

POULTRY KEEPING
AS AN INDUSTRY
FOR FARMERS AND COTTAGERS



EDWARD BROWN, F.L.S.

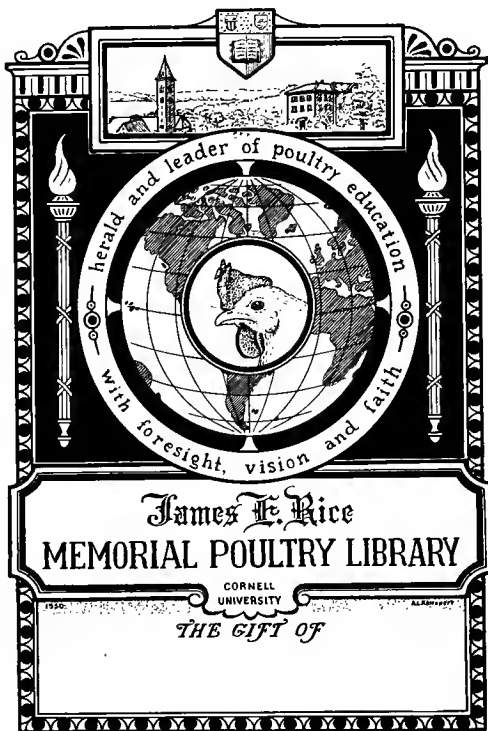
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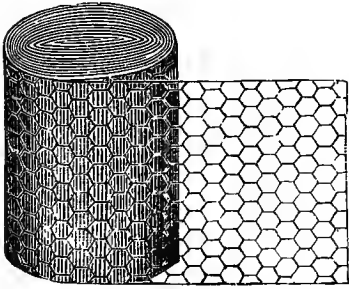
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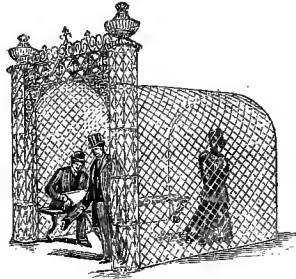
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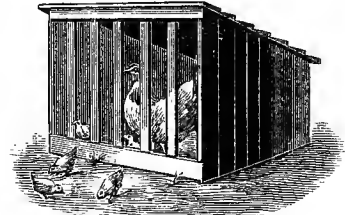


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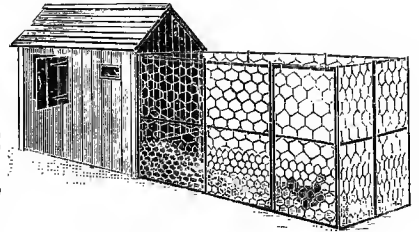


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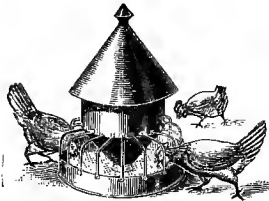
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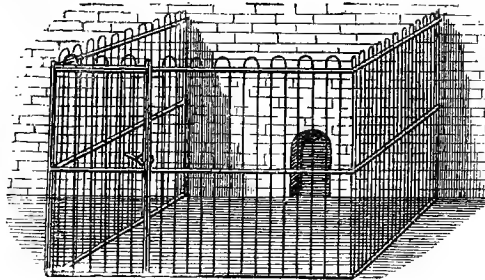
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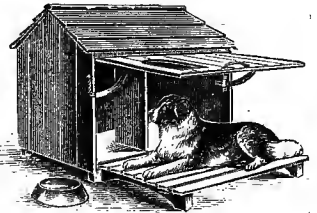
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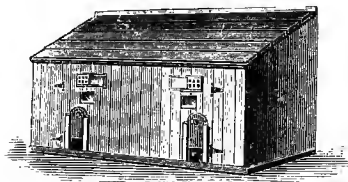
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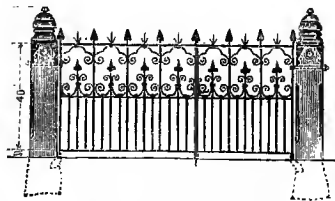
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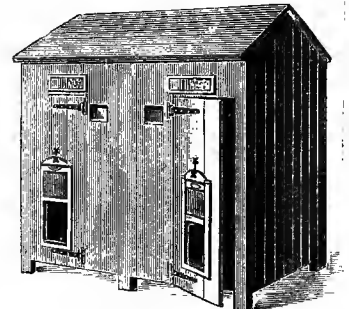
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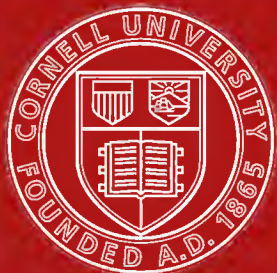
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POULTRY-KEEPING AS AN INDUSTRY FOR FARMERS
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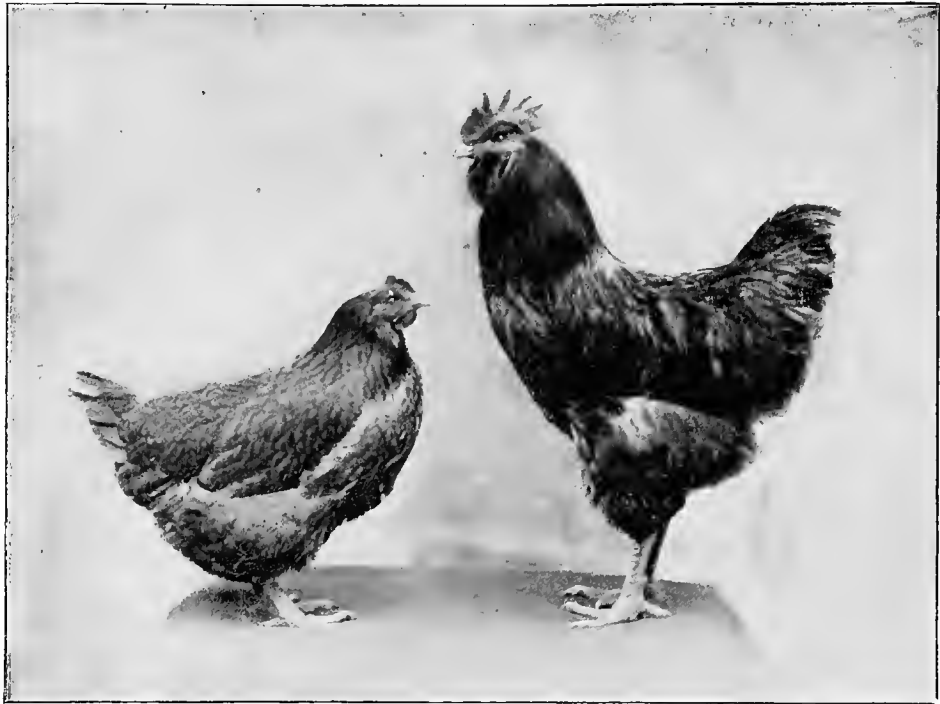


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BUFF ORPINGTONS.

Bred by, and the property of, Messrs. Abbot Brothers, Thurston, Norfolk. Cockerel, winner of First and Cup, Birmingham Show, 1897. Pullet, 2nd, Weyland Show, etc.

Frontispiece.

POULTRY - KEEPING

AS

An Industry for Farmers and Cottagers

BY

EDWARD BROWN, F.L.S.

Lecturer on Aviculture at the Reading College, and the Edinburgh University; to the Yorkshire College, Leeds; to several County Councils; Author of "Industrial Poultry-Keeping," "Poultry-Fattening," "Pleasurable Poultry-Keeping," etc., etc.; Special Commissioner (1888) of the "Weekly Freeman," Dublin; Judge of Poultry at the Royal Agricultural Society's Shows, 1887, 1891, 1892, 1893, 1897, etc.

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PREFACE TO THE THIRD EDITION.



IN the six years which have elapsed since the first edition of this work was published, very decided and important changes have been made in the development of poultry production in the United Kingdom. Many of these are referred to in the Introduction.

But up to the present we have not been able to prevent foreign supplies steadily but surely increasing. Whereas in 1891 we paid other countries for poultry and eggs the sum of £3,977,879, in 1897 this had risen to £5,087,524, and the fears expressed in the first edition as to the growth of foreign imports have been abundantly justified. Much of the increase, however, has been due to the enormous development of the Russian trade, which is said to be merely in its infancy. Probably a large proportion of the eggs received from the empire of the Tsar is used for manufacturing purposes. The fact that they are brought nearly a thousand miles to the Baltic seaboard before they are shipped to Britain means that they are a month to six weeks old ere reaching our shores, and consequently are not in that state which would make them acceptable for ordinary purposes. It has been announced that a perfect method of preservation has been discovered, and if that proved to be true it would alter materially the trade, but as yet we know nothing further.

