at the tip. The bill of the duck is black at the base, and tipped with a greenish slate colour; and the colour of the bill, like that of the Rouen, changes at different seasons of the year. The shape of the bill differs from that of any of the other breeds already named, as it does not come straight from the skull, but curves down to the centre and up towards the tip, in dish shape. The legs are of a smoky orange colour, and, from the colour of its plumage, the Cayuga is very suitable for any place, whilst its economic qualities make it one of the most valuable of all water fowls.

The Muscovy.—This duck was brought from South America, and hence it is sometimes called the "Peruvian" duck, but the name usually given to it refers to its musky odor. The drake is much larger than the duck, which is a good layer, hardy, easily reared, and rich in flesh. Being most pugnacious and tyrannical, the muscovy duck cannot be recommended for farmyard purposes. No other fowl can exist with comfort, and it is best either to have no other birds about the place, or to confine them to a run of their own, which is not always a convenient matter. Of this variety there are the black, blue, mottled, and white; the feathers are very profuse and long, and in the dark drake the colour is exceedingly lustrous. The head is noticeable for a fleshy bunch at the base of the bill, and there is also a red

fleshy arc round the eye, the face being of the same substance, and bare. The drake is furnished much more profusely than the duck, and the sex is much more easily distinguished than in any other breed, notwithstanding the entire absence of the usual curl in the tail, as the male bird is generally three or four pounds heavier than the female. These birds are by no means pleasing in appearance, and are not to be recommended for the reasons already given, though they make an exceedingly valuable, but infertile, cross with any of the large breeds, the muscovy drakes being used.

In addition to the five chief varieties of ducks which we have mentioned there are several others, but these are chiefly fancy ones, and consequently scarcely fall within our province. We may, however, be permitted to say, that for such as have a piece of ornamental water, there is nothing prettier, or will add to its beauty more, than a few of the rich-coloured Mandarins or Carolinos. The small black East Indian breed is also very good for this purpose, but it is difficult to get hardy or strong birds, for in-breeding has been so much resorted to, in order to obtain diminutive size, that the breed has really been ruined. Where the place is clean and free from smoke and dirt, the White Call, or decoy ducks, are very nice, and this variety has one decided advantage, namely, that it is tame and domesticated, not given to fly or wander away, like some of the other birds. In addition to these there are many other varieties, such as Spotted Bills, Whistlers, Pintails, and Kasarkas, so that those who desire ornamental waterfowl, need have no difficulty whatever.

In the keeping of ducks, it is necessary to have a clear idea as to the object for which they are to be kept. As we have previously pointed out, a reasonable amount of space and sufficient water for the breeding birds must be provided, and it is of no use attempting to keep and breed from ducks cooped up in a very small run. In that case it is better to

buy eggs and hatch them, or buy the ducklings, when very young, and rear them. But, granting that the place is suitable, then in rearing the birds, those intended for early killing require to be treated in a different fashion, to those that are to be kept for future breeding purposes, or to be sold. If birds destined for the table are fed upon foods that develop bone, or that which is offal in the birds when they are killed, then there is a direct waste, for these things cannot be eaten, and prevent the laying on of that flesh, which is, or should be, the aim and object of fattening. But, on the other hand, to feed birds that have to be reared to maturity, on flesh-forming foods alone, would be equally as foolish, for, in that case, there would not be sufficient bone to support the flesh, and, though the bird might apparently thrive for a time, it would begin to fail before long, and probably die. It must be clearly understood, that an undue forcing of any part of the nature of the bird, cannot but be at the expense of some other part; consequently, if too much prolonged, the balance of the system is upset, and the bird dies. This is the reason why birds, when fattened, begin to go back and lose flesh, if the process is extended too much, and the fact that feeding continuously on food of a fattening nature induces disease, would appear to show that the statement of those scientific men, who say that all fat is a disease, has something to support it, although it may be that it is the excess of fat, and not the moderate quantity of it, that really causes disease.

When keeping ducks for breeding purposes it is best to give them a running stream, if it be convenient to do so, for this is much better than a pond, but one or the other is indispensable. Two ducks should be given to one drake, or, if the birds are young ones and of a vigorous breed, five ducks may be given to two drakes. Drakes are not to be relied upon for breeding purposes when more than two years old, and it is better, therefore, not to keep them after that age,

but to fatten and kill them off. Ducks are capital layers, as a rule, and the eggs, when the drake is not older than we have just mentioned, very fertile. In hatching, large Cochin or Brahma hens should be used, as these can cover eleven, or sometimes thirteen eggs, very easily; but, it is necessary to remember, when hens are used, that a duck in sitting a nest will, on going off to feed, have a swim before she returns, and, as her feathers will be wet in consequence, the eggs get the benefit of it. Eggs under hens, therefore, must be kept moist, or they will not hatch, for, when this is not done, the inner skin gets hard and tough, so that the little inmate cannot make its way out. The nest should be in a moist place, but if this cannot be arranged, then the earth below it must be kept damp, much more damp than is required for fowls. We have always found it very advantageous to sprinkle the eggs with a little warm water when the hen is off feeding, so that the shells get moist all over. Ducks' eggs can easily be hatched in incubators, and we have been very successful in this way; but one thing must be borne in mind, that ducks' and hens' eggs are not to be put into one machine, as each kind requires different treatment. Hens' eggs only need a reasonable amount of moisture, and should never be sprinkled, whereas, for ducks' eggs, the moisture trays are by no means sufficient, and they should be sprinkled daily, so that the air in the machine will be more heavily charged with moisture than is good for ordinary eggs. Not only so, but duck eggs hatch all the better if given considerably more air, and a longer time for cooling, than is good for hens' eggs, and for these reasons, it will be seen that separate machines are required for the two kinds of eggs.

The period of incubation for ducks is twenty-eight days, but, when the eggs are very fresh, they very often hatch a day or two earlier. If the sprinkling of the eggs is attended to, there is seldom any loss during the process of hatching; but,

in order that all may come out together, or within a short time of each other, it is best to select eggs as nearly equal in age as possible. Duck eggs should be tested in the way we shall describe for hens' eggs; but it is best to make the first examination on the ninth or tenth day, and the water test on the twenty-fifth day. Of course, a daily look at the eggs is advisable; and if any get broken, all must be washed, and the nest re-made. As a rule, we do not approve of the plan of removing any of the little things from under the hen, should the hatching be irregular; but if any are greatly delayed in hatching, then those ducklings that are dry, may be taken away, and put in a flannel covered basket, near the fire. They need, however, to have something against which they can put their backs, and thus a good cushion may be put over the flannel, of course, seeing that there is enough ventilation through the sides of the basket, or the ducklings may all be smothered. The morning after the hatching is completed, the hen and her brood should be removed to a coop, placed under a shed; and, as they do not require any food for the first twenty-four hours after being hatched, they will now be ready for their first meal, which should consist of hard-boiled eggs, chopped fine, and mixed with boiled rice. This food may be continued for two or three days, when Spratt's or Chamberlain's foods, or boiled rice, or barley meal, the two latter mixed with greaves, should be given, if the birds are intended to be killed at an early age; but if not, the greaves should be dispensed with, and the boiled rice reduced in quantity, to made only an occasional food. The greaves consist almost entirely of fat, whilst the rice contains only a trace of bone-forming substances in it, so that both these foods are admirable for the purpose of forcing birds for the table; but, they are not at all calculated to build up the frames of those birds intended to be reared to an adult age. In the latter it is necessary

to have slower growth, less development of fat or flesh, and more stamina; in the former, all that is required, is to get as much flesh as possible, in as short a time as possible, with little bone, or other offal. Thus, when they are to be reared, ducks should have no forcing food, and plain barley meal or ground oats, made into a crumbly mass, will be the best food. It may be well to give boiled rice as a variation, for there can be no doubt that variety is appreciated by the birds; but, if it is given, it should have a good handful of bone meal, to every quart-measureful of the rice, which will make up for the deficiency in bone-forming qualities.

As very many persons do not know the best way to prepare boiled rice, we will give our method, for this food is a first-class one for fattening any kind of fowl. The kind known as poultry rice can be bought from nearly all corn dealers at a reasonable price, and it is good enough for the purpose, if the sample is a clean one. The way to prepare it is to put, say, a pint of rice into a gallon pan, with three quarts of water, a small handful of the chopped greaves, and a teaspoonful of aromatic compound. This we place upon the side of the fireplace, and allow it to simmer for two or three hours. In that time the rice will have swollen out and absorbed all the water, so that it will be crumbly moist, like a well-made rice pudding. If this is given to the birds when warm, though not actually hot, the eagerness with which they will eat it will be sufficient proof of how much they relish it. Those who follow our directions should remember, that it must not be allowed to boil in the usual way, or it will be soft and sloppy, but it should be allowed to gently simmer in the manner as described by us, and then it will be all that can be desired in the way of an appetising and useful food.

CHAPTER XIII.

GEESE AND TURKEYS.

Geese in England — Benefit to Crops — Breeds — Weights attained — Management — Turkeys—Said to be delicate—Breeds—Management—Fattening.

We have now nearly got to the end of our list of commercial poultry, and come to the two great—*i.e.*, so far as bulk is concerned—varieties. Of these geese are the hardier, and much easier to rear, so that in many places they are much preferred to turkeys, if fat, bringing always a good price in the market. They pay very well indeed for keeping, and the farmer will, as a rule, find it worth his while te have a few of them in the autumn, when his grain crops are off the land. In the eastern-middle counties of England very large numbers are kept, and a ride through that portion of the country would be quite a revelation to those who had not been there before. On the fields and the commons, flocks of geese and turkeys are to be seen, and the place where they are not to be found is the exception, not the rule. They are a considerable source of profit, and, consequently, are not neglected; and the vast numbers which are sent to London every year is astonishing to those who are not conversant with the facts of the case. In these counties the majority of farmers breed their own birds, but there are many who buy goslings in the early autumn, and simply fatten them for the market. In this country the sale of young goslings is rare, as those who fatten hatch their own stock, and no one part of the country is especially famous for its geese.

By putting on goslings in the way we have described, the land is made profitable after the crops are gathered, and they do it an immense amount of good. The birds purchased are generally bred by those who live near commons or waste land, and there is no need why this should not be done in every district. If it were done, the benefit derived would be great, and probably the farmers near small towns who need it most, would reap the benefit, and would also supply a demand which has generally to be met from a distance.

Of the various breeds of geese the Toulouse and the Embden are the chief, and, as a rule, for commercial purposes, it will be found better to select one of these. The Toulouse is commonly known as the grey goose, because its plumage is of that colour; and the Embden is called the white goose, its plumage being pure white throughout. The latter is said to be the earliest and best layer, which is a very great recommendation, and its feathers always bring a higher price, than do those of the coloured variety. In some places, however, pure white birds would not look at all well, because of the presence of smoke; but, these are considerations which must be left to be decided individually, according to circumstances. Both these varieties are about equal in point of size and quality of flesh. At the Birmingham Show of 1882 the weight of the winning pair of grey geese was 45lb. 4oz., and of the whites 43lb. 12oz.; but generally at that exhibition the Toulouse are heaviest. Of course these weights are abnormal, and only obtained by a very careful and continued system, which our readers will do well not to follow, but be content if they get birds from 12lb. to 18lb. weight, for the Christmas market. In addition to the varieties named, there are the Sebastopol, the Chinese, the Canadian, and the Egyptian, but we do not think that they will be found so profitable as the Toulouse and the Embden.

A capital description of the method of management appeared some years ago in the *Farmer*, and was deemed worthy of being reprinted in Mr. Tegetmeier's Poultry Book. This we now give for its practical value:—"A good-sized pond, with a plentiful supply of water and good pasturage, are indispensable to make goose-keeping a paying business, for they are very large consumers. Let them have an outhouse all to themselves, regularly supplied with clean straw, with which to make nests on the floor as the laying season approaches, and partition the nests off according to the number required. One gander will be sufficient for three or four geese. They generally lay about twelve eggs each, which number they will hatch. The eggs, for safety, should be collected daily and placed in bran, until the geese, by remaining on their nests, show their desire for sitting. The eggs must then be placed under them, and the house so arranged that they can have free liberty of egress and ingress at all times of the day, as they will require food and water daily, to which they will help themselves, if a pasture-field and pond of water be near, and afterwards return to their nests. Little attention is, therefore, required whilst they are sitting, beyond keeping their nests undisturbed, and protected from vermin. When the time of hatching has arrived, in case any young birds are out, see that all shells are removed, for fear they may cap the other eggs, and thereby prevent their hatching. Allow the goslings to remain in the nest for a night and a day; they will not require feeding during that time, but will gather strength; and, if the following morning be fine and sunshiny, they can be moved at once upon a grass-plot or other convenient place, where they will be safe, and supplied with an abundance of nice young grass, of which they will soon partake (this, their natural food, suits them better than to be crammed with oatmeal pellets), not forgetting to place them some water in a shallow vessel, with

which a little oatmeal may be mixed. If the weather is unfavourable, they must be confined in an outhouse, and plentifully supplied with nice green grass turfs and water. . . . The most critical time for young geese is about midsummer; if it is very dry weather, and the pasturage and water is not plentiful, it is then desirable to give them a few oats night and morning to assist nature over this peculiar juncture, and help them on until the stubbles are ready for them, and when those are cleared they will be in nice condition for fattening, which is best done by making them up in lots of ten or fifteen in number, according to the size of the place, supplying them with plenty of water and an unlimited quantity of oats for three weeks, giving them a clean bed of straw when required; they will then be ready for the market. The day previous to killing, turn them on to the pond for the purpose of washing their feathers, and supply a clean bed of straw in the feeding-house before their return; but take away all food and water, and let them fast until killed the next day, when they must be dressed for the market. There is not the slightest doubt geese pay well where there are conveniences for keeping them, but they must be well managed, and kept out of the mowing grass and cornfields, or they will soon do damage to the amount of double their profit."

The same plan, as is here described for fattening, may be adopted equally by those who only rear the birds, as by those who breed them also; goslings can be bought about August and September at low prices, and will fatten up very rapidly, if fed in the way described. There is only one thing we need add to what has been already said, and that is, geese must never be put in compartments alone when fattening, as is done with ordinary fowls, for in that case they would fret and lose flesh, instead of gain it.

Turkeys have the name of being very delicate and difficult

to rear, in consequence of which they are often not kept, where they might be with advantage, for, in a suitable place, they are one of the most profitable of all domestic poultry. They are undoubtedly delicate if kept on damp soil, but where the ground is dry, and the position not too exposed, they will do well. Just at one period of their growth, when they are "shooting the red," that is, when about six weeks old, and the red skin is appearing on the head, they need extra care and to be well sheltered, for getting wet just then is almost certain to be fatal. The prices obtained for turkeys, and the heavy weights to which they grow, make them very profitable indeed, and wherever it can well be done, we should strongly urge that a few of them be kept.

The varieties of turkeys known in this country are the Wild, Bronze, Narragansett, Black, Buff, and White. Of these the Wild is the hardiest, firmest fleshed, and highest flavored, even when bred in domestication; the Black approaches it most nearly but fattens more readily, while the Bronze, which closely resembles it in coloring, is the most rapid in growth, quickest to fatten, and heaviest of all. The Narragansetts and Whites are the most domestic. Large size is a matter that must be considered, for the price turkeys realize in market increases with the weight, and the fact contrary to the rule in most things, that, the price per pound of a thirty-pound turkey is considerably greater than that of one half its size is especially true in early winter, but not at all times of the year.

Turkeys are not fully grown until they are three or four years old, but it will be found that birds can be bred from, without fear, when two years of age. The young birds produce more eggs than the older ones, and begin to lay earlier in the season, and, also, are not so savage. A turkey hen generally lays about twenty eggs, but she should not be allowed to sit all these; and it is better to give the first half-dozen to hens, letting her have the rest herself, for it is very

cruel, and does not pay in the long run, to prevent her having a nest, in addition to which, she will prove a better mother than any hen could be.

The period of incubation is twenty-eight days, and the first food for the young birds should be hard-boiled egg, with dandelion, lettuce, onions, or nettles chopped up, and all mixed with bread crumbs; and to this may be added a little rice boiled in sweet skim milk, a little suet, or greaves, and in cold weather a little aromatic compound, with grain of all kinds for the birds, as they get older. We have also heard the very highest accounts of the value of Chamberlain's meal in rearing turkeys, even from those who had failed before they used it. A fresh site for the coop is necessary every morning, and a little exercise, by letting the mother out of the coop, which must be large and roomy, not less than three feet square, will do the chicks a lot of good. When the birds are about ten or twelve weeks old they may be put on to barleymeal as the staple food, mixed with a little greaves, and alternated with corn, barley, and small wheat. As soon as they are deserted by the mother, the birds should be put in a large roomy house at night; and, it is then necessary, to see that they do not perch on rails or hurdles, as crooked breasts would be the certain result.

Christmas turkeys are shut up in a light, dry, and roomy shed, or house, about the first week in November; and the Norfolk system is to keep troughs filled with maize and good barley always near them, but giving twice a day a good meal of just as much barleymeal, mixed with skim milk, as they can then eat up, and also milk to drink. The troughs are cleaned every day, and all surplus food removed. Sliced mangolds, turnips, swedes, and cabbages are also given; and plenty of sand, lime, and brick dust kept in one corner, so that the birds can get it when they wish. This is all the feeding they need, to bring them up into prime condition for the market. They are killed by having the neck broken.

CHAPTER XIV.

THE SELECTION OF STOCK BIRDS.

Importance of Care in Selection—Influence of Parents—Selection for Layers—Selection for Table Fowls—State of Breeding Stock—Buying Birds—Buying Eggs for Sitting - Space for Breeding Stock—Birds not to be Related—Evils of In-breeding—Number of Hens to Cock—When to Expect Fertile Eggs—Feeding—Importance of Health and Condition.

THE choosing of birds or animals for breeding is one of the most important matters, that can command the attention of any keeper of live stock, for, in accordance with the care and skill given to it, will be the quality of the produce. Parents impress upon their progeny those characteristics which they themselves possess, in so far as there are no counteracting influences. If these characteristics are good ones, they should be preserved by judicious mating, but if they are bad ones, then, it must be the object of the breeder, to get rid of them as quickly as possible. And in order to secure this it is necessary to have a clear idea of the influence of each parent, for the influence on either side is different to that on the other. Without this knowledge, there can be no possibility of arriving at a true appreciation of the question.

We have said that the influence of each parent is different, and, to this we may add, that, as a rule, the characteristics of both can be traced in the offspring. Sometimes, however, qualities are developed which were not found in the parents, nor yet can be regarded as a combination of qualities from

either side. As these are generally characteristics to be avoided, it will most probably be found on examination, that they have descended from the grandparents, or from progenitors even further back than that. Hence the value of pure stock, as there is with it a much greater certainty in breeding.

It may be taken as a certain rule that the male parent affects the external structure, the shape, and the outward appearance generally, including the locomotive peculiarities; and that the female parent controls the internal structure, the constitution, the temper, and the habits. But, we must in this be regarded as speaking of pure-bred birds, for with such as have been bred in any sort of way, in which all or no breeds have been mixed up, it is almost impossible to look for any certainty, as there are constantly unexpected and unwished-for developments turning up. The purer the breed, the greater the certainty of obtaining those points or qualities we are seeking for, and it must also be noted, that, if one of the parents is of a purer descent than the other, it will exert the greater influence upon the chickens. This will account for the rapidity with which a pure-bred cock improves the birds bred in a farmyard, when one is introduced, which doubtless many of our readers have observed.

Considering these facts, it may be worth our while to study the question of the influence of parents, a little more closely than is usually done, and, taking the male parent first, it will be found, as already indicated, that it affects the external structure as well as the shape of the bird. Thus, in selecting cocks for breeding purposes, it is necessary to see that they have size, which, of course, means bone and flesh, not merely feathers, and that they are of a right shape. If a bird is short in either of these qualities, as certain as can be such defect will be transmitted to its descendants. Thus it will be seen how foolish it is to choose

a bird small or of a bad shape, no matter how good he may be in other respects. It can serve no useful purpose to have a bird unshapely, even though this does not influence its profitable qualities; but, whilst we should not kill a good laying hen if she was mis-shapen, yet we would not breed from such an one, as the weakness inherent from the deformity would probably transmit itself to the chickens, and thus more than counterbalance the merits of the parent. As a rule, those birds are best which look best. And again, it would be unwise to use for stock purposes, any bird weak, or deformed in his organs of locomotion, for, though he might be as good upon the table as another one, perfect in these respects, his defects would be reproduced in his progeny, and probably intensified. As an example of this, we may mention that the breeding for white faces in Spanish —though the white face is not a defect but a sport—having been carried to a ridiculous extent, has so weakened the breed that it is now a delicate variety, not to be recommended for general purposes. In selecting a cock bird, therefore, for breeding, and this equally applies to all varieties, whether pure or otherwise, one should be chosen, close and firm in body, not too large in size—that is, not abnormally larger than the majority of his kindred, though a little larger is an advantage—clean on leg, tall, and active in his habits. Such a bird will not counteract, but, rather assist those qualities which, in a hen, conduce to the breeding of good layers. But, if a bird is wanted for breeding table fowls, one must be chosen heavy in body, deep in breast, short on the leg, and, perhaps, not so active, though by this we do not necessarily mean a non-flying bird, as these generally develop flesh on the thighs, and not on the breast. The former may be heavier in weight, but the meat is not carried in the best place, and is not of the same quality. A bird similar to what we have described, will help forward the end we have in view, and

assimilate his qualities readily with those of the hens to which he may be mated, if they are chosen with equal care.

It will be remembered, we stated that the hen affects the internal structure and vital organs of her chickens, in which are included the laying qualities, as well as the temperament and the constitution. A good, quiet mother, generally produces pullets that exhibit the same qualities in their turn, if she is properly mated, and, on the other hand, a restless, uncertain mother, will impress these characteristics upon her chickens. A poor layer, must not be expected to produce hens much better than herself, no matter with what bird she is paired, and though there is wisdom in the belief of old henwives, that it is always well to breed from hens that are known to be good layers, it is necessary to see that the cock does not counteract this influence. By judicious selection of the male bird, it may be possible to gradually improve the laying powers, as it is possible to alter the characteristics of any birds; but, of course, this can only be a slow process, and it is better to commence breeding with suitable birds, and to depend upon the hens for such an improvement, instead of on the cocks. As shown when speaking of the male birds, the purer the parents are, the more certainty there is in breeding, and this is the case equally with both sexes, though, as the cocks influence the externals, the result is more seen on their part, than on that of the hens.

When breeding with the object of producing good laying fowls, the hens selected should be shapely, have no grave defects, and, above all, be known as good layers, or from a good laying strain. To be sure of this latter point may involve some trouble; but it need not be very great, as any one who attends to the fowls, and really takes an interest in them, knows which are the best layers. By this means, it is quite possible to very largely increase the laying powers of any strain of birds; and, the care thus taken, will be rewarded

by a great difference in the production of eggs. Of course, if the male birds are bred from hens that are known to be good layers, then this will greatly facilitate the matter. Therefore, where it is thought desirable to have laying birds only, or, in places where eggs are most in demand, it is better to have non-sitting fowls, such as Minorcas, Leghorns, Andalusians, or Houdans, as these birds have been bred as layers for generations; and, their attention not being taken off by maternal duties, they consequently are much better layers. On the question of selecting hens for breeding table fowls, very little more need be said, than what we have already remarked in connection with the male birds, except that it is important to choose quiet, contented fowls, as these will be found to fatten up best of all; restless birds never do this, and as a consequence are not profitable. The breeds to be chosen should be either La Fléche, Dorkings, Crêve-cœurs, Houdans, Langshans, Plymouth Rocks, or such crosses as Game-Dorking. These must be selected in accordance with the rules laid down in the chapter on laying out the poultry-yard, where we spoke of the soil and position of the poultry-yard, and the influence these must have upon the breeds kept.

Closely associated with the question of breed to be chosen, is that of the general condition, and state of the birds selected for breeding. Here we must emphatically warn our readers against what we have indirectly mentioned before, namely, that no bird tainted with disease, or organically deformed, must be bred from in any way. Such diseases and defects will be transmitted, probably in an intensified form, to the descendants, which in their turn will probably be the means of passing them on to others. There can be no question that the breeding in of defects, or the transmission of disease, are very easy matters, whilst the breeding of them out is not only difficult, but often impossible. Stamina, and

good condition are two most important elements, which should never be lost sight of by the poultry breeder, as without these it is impossible to succeed; and, whilst great care should be taken to see that the other qualities of the birds are suitable, nothing should ever induce the use of sickly ones for stock purposes. And, also, in deciding upon the selection of breeding fowls, there must be a clear understanding as to what is required—we mean, to what purpose the chickens are to be put, and then, keeping this end in view, let them be chosen accordingly. Hap-hazard breeding never did, and never will, succeed; though, at times, a lucky hit is made, but there is no certainty as to its being repeated. A careful study of the birds to be so used will be well repaid; and, if they have to be purchased, it will be time well spent to make inquiries as to the qualities of the birds. Poultry fanciers expend both time and money freely, in order to obtain all the information possible about a bird they purpose buying, knowing the great injury which may be done through want of a little care; and the matter is equally as important to the poultry farmer. Because of the want of information, we do not advise buying in a poultry show, except it can be obtained, and many a yard has been ruined by diseased, or otherwise unsuitable birds, bought in this way. The best way is to go, or send, to known breeders, who have a reputation to keep up; and, though a little more money may have to be paid in the first instance, it will probably be found the cheapest way in the end. In the spring of the year, a very common way of getting fresh blood into a yard, or, of commencing one afresh, is to purchase eggs, and if fairly dealt with, this is both a cheap and good means of doing so; but, unfortunately, there is a good deal of roguery in the business. Where it is desired to get the yard into full operation, or to have the benefit of the new blood at once, this plan will not do, and birds must be bought instead.

We now come to the putting together of the breeding-pens, and the management of the birds in them. In the first place, there is the question of space to be given to them, and it is here necessary to utter a warning—though we have dwelt on the question of runs already—against the very common practice, of putting breeding stock into very small houses and runs. Nor do we, on the other hand, think the system of breeding from the ordinary stock a wise one, as this does not permit of the proper improvement of the stock, which might otherwise take place. The best plan, is either of those we have already recommended, namely, to have separate houses in which the birds can be kept, or a row of houses with large open runs. Weakly chickens are very often caused by want of sufficient exercise on the part of the parents; and it will be found, that the more liberty that can be given to the breeding stock, the hardier the chickens will be. Therefore, it should be a rule, that, whether the laying fowls have an abundance of room or not, the breeders must have plenty; and, upon no consideration, should the latter be cooped up in small runs. We have given in a previous article, the smallest amount of space necessary to keep birds in health and condition, and this will be a guide to our readers in this respect. A sufficient number of chickens can be bred from one pen of fowls, in a single year, to stock a good-sized yard, and thus it is worth while giving them sufficient room.

Then it is a most important matter, that a cock and hen mated together for breeding purposes, should not be related to each other. A very large amount of harm has been done by in-breeding, and the degeneracy of many of the races of high class poultry, is entirely due to this practice. Poultry fanciers, whose object is to obtain fine feather, or peculiar conformation, regardless of all commercial considerations, may, if they think fit, resort to in-breeding, for they are willing to pay the price; but, those to whom it is necessary that their

birds shall have stamina, size, and unimpaired laying powers, must not indulge in so foolish a practice. The state of the breeding stock, in very many of the farmyards of this country, where we find miserable, weedy mongrels, of no use either for laying or to put upon the table, is very largely due to the in-breeding which has gone on generation after generation, and to the want of regard for the selection of breeding birds. Of course, it may be accepted as a fact, that all our various breeds of birds have been produced by more or less in-breeding ; but even acknowledging that much, it has been a gradual process, and not a forced one. Therefore, it is more than necessary, that the birds mated together should be unrelated. Only by care in putting them together, can this be secured ; but the result is worth all the trouble.

The next subject which must be touched upon, is that of the number of hens to be put with each cock, as the fertility of the eggs will naturally greatly depend upon this. No certain rule can be laid down applicable to all breeds, as the number varies, not only with the breed itself, but with the circumstances under which they are kept. For instance, birds in a confined run are more indolent and less vigorous than those at liberty, whilst the state of the weather has much to do with the question also ; and, again, a young bird should have a larger harem than an old one. So far as a rule can be laid down, not more than four hens should be given to a cock of any of the larger and heavier breeds, *i.e.*, Cochins, Brahmas, Dorkings, Langshans, and Scotch Greys, when in confinement; but, if at liberty, then this number may be increased to six or eight. The lighter breeds can take six or eight in confinement, and a dozen when at liberty. These numbers will have to be varied according to the season of the year; of course fewer being given in severe weather, and more added, as it gets warmer and finer. The best test is, that when too few hens are given, they will

be found stripped nearly bare on the back, and when this is seen, then more should be supplied to the cock. This must be done even if hens of a different breed can only be used, as too few hens is as great a cause of unfertile eggs, as too many, and the strain upon them is also very liable to cause them irreparable injury. As the bare backs can be seen by the most casual observer in a poultry yard, there can be no excuse for the neglect of it.

As a rule, eggs may be depended upon as fertile within a week of the birds being mated together; but, we make it a rule, never to use the first two or three eggs produced by each hen after she is so mated, especially, if she has been running about in the open yard, or been mated with other cocks. Those who breed birds for exhibition, are most careful not to allow any cock to have access to the hens, except the one mated with them, during the breeding season. The reason adduced for this is, that the effects of such a cross may be noticed in the chickens, even though a considerable time has elapsed, between the alliance and the laying of the eggs. Whether this is so or not, it is quite unnecessary for us to inquire here, as it does not sufficiently concern those who breed only for commercial purposes, but, of course, it is wise to prevent mixing up in this way unnecessarily. In any case, we should not advise the using of the first two or three eggs, as they are almost certain to be either infertile, or to show signs of previous mating, neither of which is desirable.

The feeding of breeding stock, is a point on which a mistake is made by too many poultry keepers. Fowls will not lay if they are fed too well, and on this account, great care must be exercised in what is given to them, both as to quantity and quality. All fattening foods must be avoided, as these cause internal fat, which acts upon the egg organs, and prevents, instead of helping, the object in view. We believe in good food, that is, food of a sound nature, and this will

be found most satisfactory in the end. Barley, wheat, buckwheat, oats, and dari, both whole and ground, are all first-rate foods, and may be relied upon as best for the purpose. If the birds are in runs, where insect life cannot be got very freely, then a very little meat may be given to them, but not otherwise. And on wet or cold mornings, a little stimulating powder is very helpful, but upon no account should it be used when the weather is warm and dry. Green food is also very essential, and a barrow load of cabbages will be greatly relished, as well as be highly beneficial, even when the grass run is an extensive one. For a system of feeding we prefer the following :—First, a meal of soft food, mixed with boiling water, early in the morning, the sooner after the birds leave their roosts the better; second, a handful of grain in the middle of the day; and, last, a good feed of grain about an hour before they go to roost at night.

A question is sometimes asked, How much food should be given to each fowl every day? This it is impossible to answer, by stating any quantity, as the appetites of the birds vary with the season of the year, and with the different kinds of fowls, some being much greater eaters than others. The only safe rule is to either throw the food down in handfuls, or put it in dishes or troughs, and to cease giving, or remove it, as soon as the birds cease to eat eagerly. There is just one exception to this rule, and it is one that needs to be very especially mentioned here, for there are some cocks of a very gallant nature, which will not touch any food, until all their hens have been served. They call their mates to it, and see that they get enough, but do not attempt to touch it themselves. Therefore, unless the attendant is very observant, the bird will get very little to eat—certainly not enough, and will go down in condition, infertile eggs being one of the results. Where this is observed, either a little more food must be given to the cock or he must be fed by

himself. Either plan will answer the purpose so long as it is seen to. We need only just mention that material will be needed for the formation of the shells, and this may be old mortar, broken oyster shells, lime and gravel, the last being specially useful, in assisting the birds to digest their food, and should for that reason always be supplied.

The chief object should be, to keep the breeding stock in the best of health and condition, as this is most conducive to the production of strong and hardy chickens. It can only be secured by selecting good birds, in the way indicated by us, by giving the birds as much room as possible, by housing them well, and by feeding them in a systematic and sensible manner. Neglect any of these points, and the result will show itself in the progeny, because in this, as in all other similar operations, effects follow causes remorselessly. We do not say that the effect is always immediate, or even apparent at once, but it is nevertheless there, and sooner or later will declare itself.

CHAPTER XV.

HATCHING.

Shall Hens set themselves?—Selection of Place for Sitting—Hatching Boxes—Making the Nests—Food and Water—Setting the Hen—Feeding—Airing the Eggs—Kind of Food for Hens—Dust Bath—Testing the Eggs—Period of Incubation—Management during Hatching—Helping the Chicks.

The time when hens should be set, will depend very largely upon the purpose for which the chickens are required, and the breeds of poultry kept. If eggs are the object in view, and any of the breeds we have named as most suitable in such a case as this are selected, then March and April are the best months; but, if heavier breeds, such as Brahmas or Langshans are chosen, then no chickens should be hatched after the first week in April, or, at any rate, as few as possible. Birds intended for table purposes, whether chickens or ducklings, may be hatched at any time, but it is best to do so as early as possible, even in autumn. Those hatched at other times, mature, and are placed on the market, when it is overstocked, and, consequently, they do not realise so paying a price. The rapidly maturing fowls may be hatched much later than those which are more deliberate in this respect, and these are the questions which must decide the time of hatching, for, with layers, the object is to have them laying before the winter sets in, and, with table birds, it is to get them to market when prices are at their highest point. Those who breed fowls for exhibition, generally get their birds out

as early in the year as possible, to have them matured before the autumn and winter shows, except in the case of Bantams, in which, small size being a desideratum, they are bred late, so as to prevent undue growth. Thus it will be seen, that there is a way provided for all denominations of poultry keepers.

Among old-fashioned henwives there is a very general impression, that it is a much better plan to let a hen set herself, than to provide a nest for her. This is doubtless true to a certain extent, with some breeds, as they are thus content, and, being under perfectly natural conditions, often produce larger broods than they otherwise might. But, where there is any attempt at careful breeding, it is almost impossible to adopt such a system, unless the amount of ground at disposal is very large indeed, and the birds are at perfect liberty. In addition to the need for space, there are other drawbacks to a plan of this kind. In the first place the owner is at the mercy of the birds—he must wait their convenience, and it may be lose the best weeks of the year. Time is everything, and if none of his own hens are broody, he should seek for others that are, if he wishes to succeed. Then, in the second place, no other eggs than the ones laid by each hen herself can be used for hatching, which is, of course, simply out of the question ; and in the third place, if a hen elects to set herself in the laying house, constant fighting will be the result, probably ending in the spoliation of the whole nest. Some hens resist being removed, and refuse to sit anywhere but in the places they select ; but, as a rule, they are much more reasonable than this. On a large farm where hatching is to be extensively adopted, it is better to have a docile sitting breed, and for this we know of none better than Brahma-dorkings, as they will allow themselves to be handled, are large, without being clumsy, cover a goodly number of eggs, make excellent sitters and

mothers, and are very good all-round fowls. Often, however, other hens have to be obtained, and, when sitters are scarce, they must be taken. The plan we are about to suggest will generally be found to answer for all, except, it may be, very wild ones.

Where it is only necessary to hatch one or two settings each year, there need be no difficulty in setting the hens, as they can be put separately in outhouses, empty runs, or any other places of that kind, but, where a number of hens have to be kept at work at one time, then some other system must be adopted. If the farm or ground space available is very large, the hens may be distributed in various parts, under charge of the cottagers, but, as a rule, we prefer to keep them near home, where they can be looked after by one person, whose sole care they will be. And, for this purpose, it is best to devote a good, large, comfortable room, such as an empty stable, an unused coach-house, a loft above a stable, a cool conservatory, or, even a large empty room in the house itself, and, during the early part of the season, the chicken-house, if one has been made, may also be used. But, when the chickens begin to appear, it will be much better to put the sitting hens elsewhere, as they are very apt to get fidgety and restless, hearing the "cluck, cluck" of the mothers and the "peep, peep" of the chickens.

Whatever is the place selected, it should be warm, comfortable, well ventilated, free from draughts, and as even in temperature as possible, but, except in very severe weather, it is not necessary to keep a fire in it, for, if well built, it will be warm enough, though if adjoining a stable or green-house it will be all the better. In very cold weather some artificial warmth is necessary, or the hens will be most likely to desert their nests. The room selected need not be well lighted, and, in fact, a somewhat dim place is the best, for the birds sit quieter in the dark. The same room can be

used as a fattening place later on in the year, if not in a dwelling-house, and, if dark, the inmates will thrive more rapidly than in light, but hatching and fattening must not be carried on at the same time. An earthen floor is best, though when it is made of brick, cement or wood, the same result can be arrived at by laying down ashes or fine earth, about a foot thick, over the same. Upon this, all round the room, hatching boxes may be placed, if the first plan we are about to describe be adopted.

The kind of nest box we prefer, having used it for many years, is a plain deal box, about eighteen inches in height,

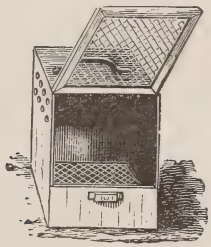


Fig. 7.—Hatching Box.

and fifteen inches square, similar to that shown in Fig. 7, which should be kept by all dealers in poultry supplies. It is made without bottom, or only with wire netting to keep out rats, but with a solid top; the upper two-thirds of the front forms a door, which may open either upwards or downwards, the latter preferred, and, if hinged and provided with a simple catch, is easily opened and closed, and, when closed, the inmate is perfectly secure, and cannot be molested. Holes for ventilation are bored in the top and the sides, and a coat of whitewash inside completes the whole. We have often made half-a-dozen of these boxes in a single afternoon, at a small cost, but they can also be bought at reasonable

prices. We prefer these to any others, especially to those made in sets, as each one can be removed at any time for cleaning purposes, and, consequently, vermin are not harboured. And as a score boxes can be kept in one room without difficulty, they answer all the purposes required. We do not approve of hatching nests in tiers, not only because they harbour insects, but, also, because the air cannot circulate about the nests, as it can in the boxes we have described. This is most important, and is sufficient to account for the non-success so often found where the nest boxes are made in sets.

Other plans can be adopted for hatching boxes. For instance, we some time ago visited a very large poultry yard and were surprised to see in use, in the hatching houses, what to us was a new plan, but which at first did not appear to be a good one. The hatching boxes were suspended to the wall, about two feet above the ground, and were made so that the hens could be securely shut in. The bottoms of these boxes were pieces of wire netting stretched upon frames, and removable, so that the inside could be properly cleaned out. The nests were simply straw—no earth or grass sod, or anything, but straw—and the owner informed us that during the previous season, the success in these nests was greater than in any other. His idea was taken from the nests of wild birds, and he believed that free circulation of air, is of the greatest importance for successful hatching. This bears out what we have already said; and whilst we cannot now go so far as to recommend this system to all our readers, yet there is undoubtedly something in it. Of course, there are many who succeed well in hatching, with only plain boxes, or even a couple of bricks; but, where a number of hens are to be set, this plan necessitates a separate place for every one, which is not at all times possible.

As already stated, where the hatching boxes recommended by us are used, the floor should be covered with fine soil, or

ashes, about a foot thick, and upon this the boxes must be placed. The object is to keep the underside of the eggs cool, and the atmosphere in the nest moist. A hen, when allowed to choose her own nest, generally selects a cool, damp spot, so that we are only following nature in doing this; and, as the boxes are without bottoms, the moisture in the earth or ashes naturally affects the nest itself. The best plan is to put these boxes all around the room, with their backs to the walls, and a space of a foot between each. Thus, in a room fifteen feet square, between thirty and forty nests can be accommodated. As each hen has to be allowed out to feed separately, it is sometimes thought advisable not to put so many in one room, but to divide them, so that two or more may be off feeding at one time. We have also seen a capital plan adopted in some places, namely, having half-a-dozen large roomy pens at one end of the room, in each of which food and water is provided, and plenty of fine dry ashes for a dust bath. By such an arrangement as this, half-a-dozen hens can be fed at one time, but, of course, they will have to be lifted off the nests, put into the pens, and returned to the nests again, when they have been properly fed. The saving of time by so doing is very great, for, allowing fifteen minutes to each bird, it would take six hours to feed twenty-four, whereas, in the way we have described, one hour would be sufficient. If the attendant has little or nothing else to do, then it is, perhaps, not worth the extra cost; but where there is plenty of other work to do, it will be found a very economical method.

After the box is in position, a good shovelful of fine soil or ashes should be placed inside, and then hollowed out with the hand like a saucer, so as to make the nest a proper shape. Care is necessary, to see that the corners are filled up, or the eggs will be very liable to roll away from under the hen, the result of which will be chilling and addling. Above the

earth, some soft straw must be laid, oaten preferred, or, if wheaten is used, it should be well beaten or rubbed in the hands, and then the nest is ready for the eggs, and for the hen.

Most of our readers will be sufficiently learned in poultry matters, as to be able to tell when a hen is "broody," or "clucking," as it is often called. Any one who has lived in the country will have no difficulty in the matter, but it may be, that a few denizens of the towns may not have this knowledge. The best sign is that the hen sits closely on her nest, and makes a sound not unlike "cluck, cluck." If taken off, she gets back again as fast as possible, resenting the interference more or less, according to her temperament. The best plan of putting a hen off being broody is to move her about; and, therefore, when she is wanted as a sitter, she must not be disturbed too soon, but left alone until the broody fever is fully developed.

In the case of a hen, which has been proved in previous years to be a really good mother, then the eggs may be placed in a hatching box, and she can get to work at once; but with a young or unknown hen our plan has been to put a few dummy eggs—*i. e.*, either chalk or spoiled eggs—into the nest, in order to test her, before the eggs to be hatched are given. By this means very many valuable eggs may be saved, which would otherwise be lost through the removal having upset the hen. The best time to set a hen is at night, as then she is more likely to settle down to her work, not having seen the surroundings. The eggs should be put into the nest, with some food and water near, and, if the rays from a lantern or candle be thrown upon the eggs so that the hen can see them, the food, and very little else, she will generally go on of her own accord, as soon as she has fed herself. Should she be reluctant to do so, gentle force may be used, and the hen placed on to the nest, and shut therein. As a

rule, if left undisturbed for twenty-four hours, a hen so treated will be found sitting closely, and all will go on well afterwards. The real eggs can then be substituted for the others; but, if she is at all unsettled, this must not be done for a day or two longer.

As already indicated by us, each hen must be allowed off the nest for feeding purposes once every day, and thus, in a room where there are a large number of sitters, it should be arranged that this shall take place in rotation. The period may be varied according to the season of the year, and the temperature of the place where the hens are sitting. Hens which find their own nests are accustomed to leave them an hour at a time; but, it must be remembered, that, as a rule, they never sit except in moderately warm weather, such as can generally be found in the late spring. It will not do, therefore, to adopt the same plan at all seasons. Eggs will stand a very great deal, and we have known them hatch, even after being stone cold for twelve hours; but this fact must not be taken as a warrant for carelessness. As a general rule, it may be accepted that ten to fifteen minutes is long enough, early in the year; but, later on, or, if in a warm place, then half-an-hour will do no harm. If the temperature is very low, the first-named period would be sufficient to kill the eggs; and, when this is the case, something must be done when the hen is off, either by closing the box or covering the eggs, to prevent their getting chilled. If the nest is made in a proper place, however, there will be no danger of this, and the periods given by us may be taken as a rule. The leaving of the nest by the hen is necessary, not only for her sake, but that the eggs may be cooled, without which they will not hatch. It is supposed that the cooler air is required to expand the lungs of the embyro chick, and that fresh vigour is thus drawn through the pores of the shell. At any rate, whatever may be the reason, it is no doubt a fact that

too close a sitter generally spoils her nest, and fails to bring out any chicks. Upon this account, therefore, if a hen shows any reluctance to come off, she must be lifted off. To do this properly, care is necessary, and the hands must be slid below the wings, so as to prevent any eggs that might happen to be tucked under them, falling down when the hen is lifted, and breaking the others in the nest. She must then be lifted up by the wings; and, if she makes any attempt to run back without feeding, the door of the hatching box should be closed until the time named has expired.

The food given to a sitting hen must always consist of hard grain, as corn, wheat or barley, and never of soft food. The latter causes looseness of the bowels, and the poor hen, unable or unwilling to leave her nest, fouls it. If this should happen, or, from any cause an egg gets broken, the eggs remaining, must be well washed, and the nest re-made. This is best done by having a pail half full of warm water, just hot enough so that the hand can bear it. The eggs should be placed in this, and properly cleaned with a sponge; and the legs and thighs of the bird must also be washed, to prevent the eggs sticking thereto, and, perhaps, falling and breaking, when the hen gets out. A dust bath will be needed also, say, a box half filled with dry ashes or earth, with a sprinkling of carbolic powder in it. This will help to keep down lice, which are not only troublesome to the hens, but dangerous to the chicks, causing that most dreaded of all chicken diseases, the gapes.

Considerable discussion has arisen as to the testing of eggs. This is done to prove their fertility, during the process of incubation. Some there are who advocate a "let alone" policy; but we do not, as we firmly believe in the testing, and always do it. If carefully done no harm can ensue; and, if unfertile eggs are present, as they very often are, especially early in the season, they can be removed, and thus six or eight hens made to do

the work of a dozen under the old system. Whether hens or incubators are used, all eggs ought to be tested on the seventh day, and, in order to obtain the full benefit of this, two or more hens should be set at the same time, so that, if a number are barren, one of the sitters can have her eggs given to the others, and a fresh nest made for her instead. Eggs may be tested in various ways. The original method was to grasp the egg with the thumb and forefinger of the left hand, using the other fingers, and the other hand, also, to shade off the light from the eyes. Many hundreds we have done in this way; but now egg testers are sold at about a quarter each, which are more certain, at any rate to those who have not tried the testing before. If there is only one window in the room, place the egg in the tester between the light and the eye, when the egg will appear cloudy or clear, as it is fertile or unfertile. At seven days, a "live" egg will have a black spot in the centre, gradually shading off to the edges, where it is much clearer, whilst an unfertile egg remains clear all the time. When working an incubator, we can tell fertile eggs thirty-six hours after they are put into the machine, but this requires considerable experience, and it is not wise to disturb a hen so early as the time named. In testing, perhaps the safest way, is to examine the eggs at night, by a candle, a lamp, or a gas jet, but care must be taken that they are kept at least six inches from the flame, or the heat will kill the embryo. All eggs found unfertile can be removed, and will be perfectly good for cooking purposes, or may be used for feeding chickens.