It must not be thought from the growth of foreign imports that home supplies have decreased, for such is not the case. On the contrary, they have developed to a considerable extent, both in poultry and eggs. The indifference, not to say opposition, experienced six years ago by those who urged upon agriculturists and others the importance of the poultry industry, and the great loss accruing from its neglect, is largely a thing of the past. Inquiry has taken its place, and from inquiry there has come a realization of the fact that it is an industry, one which needs the same commercial spirit, the same perseverance and persistency, required in all other enterprises. Given these, there is reward in the shape of substantial profit to those undertaking the work. But it cannot be too strongly emphasized that they are absolutely necessary. The old system of regarding poultry as the perquisite of women-folk, which would be got rid of were it not for social or family customs, was bound to spell loss.

During the period named there has been a remarkable growth in the consumption of poultry produce, not only *pro rata* to the increase of population, but eggs and poultry are eaten to a greater extent than ever before. This fact can be proved by the most superficial observation. The

signs are that as time goes on the increase will be accelerated. Changes in cookery, and the demand for finer and daintier articles of food, mean that demand will be greater than we have yet contemplated. Even now it is not an extreme calculation that the consumption of eggs and poultry, inclusive of home and foreign supplies, amounts to nearly £12,000,000 annually.

The present edition contains later observations both at home and abroad on poultry-keeping, the result of personal experience and noting the experiments of others. For this purpose I have made several journeys to the Continent, where they are undoubtedly in advance of ourselves in this pursuit. The work has been thoroughly revised and brought up to date, in many parts entirely rewritten, and much new material added. Newer breeds are noted, and nothing which to the writer appeared important is omitted. Progress has been made, but we have much yet to learn. As time goes on some of the views now held will probably have to be modified. Methods will be adopted which have not yet been attempted, or, if attempted, have not been carried to a successful issue. I believe we are on the eve of great developments, especially in the direction of egg production, but it is too early to speak of them, as they are still in the embryonic state. In a work of this kind it is desirable to avoid the speculative, and to recommend only that which has been proved by actual experience. Large numbers of persons have consulted me, and I am always ready to reply to requests of this kind, simply asking in return to be given the results of their own practice. It is in this way poultry-keeping as an industry will be raised to a higher plane.

EDWARD BROWN.

VELMEAD, CAVERSHAM, OXON, 1898.

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INTRODUCTION.



HERETO it has been charged, and with truth, against our systems of training and education, that technical subjects have not received the attention their importance demands. Why this should have been so it is not necessary for us now to inquire, as the fact is sufficiently apparent to all who have considered the matter. Happily it is no longer true, and the present movement towards technical and secondary education amongst the schemes adopted by County Councils throughout the country. Many of these bodies have taken up the question with great earnestness, and for the first time have been in a position to deal with the training of students in subjects which have perforce been neglected in all branches of the curriculum. However great their desire may have been, they had not the means for offering technical and secondary education, except to those who could afford to pay at a high rate for this knowledge. Such a limitation necessarily excluded the majority of our rural population from its benefits, but with the funds now placed at the disposal of local authorities they are enabled to bring the much-needed education to the people themselves, and deal with them in detail rather than in great masses. The results of this movement are yet to be seen, and can only be arrived at in years to come, when they have had time to develop. But we can look forward with great confidence, and, so far as can be observed, those responsible for administering the Local Taxation Act, 1890, and the Technical Instruction (Amendment) Act, 1891, have approached the question in a broad-minded and liberal spirit. By means of the funds placed in the hands of County Councils it has been possible to build up a system of education in technical subjects which was scarcely to be hoped for at one time. Doubtless at first a large amount of money was expended in ways which have not brought any definite return, due to the lack of experience, and the indifference of our rural

population, many of whom failed to see any need for instruction in what they thought they already knew, or who imagined that the methods adopted by their fathers and grandfathers were good enough for them, forgetting that we have opposition to meet and demand to supply, undreamt of by past generations. It was necessary, however, to teach them their own deficiencies, and the cost of doing so was money well spent. Technical education will be the means of rebuilding our rural population, and already the fruits of this work are becoming apparent.

Whilst it is to be expected that the more important subjects connected with agriculture, such as the general principles of farming, stock-breeding, and dairying, should receive the first position, what may be termed minor sections, by which is simply meant that they do not total to such big figures in our products or imports, though in some districts they occupy a leading place, have not been neglected. Amongst these must be placed poultry-keeping, fruit culture, bee-keeping, rabbit-breeding, etc., and as these touch the smaller producers chiefly, *i.e.*, small farmers and cottagers, no scheme could possibly be regarded as anything like complete which failed to provide for them. But these subjects are of import to others as well as those just named, for it has been shown in many cases that neglect of the minor products of a farm will probably mean failure, whereas attention to these subsidiary productions will determine success. This view, scouted at one time, has more and more impressed itself upon the minds of those concerned, and to-day agriculturists regard various branches of rural work very differently from a few years ago. In this there is hope for the future. The following pages bring into one focus the best knowledge attainable as to poultry-keeping, and the figures given indicate the importance of this question to farmers and cottagers, and to the community at large.

Poultry-keeping is a pursuit which recommends itself very strongly indeed to the small farmer and cottager, in that the outlay of capital required is very little indeed, and the returns are quickly arrived at. Chickens bred for the table can be marketed within a few weeks; those intended as layers will commence operations by the time

they are five months old. Only in one or two other branches of farming can the same rapid return be secured. There need be no outlay for rent, and, except upon large farms, where a special poultry woman is kept, wages do not enter into consideration. It is, in fact, one of those pursuits which can be engrafted upon the regular operations with very little additional outlay. But there is a further benefit to be derived. Fowls play an important part in cleaning and enriching land upon which they are kept, and in the following chapters evidences of this are given. If the example shown by vine-growers in France were followed, and every fruit-grower maintained a flock of poultry, large or small according to his occupation, his profits would be added to considerably, his land would be cleaned by the fowls, their manure would improve his crops, and their produce would be a welcome addition to his income. We are strongly of opinion that every fruit-grower should also be a poultry-keeper. The same applies to dairy farms. In Devon and Cornwall nearly every dairy farmer keeps poultry, and in his contracts bargains for delivering so much butter and so many eggs. As a rule he declines to sell one without the other. Milk or butter and eggs are brought together, and ought to be produced on the same place, and equal care should be taken to market one as fresh as the other. The dairy farmer has a great advantage in that his connections enable him to find a sure and constant outlet for his eggs, with a minimum of trouble.

Whilst to some extent attention has been paid to improvement of breeds, but not nearly to the same extent as in larger stock, although it is equally requisite in one direction as the other, and the necessity for proper housing is better understood than was formerly the case, the equally important details as to preparation of and marketing poultry, and the collection, sorting, packing and marketing of eggs, have, as a rule, been dealt with in a most haphazard fashion. It is true that in Sussex, in Buckinghamshire, and Norfolk, so far as poultry are concerned, the trade is conducted on systematic lines. In these counties may be found examples of what can be done by method and enterprise, examples which ought to stimulate the efforts of breeders and dealers in all parts of the country. In the egg trade much yet requires to be done. Although a few attempts have been put forth as to the collecting of eggs and forwarding them at short intervals to the retailers, it is generally true that the trade lacks organization. Abroad a very different state of things exists. Hence it is that in our own country prices are so variable, and comparatively few eggs are marketed when absolutely fresh. This fact is dealt with in Chapter XV., but it explains why in many parts of the country, even small country towns, foreign eggs have to be bought during the winter months. Something has been done in the direction indicated, but much remains to be accomplished, both on the part of producers and traders. The chief dif-

ficulty is bringing together the individual supplies and forwarding them in larger quantities. It was reasonable to expect that co-operative action might have secured this end, but that independence, perhaps it might be called jealousy, which is so characteristic of our rural population, hinders. And, it must be admitted regretfully, we do not obtain that help which might have been hoped for from the Co-operative Societies, either wholesale or retail, to whom cheapness appears to be more important than ought else. For this reason they have not afforded any great assistance in this direction, such as might be given by them. In Chapter XX. will be found some remarks on the subject of Village Poultry Societies, which are submitted as offering suggestions for united action. It is pleasing to note that the Irish Agricultural Organization Society has taken up the question in Ireland, and everyone must wish success to this splendid movement.

It is desirable to urge the application of true business principles to poultry-keeping, as in every other pursuit. There are powerful reasons why poultry producers of every denomination in each district should combine to mutual advantage, more especially in the direction of marketing. But we cannot dispense with the middleman, to whom there can be no objection if kept in his proper place, namely, as the servant of producers and consumers, not their master, as is too often the case. A middleman, be he employed by poultry-keepers or as an independent trader, who undertakes the duties of collecting and marketing eggs or of fattening chickens, renders a service which is incalculable to the community at large, and can do much to stimulate and develop poultry-breeding. He can often undertake these duties better than can breeders themselves, and deserves to be paid well for his work. Co-operation is excellent in production, or at any rate in collection or in fattening; but the sale of the produce is probably better left to the ordinary trade channels, except when direct custom can be secured. The organization of distribution is complete, and, given quality of the produce, retailers can be always secured. Several attempts could be cited where heavy loss has been incurred by adopting the reverse method. Of course, sometimes it is necessary to break down trade prejudice, or opposition, but this is exceptional. Anyone taking up the business on proper lines will be rewarded. In Sussex and Ulster, Norfolk and Normandy, Buckinghamshire and Devonshire, fortunes have been made by men who have entered upon the business. We hope to see in every district of the United Kingdom suitable for poultry-keeping, and there are not many unsuitable districts, the trade organized in the way here briefly sketched out. It is due to organization abroad that our foreign rivals have been able to achieve such wonderful results in capturing the British markets.