After this examination, nothing more need be done until the nineteenth day, except to see every day when the hen is off for feeding that the nest is all right, and, in dry weather, or, if upon a boarded floor, about a pint or a quart of hot water should be poured round the outside of the box, so as to keep the earth in the box damp, and thus provide

the necessary moisture. This is a most important, but often neglected, precaution. On the nineteenth day, a further examination will be advisable, but this time by water. A pail, about three-parts full of water heated up to 103 degs., which is just as hot as the hand can comfortably bear it, must be at hand, and in this all the eggs placed. The dead, or addled ones will generally sink to the bottom, whilst those that contain strong chicks will float in the water, and, in a minute or two, begin to bob about in a most peculiar manner, sometimes almost jumping out of the water. This is caused by the efforts of the chick to escape from its prison, and often may the chicks be heard to chirp in the shell. Only such eggs as have moved, and they need to be carefully noted to prove this, as the motion in the water may deceive as to whether they have moved or not, should be put back in the nest, as the others are certainly dead. We have tested hundreds, if not thousands, in this manner, and never found but two or three in which we had been mistaken. The benefits of this test are obvious. The water softens the shell, making the escape of the chick easier, and the removal of the dead eggs gives the birds more room as they come out, the attention of the hen being entirely devoted to them, and not partially taken away in expectation of the appearance of others.

As is generally known, twenty-one days is the period of incubation for chickens, but for one or two of the more active breeds, a day less, in which case the water test should be applied the same period of time earlier. If the eggs are very fresh when put into the nest, it will be found, when the hen is off on the day after they have been tested, that many are chipped, or even the chicks out of the shell, and, if this latter is the case, the egg shells must then be removed, and every three or four hours afterwards, the nest examined for the same purpose. These vacant shells have a very dangerous

habit of fitting themselves on to the other eggs, which simply means, that the chicks in the latter cannot get out. Unless the hatching is very uneven, we do not advise the removal of any of the birds from under the hen, but sometimes this is necessary, when they should be placed in a basket near a fire, and covered up with a piece of new flannel. This uneven hatching is more the result of some of the eggs not being fresh, than from any other cause.

Should any of the chicks appear to be unable to get out of the shell, they may be aided, but, as a rule, if they cannot get out themselves they are generally not worth the trouble. We have found, however, that the use of the water on the nineteenth day, almost entirely prevents any difficulty in this respect, but, if it is thought desirable to help the hatching, the way to do it is to get a bowl of warm water, in which they are placed, taking care to keep the chipped portion out of the water. In this the eggs are kept for a couple of minutes, when they are returned to the nest. Breaking the shell is very dangerous, for if blood is drawn, then death or deformity ensues, but the plan we have here recommended does all that is necessary in the majority of cases, and, in the others, the birds would probably drag out a miserable existence, and be neither of use, nor give pleasure to the owner. A little patience is needed, as sometimes hatching is delayed, and we should not give up eggs that had "bobbed" in the water, for two or three days after the time they were due to hatch. If two or more hens are set at once, then these late eggs can all be given to one, and the others have the chicks.

CHAPTER XVI.

ARTIFICIAL INCUBATION.

A Practical Success — Past Attempts — Difficulties — Later Attempts — The Turning Point — Roullier's Machine — Prejudice Against the Hydro-Incubator — The Incubator Trials—How Superior to Previous Machines—Drawback to Hydro-Incubator — Voitellier's Hydro — Owen's Tabular — Arnold's Egg Oven — Self Heating Incubators — Hearson's — New Centennial — "Perfect Hatcher" — The Thermostatic—The Novelty—Advice to Workers.

It is not at all necessary, now-a-days, to make any excuse for introducing the subject of artificial incubation into any work upon the keeping of poultry, for such a method of hatching has passed out of the theoretical into the practical stage; and, it is not too much to say, that there are thousands of machines at work in Great Britain, in France, and in America, as well as very large numbers used for ostrich hatching at the Cape. It is no longer a merely theoretical and expensive hobby, only to be taken up by those who have plenty of time and money at command, but has become an acknowledged success, neither intricate in its method of working, nor expensive in the first cost and subsequent management. But this has only been reached within the last few years, as many can verify, and there is every sign that the use of incubators is very likely to last, the results already attained being sufficient to justify this belief.

In theory, there has never been any difficulty about artificial incubation, because, so far as can be seen, when

eggs are laid by the hen all that is needed, if they are fertile, is to give the same amount of heat, air, and moisture as if brooded by the mother, and the chickens must come. This has not, however, been found so very easy in practice. In the first place, the heat must be kept regular, like that of the hen; and, in order to obtain this, most elaborate and ingenious machines have at various times been devised, the object being, of course, to regulate the supply of heat, so that the temperature to which the eggs are subjected might be maintained as evenly as possible. Many of these worked splendidly, so long as the mechanism did not get out of order; but this mechanism was necessarily so intricate, that very little upset it, and, in addition to this, the cost was so great that only the wealthy could afford to risk so much money over a doubtful experiment. In other machines, where the regulating power was not so susceptible, all went well so long as the outer atmosphere was moderately even, but, as soon as a sudden change came, the calculations were upset, and the eggs chilled or roasted. A hen's body is always about the same in heat, and she sits closely or lightly, in accordance with the weather; but, as a machine can never be made to think, and cannot be endowed with instinct, preparations are necessary to meet all conditions, and these preparations, in many instances, meant complexity and expensiveness. The accounts of the egg ovens of Egypt, China, and Siam, where artificial egg hatching has existed for centuries, led many to attempt reaching the same end here, and the records of the Patent Office, show the large number of attempts made to find success, many of which exhibited very great skill and scientific knowledge. It was forgotten, however, that what was possible and easy in the countries we have named, where the temperature is high and very even, is most difficult in an erratic and cold climate. Even with natural hatching, the difficulties in the way, are greater in

America than in many other countries; and, wherever a changeable climate is found there are great difficulties to contend with, both in natural and artificial incubation. This is even exemplified in the difference between the southern and the northern parts of the country, for in the former chickens can, as a rule, be hatched some three or six weeks earlier than in the latter.

As we have just stated, many attempts have been made to solve the problem, some of which promised to, and did, attain a measure of success. A generation or two ago, Messrs. Brindley, Schröder and Cantello, worked hard at the question; and, in later years, Messrs. Vallee, Boyle and Penman have done the same; but, it is with no idea of discrediting those gentlemen, that we say, they did not really help to arrive at the true solution. Mr. Boyle spent a very great deal of time, and several hundreds of pounds, in his experiments, and his machine displayed great scientific knowledge and skill. It was fitted with the best regulator we have ever seen, which was so delicate, that we have known it maintain the temperature for weeks, with a variation of only half a degree, in most changeable weather. The incubator of Mr. Penman was also very cleverly devised, and worked well; but, in both these machines, the mechanism made them expensive, and the many fine and delicate movements, to regulate the supply of air, moisture, and heat, made the working of them difficult, or, at any rate, too difficult for the results. Doubtless the makers, and a few others, were able to work them, but ordinary folks could not; and, although many tried, few succeeded in their endeavours. And, again, gas or oil lamps were used as the heating power, the cost for either of which was expensive under the system adopted, and, not only so, but the great consumption of gas or oil, charged the air with impurities, which often killed the germ in the egg, either early or late in the process. And, in

addition to this, the art of artificial rearing was very little understood, so that even when the birds were hatched, they died off in large numbers afterwards.

The numberless failures—for there were scores who made and tried artificial incubators, who were never known to fame—gave the general impression that there must be something supplied by the hen, unknown to man, but which is necessary for the successful hatching of the eggs. This was afterwards proved to be erroneous, and that the failures had been the result of a false system, upon which they had all been made. The Paris Exhibition of 1877 was an important period, so far as this question was concerned, for, at it, there were shown incubators upon an altogether new principle, and these have revolutionised the system, turning into a success that which was an entire failure previously. The machine we now speak of, is the hydro-incubator, invented by a Frenchman named Rouillier, and which, in its arrangements and mode of working, is simplicity itself, so simple that we wonder no one ever thought of it before. The main idea worked upon is, that a large body of water, embedded in non-conducting material, so as to prevent exposure to the atmosphere, will retain its heat for a very long time. These incubators have very large tanks, holding about fourteen gallons of water, which are divided into three horizontal compartments, each communicating with the others by means of a few small holes. This tank is placed in a wooden case, and surrounded on all sides, save the bottom (under which is the egg drawer), by an inch or more of felt, or some other non-conducting material, tightly pressed down. When this tank is filled with hot water, it is found that the water only loses from two to five degrees, every twenty-four hours, according to the temperature of the place where it is kept. If the water in the top compartment only be drawn off, and that in the lower ones be left undis-

turbed, the former being again filled with boiling water, the heat from this will gradually affect the lower body, and prevent its going down. By repeating this every twelve hours, the heat in the egg drawer can be maintained at almost any degree of temperature, with a scarcely perceptible variation, and, as there is no great expense in the making of such a machine, no intricate mechanism to get out of order, no cost for gas or oil, or combustion of these latter to vitiate the atmosphere, the advance upon the old system is very great, and, in practice, the hydro-incubator has been found very simple and efficient, so that now there are large numbers in operation. The inventor of this machine has stated that, in one year he hatched upwards of 44,000 chicks in these machines. In the district of France where he lives, the poultry keepers bring their eggs to him to be hatched, and go three weeks afterwards for the chicks, one in three of the birds thus brought out being paid for the trouble involved.

Hydro-incubators, on their introduction to our breeders, had to contend with a very great deal of prejudice and opposition. They were altogether against all preconceived notions, and apparently were more for playthings than actual work. The very fact of having to supply a gallon or two of boiling water twice a day was deemed too great a trouble ; but a few bolder spirits tried the machines, found them succeed very well indeed, and, at a public trial held in 1879, the hydro came off victorious, which was sufficient to give it a position at once. Many defects had by this time been remedied, so as to make it more fitted for Great Britain ; and the rearers sent out with it were found to be, beyond all question, first-rate things. Thus the hydro at once silenced all opponents, and, from its comparatively low price, at once became *the* machine. We believe we are right in saying that of its opponents in the trial of 1879, only one machine is now to be purchased, the others no longer being made. This success has made artificial incuba-

tion a fact, and thousands of chickens are hatched every year in incubators. The bearing upon the question of poultry farming is very great, as the attention given to a machine is not more than is needed by a couple of hens, whilst it will do four or six times the work, and with greater certainty. This has, undoubtedly, had much to do with the recent revival of interest in poultry keeping, and we, therefore, are justified in dealing fully with the question.

As might naturally be expected, the hydro-incubator was not allowed to have all the field to itself. If its introduction had not done any other good, that of showing where the mistake was in the construction of previous machines was enough to earn our favour. All these machines had been made on the principle of having a small tank of water above the eggs, heated by a continuously burning lamp, or gas jet. In some, the tank was partially embedded, but in others, it was entirely exposed, and in all it was very liable to external atmospheric influences. The result of this was, that every variation of the temperature affected the machine, and, during sudden changes, it was almost impossible for any regulator to withstand the pressure brought to bear upon it. Only one—Boyle's—did actually work smoothly in this way, and that was doubtless partly due to the fact, that its tank was the most protected of all. This constant variation in the temperature, could not but be hurtful to the eggs. But there was another great evil, namely, that the rapid exhaustion of the heat, consequent upon exposure, necessitated the consumption of a comparatively large quantity of gas or oil, with vitiation of the atmosphere already spoken of. On the introduction of the hydro-incubator, therefore, it was at once seen that, with a larger body of water in the tank, and the tank protected from external influences, the heat in the machine would be steadier, the consumption of oil or gas would be very small, and the vitiation of the atmosphere reduced to a minimum, or entirely

prevented, and this led to experiments, which have resulted in machines with continuous burning lamps, but without any of the objectionable features in the incubators of the past.

The incubators now upon the market, both in England and America, are numerous, and there is a considerable trade in them. It is not necessary for us to do more than refer to their leading characteristics, and then any of our readers, who may be inclined to invest in a machine, can form their own opinions as to the one most suited to them; not only so, but, as each maker issues a pamphlet or circular relating to his own machine, very full information can be got out of these.

We have seen that the great improvement which the hydro-incubators exhibit over the older ones, is in the larger body of water, as this makes the working of the machine a great deal easier, and maintains the temperature much steadier, than in the old machines, where the bulk of water was only one-sixth or one-eighth as great. The chief drawback to the "hydro," is the trouble involved in the partial emptying and refilling of the tank twice a day. In places where there is plenty of hot water at command, or, in a large room specially fitted up for the purpose with hot-water pipes, this is of small moment; but, with ordinary folks, it means a great deal of labour and trouble. One plan adopted is to have a large tin boiler, holding four gallons of water, standing upon a gas stove on the top of the incubator, in which the water is boiled twice a day, and the water run into the tank direct. Oil stoves have been introduced for the same purpose, where gas is not available; but, about two years ago, a modification was introduced in the shape of small heating boilers, affixed, by means of a couple of pipes, to the side of the machine as is shown in fig. (8), and so constructed, that the water in the tank can be re-heated twice or thrice a day, without the trouble of emptying and refilling. This is done by the simple process

of having a lamp or gas jet under the boiler, and, by the natural circulation of water, that in the upper compartment of the tank gradually passing through the boiler and thus being re-heated.

By the use of this boiler twice a day for about an hour each time, the machine can be worked; and, though this system requires care, yet with that care it is both simple and easy. The makers of the hydro-incubator are Messrs.

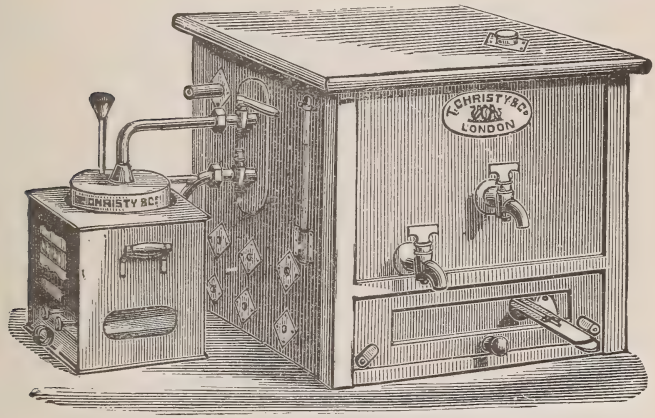


Fig. 8.—Christy's Hydro-Incubator, with Circulating Boiler.

Thos. Christy and Co., of Fenchurch Street, London, who have by their enterprise done a very great deal to solve the problem of artificial incubation and rearing, and their machines are now well known all over the world. In a place where hot water is not to be obtained easily, and in sufficient quantity, we know of no better machine than theirs, and we should in such a place strongly recommend it, as there is no danger of fire, no vitiation of the atmosphere, and there are no regulators to get out of order.

The other machines made on this hot-water principle are, first, that of M. Voitellier, of Nantes, in France. This is very similar to the Christy machine, except that it has the egg drawer rather differently situated. It is one of the oldest machines, and we have heard very favourable accounts of it, both in this country and in France. Secondly, there are the tubular incubators made by Mr. John Owen, of the Minories, London, which are very similar to the Christy, having a boiler at the side. In this case, the water in the tank is not reheated by flowing through the boiler, but, connected with the boiler are pipes through which the heated water flows, and these heat the water in the tank. And, thirdly, there is the "Egg Oven," a machine invented by Miss May Arnold, of Acton. This is almost conical in shape, and the tank above the eggs forms an archway. The body of water held in it is very large, so that the quantity to be supplied, in order to keep up the heat, is very small indeed. Capital arrangements are made for ventilation, cooling, and moisture; and, though we have not had an opportunity of testing it in actual practice, as it is of but recent introduction, we have great faith in it, as it appears to be made upon very sound principles. All these machines are made in various sizes, from thirty-six eggs upwards, and are reasonable in price.

The trouble involved with the hydro-incubators, led many to experiment with self-heating machines, and we appear now to be returning to the original system of continuous burning lamps; but, certainly, they are in a much less objectionable form than at first, as the water tanks are large, consequently the loss of heat is small, and the boilers are made small so that the water in them heats very rapidly. As a result of these alterations, the lamp flames or gas jets are diminutive, compared with the old ones, so that the vitiation of the atmosphere is reduced to a minimum. These are decided steps in advance; and, though we should prefer

the hydro-incubators if we were working on a large scale, in which case the supply of boiling water could be easily provided for, we are almost inclined to think that the self-heating machines are better for those who do not wish to conduct operations so extensively. The latter are certainly much easier to work, and are very little more costly than the others. The greatest dangers are in over-heating, and, in the case of lamp machines especially, making the air in the apartment where it is kept impure—a danger which can be obviated to a large extent, by the exercise of a little care in the working of the machine, and by having the room well ventilated.

One of the best machines of this class, is that known as Hearson's, made by the Sun Auto-Pneumatic Company, of Southwark. We have heard the very highest testimonies as to its capabilities, and recently heard a gentleman, who has about a dozen incubators of various kinds, say that he prefers this one to all the others. Above the lamp, which is placed at one side of the machine, is a chimney, which has two outlets. The first of these is immediately over the lamp, but the other runs through the water-tank and back again, the top of which is the side of the one first named. There is no boiler above the lamp, and the only method of heating is by means of the hot air passing through this longer chimney, for, when in operation, a cap fits on to the shorter one, and the heated air cannot escape in that way, except under such circumstances as we shall presently indicate. Below the tank, and just above the egg-drawer, is a metal capsule about two inches square, and in this is some fluid, unknown except to the makers, which expands enormously when the heat rises to more than 104 degrees. On the upper side is a rod, which passes up a tube through the tank, communicating, by a lever, with another rod, which is attached to the cap fitting on to the chimney immediately above the lamp. When the machine is in its normal con-

dition, this cap remains in position, and the hot air has to go the circuit already named; but, when the heat rises above 104 degrees, the capsule expands, the lever is acted upon, and the cap is lifted from off the chimney, so that the hot air escapes there, and the machine soon cools down. This capsule is wonderfully susceptible, and the incubator is found to work admirably. The usual arrangements are made in it for ventilation, and moisture, without which no machine could succeed.

ARTIFICIAL INCUBATION IN THE UNITED STATES.

Although the exact date cannot be ascertainedi, it is believed that the first hatching machine was exhibited in the United States prior to the year 1844. This was a machine presumably of English manufacture, and was called the Potolokian. It was shown in the city of New York. No reference is made in the records of the United States Patent Office to any machine for hatching chickens earlier than the year 1847. In that year, as we learn from the report of Charles H. Page, the then Examiner of Patents, two patents were granted for methods of artificial incubation. As showing the state of the knowledge upon this subject and how well these early inventors comprehended the problem awaiting solution, this report is of special interest. The Examiner says, "The operation of hatching chickens by artificial heat is much more extensively practised in Europe than in this country, though of late years the traffic in such business has increased. Two patents have been granted for modes of artificial incubation; the point aimed it in both being to imitate as clearly as possible the circumstances of nature. A good idea of the invention and its objects may be gathered from a short preamble to one of the specifications as follows:

"'Heretofore, in arranging apparatus for the hatching of

eggs by artificial incubation, it has been usual so to construct the same that the eggs are placed in a heated atmosphere of a temperature which is thought the best for the purpose, so that the whole surface of each egg has heretofore been subjected to the same temperature, which I have discovered, after numerous experiments, is highly injurious, and only a very low percentage of the eggs submitted to artificial incubation can by such means be hatched, and I attribute that result to the evaporation of too much of the fluid of the egg. It will be found, and it is a well known fact, that the germ of the egg floats at the upper part of the egg, and the bird in natural incubation applies the direct heat of the body to that part of the egg, and the lower part of the egg is comparatively at a much lower temperature than the upper part where the germ is. In addition to which the bird often leaves the nest for a time, by which each egg is more or less ventilated.

"'Now the object of the first part of the invention is so to arrange apparatus for artificial incubation that the heat may be contact heat from above, whilst the lower surfaces of the eggs are kept comparatively at a low temperature, and by such means to imitate nature as nearly as may be. I would remark that the arrangement of apparatus for obtaining the requisite heat from above to the eggs, for carrying on the process of artificial incubation according to my invention, may be varied; and, therefore, although I shall hereafter describe an arrangement of apparatus such as I have found fully to answer, and is what I believe to be best for the purpose, I do not confine myself thereto so long as the peculiar mode of carrying on the process of artificial incubation by top contact heat be retained.

"'The second part of my invention relates to the arrangement of apparatus to serve the purpose of the mother in imparting warmth to the young bird, and consists of circulating heated fluids through flexible pipes, so that the

young birds can pass under and press themselves against such heated flexible pipes or surfaces; and such an apparatus will be found to offer a like mode of applying warmth to the young to that which is offered by the mother; and the young having a warm yielding surface above, against which they can press themselves, they will not be found to huddle together as has been heretofore very commonly the case in bringing up young birds; and such huddling together renders the young very weakly and tender, and very few are raised to maturity.'"

The first of these patents for artificial incubation was granted to L. G. Hoffman of Albany, N. Y., on Feb. 20th, and the second to W. J. Canteto of England, on July 24th, in the year 1847. Both from the records of the Patent Office and from other sources the fact seems to be established that Mr. Hoffman was the first American citizen to produce a hatching machine.

From 1847 to 1870, a period of twenty-three years, the U. S. Patent Office granted no patents to inventors for machines or for methods of artificial incubation. The first machines doubtless failed to satisfy the expectations of their makers, and the problem of artificial incubation still was to be solved. Although no patents were granted during this period, we are not to suppose that the problem had been given up as insoluble by human skill. Probably men were observing, studying, thinking of the various factors, and though no record remains we are justified in regarding this as not an entirely fruitless period. On December 27th of the year 1870 a patent was granted to Jacob Graves of Reading and Henry Graves of Boston, Mass., for an incubator, the first patent granted by the United States for a machine with that name, for the patents of 1847 were for methods rather than machines. While it is not absolutely certain that this is the machine to which Mr. James Rankin, the great duck producer, alludes in his little work, "Sixteen

Years' Experience in Artificial Poultry Raising," yet it certainly possessed many of the characteristics of that machine. That machine was exhibited in Boston in 1868, and appears to have been of very thorough construction. "It was most thoroughly built in every part, and could generate all the heat needed to incubate eggs in a temperature below freezing point." But in operation the difficulty was found to be in controlling the heat. "The regulating apparatus consisted of a glass syphon, some two feet long, filled partly with alcohol and partly with mercury; the alcohol being inside of the machine and the mercury outside. In this mercury was inserted a wired cork. The heat was expected to expand the alcohol, force up the mercury, and raise the cork." This cork was attached by a small wire to the ventilator, and by another wire to a cut-off on the lamp, and had it worked well, it would have cut off the flame and opened the ventilator simultaneously. The difficulty lay not so much in the conception of the regulator as in the placing of the alcohol in the bottom of the egg chamber, where the heat was the least, so that by the time the heat had expanded the alcohol the eggs had been seriously injured by overheating. The machine also was heated on all sides, except where the door was, as well as overhead, which last is the only method now in use, and the reason for which had been fully understood by the inventors of 1847, as appears in the preamble quoted. This machine, though showing that considerable advance had been made, nevertheless proved quite a disappointment. Inasmuch as the claims in the patent of 1870 show a combination of a burner, cylinder, cork float, tube, rod, lever, spring, and crank, so disposed as to accomplish the purpose, substantially as set forth in the description of the machine given, and as both appeared in the same locality, it does not seem a strained conclusion that the same machine is under consideration in both cases.

In 1871 patents were granted to E. Woodward and N. J.

Millet of Charlestown, Mass., and also to H. J. Haight of New York City. The patent of the latter was for a rotary incubator, so arranged as to turn around gradually, the movement supposing in some way to secure the more perfect hatching of the eggs. This was a hot water machine and was considered self-regulating.