A very striking advance has been made within the last few years in table poultry, as recorded in

Chapter III., and this will be increased yet more as time goes on. We have as yet only touched the fringe of this question, and there are many districts in which no improvement has been made whatever. Still, there has been a marked advance, and with it an awakened interest in the subject. There is, in the minds of some of those engaged in the fattening business, a fear that they will suffer if this industry is extended, but they need not be alarmed. There is abundance of room for all, and the rapid growth of demand in all parts of the country needs a commensurate increase of supply. Moreover, by fattening much of the poultry seen throughout the country could be wonderfully improved, to the advantage of all concerned. This can only be by local effort, and it would not injure any of those already engaged in this business. There has unquestionably been set in motion a movement which is destined to have wide-reaching influences, but we must give like attention to the egg industry.

It may be useful to briefly summarize what has been done in educational work throughout the country. Where the respective County Councils had the duty placed upon them of controlling technical education, the entire machinery had to be provided, and it was a considerable time before this could be expected to run smoothly and systematically. There was a great deal required in the direction of experimental or pioneer work. Amongst the subjects selected poultry-keeping has held a prominent place, especially in rural centres, and it is not too much to say that the lectures upon this subject have been most popular of all, by reason of the fact that people of all classes and of both sexes are interested. Private residents, farmers, cottagers, and artisans are alike keepers of poultry. Hence the large attendances recorded, and the excellent results which have followed. Further, advice given and recommendations made can be speedily put to a practical use, which is not often the case in other branches. The fact that knowledge gained will not be useful immediately ought not to make it unpopular, for such is the case with all real education of our young people, but with their elders that which enters into everyday life is naturally of the greatest service.

In the commencement instruction in poultry-keeping necessarily took the form of lectures, wherein could be dealt with many of those objections which are raised against poultry. It is surprising the amount of opposition which was met with in some places at the outset, and what was still more difficult to overcome, the indifference as to what was intended for their benefit. Much of the latter arose from the idea that they knew all necessary for the management of their hens, and it seemed as if it was regarded almost as an insult to teach them such a subject. Such a state of things was perhaps to be expected, but with the aid of a few more enterprising spirits, who were ready to learn, we have now in some counties an altogether altered condition,

and there is eagerness to obtain such information as will help them to make the most possible out of their poultry. It would be unjust to give the impression that the opposition and indifference referred to was universal, for from the first in a few counties instruction in poultry culture proved an unqualified success. Those who have the control of this work should now realize that the time has come when lectures of this kind should only be given in response to an expressed demand, and not be pressed upon those who do not show any desire for them.

Lectures given have varied considerably in character and number. In many places at first one general lecture was delivered in order to test the interest in this subject, but as a rule courses of four or six, one each week, were found to be the preferable plan, and that is now almost universal. The advantage of such a course is that practical instruction can be given, and the subject treated in detail. In the work lantern views have proved of the greatest assistance, helpful to both lecturer and his audience. An important feature of meetings of this kind has been the opportunity given for questions. Often has it been found that replies to such questions have proved of greater value than the lecture itself, in that difficulties in personal experience can be solved. It is usual, also, for lecturer to visit poultry-keepers who may invite him to do so, and here again the individual can be reached. It must never be forgotten that to make technical education a success, so far as our rural population is concerned, the instruction must be taken to them. Only few can come to centres to receive advanced tuition, and those least able to do so are frequently most in need of teaching.

A development which the writer had pleasure in originating, and which is now being copied in the United States, where poultry is one of the most important sections of live stock, is in the shape of Practical Poultry Schools, embracing theoretical teaching and practical instruction. These have been held under the auspices of several County Councils, and are a regular feature of the agricultural work at the University Extension College, Reading. The course of lectures is as follows: 1. Introduction—Origin of Fowl; 2. Anatomy of the Fowl; 3. Classification and Varieties of Poultry; 4. Varieties of Poultry, Water-fowl and Turkeys; 5. Selection and Breeding; 6. Houses and Housing; 7. Hatching (Natural), Management of Sitting Hen; 8. Rearing of Chickens; 9. Artificial Hatching and Rearing; 10. Formation of the Egg and Chicken; 11. Values of Foods and Methods of Feeding; 12. Fattening and Marketing of Chickens; 13. Management and Fattening of Water-fowl and Turkeys; 14. Preservation and Marketing of Eggs; 15. Diseases of Poultry. But in addition the students are practically trained in the management of incubators and brooders, the cramming of poultry, dressing and trussing for cooking. The success attending this form of teaching is justification

for it, and students have been thus prepared for active work in poultry culture. The examination held at the close should be thorough, or certificates granted are of no practical value. It is to be hoped that this form of teaching will increase, so that those intending to conduct poultry farms and establishments, either on their own account or as managers, may be qualified for the work.

The difficulty in securing properly equipped poultry instructors has been very great, and for these a more complete course is necessary—at least, in the majority of cases. At Gambais (Seine-et-Oise), France, is a large poultry establishment and school, at which a very complete course of instruction, practical and theoretical, is given. This is under the control of, and is supported by, the French Ministry of Agriculture. A description of it was given in the *Journal of the Royal Agricultural Society of England*,* in which the need for a similar establishment in Britain was pointed out, at which teachers and others could be trained, so as to be able to undertake the instruction of others. It cannot be too strongly urged that unless those sent out to

* *Journal of the Royal Agricultural Society*, June, 1897. London: John Murray.

lecture are fully cognizant with poultry-keeping in all its branches, more harm than good will be done, and the entire scheme of technical education brought into contempt. Already much injury has been wrought from this cause. We may hope that ere long arrangements will be made to supply what is an undoubted lack in our present opportunities.

One more point must be mentioned, namely, the want of experimental stations where careful observations can be made in directions where we are only commencing to learn. The next few years will see many developments, and we need experimental work, as in other branches of agriculture. Canada, the United States, and several Continental countries, are in advance of us in this respect. It is by work of this kind we can extend or confirm our present knowledge. Several County Councils have commenced farm schools, and at each of these should be a properly equipped poultry section, at which experimental work can be carried out. It is impossible for such experiments to be conducted by private enterprise, for they may take years to complete, and public money cannot be expended to a better purpose than in this manner.

POULTRY-KEEPING AS AN INDUSTRY

FOR FARMERS AND COTTAGERS.

CHAPTER I.

POULTRY-FARMING, AND WHAT IT MEANS.

WHAT IS POULTRY-FARMING?—AS AN ACCESSORY—DEVON AND CORNWALL—SURREY AND SUSSEX—BUCKINGHAMSHIRE
—DISPOSAL OF PRODUCE—CONSUMPTION IN BRITAIN—IMPORTS FROM ABROAD—IRISH SUPPLIES—TOTAL VALUE
OF EGGS AND POULTRY CONSUMED.



POULTRY-KEEPING as an industry is so important a subject that it is essential at the commencement we should clear the ground of all prejudice and indicate the real meaning of terms employed.

Unless this is done, the probabilities are that we shall be misunderstood, and our subject misconstrued. In no branch of stock-keeping is this more likely to be the case than with poultry. Hitherto it has been a commonly accepted axiom that "poultry do not pay," and as profit in one direction or another is essential to the success of any commercial enterprise, unless we can give good reason for the belief within us, it is scarcely possible to command attention. To disarm those who are wedded to the idea that poultry-farming does not pay, we at once declare that this is our belief, confirmed by observations at home and abroad, if conducted upon the lines heretofore followed. Then why, it may be asked, trouble to recommend a pursuit which fails to fulfil the purposes of all undertakings of this nature? Farmers have been only too familiar with lack of profit, and do not conduct their business with any philanthropic motive. For them it is of supreme importance that the balance shall be on the right side of the ledger. To these statements we would reply that it is entirely a question of what is meant by poultry-farming. Commonly accepted, it denotes the conduct of a separate business, such as fruit-growing, and the attempts made to establish large poultry-farms, which have been many, show a long record of

failures. Many of these experiments have been conducted with considerable energy and at great cost. Others have been damned at the outset by the inexperience of their authors, who have been led on by misleading statements and by the fascination of statistics made to prove that poultry-keeping was the highroad to fortune. In the sense, therefore, of these attempts, we are at one with those who declaim against poultry-farming, for we do not believe the elements of success are contained in this pursuit conducted under such conditions. How, then, can it be made a success? Our reply is: By employing it as part of the farmer's operations, one of the many departments of his work, the combination of which enables him to attain that result for which he seeks.

It is in this spirit that we approach the subject, and our object is to show farmers and cottagers that in poultry-keeping there is money to be made—money which is now poured into the pockets of their foreign rivals, who could not hope to compete with them if they took up the pursuit with enterprise and skill. On the lines we intend to lay down there are many successes to be recorded. Farmers in various parts of the country can be found who regard poultry as an important branch of their work. In Devon and Cornwall poultry-breeding and egg-production enter into farm work to a greater extent than is, perhaps, the case in any other English counties, and there form an important element. In Surrey and Sussex, in Buckinghamshire and in Lincolnshire, much is already

done; while occasionally we come across a farmer in other parts of the country who is alive to the value of poultry-breeding, and lays himself out for its development. But of these we shall have more to say in our next chapter, which deals with the subject of "Farm Poultry in England, France, and Belgium." It must not be expected that we can furnish balance-sheets showing how much given farmers make out of their poultry. These would be, as they almost always are, unreliable and merely approximate, for it is scarcely possible to divide receipts and expenses on any farm so as accurately to show how much each branch makes. But when we find men who are known as ready to adopt new methods, and yet make a success of their farming, declare that their poultry leave them a satisfactory profit, there is no reason whatever why we should doubt the truth of their statements.

SEPARATE POULTRY INDUSTRIES.

It may here be explained that in Britain the fattening of poultry is usually a separate business, and to prevent misconception we invite a careful study of the chapter on fattening. There can be no question that this branch of poultry-production is profitable, and it is of wider-reaching influence than is commonly supposed, as will afterwards be described. It is claimed that in America, by a proper system of housing, the formation of long narrow runs, part of which is laid down in gravel and the remainder in grass, by dividing the birds into small flocks, not exceeding twenty-five in each, renewal of the stock annually, and the strictest attention to feeding and cleanliness, it is possible to keep a much larger number of fowls per acre than we have ever attempted in this country. But we have as yet no personal knowledge of the system, and therefore do not feel justified in recommending the same. But if proved to be a success—that is, if the ground can be kept sweet and free from taint—it opens out a fresh field for poultry-farming which will mean the establishment of a new industry. Even in that case, however, it is found that the system is more successful when combined with other branches of farming, as chickens must have plenty of space during the period of growth.

DISPOSAL OF PRODUCE.

Apart altogether from other considerations, one of the first questions which must naturally arise in connection with the probable success of poultry-keeping is the opportunities for disposing of the produce, and the price that can be obtained for it. In several departments of farming the great reason of recent years' depression has been the result of competition from abroad. All businesses are subject to such fluctuations, either by diminution of demand or reduction of returns through excessive supply. This has been so in corn-growing and some other branches of agriculture, but to-day the best qualities of eggs and chickens are as dear as ever

they were, and 50 per cent. more costly than was the case a generation ago, so far as the consumer is concerned, for, unfortunately, all does not go into the pockets of the producer. Still, the producer does obtain more for his goods than did his father, much less his grandfather. Together with this fact it must be noted that food for his stock is at a lower figure, and hence it cannot be claimed that poultry will not pay. With the advance in price has come an enormous increase in demand. It is not only that there are more people to eat eggs and poultry, but people eat more of them. Where one egg was consumed thirty years ago, probably ten are used now. For one chicken purchased then, probably half a dozen are now eaten. If we assume that the home production has been stationary during the last generation (which we do not think is the case, but believe there has been an advance in this respect), and that the increased consumption has been entirely provided for by foreign imports, it would mean that an average of nearly fifty foreign eggs per annum are consumed by the people of Britain. If we allow one hundred eggs per annum to each fowl, the imports in 1897 would require over fifteen and a half million hens for their production; and a quarter of a million farmers in this country, by each maintaining sixty more hens than they do, could have retained for themselves the golden guineas which for many years have been pouring out of the country—surely not a very difficult thing to attain.

SOURCES OF FOREIGN SUPPLIES.

We have already stated that the volume of imports has very rapidly advanced of late years, and in 1897 the amount paid was greater than 1890 by upwards of £1,160,864, and in face of an increased production in Ireland. Of the eggs received, the best come from France, that country being able to reach our markets in the shortest space of time. These are chiefly consumed in London and the Southern counties.* The Danish eggs stand next in point of quality, and they are sold largely in the Midland and Northern counties of England and in Scotland, where they have in many places taken the position formerly held by the Irish, the latter having lost ground by want of proper systems of marketing.† The following table will give the sources of foreign supply in 1896 and 1897, for which we are indebted to the Secretary of the Board of Agriculture:

* But of late years there has been a considerable falling off in French supplies, the reasons for which have never been satisfactorily explained. Probably some Italian supplies, which formerly passed through France, now reach us by other routes.

† Danish eggs are very carefully packed, and arrive in excellent order and condition.

COUNTRIES FROM WHICH IMPORTED.		No. OF EGGS IMPORTED.	
		1896.	1897.*
		Thousands.	Thousands.
Foreign Countries.	(Argentina)	1	15
	Austria ... ..	...	2,191
	Belgium	269,269	295,702
	Canary Islands ... ..	...	351
	Denmark... ..	187,995	209,856
	Egypt	1,295	6,562
	France	393,093	321,030
	Germany... ..	351,658	356,622
	Holland	3,855	6,346
	Italy	75	2,344
	Morocco	6,334	4,565
	Norway	24	36
	Portugal	6,457	6,979
	Russia	238,740	375,880
	Spain	9,044	5,886
	Sweden	2,333	1,419
Tripoli	1	...	
Turkey in Europe	}	234	293
Turkey in Asia			513
(United States of America)	5,724	12,952	
Foreign Countries. Total		1,526,132	1,609,592
British Possessions.	(Anstraliasia)	44	...
	Canada	60,038	68,252
	Channel Islands	2,781	4,148
	Gibraltar	198	706
	Indies, East, British... ..	...	40
	Malta	174	457
Newfoundland	34	909	
British Possessions. Total		63,269	74,512
Total... ..		1,589,401	1,684,104

It must be observed in connection with the above that the returns given as to Belgium, Germany, and Italy are misleading, because the last country through which the shipments pass are credited with them, not the country of origin. Thus, as Belgium sends very few of her own eggs, and Germany practically none, we must accord the amounts for these two countries to Italy, Russia and Austro-Hungary respectively. The most striking development of late years has been in connection with Russia. In 1890 the imports were so small that no separate entry was made in the Trade and Navigation Returns, but by 1897 they had grown to £812,297 for eggs, and £186,825 for poultry and game. The signs are that there will be a further increase, but, happily for home producers, the quality is of a low grade.

GROWTH OF IMPORTS.

It will be both interesting and suggestive to show the rapid rise in the imports of these two products from abroad since 1864, and as this is largely a question of money, we confine the subjoined table to the values, as they are fairly representative of the quantities, though,

* Provisional Figures only for 1897, as abstracted from the 'B' Bills of Entry, furnished by the Customs.

of course, there have been variations in the prices of the respective products:

	Eggs.		Poultry and Game.	
	£	£	£	£
1864	835,028	—	—	—
1870	1,105,653	—	—	—
1875	2,559,860	—	—	—
1880	2,335,451	—	—	—
1885	2,931,237	—	—	—
1890	3,428,802	—	497,858	—
1895	4,003,440	—	605,166	—
1897	4,356,799	—	730,725	—

These figures show that the imports of eggs alone have advanced in thirty-three years upwards of 400 per cent., and that there is a steady increase constantly going on, drawing from the country money which might be easily earned at home. The reason why the imports of poultry and game have not been included in the above table until 1890, is that previous to 1886 rabbits were included with them. But, it may be mentioned, the total imports of poultry, game, and rabbits in 1864 only amounted to £131,179. Of the poultry and game imports in 1897, it is probable that not more than one-tenth is the game value.

IRISH EGGS AND POULTRY.

Considering that Great Britain is the consuming section of the United Kingdom, it is necessary that we should consider the supplies from Ireland. During the inquiry which the writer conducted on behalf of the *Weekly Freeman*, of Dublin, in 1888, it was estimated that the exports of eggs and poultry from that country to Britain amounted in value to £1,613,000. Since that time the number of fowls kept in Ireland has increased enormously, and there are now about four million more fowls kept than was the case ten years ago, an increase of more than 30 per cent. This fact, and other evidence which has been obtained, enables us to state that the egg and poultry exports from Ireland now exceed £2,000,000 per annum, greater than the supplies received from any other individual country. Adding together the foreign and the Irish, the total imports for 1897 would amount to £7,087,524. Lest it should be thought that the imports have only increased *pro rata* with the growth of the population, it is desirable to state that the consumption of foreign eggs per head of the population of the United Kingdom in 1861-65 was nine, whereas in 1896 it was forty, or, if we deduct the people of Ireland, the total of the last-named year would be fifty per head.

TOTAL CONSUMPTION OF EGGS AND POULTRY.

Unfortunately, there is no definite data to go upon, or we might show the total consumption of poultry-produce in the United Kingdom. But from careful observation it does not appear unreasonable to put the home product down at £5,000,000 per annum,

exclusive of the Irish figures already given. There are those who regard this as much too low, but it is better to understate than overestimate. Assuming, therefore, that this is the amount, the total value of poultry and eggs consumed in the United Kingdom is equal to £12,000,000 per annum. In 1895, taking the figures of Sir J. B. Lawes, Bart., as a basis, the poultry-production of the United Kingdom was greater than the wheat crop by nearly £1,000,000. The same state of things is found in the United States of America, for, according to the estimate issued by the central agricultural authorities at Washington, the production of eggs and poultry was valued at 290,000,000 dollars, or 25,000,000 dollars more than the wheat crop of the States. It is admitted that in Kansas, Nebraska, and other Western States, poultry-farming saved agriculture when everything else failed.