In 1872 but one application, and this for some appliance to an incubator, and not for the machine as a whole, was granted to Jacob Graves of Reading, Mass., doubtless an improvement to the incubator, the patent for which had been previously granted. In 1873 no patent relating to artificial incubation was granted, and in 1874 but one, to Mr. H. J. Haight, the inventor of the rotary incubator. In 1875 there were two; in 1876, one to H. W. Axford; in 1877 there were four and the name of E. S. Renwick appears among them; in 1878 there were two; in 1879 we count six, among which is J. L. Campbell; in 1880 the same as in 1879, and J. Dennis Jr. among the number; in 1881 seven names appear, and that of A. M. Halsted for the first time; in 1882 five patents appear to have been granted, and the following year the same number; in 1884 but three names are given, but among them appears that of James Rankin; in 1885 there were thirteen patents granted, in 1886 twenty, and in 1887 nine; in 1888 there were nine, the following year five, and in 1891 eleven; in 1892 six patents were granted, in 1893 sixteen, and the data for 1894 can not yet be had. We have, therefore, in the last twenty-four years, beginning with 1870, no less than one hundred and thirty-five patents granted for incubators or parts of incubators. And this number by no means adequately represents the number of conceptions that have been embodied in machines for artificial incubation, for there are doubtless as many more that have been built for use but never have been patented. Not a few of these unpatented machines are automatic in regulation and very successful in operation. The writer has in mind

now one machine, built to hold one hundred eggs, from which its inventor almost invariably hatches fully eighty-five per cent. of the fertile eggs, and has actually taken out of the machine at a single hatch eighty-five bright healthy chicks. If we were to add to the successful unpatented machines all of the unsuccessful experiments that have been made the list would become formidable indeed, and it would prove that the American people are in means of accomplishing artificial hatching, as well as in other matters, a nation of inventors.

Incubators are broadly divided into two classes, hot water and hot air machines. Each class has certain advantages over the other. The hot water machines, by reason of the heat remaining in the water for a long time, prevent the eggs from becoming chilled in the event of the lamp going out. The hot air machines heat more quickly and easily and hence consume less oil in their operation. If the heat rises suddenly the opening of a ventilator cools off the egg chamber quickly before injury can be done to the eggs, whereas if there were a body of superheated water the cooling would take place more slowly, and it might take place so slowly that the eggs would be ruined. Water tanks, especially if made of iron, often become leaky in a few years, and may become so during a hatch at the risk of spoiling a batch of valuable eggs. The advantages and disadvantages, however, when the machines have good care, are so evenly balanced that one class of machines can be said to have but little if any real superiority over the other. There used to be a vigorous contention over the character of the heat supplied, the advocates of the hot water machines claiming that the heat from their incubators was more moist, and that therefore they prevented the eggs from becoming too greatly evaporated. This contention, it is needless to say, really had no merit in it beyond the fact that if the tube used for filling the tank was left open there would be a little evapo-

ration, and a very little indeed, from the water in the machine, and this would produce a small amount of moisture in the air surrounding the machine. As machines are now constructed with a tight fitting cap to the opening into the tank, no moisture can escape into the outer air, no evaporation take place, and therefore the heat is just as dry in one class of machines as in the other. This contention has been altogether silenced as the truth has become known.

Incubators are also broadly divided into two classes, according to the method of regulating the heat. In one case this is accomplished by an automatic regulator which opens a valve allowing the warm air to escape from the egg chamber, or which lifts a cap allowing the heat from the lamp to escape so that no more can be added to the egg chamber until the temperature drops back to the desired degree. In the other case it is accomplished by what is known as a lamp trip, which is, usually, a small metal sleeve slipping over the lamp burner and attached to the automatic regulator. As the temperature rises the regulator draws up this sleeve, thus diminishing the size of the flame and the amount of the heat. These two methods are sometimes combined in the same machine, the flame being diminished and the warm air being allowed to escape simultaneously. When but one method is employed, although there may be an honest difference of opinion, it seems to the writer that the first is the preferable. The lamp trip does not always work successfully, at least upon some machines, and, especially in hot water machines, there is often needed a sudden cooling of the eggs which cannot be secured by the lamp trip alone. A combination of the two methods usually works admirably, but such a combination adds to the complexity of the machine.

The most obvious classification of incubators is that into those without a regulator and those provided with a regulator. The former class has been almost entirely supplanted

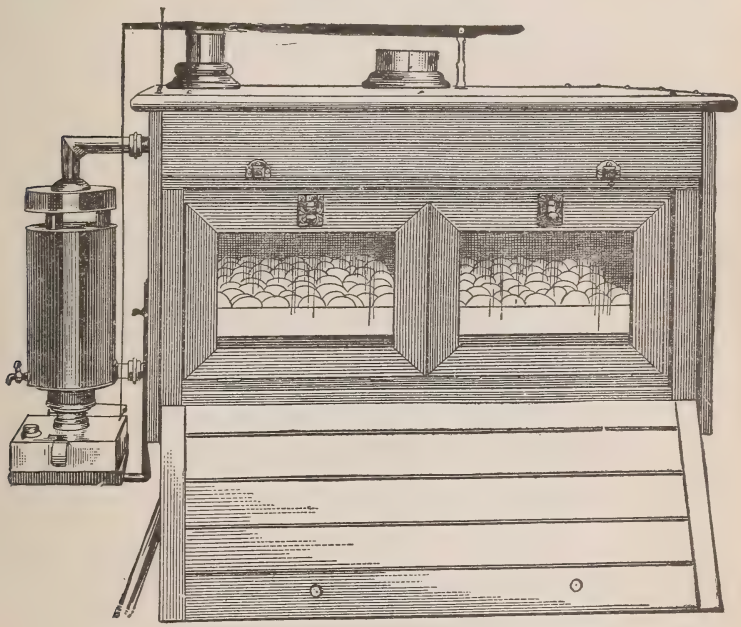
by the latter in the markets, though frequently home-made incubators have no automatic regulator. Among the most noted machines of this first class is the invention of J. Dennis Jr. of East Providence, R. I., patented in 1880. This machine deserves especial notice, not only because it has been quite a successful hatcher, but also because it introduced a unique feature into incubators. The most of the incubators which are operated without a regulator depend upon the fact that an inclosed body of hot water retains its heat for a long time, the cooling process being very gradual. This is reduced to the minimum by inclosing the tank in a casing packed with non-conducting material. At stated periods a portion of the water is drawn off and its place supplied by an equal quantity of boiling water. But the invention of Mr. Dennis, the Reliance Incubator, makes use of soapstone to retain the heat. The soapstone, in which are imbedded hot water pipes, to furnish it with the desired amount of heat, is placed in the upper part of the incubator, over the eggs, in the position occupied by the usual tank. The heat is supplied to the hot water pipes by an oil stove of special pattern. As the hot water circulates through the pipes, the soapstone absorbs the heat, which it gradually radiates through the egg chamber. The body of the machine is made of metal, with an inch space between the inner and outer casings, to be packed with non-conducting material. There are two egg drawers and over each is a ventilator that is kept constantly open. Evaporating pans supply moisture to the air as it enters the egg chamber. The regulating of the heat depends upon the size of the flame in the oil stove. A little experience with a machine enables one to gauge the flame quite accurately for securing the desired temperature for the eggs. This machine, though practically out of the market, did really good work in its day, as has been learned from those who operated it. The perfection to which the various regulators have been brought

has practically driven out of market machines without regulators, though home-made machines are often constructed in this way. Outside of the Olentangy Incubator, made by Geo. S. Singer of Cardington, Ohio, the writer is unable to recall a machine now manufactured for sale that is without an automatic regulator, and even the Olentangy is claimed to be self regulating, though having no automatic device for this purpose. Ten years ago this was not the case, for, besides the Reliance, there were a number of such incubators on the market, among which were the Pacific and the Novelty.

The number of really valuable automatically regulated incubators is so great that one is embarrassed in the selection the most representative for description. Popularity is no sure index of the comparative value of the machines, for the one which is the most popular to-day may be eclipsed by a rival to-morrow. Fortunately the purpose of this work is not to decide which is the best, but to show how some of the most representative machines are constructed, with a brief mention of others, perhaps equally as valuable for practical use.

Among hot water incubators none is more popular than the Monarch, or "Improved Monarch," as it is now called by its inventor and manufacturer, James Rankin of South Easton, Mass. This machine grew out of a need Mr. Rankin felt in carrying on his business as a practical poultry raiser. A machine which he bought, now nearly a quarter of a century ago, having proved a failure, induced him to experiment in the hope of ascertaining its defects and of discovering remedies for them. The outgrowth of all these experiments was the incubator which has now been so long and so favorably before the public. The machine, of which a cut is shown, is constructed with two cases, the inner one of galvanized iron, the outer of wood, with an inch space for dead air and heavy sheathing paper. It is furnished with three

doors, two inner ones of glass and an outside one of wood. The tank, which holds about thirty gallons of water, is made of galvanized iron, and is located above the egg chamber. It is packed at the sides and on the top with heavy hair felting an inch in thickness. The machine is regulated by the expansion of water. At one end of the tank is attached

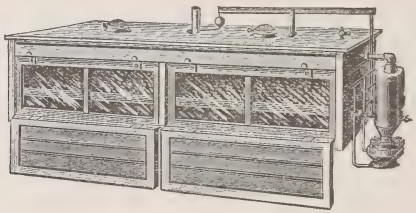


The Improved Monarch Incubator.

a tube some three or four inches in diameter. In this tube is inserted a float of thin brass foil, which acts upon a horizontal bar connected with the extinguishers on the lamps. The action is as follows: when the water in the tank becomes heated above the degree that is desired it expands and, as it expands, it forces up the brass float, which tilts the horizontal bar and communicates its action to the metal

sleeves, which are drawn up so as to diminish the size of the flame. When the water cools, it contracts again, and the metal float following the water pulls up the horizontal bar, which causes the sleeve on the burner to drop down and increase the size of the flame. On the largest machines two lamps are used, though one is usually sufficient to furnish all heat required. The lamp heats the water through a small copper boiler and a constant circulation is kept up. The machine is furnished with adjustable trays, the egg chamber is roomy, and excellent results have been had from its use. The inventor hatches from 8,000 to 10,000 ducks and chickens each year, and many other large establishments use these machines.

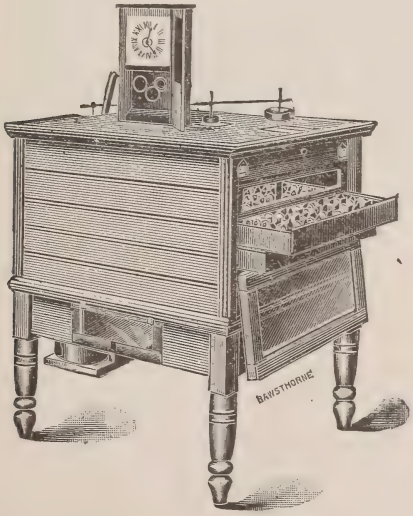
In describing this, and other machines, a free use is made of the manufacturer's description.



The Challenge Incubator.

The Challenge Incubator, invented and manufactured by Wood and Paige, Lynn, Mass., practical poultry raisers, is a machine that is giving very general satisfaction among its users. It is a double cased machine, the outer of wood, the inner of zinc, with a space of two inches, firmly packed with sawdust, between the two cases. The floor is also double, with sheathing paper between. The tank is made of heavy galvanized iron, the boiler of copper, and the connections of brass. The circulation of the water is about the edges of the tank, then through the centre and, as it cools,

it flows through a lead pipe passing around the bottom of the machine and thence into the boiler. A good circulation is thus secured. On this return pipe the moisture pans rest, about two inches above which the egg trays are placed. The eggs are turned by a train of friction gears, the simple motion of pulling out a rod turning every egg in the machine. The regulator is a ball attached to a lever, and operates by the expansion of heated water. As the water expands, it rises into a small glass globe. This globe is



The Eureka Incubator.

attached to a long lever, one end of which is attached to the cut-off on the lamps. As the water expands, its weight causes the end of the rod to drop, the motion reducing the flame and thus shutting off the source of heat.

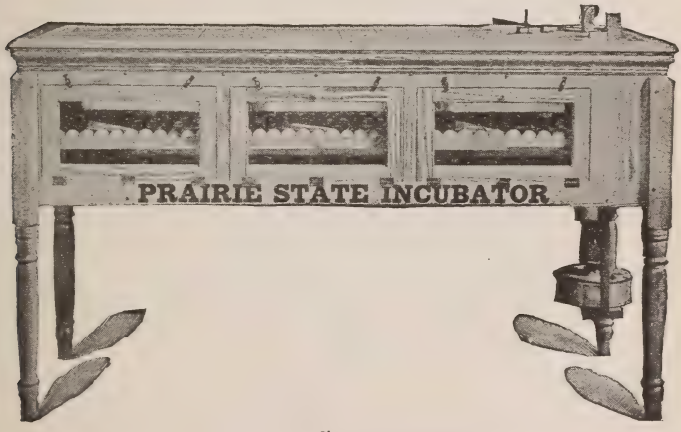
The Eureka Incubator enjoys an excellent reputation. Its inventor and manufacturer, Mr. J. L. Campbell of West

Elizabeth, Pa., has been for years a more than ordinarily careful experimenter in artificial incubation, and the results of his many experiments he has embodied in his machines. The case of the Eureka is double and well put together. The tank or, in double tray machines, the two tanks are made either of galvanized steel or of copper. The steel tanks are painted inside before they are put together. Moisture is supplied from a pan, and in the double tank machines this pan is a covered arrangement over the surface of which as much or as little air can be passed as is desired. The heat is regulated by a thermometer placed directly over the egg and attached to the centre of a balanced bar or walking-beam situated on the top of the incubator. One end of this beam is provided with a wire that connects with the lamp burner, the other is connected with a valve. When the heat rises the lamp trip operates by diminishing the flame, and the heat is kept at any required degree. The valve will also open and let out the over-heated air. The cut-off on the lamp is of a peculiar pattern, instead of a metal sleeve which slips up and down, being so constructed that it opens and shuts against the wick from each side. The eggs are automatically turned by a clock-work arrangement, the clock being set to turn the eggs at any hour or hours the operator may deem advisable. Machines are made of various capacities and with both double and single trays as may be desired.

Among other hotwater incubators which have an excellent reputation may be mentioned the Climax, manufactured by the Climax Incubator Co. of Fitchburg, Mass.; the Improved Monitor, made by A. F. Williams, Bristol, Conn; the Improved Noxall, manufactured by Geo. W. Murphy, Quincy, Ill.; the Improved Victor, manufactured by the Geo. Estell Co., of Quincy, Ill.; the Buckeye, made by the Buckeye Incubator Co., of Springfield, Ohio; the Juniata, made by the Juniata Incubator Co., of Yeagertown, Pa.;

the Flower City, manufactured by the Flower City Incubator Co., Rochester, N. Y. ; the Perfected, made by H. D. Moulton, Taunton, Mass. ; and the Reliable, made by the Reliable Incubator and Brooder Co., Quincy, Ill. This list is by no means complete, but it gives some idea of the great number of really good machines that are now manufactured.

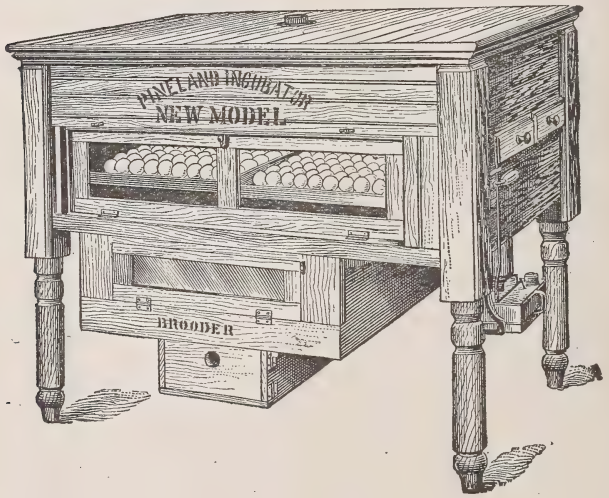
Among hot air machines there is none that enjoys a greater popularity than the Prairie State, manufactured by



The Prairie State Incubator.

the Prairie State Incubator Co., of Homer City, Pa. This machine is used extensively in centres of broiler-raising, in the establishments of market poultrymen, and in the more limited quarters of the fancier. The machines are "single-decked," that is, have but one tier of trays. The air for the egg chamber enters from below within a tube which surrounds the lamp flue, by which means it is warmed, and in its ascent it passes over the moisture pans, which are situated in the centre of the machine and the top of the egg chamber, thus securing the desired humidity. The flue of the lamp passes upward through the machine and through

the radiator and enters a galvanized iron radiator covering the entire top of the egg chamber. Thence it passes upward and out of two pipes at the end of the machine. This galvanized iron radiator, warmed by contact with the heated air, radiates the heat from above down upon the eggs to be hatched. The heat is regulated by a thermostat of metal, operating a valve by means of a connecting rod. This valve



The Pineland Incubator.

covers the top of the lamp flue, compelling the heat to pass upon the above described circuit, but, when the temperature becomes too high in the egg chamber, the valve is lifted by the thermostat and the heat escapes from the lamp, being no longer forced through the radiator. The operation is a very simple and reliable one. Below the egg tray there is a considerable space, and as the chickens hatch they drop down into this space. This space becomes a nursery for the chicks until the hatch is completed.

The Pineland, manufactured by the Pineland Incubator

and Brooder Co., of Jamesburg, N. J., is another machine that has a good and growing reputation. In construction and general principles this machine is quite similar to the Prairie State. It is regulated by a lamp trip, and it radiates heat from a radiator above the eggs. Its thermostat is a hard rubber bar. In the larger machines there is a division, making them practically two machines. Two lamps are provided and the sides can be operated independently, or one side can be filled with hens' eggs and the other with ducks' eggs, and the hatches will not interfere with each other. This idea is claimed to be original with the Pineland, though some other machines are now built upon the same principle.

The Thermostatic Incubator, of E. S. Renwick, is one of the most scientific machines ever produced, but its complication has prevented its general introduction to the public. A mechanic would doubtless pronounce it one of the most perfect machines ever invented. In the hands of one who has a little mechanical ingenuity it would seem that this machine could not fail to give satisfaction, but many operators of incubators lack this ingenuity and consequently prefer a simple, if less scientific, machine. The air, warmed by contact with metallic lamp flues, passes over surfaces of water and, ladened with moisture, is radiated upon the eggs from above, and then, passing through the nursery at the bottom of the machine, it is conducted out of the incubator by a flue at the rear. The heat is regulated by a thermostatic bar which operates a clockwork arrangement that opens and closes the lamp flues as less or more heat is required. The machine embodies devices for turning the eggs, for permitting the chicks to drop into the nursery, for governing the heat, and for whatever else may be necessary to secure a compliance with all the requisites of artificial incubation.

The Simplicity, manufactured by the Von Culin Incubator Co., of Delaware City, Del., is a thoroughly well built incubator. Its walls are five inches thick, the space between the inner and outer walls being packed with a light, non-

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* In order to give as clear an idea as possible of the construction of an incubator we publish the following illustrations, which show the interior parts of the Improved Simplicity Hatcher. A careful study of these illustrations will show exactly how this machine is constructed, and will make clear the terms used in describing the other incubators mentioned in this work.

VON CULIN'S IMPROVED SIMPLICITY HATCHER.

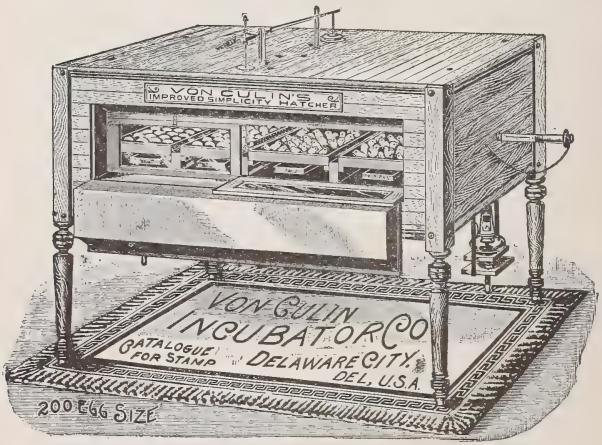

Fig. 1.

Figure 1 is a view of the Hatcher, showing one of the lamps, and the general exterior of the machine.

Fig. 2 is a view in perspective, showing the body of the improved incubator with top and outer walls removed.

Fig. 3 is a longitudinal section on line XX of Fig. 4 of the improved incubator, showing the thermostat and its connections.

Fig. 4 is a view in cross section of the space between the inner and outer walls of the improved incubator.

conducting material. The inner door of the machine is made of glass, but the outer door is of equal thickness with

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Similar letters refer to similar parts throughout the several views.

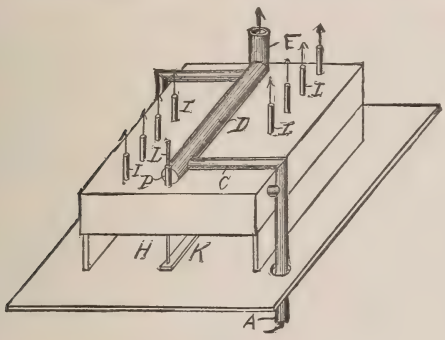


Fig. 2.

AA are inlets for conducting hot air into the heater S through pipes BB. When E is open, it allows the hot air to pass up AA and CC, through D, and out at E, making a draft which draws hot air out of the heater S at BB, at the same time drawing cold air into the heater S at IIII.

D is a discharge pipe double the capacity of C, and carries off hot air from CC out at E when E is open.

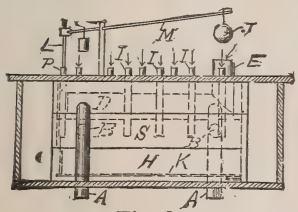


Fig. 3.

E is the main outlet for hot air, S is the hot air heater, five inches deep.

H is the egg chamber.

IIII are tubes running through the top of heater S, through which cold air is drawn into heater S, when E is open.

K is a thermostat in the egg chamber and is on a level with the eggs.

L is a metal rod connecting the thermostat with the l ver M.

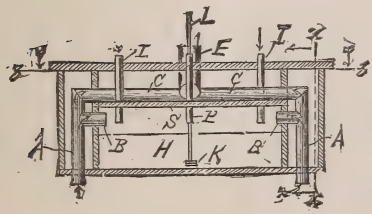


Fig. 4.

J is a ball or cover suspended at the outer end of the lever M, and is made to open or close the outlet E by action of the thermostat K.

P is a tube running from the egg chamber H through the heater S, and through which the rod L passes. X is one of the lamps, two being used at diagonally opposite corners of the incubator.

the walls. The thermometer is mounted on a wooden rod and is pushed through a hole in the side of the machine. To examine it one can pull it out and note the temperature without opening either outer or inner door. The thermostat consists of a rubber and brass bar, connected with an upright rod, which in turn is connected to a long but very light wooden bar. At the end of this bar is attached a metal cap that fits over the lamp flue. As the temperature rises the thermostat bends down, pulling with it the upright rod, which operates the long bar and lifts the cap, thus allowing the heated air to escape. Heat is radiated from above. This machine, owing to its thick walls and to the complete circuit of hot air, is very inexpensive to operate, the lamp consuming but a very small quantity of oil. The thermostat is sufficiently sensitive to enable an operator to run the machine through a hatch with scarcely any variation of temperature.

The Surprise Incubator, invented by Frank C. Beardsley and manufactured by the Surprise Incubator Co. of East Billerica, Mass., and the Homer City Incubator made by the Homer City Incubator Co. of Homer City, Pa. are well indorsed as successful hot air machines.