It is interesting in this connection to compare the imports of eggs with other food-supplies, which could be produced equally well in this country, and the following figures show the returns for 1897:

	£
Cheese	5,886,546
Eggs and poultry	5,087,524
Fresh mutton	4,827,868
Cured or salted fish	2,589,165
Margarine	2,485,870
Raw fruit (growable in United Kingdom)	2,241,025
Lard	1,993,143
Potatoes and onions	1,961,020

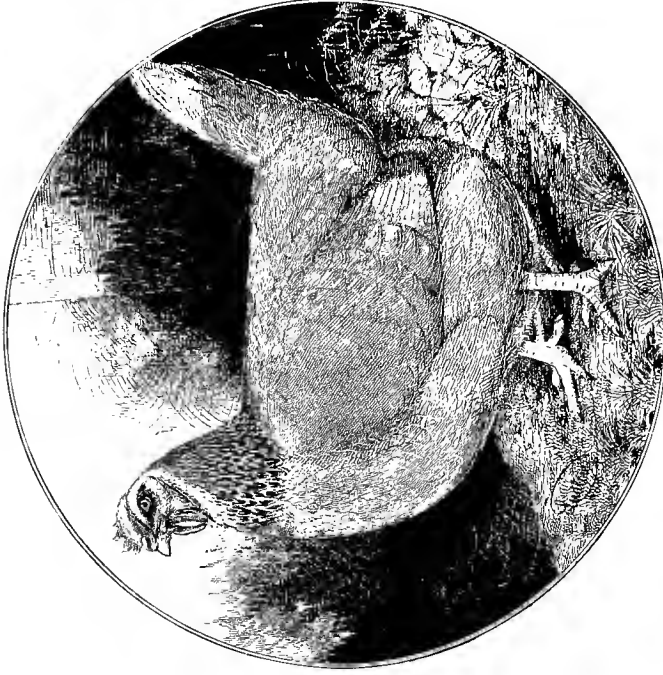
POULTRY AN ADDED CROP.

In face of the statistics given above, it is impossible for anyone to pretend that the question of poultry-keeping is beneath the notice of farmers and cottagers, and it is pleasing to see that many are awakening to this fact. We do not assume that £5,000,000 is going to save the agriculturist from ruin, but it would materially help him in his difficulties, and there are cases which could be cited where the fowls have been the means of keeping the home during the stress of this last few years, whilst in others they have given opportunity for a new industry. As Dr. Fream has so well shown in the Journal of the Royal Agricultural Society of England (Vol. V., Third Series, Part II., 1894), "the rearing and fattening of poultry—including fowls, ducks, geese, and turkeys—as well as the output of eggs, might be very largely extended at home without displacing any other kind of produce."

In fact, a further crop can be obtained without interfering with any present operations, and in many cases helping them. But the benefit is not only to be measured by the amount of money earned, for the work done by fowls in the way of manuring and cleaning the ground is incalculable. Farmers have a golden opportunity in this direction, but it is equally important that cottagers and labourers should advance in a like manner. In some districts, unfortunately, restrictions are put upon their keeping poultry, which are greatly to be deprecated. This, however, is chiefly in the corn-growing counties, and arises from a fear that food will be stolen for the fowls. Elsewhere there need be no danger of this kind, and the money which cottagers and labourers can make by keeping a few fowls would do much to make their lot in life brighter and better. One man informed us that he had made enough from his poultry to pay his rent, which meant 20 per cent. added to his income.

COUNTY STATISTICS.

It will be remembered that in 1885 and 1886 an attempt was made by the Board of Agriculture to obtain statistics of poultry in Great Britain, but afterwards abandoned. These statistics are, however, secured in Ireland and France, as well as America, and it may be hoped that the feature will be again introduced. Without it we are largely in the dark as to home production. What can be done elsewhere is surely capable of accomplishment in Britain, and we cannot too strongly urge its reintroduction. The returns of the years named showed that there was scarcely one fowl for every two acres of cultivated land, whereas in Ireland there were twice that average. Since then the number of fowls kept in the sister island has greatly increased, for the latest returns show that there are now 1,178 fowls for every thousand acres of cultivated land. If Britain were brought up to the average of Ireland—and to do so would not mean more than a reasonable development, for we have to take into account the uncultivated areas where poultry could be bred—it would probably add £5,000,000 annually to the poultry-production of the country. So far as we can at present see, there is no danger for a long time of overtaking the demand for eggs and poultry, which is increasing year by year. But to obtain the best results it will be necessary to organize the trade, upon which point we shall have more to say in due course.



SILVER GREY DORKINGS.

Bred by, and the property of, Mr. Herbert Reeves, Emsworth, Hants.

Cockerel, winner First and Cup, Birmingham ; Second, Crystal Palace Shows, 1897 ; and one of team of six birds which won Jubilee Challenge Cup. Pullet, winner First, Royal Counties, Tunbridge Wells, Birkenhead and Boscombe Shows, 1897.

CHAPTER II.

FARM POULTRY IN BRITAIN, FRANCE AND BELGIUM.

POULTRY A NEGLECTED QUANTITY—NOTABLE EXCEPTIONS IN BRITAIN—POULTRY AND POULTRY PRODUCTS IN FRANCE—POULTRY ON FRENCH VINEYARDS—QUALITY OF FLESH—POULTRY IN BORDEAUX MARKET—NORTH AND NORTH-WESTERN FRANCE—OTHER DEPARTMENTS—BELGIUM.



HERETO, with a few notable exceptions, and in some special districts, the farm poultry of this country has been a very neglected quantity. As a rule, fowls were relegated to the farmer's wife and daughters, to whom every bushel of grain was either begrudged, or regarded in the light of a contribution to the women folk, enabling them to obtain sundry articles of ornamentation without troubling their husbands for the money. When farms were small, and the wife jogged weekly to market with her "good man," she carrying there her store of butter and eggs, this sort of thing did not matter, for all the operations were upon a comparatively moderate scale, and poultry probably held a relative proportion to other products. But now a different condition exists, and, in face of the vast volume of foreign imports, as well as their own needs, it is necessary to rise to a higher conception of the question.

NOTABLE EXCEPTIONS.

The notable exceptions have been in Surrey and Sussex, East Anglia, Lincolnshire, Devon and Cornwall, Buckinghamshire and Bedfordshire, and Cumberland, and to a greater extent in Ireland, where poultry-keeping is largely followed. In East Anglia turkeys and geese are produced to a large extent every year, and it may safely be asserted that no fowls of these two races in the whole world can be said to equal them. Even the mammoth bronze turkeys of America do not rival them in quality; and a prime-fed Norfolk turkey will command the top price everywhere. In Lincolnshire geese are reared to a considerable extent, though not nearly so much as might be, and the same can be said of Cumberland. But it is something to know that some farmers are alive to the profitable nature of this branch of poultry-keeping. In Surrey, Sussex and West Kent large numbers of poultry are reared, but chiefly by cottagers, who sell them to fatteners; and

even here the demand is beyond the supply, for vast numbers of Irish lean chickens are brought there to be fattened, and afterwards are sold on the London market as Surrey fowls. But upon this subject we shall speak more fully when discussing the question of fattening and marketing; and when we take up duck-keeping, we shall deal at length with the system adopted in Buckinghamshire, whence are derived the famous Aylesbury ducklings, for which are obtained such high prices in the spring season, and which industry is of great importance to dwellers in the Vale of Aylesbury and surrounding district. In Ireland vast quantities of eggs and fowls are produced, but there is much yet to be done, both as to development and improved systems of marketing. With these exceptions, poultry-keeping by farmers and cottagers cannot be said to receive anything like the attention it deserves, and there are few who give it a really serious thought as part of their regular operations, though many are now looking upon it with less prejudice than was the case a few years ago.

POULTRY IN FRANCE.

When we come to France, a different state of matters exists, and it has been so for a long period. Arthur Young tells repeatedly in his travels of seeing immense quantities of poultry there. The Ministry of Agriculture lends its powerful assistance and support to whatever will develop the industry, and annual shows held under its auspices embrace poultry, both living and dead, as an important and prominent feature. Some time ago a calculation was made as to the value of poultry and poultry products in France by the journal *Le Poussin*. From this we learn that there were 43,858,780 head of poultry, which, valued at 3 francs (2s. 6d.) each, gave a total of £5,482,872 10s. A fifth of this number is sold off every year for the table, value £1,114,210, leaving altogether about 2,400,000 capons, and a total of 32,982,024 head of poultry for breeding, which

annually produce 101,000,000 chickens. Out of this number about 79,000,000 are sold for 1s. 6d. each, amounting to £3,920,000; or taking into account the value of poultry sold for what may be termed fancy prices to breeders, *Le Poussin* made the total value to be £7,176,210. Calculating the average number of eggs laid by each hen per annum at one hundred, the total, exclusive of those which are used for setting, would be 3,187,702,800, and their value £8,925,568, so that altogether the value of poultry and eggs produced in France is rather over £16,000,000—probably treble, and certainly more than double, the annual product of the United Kingdom. France not only supplies her own needs, which are great, but is enabled to export large quantities, both of eggs and poultry.

POULTRY ON FRENCH VINEYARDS.

Personal observations in several parts of France have impressed one fact, namely, that poultry are made a portion of the regular work of all cultivation, even, where to our English ideas they would be least looked for, upon the vineyards which occupy so much of French land. The vine is subject to many enemies, and at one season of the year vineyards are infested by hordes of slugs and earth-worms, which, if not kept down, destroy the growth. It is customary in the month of June to employ labour to pick off those slugs, but the efforts of fowls are also largely depended upon for the same result, and at other seasons they are found to be most valuable helpers to successful working of the vineyards. Fowls are to be seen on every side and in every field. For them houses are provided, scattered here and there near to or among the vines. Some are permanent, but the majority are movable, and narrow enough to stand between the rows, generally provided with handles at each end to facilitate carrying. At all seasons the poultry are permitted to wander at will, save when the fruit is just ripening, and we have seen a flock of thirty or forty birds eagerly following the plough, rejoicing in all the good things turned up by it. They are famed for the quality of their flesh and the richness of their eggs.

The fowls found on the Medoc vineyards are known as the Landes fowls. These owe their name to, and doubtless emanate from, the Landes district, lying between Bordeaux and the Pyrenees. They are very irregular in colour. Many are black, but some are speckled, like the Campines, the Ermines, and the pencilled Hamburgs; others are very bad imitations of, or offshoots from, brown Leghorns; whilst there are others not unlike the silver-gray Dorking, especially in the hens. Though this variation in colour is to be found, the type of all the fowls is pretty much the same, the shape being not unlike that of the Leghorn race, though perhaps a little shorter in the leg than we are now accustomed to see in the Leghorn, more resembling what that fowl was when first introduced into Britain. The size of the fowl is very good, better than

it appears at first sight, for the food they obtain makes them very plump and heavy. The great majority have single combs, and we should think, from their external appearance, are good layers. Like the great proportion of French fowls, most of the fowls in these vineyards have black legs, but there are a goodly number with yellow legs, and a very few have white. We thought that we could recognise several varieties besides the Landes amongst the fowls in the vineyards of the Medoc, and it has been suggested that as there are so many châteaux there, the wealthy owners of which have gone in for purer and rarer breeds, it has led to a mixing up of the stocks. There appears every reason to accept this as the explanation. One thing we have specially noted, namely, that in all the district we never saw a feather-legged bird. All were clean-legged, and of an active habit of body. The fowls are well cared for, they are well treated, but not pampered in any way, and the houses in which they are kept are of a very ordinary type, though in some cases more elaborate structures have been built.

INFLUENCE OF SOIL.

The best soil for vine-growing consists chiefly of gravel, and in many places could not be used for anything else. There is a great variety in the quality of the soil for this purpose—in fact, as much variety as in the wines they produce. One very remarkable thing we learnt is that the best fowls are reared on the estates where the best wine is made. Evidently the qualities which go to make these wines are just those needed to produce fine quality of flesh in fowls. What these qualities are is not stated, but there is the fact. Of course, the quality of the soil must have much to do with the flesh, for the richness of the Dorking country in England, and of the La Sarthe district in France, has been instrumental in making the fine fowls produced therein. For quality of meat we have not had any that were superior to these French fowls. They are not so large as many that we have seen, but yet are very fleshy, and with meat beautifully white. Perhaps the method of cooking has a considerable share in arriving at this desirable end, for the fowls are roasted before an open wood-fire, and we are convinced that to this is due something of the beautiful flavour of the fowls, but yet not all.

Further east in France are found the famous La Bresse poultry, which command the highest prices on the Paris markets. These birds come from the departments of Ain and Saône-et-Loire, to the south of Burgundy, where we find very similar conditions prevailing to those met with in the Medoc, and in Normandy magnificent birds are produced on the rich plains and valleys of that great province of France.

At Bordeaux is an arrangement which we have seen also in some other parts of France, namely, the sale of fowls in sections. At Paris, half-fowls can be pur-

chased, but at Bordeaux the system is carried much farther. Here, almost any portion can be purchased separately—breasts, legs, wings, or carcase. This method is applied to all kinds of fowl, and we saw chickens, turkeys, ducks, and geese so treated. The blood is also sold separately, and no portion of the fowl is wasted. Thus, the Bordelaise housekeeper, able, as most of the French are, to make a fine dish with little meat, can obtain a leg or a wing, or, on a special occasion, the breast, needing to buy no more, and those who like soup can buy the carcase.

FRENCH EGG DISTRICTS.

Whilst almost every part of France produces considerable quantities of eggs and poultry, the departments which chiefly supply our English markets are the northern, north-western, and western, or those bordered by the English Channel and the Bay of Biscay. Over the whole of this large area poultry-keeping is an important part of all rural operations. Every farmer and cottager maintains a considerable flock of poultry, and some depend chiefly upon them for their livelihood. But there are no large poultry farms to be found in these or any other districts of France. The system adopted is that collectors visit twice or thrice a week, and sometimes daily, each farm or cottage, taking the eggs obtained to dealers, who pack and forward to England. So perfect is this system on the northern seaboard, that it is possible for eggs to be offered for sale in London the fourth day after they are laid. Without such a system of collection French eggs would never hold the position they now occupy, for it prevents the eggs being marketed when they are stale. The methods of sorting and packing will be dealt with later on, as they are important factors in the success of the French egg trade.

NO LARGE POULTRY FARMS.

It may therefore be taken as a certain fact that universal production of a few each, and not large numbers kept by individual farmers, is the basis of French poultry-keeping, for, as we have already said, large poultry-farms do not exist, by which is meant farms devoted to poultry alone. Community of ideas and of interest have, however, led to the adoption of varieties of poultry which rank amongst the best of all for economic purposes. These vary with each district. In Normandy we find the La Flèche, the Le Mans, the Crèveœur, and the Courtes Pattes, all famous for their superb table qualities. Nearer to Paris we find Houdans or Faverolles, and further south a breed called the Barbezieu, bearing many resemblances to the Minorca, these being excellent layers, and yet not so dry in flesh as the laying breeds here generally are. In the Burgundy district are bred the famous La Bresse fowls which are finest of all French poultry, and command very high prices on the French markets; whilst in other departments are to be found varieties

not sufficiently prominent to be separately named, but combining qualities which make them especially adapted to the conditions where they are bred. We do not say that all French poultry-breeders pay the same attention to pedigree as do the British stock-raiser or the poultry-fancier, but the rule is certainly to maintain purity of blood, and to retain external characteristics as well as economic qualities.

POULTRY IN BELGIUM.

During the last few years there has been a great development of poultry-keeping in Belgium, both for eggs and table-poultry. This is seen especially in Flanders and Brabant, to which districts the author recently paid a visit. To the north of Malines vast quantities of Coucou de Malines are bred on the sandy soil and amongst the pine-woods there met with, and it is acknowledged that the great increase of fertility in the soil is largely due to the fowls kept thereon. When the chickens have attained a sufficient age, they are taken to a market at Londerzeel, where come the fatters from Merchtem, Opwyck, etc., who take them for feeding off in much the same manner as our Sussex men. The extent of this business is shown when we state that at Merchtem half a million fowls have been sold in the public market in twelve months.

In other districts eggs are produced to a very large extent. The two varieties chiefly kept for this purpose are the Campine and the Braekel. The former is a relative of our Pencilled Hamburgs, and is admitted to be one of the best layers known. At one time its eggs were very small, not much more than $1\frac{1}{2}$ ounces in weight. By careful selection they have been considerably increased, and now the average is over 2 ounces each.

A new industry has sprung up in Belgium within the last ten years. Some hundreds of thousands of pullets are imported annually from Italy, which are sold to the farmers at about 1s. 6d. each. They are of the Leghorn type, and prove to be excellent layers. As a rule, they are imported during the summer months, when from three to five months old. One importer whom we interviewed receives about two hundred thousand of these birds every year, and there are others engaged in the business. The buyers only keep them for one year, when they are fatted off and killed, a fresh lot then taking their place. There is no reason why some such system could not be adopted in this country, but it would be better if breeders in Ireland or the less cultivated districts of Britain provided the young stock, as they could do if they laid themselves out for breeding on an extensive scale. It may also be mentioned that great developments have also taken place in Denmark, almost entirely for egg-production, for which purpose the Leghorn, or Italian fowl, as it is called upon the Continent, was imported some years ago, and is now chiefly met with in that little kingdom.

CHAPTER III.

RECENT ATTEMPTS AT IMPROVEMENT.

EFFECTS OF GREATER COMFORT AND TRAVEL—BETTER PRICES CAN BE GOT—FARMERS COMPELLED TO LOOK IN NEW DIRECTIONS—ROYAL AGRICULTURAL SOCIETY—DIRECTIONS FOR IMPROVEMENT—INFLUENCE OF SHOWS—FATTENING INDUSTRY—DUCK-BREEDING—INCREASE OF POULTRY UPON FARMS—POULTRY AND FARM CROPS—RAILWAY RATES—SITUATION AND INFLUENCE—NATURE OF WORK.