Nothing in the circulars of manufacturers of incubators is more misleading than the impression they give, even if they do not directly assert, that experience is not necessary for the successful operation of the advertised machines. It is doubtless true that remarkable hatches have been secured occasionally by inexperienced persons, but it is equally true that experience is valuable in operating incubators. There have been condemned, without doubt, many really valuable machines simply because the operator lacked experience; machines, which, in other hands, would produce admirable results. One of the most successful poultry fanciers in the United States, a man who raises several thousand chickens each year, said, in an address delivered

in 1893, "I have tried them for several years, having used all the best machines; and I would not take the best one that is manufactured to-day as a present, if I was obliged to use it myself. Chickens hatched by the hen are much stronger, larger and finer in plumage; there is as much difference between artificially produced chickens and natural ones as there is between Jersey butter and oleomargarine." And yet there can be named a number of fanciers who could not be induced to hatch and rear their chickens by hens, who find that size, color, hardiness and every other valuable point can be secured by artificial means equally as well as by natural means and with much less trouble. The idea that artificially hatched chickens are inferior to those produced by the natural method has largely died out, though it still persists in a few very conservative minds. From the time of Reaumur, who introduced the art into France, by hatching chickens in barrels by the heat of fermenting manure, to the present there have not been wanting objectors to the artificial process. It will be remembered that people asserted in Reaumur's day that the chickens he hatched in his barrels were unfit for human food because they tasted of the heating material, and that such chickens were absolutely sterile and if the process were persisted in the race of fowls would necessarily die out. Modern objectors have not been quite so absurd, though they have claimed that size would be deficient, shape imperfect, hardiness impaired, plumage less perfect, and for exhibition the birds would score at least two points less. And these objections had a certain basis, the basis of inexperience in operating the machines. One gentleman, whose experience may be given as a type of that of the average operators of incubators, has expressed himself to this effect: "The first year that I ran an incubator the results were such as to lead me to think the machine was a delusion and a snare. The few chickens I hatched out of many

eggs were deficient in size and plumage. The second year I had better results, but the artificially hatched and brooded chickens were inferior to those produced in the natural way. The third year, however, when I had learned how to run my machines, gave me such satisfactory results that I prefer the artificial to the natural method. I find I can produce as large, as handsome, as hardy and as valuable chickens by the artificial as I can by the natural method, and I really think I can do even better than that, for my artificially produced chickens are the finest I ever reared. It took me three years to learn how to do it, and I do not feel now that the whole art has been learned; I expect to improve still more in the future." If this gentleman's recital of his experience is true, and if it is a typical experience, then the best that can be hoped to be done by suggestions is simply to shorten the period of learning, not to do away with its necessity.

One of the first things to be considered in operating an incubator is its location. Many manufacturers claim that their machines will hatch anywhere, and perhaps they will, but the place where they will do the best work is where there is the most stable temperature with a supply of pure air. The cellar of a dwelling house, or what is perhaps even better, a basement underneath the ground on three sides, will secure an even temperature and proper ventilation. It does not matter so much what the temperature is, provided it is not subject to sudden or great changes, because incubators as now constructed are capable of generating a sufficient degree of heat in the egg chamber even in a temperature that is nearly at zero.

Another requisite of successful management of incubators is the securing the proper degree of humidity in the atmosphere. Reaumur found that he could hatch no chickens in his barrels until he had excluded all moisture, but the necessity in his case may have been quite as much the keep-

ing out of foul gases as the exclusion of moisture. Experience with incubators, however, has led to quite a change of ideas in reference to the necessity of moisture. At first it was supposed there could not be too much, but less and less moisture has been supplied with constantly improving results. Some admirable hatches have been secured without the use of any moisture in the egg chamber. It seems to be tolerably well settled that when a hygrometer shows the humidity to be about forty-five degrees the air is sufficiently moist for hatching purposes. If this degree of humidity is present there is no necessity of adding to it by evaporation. If, however, the air be very dry there is danger that the liquid within the eggs will evaporate too rapidly, and that the membranous lining of the shell will become too tough for the chicken to break out when the three weeks of incubation are passed. On the other hand unless the egg evaporates sufficiently the chicken grows too large and is unable to turn about in his shell and break his way out. The golden mean between too much and too little moisture should be preserved.

Numerous experiments have proved apparently that eggs need to be turned once at least in every twenty-four hours. Many ingenious mechanical devices for turning the eggs have been invented, and they are useful, provided the temperature of the egg chamber is the same in all its parts. But this is frequently not the case, and the result is that, when these automatic burners are used, the eggs in one part of the machine hatch, while those in other parts do not. It is always advisable to test the various parts of the egg chamber, and see whether the heat is alike throughout. If it is not do not turn the eggs automatically, but by hand, and take pains to shift the positions daily, so that each egg will, in the course of the three weeks, occupy every place in the chamber. More uniform hatching will be secured in this way.

Eggs should be tested after they have been in the ma-

chine a week and the clear eggs removed. This will be early enough for beginners, though with experience one can test them successfully when they have been in the incubator three days. Such eggs as are removed at this testing are perfectly suitable for human food, and are much better than the majority of "store" eggs, especially such as one buys in the summer. A second testing should be made on the tenth or fifteenth day, and every egg that does not have a strong, live embryo should be removed from the machine.

After the eighteenth day until the hatch is completed the incubator should not be opened. It may be difficult to restrain curiosity, but it is advisable to do so. If the door is constantly opened the temperature becomes variable at a time when it should be uniform, the hatching eggs are subjected to cold draughts that may chill and even kill the chickens just breaking their way out. The percentage of many hatches is doubtless greatly lowered in this way. If you must see how things are going on, content yourself with peeping through the glass of the inner closed door, and do this just as infrequently as possible. When the chickens are out and dried will be time enough to count them. As they do not need any food until they have been hatched from twenty-four to forty-eight hours, because of the absorption of the yolk of the egg, there is no cruelty to them in waiting for the completion of the hatch. When the hatch is completed and the chickens all nicely dried they are ready for removal to the brooder which has already been warmed for their reception.

CHAPTER XVII.

REARING—NATURAL AND ARTIFICIAL.

Size of Eggs—Supposed Ways of Testing Sex and Fertility of Eggs—Formation of Egg—The Young Chicks—First Day after Hatching—Food—Coops—Influence of Early Management—Coddling Injurious—First Three or Four Days—Second Stage—The Run—Food—Meat Diet—Green Food—System in Feeding—Cold Mothers Troubles with Hens—Artificial Mothers—Management—Outdoor Rearers—Heat—Overcrowding—Teaching Chicks to Eat—Turkeys as Rearers.—Water—Milk.

THERE is a great variety in the size of eggs laid by the different breeds of domestic poultry, but, the size of the egg is very little indication of the size of the fowl which it will produce. Of course Bantams lay much smaller eggs than ordinary fowls, and ducks much larger ones; but, if we take the Spanish tribe, which are almost the smallest in size of body, save only Bantams and Hamburghs, they have almost the largest egg of any; whereas, on the other hand, Brahmas and Cochins, which are the largest fowls, have very much smaller eggs than any other domestic fowls, except those already named. Doubtless, they are very rich in quality, whilst the Spanish are rather dry; but, what we have said, shows that the size of fowl and the size of egg have no regular relationship, and, therefore, larger eggs than those usually laid by the fowls should not be selected for hatching. Very large eggs are generally double yolked and unfertile, or, if fertile, produce mal-formed chicks. The best, and only

safe plan, is to select ordinary-sized, smooth-shelled, and good shaped eggs, refusing such as are abnormal in any way. We have heard it stated that long and pointed eggs produce cock birds, and that short, round eggs produce hens; but the belief upon which this supposition rests, is so wanting in proof, and the opposite has been so often shown, that it must be dismissed as incorrect. We have also heard that eggs laid before noon produce hens, and after that time of day cocks, the promulgator of this extraordinary theory declaring that he has proved its truth scores of times; but this must be dismissed as nonsense. It has been also said, and with a greater measure of probability, that the fertility of eggs can be told by placing the broad end to the mouth, and breathing upon it. If the egg feels cold, it is unfertile; but if it is warm, or, to describe it more accurately, appears to give back warmth, it has been impregnated. The reason for this is stated to be, that a fertile egg contains the germ of life, and that there cannot be life without heat; therefore, the egg does not absorb the same amount of heat when breathed upon, as when an unfertile, and, consequently, entirely cold egg is tested. We have known many instances where this test has been applied, and the eggs selected accordingly, with the result that they have turned out as marked, when placed in an incubator; but, we have known other instances, where it has not been found so reliable, and we cannot, therefore, state that the test is an entirely safe one. It is a fact, however, that after eggs have been in process of incubation for ten or twelve days, and are exposed to the atmosphere for five minutes, the living and the dead ones can easily be distinguished, if held in the hand. The former are as warm as when the hen was on them, whilst the latter are quite cold, or very nearly so.

The formation of an egg is truly a wonderful process, and puts the poor, weak inventions of man into the shade.

The yolk, which contains the germ, when detached from the ovary, finds its way to the oviduct, and is there coated in succession with numerous thin layers of white—which is largely composed of albumen. It has the chalazas—which hold the yolk in position, and are known as the portion which cooks take out when beating up an egg—fixed, is then covered with the two outer membranes or skins, and, finally, before being voided, is covered with the shell. The white is the matter from which the chick is formed, when the germ of life is present, and the egg subjected to the proper conditions. The yolk-bag contains the food of the chick, and, during the process of incubation, this bag hardens, and is absorbed with its contents into the stomach of the bird, shortly before it emerges from the shell. Thus, by a bountiful provision of nature, no food is needed by the chick during the first twenty-four hours of its existence, and giving any food during that time, is not only useless, but positively injurious, so that no attempt should be made to force the birds to eat. Young poultry keepers often get anxious, because the food put down during the first day is not eaten, but for the reason just stated, there is no need to have any fears on that account, and the appetite will come in proper time, for which patience, must be exercised. Another custom is observed by some persons, which is a useless one, namely, the giving of a peppercorn to the newly-hatched chick; but, unaware as we are of the reason advanced for this custom, it is not based upon experience or upon common sense, and we can only characterise it as "an old wives' fable." A still more foolish custom is occasionally found, which deserves the strongest condemnation, namely, that of tearing off the hard scale found on the beaks of all young chicks—so placed to enable them to break through the shell—and putting it down the throat of the bird. This is not only without anything to recommend it, but is, at the same time, cruel and barbarous, and also

unnecessary, as the scale naturally falls off after a few days. Possibly, if we could trace it, this custom originated in some old superstition, born in an age when there was a charm in cruelty, or, when no thought was given to the sufferings of those who were weak and defenceless.

When the process of hatching is entirely over, and all the birds are out, it is better not to disturb the hen, after having given her a good feed, for twenty to twenty-four hours, when some hard-boiled egg, chopped fine, mixed with an equal quantity of bread crumbs, and slightly moistened with milk, should be given to both the hen and her brood. The best plan for making the bread crumbs is to get a sieve, about ten or twelve inches in diameter, and of a moderately fine mesh. This, in use, is turned upside down, and bread rubbed through with the hands, in which way, if the loaf is not too new, nice even crumbs will be made very rapidly. When giving the first feed, it is best to put the food upon a board in front of the nest, and the hen and chickens placed near it, when the tapping of the hen's beak will be sufficient to attract the attention of the chicks, and they will soon begin to feed. No more than they eat readily should be given, and any that is left ought to be removed at once, for the best rule for feeding chicks is, little and often. Only sufficient should be moistened to serve two or three times; and, when the weather is cold or wet, a pinch of stimulating powder will be very beneficial. Clean water in clean dishes must be given, or, what is better, warmed milk; but shallow dishes or saucers should be used, or the birds may get drowned. We once bought some dishes which were made with a series of rings or ridges on the upper side, so that the birds could not possibly come to any harm, and the quantity of water which each held was, so small that they had to be refilled twice or thrice a day. But small fountains, with a cup at one side, are even better than these, for the birds can drink out of

them, but cannot stand or get into them. They are made both in ware and zinc, and can be obtained at reasonable prices.

After the hen and her brood have had their first feed, they should be removed to a coop, either placed in a shed (such as we have before described), or in some warm, dry, sheltered spot, where the sun will reach. A lawn, a meadow, a wood, or, in fact, any place that is grassy, and, what we have said, will answer; but it must be away from the ordinary hens, as they are very apt, from jealous motives, to interfere with chickens; and, for the same reason, coops must not be too near each other, without some provision to prevent the hens fighting, which will not be to the advantage of the young broods. Coops of all patterns, shapes, and sizes can be obtained, but if cheapness be desired more than appearance, a box or a barrel is capable of being made into a good coop, by any one handy with tools. The things to be sought for in a coop are—that it shall be dry above and below, ventilated, but free from draughts, easily moved about, having laths or bars at the front, so that the chicks can get out and in, but not the hen, and have a folding shutter, so that the whole can be closed up at night. If the ground be dry and sandy in its nature, or, when the coop is in the shed, there need be no floor, as the straw used will be sufficient; but, if it be at all damp or cold, a wooden floor should be used. A flour barrel, which can be bought for a quarter, will make two good coops, if the head be fixed on and the barrel itself sawn in two. Laths can then be nailed on to the only open part, constituting it the front, and two or three staves can be taken out of the under sides, so that there will be no floor, or it can be raised up above the ground by wooden feet or bricks, which should always be done when a wooden floor is used. Thus in a very simple manner can a capital coop be made, and at little cost; but if something better is needed any

joiner can make one to look nice, or there are plenty sold both at low and high prices. We like those best that have floors separate to facilitate cleaning, and nailed on to two pieces of scantling, the floor fitting inside the coop, and the two sides of the latter resting upon the scantling, for by this means all chance of the wet getting in is obviated. Fig. 10 is a capital example of one of these. If the coops cannot be put very wide apart, it is better to use wire runs, as these prevent the chicks wandering away and getting mixed with other broods. In fact, it is always better to use a run for

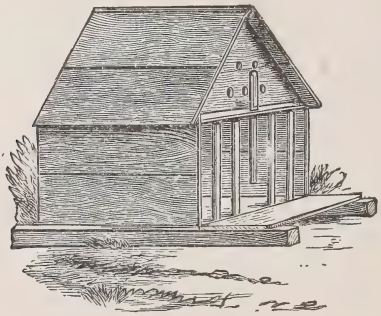


Fig. 10.—Chicken Coop.

the first week, if the coop is outside, moving it to fresh ground every day, but after then, if there is plenty of ground, the run can be dispensed with, and the hen allowed to be out also, at least for a few hours in the day.

The growing stage in the life of young chickens, as in children, is the time that very largely controls their size and stamina, and therefore much depends upon the method of treatment during such growth. Unless there is a good supply of nutritious food, the strain upon the system will not be provided for, and the chicken soon

dies, or, grows up a weedy, stunted thing, of no use to any one. We must not be thought from this to be advocating pampering or coddling, for we do not believe in such a system; but, there is a way of feeding well in which there is no pampering, and as to coddling, whilst we certainly think that the young chicks should be protected from the severe storms, it is much better to put them out of doors—except in severe weather—as soon as they are a week or ten days old. This, of course, does not apply to very early hatched chicks, for, as they are brought into the world at an unseasonable period, they need special treatment, and must be kept in such a house as we have already described. There is another advantage also, in giving them liberty, and that is, they can find grubs and worms, which, it must be remembered, are their natural food. But on these topics we have already said all that is needed.

For the first three or four days, it is better to continue the egg and bread crumbs, of which the hen should be allowed a share, as it is necessary to get up the tone of her system, which, naturally, is much reduced during sitting, in order that she may begin to lay as soon as she gives up her charge: otherwise, if she is not well fed, there may several weeks elapse before she does this, and thus "penny wise" will be "pound foolish." The chicks require to be fed as soon after daylight as possible, and at intervals of two hours until the evening; a final meal to be given by candle-light, about ten o'clock at night. If it is not possible to be up so early in the morning as this may appear to require, a little canary seed should be left overnight, where the birds can get it as soon as they are astir; but this will not take the place of warm food and fresh milk, so that it must not be made an excuse for idleness. A bad riser is certain to be behind with his chicks—all other things being equal—compared with one who is a good getter up.

Inexperienced poultry keepers are very apt to make a great mistake in rearing chickens, by neglecting those a month old and upwards, for the younger broods. The reason of this is not difficult to realise, for, it is thought that the birds, having got so far in safety, are able to look after themselves, and do not require the same amount of attention as the younger ones; whereas, the fact really is, that the birds at the age mentioned, need actually more care than they ever did before, or will again. Doctors tell parents that boys and girls in their teens need more support than at any other time. So it is with chicks; and neglect at this period is attended with very serious results, more birds being lost then, than at any other stage of their growth. The cause is, that the down or nest-feathers, which have enveloped the body, are being shed, and the full-grown feathers taking their place, thus causing a continual drain upon the system; it is, in fact, a first moult, and there is not the same strength to meet it as is found in adult birds. Extra warmth, additional nourishment, and careful feeding, are all most important to the well-being of the chick, and undue exposure to cold or wet will be very dangerous, and ought to be guarded against. Of course, some breeds are hardier than others, and get through this stage much more easily, but the strongest need such care as we have indicated. In fine open weather the feeding will be the great point requiring attention, but, in bad weather, it will be a good plan to put the coop inside the chicken-house.

When the coop is outside it is better to have a wire run for the chicks, though this can be discarded after the first week, and the birds allowed to run about freely. At the end of another week the hen may be allowed out also; but she must be kept within an enclosure, or be watched, for, if left alone, she will probably lead them away too far, and tax their strength more than they can bear. For food, oatmeal, Spratt's, or Chamberlin's prepared meals, may be given

alternately, with some crushed hempseed, which, when they are three weeks old, can be substituted by dari or buckwheat, both of which, and the latter especially, make capital chicken foods. Some correspondence has appeared in poultry journals of late, in which the rearing of chicks on grain alone was advocated, and some writers stated, as their experience, that it is better than soft foods. We believe too much pampering does takes place, but, at the same time, we think that, for early broods especially, these warm, nutritious foods are of immense service. Rice is a food which chicks are wonderfully fond of, if properly prepared; but as it is entirely deficient in bone-forming qualities, some bone meal should be mixed with it, or leg weakness will probably ensue. The best way to prepare it is, to put a pint of poultry rice into three pints of water, and allow it to simmer (not boil), on the stove or side of the kitchen fire, for a couple of hours, when it will be found that the rice will have swollen out and absorbed all the water. If the soil upon which the chicks are kept, contains plenty of worms and slugs, it can be dug up a little, and there will be no need to provide any animal food; but if it is sandy, or the birds are kept in a confined space, then some provision must be made in this way. Dead fowls come in very useful for the generation of gentles, and should be allowed to hang a few days, when thousands of fresh flies' eggs will have been deposited. If buried in the run the maggots will soon begin to show themselves, much to the advantage of its inmates; though upon no account should a diseased fowl be used in this way. Green food should also be supplied, and can take any form that is most convenient. Grass is, of course, to be desired, but not cut grass, if anything better can be got. Lettuces, cabbages, and, in fact, any garden stuff of this nature may be given; and we know of one of the largest breeders in the kingdom, who puts down, in his chicken run, a barrowful of lettuces every morning,

and he declares that he would never be able to raise such fowls as he does, were it not for this. A spare corner of the garden may very profitably be set on one side for growing lettuces, and a plentiful supply thus secured.

There can be no question that the best system which can be adopted in feeding chickens is little and often. For the first fortnight they ought to be fed every two hours, for the next month every three hours, and after that, until they reach maturity, four times a day. As already stated, the first food should be given as soon after daylight as possible, and the plan, or rather want of plan in some yards, of allowing chicks to run about three or four hours before getting their first meal, is calculated to do more harm than most people think of. The leaving of seed overnight is better than nothing, but a warm meal is very much to be preferred. In large yards, where the food takes some time to prepare, the following system, which we saw recommended some time ago, may be adopted with advantage:—Get a square wooden box, strongly made of thick wood, and line this out with felt, or felt carpeting—sides, bottom, and lid, so that the centre compartment may only be about one-fourth the size of the box itself, the dimensions of which must be regulated by the requirements of the owner. Last thing at night, half cook some food in a tin kettle or pan with lid, made to fit the centre of the box, and put kettle and food just as it is into it. Then close the box, and next morning the food will be found perfectly cooked, and quite hot, whenever opened. By this means, all the trouble consequent upon lighting a fire and getting water to boil will be obviated, and the chicks can be fed as soon as any one is astir, at least half an hour before food could be prepared for them. The last feed at night should be given about an hour before dusk, except to the birds less than a month old, who need a feed by candle-light, and this feed must consist of grain, as it takes longer

to digest than meal, and, consequently, keeps up the warmth much longer than soft food would. Intermediate meals should be varied, and it is a good plan to try and change the food as much as possible, as by this means the appetite is tempted and growth encouraged. A bad feeder can never be anything but a bad thriver, and, change of diet by tempting the appetite, is the best method of inducing the birds to eat heartily. Overfeeding must, however, be carefully avoided, and food should be removed as soon as the birds are satisfied, never being allowed to stand about.

When the chicks are about six to eight weeks old, the hen will begin to get restless and neglect them, when she should at once be returned to the laying house, and the chicks then put into a separate house and run. If the weather is at all cold or stormy, cold mothers may be provided, or, if not, broad shelves covered with dry sand or earth will answer best. These cold mothers are simply wooden frames across which canvas is stretched, and on the underside of this canvas, strips of flannel, or thin felt, is stitched, so that when raised up or fitted into grooved ends, the chickens get under and are protected from the cold. Generally, however, there is no need for anything of this kind, as the hen remains long enough with her brood, to enable them to do without further protection; but, as we stated at the beginning of this chapter, care and attention are specially necessary at this stage of a chicken's existence; it is better to be on the safe side, and, as there is no artificial heat in a mother such as we have described, there the birds are not coddled by the use of it. Plenty of room should also be given, and we prefer, whenever possible, to divide our chickens, which can easily be done by means of the movable poultry-houses, recommended in the chapter dealing with the subject. The older chicks are very prone to ill-treat the younger ones, and it is for the sake of these latter, as well as to prevent overcrowding, that we

adopt this plan. The giving of room allows the chicks to run and fly about, which develops their wing and breast muscles, keeps them in health, and assists their growth. Nothing is more miserable than to see chickens, from a month to three months old, cooped up in a small run. No wonder they grow slowly, and are always small and stunted in appearance.

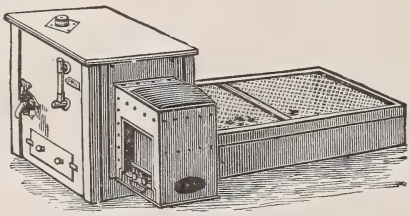
As we have given a detailed acount of the various incubators now offered for sale, together with a brief history of the question of artificial incubation itself, it is necessary that we should say something about artificial rearing, for one would naturally appear to depend upon the other. All poultry keepers have at some period been troubled with bad sitters, and, also, with clumsy, negligent mothers, the latter especially, being very annoying. It is, doubtless, very provoking to have a setting of eggs spoiled, but it is even more annoying, when they have been hatched, and the chicks are running about strong and lively, to find some crushed to death, and others dying for want of proper attention from the hen. Hence many attempts have been made, to solve the problem of rearing by artificial means.

These artificial mothers were in use by a few persons, a considerable time before incubators arrived at anything like their present stage of perfection, and, as might naturally be expected, they are now very largely used. At first the makers of incubators fitted them to their machines, but this, we believe, helped to make the latter even more unsuccessful than they otherwise might have been, for when any chickens were brought out, they were necessarily kept in runs a foot or two square, and, of course, indoors, so that in a few days they died off, from want of fresh air and proper exercise. The first step towards success was in the separation altogether of the mother from the incubator, and they have, since this has been done, been found most successful. At

first sheepskins were used, with the wool downwards, and above the skin there was a hot-water tank, but the chickens were very often hung in the wool, and they, therefore, never became really popular. The first to win anything like popular favour, was a contrivance similar to the one just named, but, with the important exception, that flannel strips were used instead of the sheepskin, and, as there were capital arrangements made for heating, ventilating, and cleaning, much real success was attained by it. The present writer reared large numbers of chickens during several seasons in these machines; and, as at that time the incubators were unsatisfactory, hens were used for hatching, but, as the artificial system of rearing presented so many advantages over the natural one, the chicks were taken from the hens, when a day old, and placed in the artificial mother. The demand for these mothers was but small, and that kept up the price, so that only a few persons went in for them.