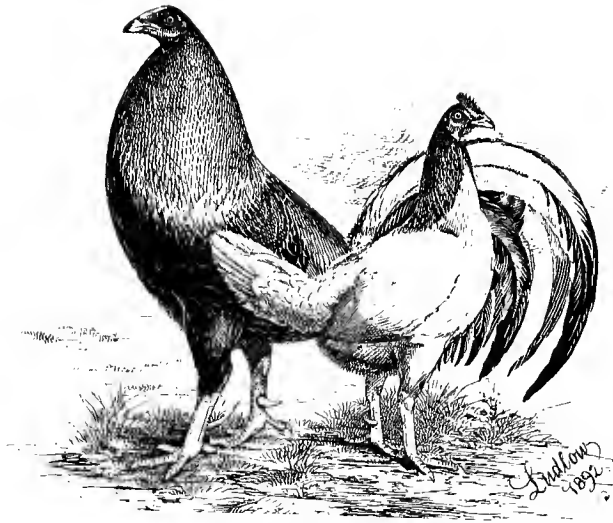


HERE can be no question but that in the last few years there has been a large increase in the consumption of poultry produce. The greater comfort in which many of our vast industrial army now live than was the case with their grandfathers, and the enormous increase in wealth of the middle class, has resulted in a demand for finer and more delicate articles of food. Further, travelling in other countries has broadened the ideas and cultivated the tastes of our people, for when they have experienced the delicacy of French cookery, and learnt the multifarious ways in which both fowls and eggs can be served, they seek to follow on similar lines. And there is every reason to assume that this line of progression will continue, and that poultry produce will more and more enter into the food-supply of the country. We have still some way to go ere we come up to the French standard, but the chase has been an active one for some years. Where there is most to be done is in the direction of better produce. So far as eggs are concerned, it is chiefly a question of quantity and methods of marketing, for France cannot send us any better eggs, and maybe not as good as are to be obtained in Great Britain or Ireland. Some day it may be that eggs will be sold for quality and by name of breed, for there is no reason why the quality should not be paid for as well as the quantity. In the case of poultry, however, there is yet much to be done. We need fear no one with regard to the quality of our turkeys, geese, and ducks, but in respect to fowls we are a long way behind our neighbours across the English Channel. Well-fed fowls can be obtained upon the London markets, chiefly from Surrey and Sussex, but even the best of these do not compare favourably in certain respects, especially as to finish, with what are regularly to be seen in Paris and other French markets, where much higher prices can be secured for the best specimens than at present are obtainable in England.

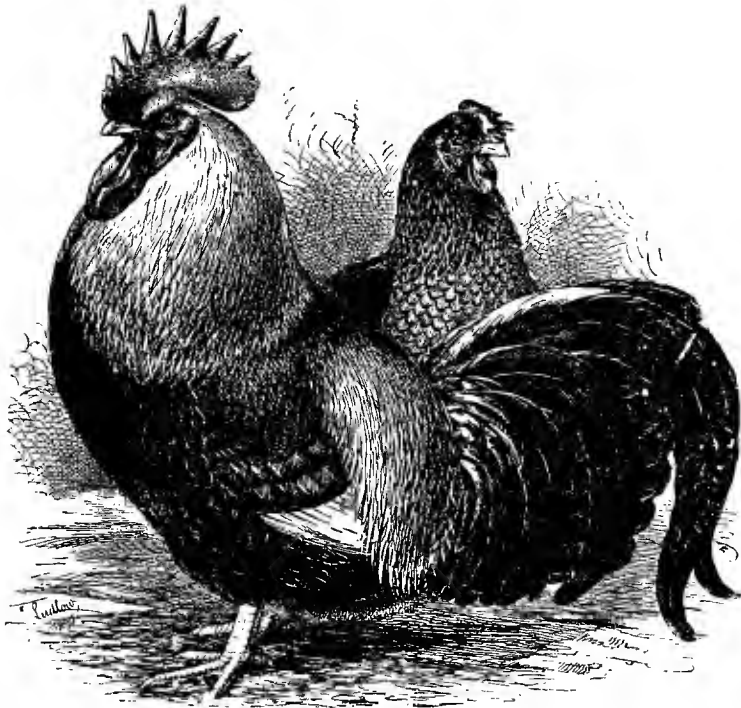
Still, when we remember the rates asked for spring ducklings, for Christmas geese and turkeys, it is very evident that there are plenty of people ready to pay top prices for first-class fowls if they are to be had. This has been the experience in all other branches of food, and would undoubtedly be so with poultry.

FARMS AND POULTRY.

The force of recent events in connection with agriculture, and the necessity for paying more attention to other branches of this great industry than was the case a few years ago, is doing much to compel farmers to look to fresh developments. Many, who would have spurned the idea of poultry-breeding as an important part of their regular operations, are now looking to it with a friendlier eye. Careful observations throughout the country have led us to the opinion that more fowls are kept than ever was the case before. Much of this is due to the fact that in 1885 the Royal Agricultural Society determined to add a poultry section to its annual shows, and since that time it has been a most interesting feature of the great society's annual exhibition. This is now upon an excellent basis, providing classes for all the most useful breeds as well as various crosses, and by means of dead poultry classes giving a practical object-lesson which cannot fail to be of great benefit to those who see the specimens displayed. At the London Smithfield, Birmingham, and Dairy Shows table-poultry classes have been given of late years, and more has been learnt in connection with these displays as to the relative value of poultry upon the table than would have been possible in any other way. We can bear emphatic testimony to the fact that since the Royal Agricultural Society lent the support of its influence to the encouragement of poultry culture, prejudice has been easier to combat, and farmers generally have looked with more favour upon this as a branch of their operations. And in many parts of the country examples



OLD ENGLISH GAME.



DARK DORKINGS.

can be met with of those who have gone in for it with decided success. But there is much yet undone. The influence of a few successes will go far to break down prejudice remaining, and when it is seen that farmers can add to their success by taking up poultry-keeping with energy and skill, the more conservative of their neighbours will ere long be compelled to recognise its importance. Dissemination of the best information as to breeds and methods of management, and better ways of bringing producers and consumers into closer touch, materially help to this end. We are pleased also to acknowledge greater readiness on the part of chambers of agriculture and of farmers' clubs to allow this subject to be discussed, and we have welcomed the opportunity afforded us from time to time of attending such gatherings and delivering addresses thereat. In a few instances dairy and agricultural schools have established a regular series of lectures on poultry-keeping, and much more might be done in this direction with manifest advantage. The training of young agricultural students will have a vast influence in the future, and we hope that ere long every such school will make poultry-keeping a part of its regular course. There is yet another way in which influence can be brought to bear, namely, by landowners and men of leading position in the country. Thus in various ways has the matter been brought forward, the all-powerful press from time to time lending the weight of its influence. Consequently, it is not at all surprising that poultry-keeping occupies an altogether different place from that held by it a few years ago. And as the various County Councils are now engaged in teaching poultry-keeping for profit, it is not unreasonable to expect that we shall see a very marked change in a few years. It is all-important, therefore, that this subject be kept to the fore, and that farmers and cottagers should recognise the possibility of making it a profitable source of income. To do this right methods must be adopted, and the present work has been written with that object in view.

DIRECTIONS FOR IMPROVEMENT.

The directions in which improvement must take place are: (1) better breeds; (2) more correct methods of management; and (3) improved systems of marketing, each of which are essential to success, and the neglect of which must greatly minimize any profit derived from the pursuit. The question of breeds is of primary importance, for there is a great difference in the respective breeds of poultry as to their economic qualities, and these must be studied in order that selection may be made of those most suitable to the place and the object in view. Fortunately, there is an abundant variety from which choice can be made, so that every condition and need can be provided for. What we recommend is that a breed which at once supplies the requirements of any district, and is found

to adapt itself to its special condition, should be adopted. This has been done in Devon and Cornwall, where poultry-keeping is more universally carried on than in any other district of Britain, and also to an even greater extent in France and Denmark. In the first-named counties are to be found the Minorca and Indian Game, the former one of our best laying varieties, and the latter excelling greatly in its table properties. It is in the way here recommended that our country has become famous for its cattle and horses and other kinds of stock. Divided and erratic methods will never succeed, and we believe that when fowls of a common type are found universally in any district—provided, of course, that they be of the best kind for that district—the results will be much more satisfactory than when selection is made upon a higgledy-piggledy fashion, which is only too common. We have had the pleasure of meeting several agriculturists who breed poultry extensively, and the plan adopted by them has been to test different varieties upon a small scale, and then adopt the breed which proved to be most suited to their place and conditions. It is often found desirable to keep two varieties, in order to provide for both a winter and summer supply of eggs, and still more so when chickens are to be marketed; and as one of the matters which every poultry-keeper must bear in mind is the maintenance of a regular supply of eggs, it is not surprising to find that the winter laying breeds are becoming more and more popular.