When incubators a few years ago became more easily worked, there came with the demand for them, one also for the mothers, especially as many who might have thought it cruel to separate the hen and her chickens, could have no such feelings with respect to machine-hatched birds, and all the makers of the former have been compelled to provide the latter also. These are generally made very similar, both in appearance and methods of working. There are, therefore, the hydro or hot water mothers, and, also, those in which there is a continuous burning lamp; but, whilst we in great measure prefer the former method for incubators, the mothers upon this system are rather troublesome when kept out in the open, as boiling water has to be carried to them twice or thrice a day, and this, in many cases, involves an amount of trouble which becomes a serious burden. To obviate the difficulty, some of the hydro-mothers have a lamp and circulating boiler fitted to them, so that by lighting the former, for an

hour or two every day, the heat is kept up. This is much to be preferred to the other plan, and saves unnecessary trouble, but the lamp must be so protected so as not to be easily blown out. One of the best mothers we know of, is made by Messrs. Tomlinson & Co., Birmingham, Eng., called "The Winged Brooder." It is fitted with a continuous burning lamp, so arranged that it can scarcely be affected by wind, or anything else, outside. At the sides are flaps or wings closing in at



THE "ACME" IN-DOOR REARER.

Fig. 11.—Owen's "Acme" In-door Rearer.

night, and it can be fitted with outside cover and runs, so that, altogether, it is a most useful appliance. Another very good one, of which Fig. 11 is an illustration, is that made by Mr. John Owen, of the Minories, London. This is provided with a lamp and has a covered run. It can also be fitted with a cover so that it can be used in the open. Mr. Jas. Watson, of Kilwinning, Scotland, has a very good one also, and all the other makers send out mothers more or less near to our ideal.

At first it was the custom to keep the mothers in houses or sheds, but that was found to be a bad plan. It may be advisable to do this for the first few days, and hence the value of a small chicken nursery made by Messrs. Tomlinson and Co., but we do not approve of the plan for older birds. Chicks need, and must have, plenty of fresh air, and the only shelters

we should use, after they are a week old, except very early in the season, are the covers sold with most machines, which protect the mothers from wet, and give the birds a dry run. This is shown in the Christy out-door rearers (fig. 12). These, as will be seen, have wooden sides and glass tops, and

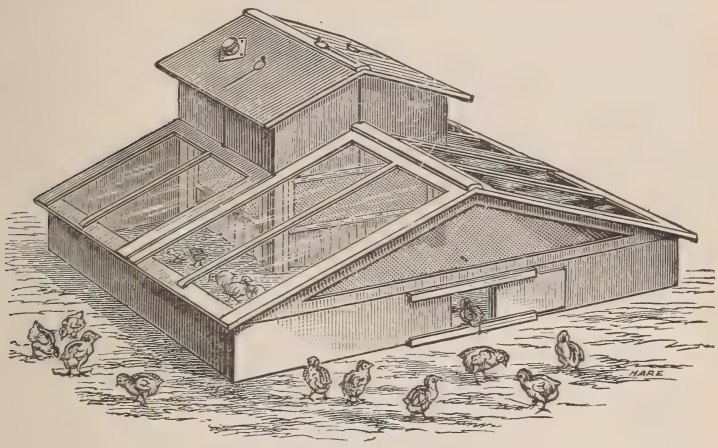


Fig. 12.—Christy's Out-door Rearer.

can have wooden floors, or not, as may be desired. They have doors, so that the chickens can be allowed out or kept in, as the attendant may think best, and generally are easily moved about, so that the birds may have fresh ground every day. During the first week the chicks should be kept in the chicken house, but after that, unless the weather be exceptionally severe, they are much better outside. The run should always be dry below and changed every day, with fresh sand or dry earth thickly covering the floor, if it be a wooden one. Pure air and cleanliness are essential to success, and, for this reason, the mother should every day be lifted out of its place, so that all vapours and foul air can get away, and,

at the same time, the whole should be thoroughly cleaned. Where there is flannel for the chicks to nestle amongst, this should be taken out and purified, by having plenty of dry earth well shaken through it. The heat also needs to be well looked after, as many poultry keepers make a great mistake in having their machines too hot, which is a much greater evil than a little cold would be. Mothers should never be allowed to go above 80 degs., and, except in summer, below 65 degs., but the margin between these two is sufficient for the variations of the weather. It is true that the chicks will not get so close to the tank, if hotter, but too much heat makes them tender, and it is to be remembered, that the heat from their own bodies increases the temperature, so that in summer if the mother was 80 degs. before they went into it, it would probably be ten or fifteen degs. higher after they had been in for a time. The best test is to put the hand against the bottom of the tank, when it may be accepted as all right if just warm and comfortable, but if the hand cannot be kept against the metal it is too hot. Overcrowding is also very dangerous, and we would not be inclined to put more than forty chicks a week old, or twenty-five above that age, into one machine. Nor is it wise to keep them in it too long; for, if healthy and strong, they may, when five or six weeks old, be transferred to the cold mother, which, as we have already described, is simply one without any water tank or heating arrangements. The state of the weather and the strength of the birds will, however, largely decide this question. As to teaching the birds to eat, which the hen does, this only needs to be done with the first brood. The way to proceed is to put some food on a piece of board, and tap the same with a pencil or piece of stick, to which imitation of the hen's pecking the chicks will readily answer. Later broods can have an older chick put with them, and it will in this respect act a maternal part.

In many parts of France, turkeys are very largely used for the hatching and rearing of chickens, the advantage of these birds being their docility, their capability for covering a large number of eggs, and caring for a large number of chickens. It is no uncommon sight to see turkeys, with fifty or sixty chicks, being driven in the morning to a wood adjacent to the residence of their owner, where they are left all day in charge of decrepit old women or young children. In some instances, the chicks have been hatched in incubators, but this is generally in those districts where there are hatching factories, if we may use the term, at which places egg hatching is conducted on a large scale, the peasants taking their eggs to be incubated, and paying a percentage of the chickens for the trouble. But in England, also, many persons have used turkeys with very good results. There are, however, several things necessary to make this plan a success. In the first place, it is necessary to have ground enough, as putting a turkey with half a hundred chicks upon a small piece of land would be a failure, for there would not be moving room, and the ground would soon get contaminated. But, on the other hand, if an unlimited run be given, the turkey must be watched, or she will lead the chicks astray and overtax their strength. It is true she may be cooped, but after the first ten days this is not advisable, and the best plan is to keep her in a fenced run. Where this can be done, turkeys will be found to answer admirably, but, of course, the houses or coops used for them need to be well ventilated and roomy; especially so, in fact, because of the larger number of birds to be kept therein. They are very easily managed, and the way to get one to take charge of a brood, is to allow it to sit on potatoes for a few days, and then the chicks may be put under her at night. We have seldom known one refuse accepting a charge of this kind; but, in order to be on the safe side, it is as well to put only a few in at first If she attempts to

injure them, they must be removed, but if not, all may be given to her, and she will be delighted to have so large a family, nursing them in most respects better than an ordinary hen would or even could. When this system of rearing is adopted, special care will have to be given to the weakly ones, and any so found, should at once be removed where they will not be crowded, and can have individual attention. When the birds are a month old, if of a strong, hardy breed, the largest may be removed to a cold mother, and this will give more room to the rest. As soon as all appear to be grown enough, they may be taken away and a fresh batch given to the turkey, which will rear a couple of hundred in a season in this way without the least objection.

From first to last the necessity for drink should never be forgotten. Water is the natural drink of all poultry. It should be pure and fresh, the drinking vessels being filled at least daily, and, whenever filled, carefully emptied and cleansed. There are numerous convenient forms of drinking fountains, but in the use of them there is a constant temptation for the attendant to neglect to empty them, but to simply fill them afresh. These should never be used for milk, which is excellent for chickens and fowls of all ages; but this should be presented in shallow pans, so protected that the chicks cannot get into them.

AMERICAN BROODERS.

American brooders are even more numerous than American incubators, for every manufacturer of an incubator is also a manufacturer of one or more styles of brooders.

Like incubators, brooders are divided into two classes, hot water and hot air. Both kinds do really good work, but the preference is generally given to the hot water machines. The body of hot water will long retain its heat, and as

brooder lamps are rather more exposed than incubator lamps there is more danger of their becoming extinguished.

Brooders are also divided into top heat, bottom heat, and a combination of the two. Top heat brooders are the most popular, and are usually tank or hot water machines. Bottom heat is popularly supposed to cause cramp in the chickens, though there is not the best of proof to support this supposition. A combination of top and bottom heat works admirably. This may be secured either by the hot water or hot air method of warming the brooder. In the hot water method the tank is situated beneath the floor of the brooder, there being a space between the top of the tank and the floor of the brooder. The air in this space becomes heated and warms the floor of the brooder. Pipes are inserted into the brooder floor and extend up nearly to the top of the brood chamber. Then pipes conduct the warm air from the space between the tank and the brooder floor to the upper part of the brood chamber, from which it falls upon the chickens.

In top heat brooders the chickens like to get their backs up near the source of warmth, while in bottom heat or in bottom and top heat combined they will flatten themselves out upon the floor. They appear to be very comfortable in either style of brooder.

Brooder chickens are sometimes kept too hot, sometimes too cold, and in neither case will they do well, although it is better to keep them too cold than too hot. The brooder should be kept for the first week at a temperature of about ninety degrees, Fahrenheit, and the temperature should be reduced from five to ten degrees each week until the chickens are removed from the brooder. This removal can take place at four weeks of age in moderately warm weather, but in cold weather they can be allowed to remain one or two weeks more. Some successful raisers advocate the removal of the chickens at the age of three weeks in moderate

weather, and in four weeks no matter how cold the weather might be.

While the chickens are in the brooder it is advisable not to overfeed them. Keep them a little hungry, so that they will be eager for their five meals each day, and this will induce them to take the needed exercise. While many advocate a dough of some kind for the chickens, the writer is of the opinion that a dry diet is the best. This may consist of millet, cooked oatmeal, very finely cracked corn and wheat, and beef scraps. A mixture of equal parts, or the different articles fed at different times in the day, will produce the best results.

Grit, shiny, clean, fine is greatly needed. This can be purchased all ready for use or can be made at home by taking a little trouble. But it should be provided. It is very important for the health of the young chicks.

Fresh water or milk or both should be furnished for drink. If milk is used give it to them before it turns sour. Sweet milk will make them grow rapidly. But when it is not convenient to give them milk, see that the water dishes are kept full of pure, clean, fresh water.

Cleanliness in the brooder and about all food and water dishes is indispensable. The brooder should be cleansed daily and fresh sand or wheat bran dusted over its floor. Both sand and bran are good and it is difficult to decide which is better for this purpose.

By following the above suggestions and by keeping the chickens out of the brooders, exercising in the fresh air as much as possible, to which end they should never be fed in the brooder, and by securing one of the many admirable brooders made, a very large percentage of the chickens can be reared to maturity.

Among the best American brooders is the Billings, manufactured by the L. C. Billings Co., of Milford, N. H. This is a well built machine, having a tank for the hot water situ-

ated above the brood chamber. The brooder is divided into compartments, usually two or three, the floor of each being removable like a drawer in a desk. It is but a moment's work to draw out this floor, empty the fouled sand, add new sand and put it back into its place. Unlike most brooders, the Billings is provided with an automatic regulator, so that the heat can be perfectly governed even in changeable weather.

Another excellent brooder is that made by the inventor, Earl Barney of Schenectady, N. Y., and called after his name, the Barney brooder. This is a well built, hot water brooder, but is a rather expensive machine, the price being from $30 to $40, according to finish and whether for outdoor or indoor use. The same inventor has also a hot air brooder embodying similar principles to his hot water brooder and selling for something less.

The Pineland Incubator and Brooder Co., of Jamesburg, N. J., manufactures several styles of brooders, among which the Sectional is perhaps the best known. One feature of this firm's make of brooders is the adjustable floors which adapt the height of the brood chamber to chickens of any age and size. The brooders are tank machines, the heat being distributed by the circulation of hot water. They are all well built and do good work.

The Prairie State Incubator Co., of Homer City, Pa. is also a large manufacturer of good brooders in several styles. This company builds outdoor and indoor, hot water top heat and hot air top and bottom heat brooders, and in construction and execution these machines are equal to the reputation of this well-known company.

The Ayer Brooder Co., of Ayer, Mass., manufacture the Apollo brooder, the invention of A. A. Fillebrown. This brooder operates admirably and is a very successful machine, its principal drawback being the difficulty of cleaning it. This it is hoped the inventor will remedy.

The Olentangy Brooder, made by George S. Singer of Cardington, Ohio, has had a large sale. It has a circular tank in the centre of the brooder which holds the heated water. It is claimed that this arrangement prevents crowding and that the chickens will spread out around the sides.

Many more admirable brooders could be named, but the above perhaps sufficiently illustrate the principle upon which they are constructed. There is little danger of getting a really poor brooder, though of course all are not equally good. But whatever make is used it is desirable to avoid bottom heat alone; let the brooder be either top heat or a combination of top and bottom.

In addition to the many separate brooders which are made, there are numerous designs for brooder houses, the general principle of which is the same, though the particular applications may differ in details. This principle is a number of hot water pipes, with returns to a boiler or heater, by means of which a constant circulation of hot water is kept up. The chickens warm themselves beneath these pipes. While this method reduces the labor and can be employed, perhaps, with advantage in large establishments, it is not believed to give so good results as are obtained by the use of separate brooders. Such a system is not needed by the person who rears one or two hundred chickens annually.

CHAPTER XVIII.

FOOD AND FEEDING.

Food the Fuel of all Life—Effect of Bad Food—Effect of Over-feeding—Food for Fowls in Confinement not to be same as when at Liberty—What is Needed in Food—Qualities of the Grains—Barley—Oats—Wheat—Maize—Buckwheat—Pulse—Rice—Bone-meal—Water.

The question is often asked, especially by new beginners in poultry-keeping, what is the best food for poultry, and the matter is of such great importance, that we wish to deal with it fully, so that our readers may know what is the best food for poultry under the conditions in which their fowls live. That food must have a very great influence upon the health and success of the birds, will be acknowledged at once by all, for it is virtually the fuel which keeps the engine going, and any neglect to supply this fuel, or the supplying of improper fuel, means that the machine will not work properly, and that there will be a great loss of power. This is the case with all animals, and the attention which has been paid to the question of feeding by scientific men during late years, shows that the importance of the matter has been somewhat realized. But even yet there is a considerable amount of ignorance on the matter, for there are many who appear to think that so long as an animal or bird gets plenty of food, that is all that the owner need care about; but this disregard to the kind of food so given, to its effect upon the birds themselves, and to the conditions under which they labour,

is most injurious, for the saying, "What is one man's meat is another man's poison," holds good so far as fowls are concerned, as much as it does for human beings. Feeding upon bad or unsuitable food must always be very harmful, for, as the food is given to repair the waste of the system which goes on daily, and the body in its various parts is really renewed by the food eaten, it will be seen that this bad food naturally brings on diseases, or injures the system by failing to supply those elements that are necessary to it. Eating to repletion by fowls is generally due to want of system in feeding, or the giving of food that is tempting to the appetite —probably because of its being rich in its nature—and this means that the food will have certain qualities or elements in excess, which will, in their turn, develop other qualities in the birds, and thus may be positively injurious instead of beneficial. There is, perhaps, more harm done by the giving of rich and unsuitable food than in any other way, and many diseases at one time foreign to fowls have been thus made prevalent. How much food should be given has already been dealt with, in the chapter on "The selection of stock birds," and we need not repeat it here.

It will be seen that one object in giving food, is to supply the daily waste that goes on in the system, for, if the matter thus eliminated is not replaced, the bird will soon die from exhaustion. The first thing, therefore, is to supply this waste, but if only this is done, the bird will be just kept alive, no more. As fowls must be regarded as producing machines, they have to be supplied with the materials necessary for production, or it cannot take place, and we must have regard to the elements needed for composing whatever is produced, if we wish to do it with the greatest ease, and with the least wear and tear to the fowl. But in addition to this, we must not forget the conditions under which the fowls are kept, for, the activity of the birds, the amount of

space given to them, and the kind of food they are able to obtain for themselves, all of which should guide the selection of that given to them. Many persons appear to think, that if they give the same food to fowls in confinement that they obtain when at liberty, all will be well; but such is not the case. Under the latter circumstances the food consists of worms, slugs, and grain, the two former chiefly, and we are sure that if the same amount of animal food was given to birds in a limited run, that is obtained by those at liberty, it would result in disease very speedily. Birds with plenty of space are much more active than those in confinement, and eliminate surplus matter from the system very rapidly. As this elimination means exhaustion of fatty matter chiefly, because exercise causes warmth, which is the result of a consumption of oil in the body, fat-forming foods can with advantage be given to such fowls; whereas, on the other hand, birds that are in confinement do not consume the oil so rapidly, and if as much fat-forming food is given to them, it cannot be used, but will clog up the machine, storing the fat by laying it on internally, and this storage will be found an evil instead of a benefit. The great chemist, Liebig, used to say that all fat was a disease, and that it should not be allowed under any circumstances; but, whilst we are not able to accept this statement fully, for it must be remembered that a slight reserve of fat is beneficial as a reservoir of heat, yet there can be little doubt, that if this fat is not consumed before any more is stored up, and one layer piled upon another, then it takes the form of disease. It is not a pleasant thought, but, nevertheless, it is a fact, that what we are accustomed to consider ripeness or tenderness, is but the first stage of decay. For instance, a piece of meat may be rather hard if cooked soon after the animal has been killed, but if kept a few days will become tender. We do not for one moment wish to argue that such "tender"

meat is injurious, for, on the contrary, if not tainted it is much easier to digest, and better in every way than newly-killed meat; but we are using the fact simply as an illustration of our point, namely, that fat, unless soon consumed, is of itself a tendency to disease.

In addition to what we have already said, namely, that the conditions under which the birds are kept must be considered, the object for which they are fed needs to be regarded also. The various foods have many different qualities, some grains being well balanced, and others having an excess of one or two elements. Thus it is necessary to consider what is the object in view, for it will be obviously manifest to all, that foods which may be useful for one purpose will be useless for another. Thus where eggs are to be produced, for which many elements are needed, chiefly albumen and oil, with no one element greatly in excess, then a well-balanced food is needed. But where birds are being fattened for killing, then it is best to give foods which contain a large quantity of flesh or fat-forming qualities, as these cause the plumpness which is so desirable in table fowls, and where such foods are not given, then if the birds do get into good condition, there must be a large waste of unneeded qualities before this can be secured. And when chickens are being reared, it is most desirable that they should have food which will develop bone and muscle, not merely fat, except when intended to be early killed for the table, for birds fed upon flesh-forming foods only, have not strength of frame to support the flesh, and though they may thrive for a time, will soon die off for want of stamina. Birds forced too much go back in the same way, and, therefore, forcing should only be employed with birds intended to be killed early.

What is required in the food given to fowls, is well described by Mr. Tegetmeier in his Poultry book, when he says:—"To supply the materials required for the growth of

young animals and for the formation of eggs, as well as those required to repair the waste arising from the movements of the living body, a second variety of food is required (in addition to warmth-giving foods), for the starch and other substances before enumerated cannot supply these wants. Substances possessing this power are termed flesh-forming food. The most important are the gluten, and similar substances, existing in variable quantities in different grains; in large proportions in the varieties of pulse, as beans, peas, &c.; and in the materials which form the solid parts of the flesh of animals, of eggs, of milk, &c. In consequence of these substances containing the element nitrogen, which is wanting in the other varieties of food, they are frequently termed nitrogenous foods; whilst the fat-forming and warmth-giving are called carbonaceous foods. The mineral and the saline substances contained in the bones, and in other parts of the bodies of animals, occur in larger proportion in the bran than in the inner part of the grain. A due supply of bone-making and saline materials is absolutely requisite to the growth of a healthy animal; as if wanting in the food, the bones become soft and the general health speedily fails." It will thus be seen that what is required in a well-balanced food, are qualities for warmth-giving, flesh-forming, fat, or oil, and bone-making; but, as there are few foods which are so balanced, and at the same time as foods are required for special purposes, such as chicken-rearing and fattening, only those foods suitable should be used, or a combination of them.

By examination the qualities of the various foods have been abundantly proved. If we take barley, one of the commonest grains given to poultry, we find that it contains a very small quantity of fat or oil, has 13 per cent. of flesh-forming properties, 55½ per cent. of warmth-giving, and 4 per cent. of bone-making substances. It is, therefore, most

suitable for rearing purposes, and for egg production, though in cold weather some food with more fat in it should be given, so as to make up for the deficiency in this respect; but in summer this is not necessary, and then barley is one of the best foods we have for the purposes named, whether whole or ground. If used in the latter way, care must be taken to have the meal good, pure, and freshly ground, for often it is made of inferior grain, or the good meal is mixed with some other stuff to cheapen it. The pure can easily be told, as it is rough, and there is not much fine dust about it.

We come next to oats, which are, perhaps, the best balanced of all the grains, having 6 per cent. of fat or oil, 15 per cent. of flesh-forming, 47 per cent. of warmth-giving, and 2 per cent. of bone-making properties. The husk or fibre is extremely great, being 20 per cent. of the whole. Oats are not, however, very much used, as only the best kinds are relished by the fowls, and these are somewhat expensive. Poor kinds, such as are known as long or Tartar oats, are not good food, and contain more husk than anything else, which, though good in its place and in proper quantities, is not of much use. Provided the best oats are ground up, husks and all, they make an admirable food; but we have commonly found great difficulty in obtaining these ground oats, and millers do not appear willing to take the trouble involved in the making of this meal, especially as so little is used. Oatmeal is of a different nature to either whole or ground oats, for the process it undergoes on the kiln, and the removal of the husk, gives it different qualities. It is, however, splendid for chickens, and for fattening purposes, and a fowl fed upon it makes splendid eating.

The chief of all the grains, wheat, is not much used for fowls, except on farms where there is plenty on hand, for it is an expensive food. There are, however, large quantities of

shrunken wheat, the screenings from the better and perfect grain, used; and also the smaller and inferior samples. The best contains 3 per cent. of fat, 12 per cent. of flesh-forming, 70 per cent. of warmth-giving, and 2 per cent. of bone-making properties, with very little husk or fibre, and it is, therefore, one of the best winter foods for general purposes, though not suitable for fattening. It may be interesting to many of our readers to learn that the small wheat, or screenings, is, as a rule, better for poultry feeding than the best quality of grain, as it is richer in flesh-forming qualities than is the other. When ground up for poultry feeding, the meal so made should be mixed with some other kind, such as barley meal or ground oats, as it is rather too stiff and pasty when the water is added to it, if given alone, but if so mixed this will be prevented.

Indian corn, or maize, is a food which has always been employed in this country, chiefly because of its cheapness, for it is undoubtedly, or has been, the cheapest of all grains. It has more fat or oil than any other, namely, 8 per cent.; it has also 12 per cent. of flesh-forming, 65 per cent. of warmth-giving, and 1 per cent. of bone-making qualities; so that its tendency is to lay on fat, and the want of bone-forming substances makes it by no means a well-balanced food, except for fattening purposes. The free or exclusive use of it often does harm, as it promotes the formation of internal fat, which soon checks laying, and, if long-continued, induces apoplexy and probably diseases of the internal organs. It is, however, an admirable fattening food, but, when used for this purpose, should be ground and swelled with scalding water and fed in alternation with whole corn or some other grain. It is admirable for feeding whole to all kinds of poultry for the night feed, especially in cold weather, as it digests slowly and keeps them warm all night. Corn or cornmeal should only be given to laying fowls in cold weather, and even

then ought to be accompanied by three or four times its bulk of other kinds of grain or meal, and it should not be fed too freely to birds in confinement. All this may appear to be a strong condemnation of it, yet it is no more than necessity requires, and the undoubted value of the grain in some respects, makes such a condemnation all the more needful.

The food most used on the continent of Europe for fowls is buckwheat, which is a most admirable food for laying birds. It contains 11 per cent. of oil, and of the other properties, $1\frac{1}{2}$ per cent. of flesh-forming, 54 per cent. of warmth-giving, and 2 per cent. of bone-making substances. It will be seen from this that the fattening property is small, but the other qualities and its stimulating nature, make it specially suitable for laying fowls, and it is equally so whether whole or ground. If ground, the husk should not be taken from it, for though this does not contain much nutriment, it prevents the finer meal becoming stiff and pasty, which it would be very much inclined to do were it absent.

All kinds of pulse, such as peas, beans, and tares, are very strong in flesh-forming substances, having 2 per cent. of fat or oil, $23\frac{3}{4}$ per cent. of flesh-forming, 48 per cent. of warmth-giving, and $2\frac{1}{2}$ per cent. of bone-forming qualities. These are not suitable for fowls if given alone, as they are too stimulating, and the excess of flesh-forming qualities causes a hardening of the muscular fibres, and the flesh produced is too hard for eating. In fattening fowls for table use, these are found useful to mix with other foods, but alone are not to be recommended for the reason already given.

Rice consists almost entirely of warmth-giving qualities, starch forming the chief of all. Of fat or oil there is but a trace, of flesh-forming substances but $6\frac{1}{2}$ per cent., and of bone-forming qualities only $\frac{1}{2}$ per cent., whilst of the warmth-giving qualities there is $75\frac{1}{2}$ per cent. On this account it is only suitable for birds being fed for the table, and layers

kept on it do not thrive at all, whilst for chickens not intended for early killing, it is one of the worst foods possible. It should, therefore, not be used except for the special purpose already named by us. Dari, millet, hemp, and other seeds are all useful for young chickens, but otherwise are not suitable for fowls. Although not really a poultry food, in the sense that birds can be fed on it alone, bonemeal is a most useful thing for mixing with such foods as are deficient in bone-forming substances. For chicken rearing it is invaluable, and is a great preventive of leg weakness, also being very good for adult fowls occasionally. Care must be taken to purchase the right kind, made from fresh bones, and not the scrapings from the bone-handle makers, which are of no use whatever.

Fowls of all kinds and ages should have access only to pure water. Barnyard leachings, water from the kitchen sink, or in villages that flowing in gutters and alley-ways are all unwholesome and liable to cause disease. Stagnant water of any kind is bad. Fowls should always be supplied with fresh, pure water, and the drinking vessels should be easily accessible for confined fowls in the runs or houses. The drinking fountains before mentioned, which are of tin, galvanized iron or earthenware, are excellent devices provided they are emptied, cleansed and rinsed out whenever filled.

CHAPTER XIX.

EARLY EGGS AND CHICKENS.

Early Eggs and Chickens bring High Prices—How to Secure Them.—Pullets to be Used—Hens to be Mated Early—Good Housing and Feeding.

THE first object of every poultry keeper, who wishes to succeed in his business, is to have his produce ready for market when the commodity is scarce, as, of course, he can get a much higher price then than at any other time. This holds good in everything, and if we compare the cost of articles in season and out of season, it will be seen how large the margin is to pay for the additional labour and trouble which must be expended in order to obtain the articles out of due time. That this labour and trouble is needed, no one need doubt for a moment, and the getting of early eggs and chickens demands it, but the profit far more than compensates. Really fresh eggs can be sold, in many towns, from November to March at forty-five to sixty cents a dozen, and fine, plump chickens vary from twenty to thirty-five cents a pound until May, the highest prices being obtained in Eastern cities. We do not mean to say that these are the prices actually obtained by the producer, for, unfortunately, middle-men take far too large a share of the profits; but, wherever there is a large permanent population, customers can always be found for really fresh eggs and plump home-fed chickens, and at the best prices.

There are also large dairy companies and hotels ready to contract for taking fresh eggs all the year round at good paying figures; but in every case, whether the sales be made privately or not, there must be the certainty of the eggs being fresh. Ordinary (so-called) new-laid eggs, as sold in the shops, are generally a week or ten days old at least, because they are only sent to market once a week, so that probably the freshest ones were laid two or three days before that, and others are still older. This uncertainty makes eggs really new-laid in constant demand.

A very frequent complaint amongst poultry keepers, is that they can get any number of eggs at the time when they are plentiful, and therefore cheap, but when eggs are scarce they get few or none. In many instances this is due to the unsuitability of the breed; but we need not say more on this question, as it has been dealt with very fully in a previous chapter. What is wanted is to keep only those birds known as prolific layers, such as Leghorns, Minorcas, Houdans, Black Hamburgs, Langshans or Plymouth Rocks. Then, again, there is the matter of housing and feeding, both of which are most important, and should have the greatest attention. We need not, however, say more on this matter either, as we have dealt with both these questions before. There are people who have the right kind of birds, who house and feed them well, and yet who cannot obtain eggs very early in the year, and, of course, cannot have early chickens, the entire cause being that their birds are too old. Birds above two years old do not commence laying until the end of February or the beginning of March, no matter how good layers they may be, and if only these be used, then neither early eggs nor chickens can be expected, and certainly will not be obtained.

Hence it will be seen that to obtain early eggs, only young birds, that is pullets of the first or second year, must

be used. Birds of the various breeds already named, if hatched in March and April, will begin to lay at latest in September, October, or November, and will continue to do so right through the winter. At first the eggs will be small, but will gradually improve in this respect, and pullets of the previous year will, if well housed, begin to lay about December, and their eggs will be large and well formed; so that the matter, if carefully managed, is not very difficult, and a constant supply of eggs can be obtained. It is of no use expecting that May or June hatched birds will commence to lay before the spring; they may do so, if the autumn and early winter are very favourable; but that, of course, is not a matter that can be arranged. January and February hatched birds are too early to be used as layers, and do not, as a rule, answer for this purpose, as they begin about August, fall into a moult a little later on, and are very uncertain in their produce during the winter. For eggs, therefore, we prefer birds hatched in March and April, and not more than two years old. In a well-arranged yard, half the stock of layers will be bred each year, and half will be killed off annually. This plan we have seen adopted in many yards, and can strongly recommend it.

Those who wish to have early chickens must follow the same rule. The pens should be mated together early in November, for the earliest hatches, and later in the month for those not required so soon. By using pullets of the first year for the former, and those twelve months older for the latter, with young and vigorous cockerels, fertile eggs may be expected within a few days of the birds being mated, and thus a succession of chickens produced, to be ready at the time when they are scarce and dear. Of course the number of pullets to each cock must be regulated, and should not exceed half-a-dozen at the outside, and that

number only for the most vigorous breeds. The birds will require to be housed comfortably and fed well, and in winter time the eggs should be gathered as soon after they are laid as is convenient, for they are apt to get frosted in the nest during severe weather; this, as we all know, is a thing to be avoided if possible.

There will, doubtless, be some who object to this plan of using pullets for breeding purposes. Chickens, they say, bred from immature birds never do very well, and this objection is perfectly correct so far as ordinary fowls are concerned, as doing this gradually weakens and reduces the size of any race of fowls. For birds that it is intended to rear to maturity, we do not like breeding from pullets of the first year, and, therefore, would always breed the laying fowls from birds of the second year, and also those to lay the eggs from which the early chicks are expected. This simply means that if last spring we bred some laying pullets, and also some specially suitable for table fowls, from two-year-old hens, we would use the former to produce eggs for sale, and the latter to produce eggs from which we would hatch the chickens for early killing. As the latter are not intended to be reared, the breeding from immature birds can do little or no harm, and this is the only way by which very early chickens can be obtained. It is not natural for fowls to breed until March or April, when pullets are about twelve months old, so that, if we break through the rules of nature, we must be prepared to spend care and trouble in order to obtain what we require, but if we do this, we may reasonably hope that the result will far more than repay us.

CHAPTER XX.

THE PREPARATION OF TABLE FOWLS.

Superiority of French System—Breeds of Fowls Suitable for Fattening—Methods—Duration of Process—Food—Fattening and Cramming Machines—Cramming by Hand—Killing Fowls—Dressing in France—Shaping-boards—Advantage of Dressing—Caponising.

The question of preparing fowls for the table, is not one that can be neglected, even by those poultry keepers whose object is primarily eggs, as they have many birds which, if fattened and killed off, would sell profitably; but, unfortunately, the question of preparing for the table is very little understood, and there is very great room for improvement in this respect. The great superiority of the French dressed poultry, which is evident to all who visit Paris, is due to three things: first, the greater care taken in breeding table fowls; second, the capital methods of fattening; and, third, the splendid way in which the birds are trussed when offered for sale. In our American markets we find a different state of things altogether. There is, at the outset, little or no care taken with respect to the breeds—except, perhaps, in one or two districts; the birds are, as a rule, picked up out of the farmyard and killed at once, without any preparatory feeding whatever; and they are, as a rule, simply plucked, not even drawn (much less dressed and trussed, except in New England), and with head and feet on. We hope, however, that a change for the better will soon take

place ; and there are signs that lead us to hope that a considerable improvement will be found within a few years. Prejudice is hard to kill, and it may be that the French plan of trussing will never be adopted in this country ; but, if a system of fattening becomes general, that will be a considerable step in advance.

We have already pointed out in previous chapters, the kinds of fowls most suitable for table purposes, therefore it is not necessary to enumerate them here ; but we may mention again, that those birds which have the meat upon the breast

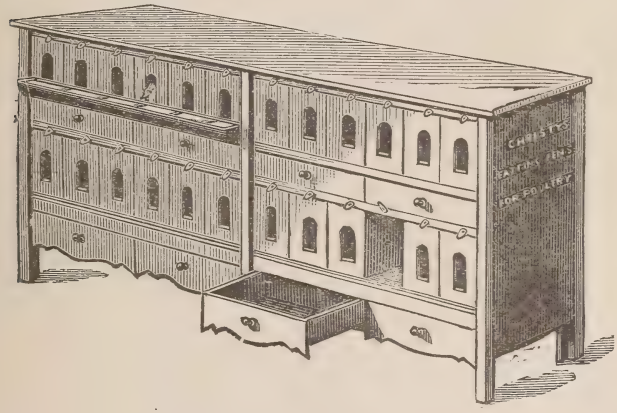


Fig. 13.—Christy's Fattening Pen.

and not upon the thighs, are generally the best for fattening. The question we have now to deal with, is that of the fattening of the fowls, and the methods adopted in France are worthy of being fully described here. The commonest plan in France is to keep the chickens in square pens, just sufficiently large to allow them moving room, but no more. In some instances a room is completely lined out with these pens, and, when all the pens are full, and feeding time is on, then the scene is a very busy one. The partitions are made

of wood, and the front half of the floors of the same material; but the back half is formed of wire rods, so that the droppings can fall into sliding trays, full of earth, provided below each row of pens for this purpose. The fronts are formed either of wire rods or of wood, with an oblong hole just sufficiently large to allow the bird's head to come through for feeding purposes, as is shown in fig. 13, which is an appliance for fattening twenty-four birds introduced by Messrs. Christie and Co. If there is only one row of pens, then the tops are made to open, for the putting in and taking out of the birds; but when two or more rows are placed one above another, then the fronts are made removable. The rooms in which the pens are kept are always warm and well ventilated, but dark, as the chicks are found to be much more contented than when kept in the light. Thorough cleanliness is observed, both in the pens and the feeding-troughs, which are placed in front of the cages, and the birds are fed four or five times a day. Such a house as this is easily fitted up, as both wood and wire are cheap, or the small fattening pens can be made in sets of three, six, or twelve, by any handy joiner. The compartments should be fifteen inches from back to front, twelve inches wide, and eighteen inches high, which will be large enough for all ordinary sized fowls. The trays must not be omitted, and whenever the pens are made more than one tier high, each row had better be made separate, as this will greatly facilitate cleaning.

The period in which fowls may be fattened varies very considerably, but about three weeks, if properly managed, should bring them into capital condition. Some of the dead fowls shown at the French shows, are fattened for a much longer period, and we have heard that a prize pair of birds had been in preparation no less than nine weeks, but for ordinary purposes the period we have named is quite sufficient. The

food given should consist of indian, barleymeal, oatmeal, or buckwheat meal, all fresh and sweet, and mixed with skim-milk. Any of these meals may be given separately, but the better plan is to have a mixture made of equal parts of each, to which a little fat, such as lard, or dripping from meat, is added just before the milk. It is wise to boil the milk first, and mix the food stiff, but not too pasty—crumbly moist is the best definition we can give of it. This should be supplied to the birds warm, and when they appear satisfied what is left in the troughs should be taken, made into finger-pieces shaped like a bolus, and after dipping these in milk one or two may be put down the throat of each fowl, or, if the crop of any one is found to be unfilled, as many as will fill it up. There are some poultry fatteners who do not allow the birds to eat anything naturally, but cram them entirely in the way described. This is, however, unnecessary, and entails more labour than the plan we have recommended, without any corresponding advantage. Two or three pounds can be added to the weight of a large chicken in about three weeks by this method, and the flesh will be of the finest colour and texture, more succulent, and in every way superior to that of the fowls ordinarily purchased in the poulterers' shops. A demand for such birds will soon grow up, and the prices obtained will repay all the trouble and labour expended. We know instances where orders cannot be half supplied—orders from private families, and at very good prices indeed, and a little effort would secure the same result in most places.

Another system of fattening in France, is by means of circular and revolving cages, some consisting of over two hundred compartments, and with these are cramming machines. The cage revolves upon a centre pivot, and the birds are fastened into the compartments by straps fastened to their legs. The cramming apparatus is charged with liquid food,

made of buckwheat meal mixed with milk, to which a little suet or fat is added. This is fitted into a square cage in which the feeder stands, and in the larger machines he can elevate this cage to any tier he wishes to be at. As soon as the revolving cylinder is turned, and one of the compartments thus brought opposite to him, he seizes hold of the inmate with the left hand, deftly opening its beak at the same time, and holding in his right hand the brass nozzle of an india-rubber tube connected with the machine, inserts this into the throat of the bird, then with his foot presses a treadle, and sufficient of the liquid for one meal is forced into the crop of the fowl. The process is repeated with each bird four or five times a day, and they are in prime condition in three or four weeks. Many think the process a cruel one, but we have watched it repeatedly, and can vouch for the fact that the fowls are always eager for their turn to come.

In some parts of Sussex, England, and in France also, really the same system is adopted, though the method employed is rather varied. Cages line the room, in the centre of which an attendant is seated on a bench, having a cramming machine with a short nozzle pointing towards him. Another attendant hands him a fowl, into the mouth of which he inserts the nozzle of the crammer, and, pressing a treadle with his foot, the food is injected into it. Meanwhile, another bird has been brought and is exchanged for the one fed, so that no time is wasted. We have seen it stated, that a couple of active men can feed two hundred birds in an hour in this way.

Where cramming is preferred, and we ourselves see no objection whatever to it, perhaps the best plan is that adopted by Madame Aillerot, a great French poultry breeder and fattener, famous for the excellence of her stock, and who has for several years taken first prize for dressed poultry at the great Paris exhibitions. Buckwheat

meal, suet, and milk are made up into *patons*, as the finger-pieces are called. The paste is first well worked together until it is very smooth, and with a dish or basket of these *patons* the round is commenced. The head of the bird to be fed is taken into the left hand, the beak opened, and three or four of the crams, which are first dipped in milk, put down the throat. Birds are so fed about four times a day, and the only drink given is milk, the result being that the flesh is beautifully white and tender when killed. But, whatever be the system adopted, it is absolutely necessary to carefully watch the birds, and as soon as they are seen to be losing their appetite, or to show signs of going off—for if the fattening is too much prolonged the fowls begin to lose flesh again, instead of gaining it—they must be killed forthwith.

Much depends upon the manner of killing fowls for the table, and the appearance of the birds when dressed will be largely affected in this way. But no matter what system is adopted, the birds should be starved for fifteen or eighteen hours before being killed, so that all the food in the crop may be consumed. Often we see chickens offered for sale with th crops full of grain, the result of which is that it soon begins to sour, and the fowls lose that fresh smell which they would otherwise have retained for a considerable time longer. The ordinary plan is to dislocate the neck, in which case death is instantaneous, as the spinal nerves, arteries, and veins are all torn asunder, the head remaining attached to the body only by the skin. The disadvantage of this plan is that if the fowls are hung up, there is a large accumulation of blood in the neck, which tends to decomposition ; but this can be easily avoided by making a deep cut in the roof of the bird's mouth, when the blood will flow freely away. Then there is the simpler method of chopping the head off, but to both plans some persons object on

account of the movements of the fowls, which continue for some minutes after the neck is broken or cut. These movements are due to muscular irritability, and the bird is not sensible of any pain; but, if objected to, the body can be put into a basket until after the movements have ceased. We think, however, that this is a feeling soon overcome, and that the best plan is to tie the fowl by the legs, and hang it to a hook in the wall; then break the neck, and make a cut so that the blood can run away. Death can also be caused by cutting the throat, in which case it is immediate, or by simply passing a sharp knife through the roof of the mouth to the brain, but the plan we have recommended will be found the simplest and most effective in all respects.

One of the reasons mentioned by us for the great superiority of French fowls as seen in the markets, lies in the dressing of the birds after they are killed. The Gallic poulterers have reduced this to the nature of a science, for it is recognized that the method of preparation has much to do with the appearance of the birds, both when offered for sale and when on the table. The fowls are plucked immediately they are killed—not left with the feathers on them, as is too often the case here — and are then laid upon shaping-boards with their backs upward. One of these boards is simply a flat piece of wood, about the same width as the fowl to be placed upon it, having a block at each end, one to support the neck and the other the rump, and thus the bird is kept perfectly level. Great care is taken to see that the bird is manipulated before it gets cold and set, and this is first done by bending in the rib bones, after which the knee is pressed into the back, the breast forced inwards, and the legs fastened over the breast so as to keep it in its place. The fowl is then placed upon the shaping-board back upwards, and a wet linen cloth

fastened tightly down over it, by means of tapes tied round the bottom board. When kept in this way for twelve hours, the flesh is firm and the whole appearance shapely, with no loose flabby flesh to repel the sight. This shaping of the birds accounts for the great difference between French fowls and our own, and there is no doubt but that the trouble involved is amply repaid. The method offers other advantages, as well as that of mere appearance. When the cook gets the bird, she cuts the string which fastens the legs, for the shaping-boards and cloths are not sold with the fowl, and forces these down again, which brings the meat out on the breast without the bone rising. When on the table, the carver does not meet with the pieces of bone which obstruct the passage of the knife in an English dressed fowl, and it is a pleasure to be able to cut slice after slice off the breast. This is one reason why French fowls appear to have so much meat on them, but, it is also a fact, that they are fed up to greater weights than are fowls in America. We have seen a statement, that at one of the great Paris shows, the first prize pair of La Flèche fowls weighed twenty pounds, plucked and dressed, whilst the pullets of the same breed turned the scale at sixteen pounds the pair.

It may not be possible to adopt the French system, as just described, in its entirety in this country, but, at the same time, we do not see why a portion of it might not be grafted on to our own plan, or plans. For instance, there would be no difficulty, either as regards expense or trouble, in using the shaping-boards and cloths, by which means the birds would be braced up and made shapely, and thus do away with the soft appearance which is so objectionable. In all our principal markets it is found that birds well dressed bring more money than those sent in a careless manner, and labour spent in this way is never lost. It is

customary for some poulterers to break the breastbone of fowls, in order to make them have a full appearance, but this only hides bad work in the fattening process, and it is thoroughly unnecessary, when the birds are properly fed before killing. It is also a source of annoyance to the carver, preventing slices being cut off the breast as easily as they otherwise would be, and at the same time accounting for the ragged appearance of the cut, when laid upon the plate. Properly selected, well fattened, and carefully dressed, there is no need for such a practice as this, and the sooner it is abandoned the better. Prejudice is undoubtedly hard to kill, but it is not impossible to overcome it, and the benefit to both producer and consumer is so striking, that it would not be long before prejudice would acknowledge its error, by following in the same course.

This would appear to be a suitable opportunity for saying something about another custom, which is largely adopted in France, but which has never become very general in this country, namely, that of caponising, which is the taking away from cockerels the power of reproduction, by the doing of which, the weight of the birds, and the tenderness of the flesh, are both greatly increased, and fowls so treated are to be met with very generally all over the Continent, at least in those districts where poultry breeding is largely practised. In some places pullets are also operated upon, for a young hen that has never laid, is regarded as daintier than any male bird, but, as a rule, these are fed up and killed before laying has commenced, so that there is no need to subject them to the operation. One of the best descriptions of caponising is that given in Tegetmeier's Poultry Book, which is of itself a translation from a French treatise by Mdlle. Millet Robinet:—

"The instrument employed in the operation should be

very sharp; a surgeon's small operating-knife, termed a curved-pointed bistoury, is far better than an ordinary knife, as it makes a much neater wound, and so increases greatly the chances of healing; or a curved-pointed penknife may be used. A stout needle and waxed thread are also requisite; a small curved surgical needle will be found much more convenient in use than a common straight one.

"It is necessary that there should be two persons to perform the operation. The assistant places the bird on its right side on the knees of the person who is about to operate, and who is seated in a chair of such a height as to make his thighs horizontal. The back of the bird is turned towards the operator, and the right leg and thigh held firmly along the body, the left being drawn back towards the tail, thus exposing the left flank, where the incision has to be made. After removing the feathers the skin is raised up, just behind the last rib, with the point of the needle, so as to avoid wounding the intestines, and an incision along the edge of the last rib is made into the cavity of the body sufficiently large to admit of the introduction of the finger. If any portion of the bowels escape from the wound it must be carefully returned. The forefinger is then introduced into the cavity, and directed behind the intestines towards the back, somewhat to the left side of the middle line of the body.

"If the proper position is gained (which is somewhat difficult to an inexperienced operator, especially if the cock is of full size), the finger comes into contact with the left testicle, which in a young bird of four months is rather larger than a full-sized horse-bean. It is moveable, and apt to slip under the finger, although adhering to the spine; when felt it is to be gently pulled away from its attachments with the finger and removed through the wound—an opera-

tion which requires considerable practice and facility to perform properly, as the testicle sometimes slips from under the finger before it is got out, and, gliding amongst the intestines, cannot be found again readily; it may, however, remain in the body of the animal without much inconvenience, although it is better removed, as its presence is apt to excite inflammation.

"After removing the left testicle, the finger is again introduced, and the right one sought for and removed in a similar manner. It is readily discovered, as its situation is alongside of the former, a little to the right side of the body. Afterwards the lips of the wound are brought together and kept in contact with two or three stitches with the waxed thread. No attempt should be made to sew up the wound with a continuous seam, but each stitch should be perfectly separate, and tied distinctly from the others.

"In making the stitches great care should be taken; the skin should be raised up so as to avoid wounding the intestines with the needle, or including even the slightest portion of them in the thread—an accident that would almost inevitably be followed by the death of the animal.

"After the operation the bird had better be placed under a coop in a quiet situation, and supplied with drink and soft food, such as sopped bread. After a few hours it is best to give him his liberty, if he can be turned out in some quiet place removed from the poultry-yard, as, if attacked by the other cocks, the healing of the wound would be endangered.

"After the operation the bird should not be permitted to roost on a perch, as the exertion of leaping up would unquestionably injure the wound; it should, therefore, at night be turned into a room where it is obliged to rest on

the floor previously covered with some clean straw. For three or four days after the operation the bird should be fed on soft food; after that time it may be set at liberty, for a short period, until it has recovered entirely from the operation, when it should be put up to fatten."

CHAPTER XXI.

THE DISEASES OF POULTRY.

General Treatment of Disease—Causes—Apoplexy—Bronchitis—Bumble-Foot—Catarrh—Consumption—Cramp—Cropbound—Diarrhœa—Diphtheria—Egg Organs—Feather Eating—Gapes—Roup—Cholera.

Such a work as this would be incomplete were no reference made to the diseases of poultry. We do not intend to go into any long descriptions of the diseases which affect domestic fowls, for they would mystify the reader, but shall give short descriptions sufficient to enable a disease to be recognized, and the best methods of treatment. It is a fact, however, that the treatment of disease in birds presents a considerable amount of difficulty to the ordinary poultry keeper, for the body of the fowl being covered with feathers, and there being so few ways in which the special complaints can be diagnosed, one form of disease can very easily be mistaken for another. There are, however, symptoms to be found accompanying all diseases that may, by a little careful examination, be discovered, and from these it is possible to learn, what is the matter with a fowl. We may say that, where there are a goodly number of fowls, it is much better to kill any bird right off that presents the appearance of having an infectious disease upon it, rather than to run the risk of allowing it to communicate the same to others. If the bird so affected be a very valuable one, then an effort may be made to save it;

but it will generally be found cheaper in the long run to kill it. Especially is this so with roup, which is a most infectious and fatal disease; and when it once gets into a yard, is very difficult indeed to get rid of. In any case, when a bird is seen to be ailing, it should be put somewhere by itself, so that it may not be near the other fowls; and should the complaint from which it is suffering be a contagious or infectious one, then probably the other birds can be kept free from it; but if it is not, no harm will have been done. This is a rule which should never be broken; and, if the attendant will every day look round the fowls, he will soon see if any are moping or refusing their food, and if these are removed, as we have suggested, disease may and will, in many cases, be kept down.

There can be little doubt that diseases have been greatly fostered and increased by the present system of keeping fowls. Naturally birds are subject to but few diseases; but the feeding upon rich or unsuitable foods, over-crowding and keeping upon the same ground for a long period, gradual weakening of the system by in-breeding, and exposure by sending to shows, all have had the tendency to make the birds more subject to various forms of disease, to which at one time they were entire strangers. Hence the necessity for treating fowls in a common-sense manner; for by this means much may be done in the way of preventing disease, which is at all times much better than cure, and much easier also. It would be beyond our province to go very deeply into the treatment of diseases, but for facility of reference we will give them in alphabetical order.

Apoplexy.– Birds, which have been apparently in good health, are sometimes found lying on the floor of the fowl-house, being unable to move, having fallen from their perches. This is apoplexy, and is the result of over-feeding, by which we

mean not only too much food, but also too rich food. Indian corn has been found to be a great cause of this disease; and the death of one bird, should be taken as an indication that the others can only be saved, by reducing the food both in quantity and quality. If the bird so affected is not dead, a vein on the under side of one wing should be opened, and the blood taken will reduce the pressure on the brain. The bird should be fed on light food for some time, and kept in a quiet place.

Bronchitis.—When a cold settles on the lungs or chest, instead of in the head, and the bird is constantly coughing, without having any other symptoms of cold, then it is a form of bronchitis. The bird should at once be removed to a warm, moist atmosphere, which will generally be sufficient to effect a cure, though a few doses of homœopathic tincture of aconite will materially assist it. A warm day must be chosen for returning the fowl to its ordinary house, and the same precaution is necessary in all bronchial or respiratory affections. For this disease, Mr. Tegetmeier recommends the administration of one grain of calomel and one-eighth of a grain of tartar emetic to be given at night.

Bumble Foot.—Dorkings and Houdans are subject to this more than any other varieties, though we have found it in others. A wart-like substance appears in the ball of the foot, and if allowed to grow the bird becomes entirely lame. The cause is generally high perches, but constant walking upon cement or stone will have the same effect. The corn should be removed with a sharp knife, and the part be touched with nitrate of silver, after which it is better to keep the bird on clean straw for a few days. The inflammation may be reduced by bathing the foot with warm water, and the heat of the body should be also reduced by some aperient medicine.

Catarrh or Common Cold.—This complaint is indicated by the same symptoms as we find in human beings, namely, a running at the nostrils, and a slight swelling of the eyes. It arises from cold or exposure, and if not attended to may develop into roup or consumption, both of which should be consulted for further information. For cure, the bird should be kept in a warm place, and have doses of roup pills, or homœopathic tincture of aconite, and have nutritious food, rather stimulating in its nature.

Cholera.—*See* page 264.

Consumption.—This is often an hereditary disease, and when so is impossible to cure; but it is also caused by damp, dark, badly ventilated houses. Scrofulous tubercles form in the lungs, and when the bird takes cold, that settles there. The bird is seen to gradually waste away; there is cough and constant expectoration, and the poor thing soon dies, a mass of bones and feathers. No bird suspected to have any seeds of consumption in it should ever be bred from, but if the disease is acquired, not hereditary, then it may be cured if taken in time. Good housing, wholesome and abundant diet, are necessary, and capsules of cod-liver oil with quinine, or Parish's chemical food, and capsules of cod-liver oil only, will be the best treatment. We should, however, strongly urge that any bird so affected, even if apparently cured, be not bred from, as there is always danger of its transmitting the disease to its progeny, and the system must be weakened.

Cramp.—Chickens kept upon a clay soil, or in a damp place, are often subject to cramp, which is known by the toes of the birds beginning to curl in, and then the bird has to walk or its knuckles. When discovered, the chicken should be placed on a perfectly dry floor, and fed upon stimulating foods. It will also be a help towards cure, if the feet and legs are bathed with warm water, and afterwards rubbed with turpentine.

Cropbound.—Fowls, from various reasons, are sometimes unable to pass the food from the crop into the gizzard, and the former becomes charged with food, hanging like a bag in front of the bird. If not relieved, it will soon die of starvation, for, no matter how much it may eat, none of the food can pass into the stomach so long as the obstruction remains. When discovered, some milk and warm water should be poured down the throat of the bird, to soften the food in the crop, which should then be well kneaded with the hands. Often, if dealt with early, this will be found sufficient, but if not, then an incision must be made through the skin to the crop, and its contents removed with the aid of an egg-spoon. Care must be taken to see that all is removed, for if the original cause of the obstruction be left, then all will have to be done over again. The crop should be washed out with warm water, and must then be stitched up, the inner skin first and the outer one afterwards, for which purpose silk or horsehair are the best materials. The bird needs to be fed on soft food, such as sopped bread, for three or four days, and kept without water, when it will be none the worse for the operation.

Diarrhœa.—The use of bonemeal will generally prevent this complaint, which may arise from an insufficient supply of grain, or from unwholesome food. Some boiled rice mixed with powdered chalk will often stop it, and we should not advise any stronger remedy in slight cases. When, however, the diarrhœa becomes excessive; then chlorodyne, given in water as prescribed on the bottles, is the best thing for it.

Diphtheria.—We have never heard of this disease making its appearance except in exhibition yards, and the ordinary poultry keeper need not fear it, except when buying birds.

Its indications are, severe cold with high fever, and in the throat white spots are seen filling the glottis. Any bird so affected should be killed forthwith, as it is one of the most contagious and fatal diseases known, and when once it gets into a yard, it is not often got out again without the sacrifice of all the stock.

Egg Organs.—The delicate mechanism by means of which the egg is formed and voided, is sometimes put out of order, but, as a rule, this is the result of bad feeding, which stimulates or forces the organs, and the ordinary course of nature is upset. Or, it may be, that the insufficient supply of shell-forming materials, results in soft or shell-less eggs being voided. Birds at liberty are not often so troubled, and those in confinement need to be carefully fed, and to be supplied with the materials for shell formation. Sometimes a hen becomes egg-bound, when a little castor oil may be tried, but if that fails, then a little olive oil should be injected into the oviduct, and this will generally secure the object in view. Great care must be taken in so treating a bird, as rough usage may easily break the egg, such a circumstance being almost always followed by a fatal result.

Feather Eating.—Few birds at liberty are ever found to acquire the disgusting habit of feather eating, and in confinement it is found mostly amongst the Asiatic varieties and Houdans. When once contracted it is very difficult indeed to cure the habit, and it is best to remove any bird found so transgressing, and, if not valuable, to kill it, at the same time trying to remove any cause that may exist.

Idleness is a very great cause of feather eating, and hence the having nothing to do, tempts birds in confinement to pluck out each other's feathers. It may also be that

birds so confined, do not obtain something that is necessary to them, which we know nothing of, and cannot supply, but which at liberty they can find for themselves, and the feathers satisfy the craving thus engendered. And for this reason we have sometimes found bonemeal of great service, once curing a hen by putting a large quantity of this into every dish of food she had for several days, giving her soft food all the time. But in other cases we have known this remedy to fail entirely, and we are fain to acknowledge, that at times we have been completely puzzled how to proceed. Thirst also is said to induce the practice, and the treatment recommended in the following translation from an article which recently appeared in a French poultry journal, will indicate further measures :—

"The cause appears to us, to be attributed to the general discomfort felt by all classes of poultry during the cold weather, and especially the east winds. The poor things, huddled together in a sheltered corner, dare not come out in the open unless at feeding time, and then they never scratch about, nor look for insects, grass, or those little nothings which constitute the essential part of their food, and which is found in every run well attended to. Under these circumstances the want of animal food has made itself felt, and the opportunity and temptation being within their reach, they have pulled at one another's feathers, which they eat with evident satisfaction. The only immediate remedy is to set them at liberty, but as this cannot be done in every case, one has to be satisfied with the means at his disposal. Let them have, several times a day, green-meat. Mix with the soft food, some meat cut up into small pieces. Avoid tainted meat. Renew the sand in the runs, and especially put dry sand under the sheds where the fowls generally dust themselves. Care must be taken with a hen, although not picked herself,

but always pursuing the others, to isolate her. One single bird is sufficient to set a bad example. In small runs it is the cock which is generally picked first. Is it from excess of affection, or is it spite and revenge? It is difficult to say. At all events, he seldom resents it, and allows himself to be plucked without resistance. In this case the best way to protect him, is to rub him over with a sponge dipped in paraffin. In repeating this operation two or three times, at an interval of some days, the hens will entirely cease to strip their lord and master."

[I believe a *judicious salting* of the food will cure a feather-eating flock almost always. W.]

Gapes.—Chickens are sometimes troubled with what is known as gapes, so called from the constant gaping of the mouth. This action is the result of the presence of worms in the throat, and if these are not removed, the chicken soon dies from suffocation. The cause of these worms is difficult to ascertain. Some are able to prevent them, by the application to the heads of newly-hatched chicks, of a mercurial ointment, but in other cases they appear to arise out of the ground, and all efforts to get rid of them are in vain. The worms can be dislodged from the throat, by dipping a small quill feather in turpentine, and then passing it into the throat, where it is twisted around and jerked out, thus dislodging the worms. Fumigating with carbolic acid is also a most effectual cure, and where chicks are largely affected, it is worth some trouble to save their lives. We have also seen recommended, placing the chicks in a box and dusting them well with fine lime, which gets into the throat and makes the birds cough, thus bringing out the worms. In both these cases care must be taken not to kill the birds by suffocation, which may easily be done if the treatment is continued too long.

Roup.—It has been stated that cold never becomes roup

without the blood is in a scrofulous condition, and we are inclined to think that this is so. Mere cold is not difficult of cure, whilst roup is, and the latter is best known by the breath having an offensive smell in conjunction with the cold. It is necessary, therefore, to do more than merely attend to the cold; something to counteract the affection of the blood is needed. A roupy bird may be known by the offensive breath already spoken of, the discharge from the nostrils, and the swollen face and eyes. It is exceedingly contagious, and will soon spread through a whole yard, if not arrested. In consequence, birds affected should be rigidly secluded, or killed off at once. Sulphur or charcoal are the best to correct the scrofula, and Walton's roup pills or copaiba capsules should be used for the cold. The face, nostrils, and mouth should be well washed with Condy's fluid, or solution of chlorinated soda, so as to kill the mucus which gathers there. Especial care is necessary to see that the birds do not communicate it one to the other, as in drinking out of the same fountain, or eating out of the same dish. All dishes, etc., should be at once washed in diluted carbolic acid, and the houses well lime-washed out.

Cholera.—This is an epidemic disease peculiar to this country, attacking and often nearly destroying isolated flocks and yards having poor sanitary arrangements or care. It is probably malarial in its character, affects the liver, poisons the blood, causes violent diarrhœa, and is often exceedingly rapid in its action and termination. The fowl attacked is droopy, weak, in high fever, with thirst, rough and draggled plumage, and has diarrhœa with green droppings. Drs. Dickey and Merry recommend pills as follows: Blue mass, 60 gr.; camphor, 25 gr.; Cayenne pepper, 30 gr.; rhubarb, 48 gr.; laudanum, 60 drops; made in 20 pills and given one every four hours till they act freely, and, when they have acted, half a teaspoonful of castor oil and ten drops of laudanum to each fowl.

CHAPTER XXII.

POINTS OF MANAGEMENT.

Importance of Details—Keeping an Account—Rotation of Crops—Poultry Manure—The Dust-bath—The Preservation of Eggs—Packing Eggs—Sending Eggs to Market.

Our last chapter must be given up to those details of management, which we have not been able to touch upon previously, or only in an indirect manner. It must not be assumed, however, that because we have left these to the last, that they are unimportant; on the contrary, they are most important, and though they may be regarded as only details, yet these details will have a very great influence upon the result, for the neglect of one thing only will, in the course of a year, even if most trivial in itself, become an appreciable matter. This we need not dwell upon, for the same thing is found in all pursuits, and in every department of life.

We should, at the outset, urge all who go in for poultry keeping to keep a strict account of every item of expenditure and receipt, and to annually make a balance sheet, for there can be no question that in this, as in many other matters, there is far too great laxity in the keeping of accounts. Wealthy persons, who do not care how much a thing costs them, may be permitted to dispense with all such records as we are now recommending, yet even they will find it advanta-

geous to have them. But so far as those are concerned who look upon their poultry as a means of adding to their income, and with whom they must be profitable if kept at all, it is almost essential that they should set down every item of expenditure and receipt, not only for reference and as a means of seeing whether the fowls pay, but also for future guidance. Armed with a full and faithful record of a year's work, an intelligent poultry keeper will be able to avoid past mistakes, to see in what direction he may develop his business, with the greatest probabilities of success, to know which breeds have proved the most profitable, what expenses can be cut down, and, it may be, can discover how to turn a loss into a profit. Figures are stubborn things, but a study of them has saved many a man from ruin, and we believe that in every pursuit of life, whether it be our ordinary affairs, or those outside things which minister to our pleasures, but especially in matters of business, a strict account should be kept of every item of expenditure. Without this, there is great danger of getting the balance on the wrong side. We have no wish to write a homily on the economies of life, though such a subject is full of the deepest interest, but this is not the proper place for it. We urge every one, however, whether the number of his birds be small or great, to keep an account of the same. The cost of a book in which to keep the account, need not be more than a shilling or two, and, except where very large numbers are kept, one book will be sufficient. A quarto book, bound in boards, ruled with $ and cts. columns, and containing about a hundred pages, can be obtained for a quarter, and the majority of our readers will find this as large as they will require.

The poultry keeper must begin his account by taking stock of all his birds, houses and appliances on hand at the beginning

of the year (which does not necessarily mean January 1st), and the money value of these will represent the capital invested in the yard. Then he will require several pages to be set aside for the cash account, in which all his money receipts and expenditure should be set down day by day, together with the particulars of the same. Next will come the egg account, which will show the number of eggs laid, and the way in which they are disposed of. If the number of fowls kept be only few, and not very fluctuating, it will not be requisite to have a poultry register ; but if the stock be a large one, then it will be advantageous to keep such an account, adding all the birds hatched or purchased, and, of course, taking from those the sold, killed, or otherwise disposed of. A hatching record is very useful during the breeding season, in which the date of setting the hens, the date the eggs are due, the number fertile and hatched, and breeds, can be enumerated. This prevents many mistakes being made, but in some yards a simpler plan is adopted, namely, that of hanging a card above each hatching box, upon which these particulars are entered, and all that need then be put in the books are the numbers hatched. At the end of the twelve months the stock of fowls, &c. should again be revalued, and a balance sheet made, showing the operations of the twelve months, with the result thereof. We must just remind the poultry keeper, that the value of eggs and chickens used in the household must be placed to the credit of the yard, or the balance sheet will not be a true one.

In one of our earlier chapters, we hinted at a system which can be adopted by small farmers and other occupiers of land, in which the fowls really form one in a course of rotation of crops. This is not necessary on a large farm, for there the birds can be placed on the land after harvest, or, as we have sometimes seen, the houses may be widely scattered apart, and

the fowls allowed to wander about even amongst the growing corn or roots. Fowls will do no harm to either of these crops, when they are four or six inches above the ground, and as they are as fully grown as this by the time the chickens need be put out, there is no difficulty in adopting the plan; the birds will thrive amain, for they will get just the food most suited to them—insects and worms—and, in return, the crops will be benefited by their droppings. Where smaller runs have to be given, it is a capital plan to have double runs to each house, using these on alternate years, and growing vegetables on the ground not in use. By this means the ground will be kept sweet and clean, it will not get contaminated, disease will be prevented, and the crops grown thereon will be very heavy indeed. Of course the system can be largely extended, and fields lying fallow for a year may be used for poultry keeping.

This leads us to the subject of poultry manure. Although there is no doubt that the droppings from fowls is most valuable, though not quite so good as has sometimes been represented, it has not yet become a marketable commodity of any importance. There is a limited demand for it amongst gardeners, but, as a rule, it is much better to have some means of using, instead of selling, it. None should be wasted, and mixed with fine dry soil it becomes a most valuable manure for any kind of crops. We know one farmer near Aylesbury, who buys large quantities of the duck manure for his root crops, finding it the best he can get for them, and certainly the cheapest. It has been estimated that the droppings of a fowl is worth fifty cents a year to the land, and if that is so, then the keeping of poultry becomes of still greater importance than we have ever claimed for it.

In our chapter on the sitting hen, we spoke of a dust bath, and this is needed by ordinary fowls also; those

who know the value of such a bath, both in summer and winter, consider it essential to successful poultry keeping. And how few of our poultry keepers there are, who give their fowls an opportunity of revelling in a heap of loose earth or ashes, either in the hatching season, or when the ground is damp and they cannot obtain it naturally. The dust bath is to poultry, nature's cleaner and renovator, and is as necessary for cleansing the feathers of fowls from vermin and effete matter, as a cool pure water bath is to the person of cleanly habits. Poultry with free range in summer, will be able to help themselves to a dust bath, if they have to roll in the newly made flower or vegetable beds, but with fowls in confinement the means and material must be supplied. A dry mass of fine sand or road dust, fine loam or coal ashes, old mortar, or in fact anything of that kind will do. This mass of dry material should be under a shed to protect it from rain in summer time, and in the sunniest corner of the hen-house or shed in winter. A capital plan is to have a small shed adjoining the fowl house, with or without a connection thereto, and devote this entirely to the purposes of the dust bath. Such a shed need not be more than a couple of feet high, and should be entirely open at the front, with a sloping roof to keep out the rain.

If we watch the habits of all wild birds, we can see them in the open clearings and on the country roads, at early sunrise, dusting themselves as rapidly as possible; and if we give our domestic fowls a chance, we can see an instinctive desire in the young, as well as the old, to scratch, and pulverize the earth, if in lumps, and they will then adjust their feathers, and by the rapid action of their claws dust themselves thoroughly, and by shaking, rid themselves of lice. The dust bath is made more effective by putting a handful

or two of sulphur and carbolic powder through the mass, and mixing them together. The ground should be excavated out six inches, or the shed have a front ledge of the same width, and this filled up with the ashes, or whatever is used. If of much less depth than this the birds will be unable to get a thorough cleansing. Cleanliness in every way is of the greatest importance. Uncleanliness about the fowls, their quarters, or their runs, is a sure cause of disease. It generates vermin, and vermin saps the foundations of health. Hens will not lay well, nor thrive while infested with lice, or while they roost in filthy places, and inhale the noxious gases which emanate from their accumulated droppings. Ill-ventilated fowl houses, and the absence of light and sun, exert a powerful influence on the health of fowls.

There are many poultry keepers who make a great mistake, in that they do not take sufficient care to send their produce to market in the best way. We have already dealt with this subject in its relation to fowls, but it is also necessary to say a few words upon it so far as eggs are concerned. Purchasers of eggs know what a great difference there is in what are known as new-laid eggs, and we believe this is largely influenced by the method of preservation. Eggs can be kept for three or four weeks in a very simple manner, and it will be difficult for even an expert, at the end of that period, to tell the difference between such an egg, and one three or four days old. If they can be kept fresh for this length of time, they can be so kept for a shorter period, and as in many places it is convenient to get them to market only once a week, such a system as we are about to recommend will be found of the greatest value. The place selected for keeping eggs should be cool in summer, but not cold in winter, that is, it should be kept at a temperature of from 45 to 60 degrees all the year

round. If too cold, the eggs will freeze and crack, if too warm, they will commence to decay and get stale sooner than they otherwise would. Shelves should be fitted up with holes bored in them, sufficiently large to keep the eggs upstanding, but, of course, not large enough to allow them to pass through. These shelves will be very inexpensive and will serve a lifetime. The eggs should be placed in these holes broad-end *downwards*, and tests have proved that they will keep fresh in this position, very much longer than with the broad end upwards. Some keep eggs in bran, but the pierced

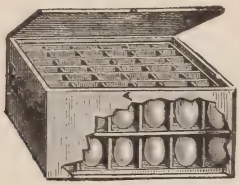


Fig. 14.—Travelling Egg Box.

board is much preferable, and the free circulation of the air round the eggs, assists greatly in their preservation. Instead of the pierced shelves, cardboard partitions, as used in egg boxes, may be adopted, but we do not think that they are so good or so handy.

The advantage of getting eggs to market as soon as possible after being laid, has led to the adoption of special boxes for the purpose of sending them by rail. The old system of packing in straw may serve very well where time is of little object, but it is clumsy and not very safe. The boxes we are now speaking of, are made in almost all sizes from one dozen upwards, and consist of strong square

wooden boxes, generally with lock and key, inside of which are cardboard partitions, forming squares, of sufficient size to allow an egg to stand upright in each. Between each row, a sheet of thick felt is placed, and no other packing is required, the eggs travelling in this way with very little danger of breakage. Fig. 14 shows one of these boxes, holding six dozen eggs. The benefits of the system are obvious, for the boxes are easily filled, as easily emptied, and can be used over and over again, so that the first, is the only cost, and that is by no means a heavy one. Another kind

Fig. 15.—The "Ovifer" Egg Box.

of package is that known as the "Ovifer," shown in Fig. 15, the eggs in this being held by springs fixed to tin trays, which latter are fitted into a wooden box. It is customary with those who send their eggs to market every day, to date each one as soon as collected, but, whilst in their case such a plan is to be recommended, for obvious reasons it would not be wise for others to do so. But when eggs can be sent out daily, better prices will be obtained, and present express rates, as well as the cheap freight now charged by

the railway companies, offer facilities to poultry keepers to reach consumers, which were never given before. Arrangements can often be made with hotels and large houses, for supplying eggs at good paying prices. The energetic poultry keeper, will take care to omit no opportunity of this kind, in order to make his profits as large as possible.

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