At one period, mongrels, or "barndoor" fowls as they were miscalled, were almost universal all over the country; but it is being more and more realized that all improvement must be by means of pure races, as has been the case with larger stock. Farmers now are understanding the importance of always introducing pure-bred male birds among their flocks, and never using cross-breeds for this purpose. But a mistake is made by year after year changing the breed of male bird. Sometimes one and sometimes another is used, and frequently they are antagonistic in nature, so that the improvement is not nearly so rapid or so steady as would otherwise be the case. It is much better to learn which breed or cross is most suitable to the soil, the general conditions, and the market demands, and adhere to it, of course securing fresh blood for mating each year. Indiscriminate crossing is a mistake.

THE FATTENING INDUSTRY.

Until a comparatively recent period very little was known as to the great fattening industry of Sussex, Surrey, and West Kent, which practically has had the monopoly of producing the finest qualities of poultry. Over a very wide area rearing of chickens for selling to the higglers is carried out, and so great is the demand for these birds that something like 300,000 are brought over from Ireland every year to supply the places which cannot be supplied locally. Moreover, fatteners

complain that they have to pay such high prices for lean birds that they do not make the profit they should secure. One farmer in West Kent sold chickens to the value of £87 to the higglers in twelve months, the produce of fifty hens, which works out at nearly 35s. per hen. All this shows a very healthy state of things. As a further indication of the extent of the industry, in twelve months the London, Brighton, and South Coast Railway Company conveyed from two stations in Sussex, Heathfield and Uckfield, 1,850 tons of dead poultry, and consignments are made from many other stations. That breeders and fatters alike find the business profitable cannot be doubted, and the same principles adopted in other districts would give like results.

Consequent upon the movement in favour of developing table poultry elsewhere than in the counties named, for there is no reason why it should be concentrated on the Weald Clay, it is satisfactory to record that fattening establishments have been commenced in many other parts of the country. From personal knowledge, these are now to be met with in Middlesex, Essex, Hampshire, Cornwall, Gloucestershire, Shropshire, Norfolk, Cambridgeshire, Lincolnshire, Yorkshire, and Lancashire, in South Wales, and the south-west of Scotland. The chief difficulty experienced by the owners is in obtaining a supply of suitable birds, but in process of time it will be overcome, so soon as breeders learn the advantage of meeting the requirements of fatters. There is no reason why fattening should not be carried out in one place as in another. Many districts, especially where lighter soils are met with, would give equally good results in securing early birds. The heavy lands would not be quite so good for this purpose, but there the system prevailing in Belgium could be adopted, namely, of rearing in one district and fattening in another, markets at suitable centres bringing the two classes into contact. In Ireland, than which there is no more suitable country for poultry-rearing, an effort is now being put forth in this direction, and it may become as famous for its fat poultry as for its butter. It certainly appears better to send the birds fat and dead, rather than sell lean and allow them to be fattened in Sussex.

DUCK-BREEDING.

Another direction in which there has been considerable development since this work was first issued is that of duck-breeding. At one time it was concentrated in the industrial form in the Vale of Aylesbury, in Buckinghamshire; but it has greatly extended, and now vast quantities are produced in Bedfordshire, around Leighton Buzzard. There is no need, however, why those two counties, good though they are for the purpose, should have a monopoly, and it is pleasing to record that equal success has been achieved in other parts of the country. In the Fylde district of North

Lancashire the number of ducks kept is enormously in advance of ten years ago. This is largely due to the example of Mr. Peter Walsh, of Bourne Hall, Poulton-le-Fylde, who in 1897 hatched and reared nearly 19,000 ducklings. Mr. Walsh is a farmer, the inventor of an incubator, with which he hatches the bulk of his birds, and what he has done there can be accomplished elsewhere. That he has found it profitable is unquestionable, and as we tell in Chapter XVI. the story of his enterprise, it will astonish many of those who have thought that 'poultry don't pay.' Another farmer in Norfolk, near Diss, raised in 1897 about 10,000, and many other cases could be cited where excellent results have been secured, though perhaps not on so large a scale. In Cornwall a commencement has been made in the same line, and if the residents of that county take it up with the same determination as they have shown in other branches, they will be able to place very early ducklings on the London market.

INCREASE OF POULTRY UPON FARMS.

It is only necessary to exercise a small amount of observation to see that in connection with ordinary farming there has been a very great increase in the number of fowls kept throughout the country. Even from the windows of railway carriages this is apparent to the traveller, but when we take the rural districts in detail, it is very gratifying to see to what an extent development has taken place. As a rule, the increased number of fowls is accommodated in the portable houses or 'huts,' such as are described in Chapter VI., and there can be no better method of linking poultry-culture with ordinary farm operations. We believe that the increase of poultry now kept in some districts is much greater than is commonly supposed, but hundreds of thousands more could be maintained without any difficulty whatever, in so far as opportunity is concerned.

POULTRY AND FARM CROPS.

This is even true in arable counties. Abroad it is not found that fowls do any serious injury to growing crops, such as corn, roots, etc., but with us the opposite notion is very strongly held. Even the small amount of damage is far more than compensated by the benefit received, both in the shape of manure and keeping down various pests. A striking proof of this was published in the *Agricultural Gazette* (April 26, 1897), which is in itself an indication of dying prejudice against poultry. Mr. J. R. Woodhouse wrote as follows: 'Last spring I planted a field of barley, and it so happened that I did not go near it again for some nine or ten days. Now, when I did visit the field, I found that my fowls had been there, and had played such havoc, as I thought, with a portion of the field, that I concluded it would have to be replanted. I, however, was not in a position to do so at once, and before I could make it convenient the barley was up

I then found that this portion of the field was certainly not so thick as the rest. Still, I thought if it should rid, or stool, as it is sometimes expressed, it would do, and therefore I did not interfere with it. I did do so, and I harvested a very fair crop. About a fortnight after it came up there appeared unmistakable signs of wireworm in various parts of the field, but no indication whatever of there being any in that portion of the field where the fowls had been at work. I therefore did nothing to this, but applied a dressing of nitrate of soda to the rest of the field, that being the best remedy I ever could discover for this pest. It had the desired effect; but, taking it as a whole, the portion of the field thus dressed was no better than that where the fowls had been, which was not so treated. I was mentioning the circumstance to an acquaintance of mine, and he said his uncle some thirty years ago went over Tiptree Hall, and, afterwards meeting the late Mr. Machi, had some conversation with him, and expressed surprise at his allowing the poultry to run over the fresh-planted fields. His reply was "that if the grain was put in sufficiently deep he considered they did more good than harm, as they picked up a number of insects that were injurious to the crop." This theory, which I have no doubt would have been laughed at by many farmers, and which at one time I should have treated with ridicule myself, this year proved correct in my case.

RAILWAY RATES.

Complaints at one time were very rife as to the hindrances placed in the way of producers by high railway rates, especially for small parcels. But a marked change has been made by nearly all our railway companies, and now there is every facility for marketing produce in the best and most inexpensive manner. The pioneer in this direction was the Great Eastern Railway Company, but others have followed suit. What we want, however, is for this system to be universal, equally applicable to all stations, and not limited to any one line where two companies are concerned. We know that there is a strong disposition on the part of our railway authorities to respond where there is the chance of regular traffic. But intermittent and uncertain production can scarcely be expected to obtain the same rates as where a constant supply is found. When twenty pounds are conveyed for fourpence or sixpence, it is scarcely surprising that a considerable impetus has been given to this trade. Correlative with

the reduction of railway rates has been a lowering of charges in the Parcels Post, which, after the first, is charged one penny per pound. This cannot compete with the railways for heavier articles and for short distances, and there is necessarily a limit to the weight which can be taken. But for lighter articles conveyed over 100 miles, or from places where railways do not touch, it is a valuable concession.

SITUATION TO INFLUENCE NATURE OF WORK.

We have already mentioned that the nature of the soil must be taken into consideration. It is impossible in a work like this to provide for every set of circumstances. Each poultry-keeper should bear in mind the fact, of which he is familiar in connection with cattle and sheep, that frequently a breed will not thrive at one place, whilst it will do excellently at another. Only by experiment can this be proved. Sometimes failure results simply through inattention to the point. We know of a case in East Anglia of a farmer who made an attempt with Dorkings on unsuitable land, and, even when it was apparent that the breed named was unsuitable, he persisted, but could not succeed. The chickens were long in growing, and did not thrive in the way necessary to market them in the best manner. Those who live on heavy lands will be well advised if they make eggs their chief object, and for this purpose will find that the yellow-fleshed varieties are the most suitable; and the same is true in lower-lying districts, which are always somewhat damp. Sandy or gravelly soil is adapted for almost all kinds of poultry, but where very dry there is a tendency to bleach the leg and flesh, especially if yellow, and here white or dark fleshed fowls would be preferable. Pure sand is not good for poultry-rearing, containing very little natural food, and the growth upon it is in-nutritious; hence fowls kept thereon will be poor both in flesh and eggs. On lime and chalk white-fleshed fowls only should be kept, as they are the natural result of, and in sympathy with, that kind of soil. As a rule, where lime is found the ground is dry and porous, it is warm, being retentive of heat, as also is gravel, and is thus most suited to the production of table poultry. Ducks can be kept in the valley bottoms, which are usually dampish. Geese are better raised on the higher lands where sheep usually can be bred. But turkeys require dry soil, such as contains sand, gravel, or lime.

CHAPTER IV.

THE BREEDS OF POULTRY.

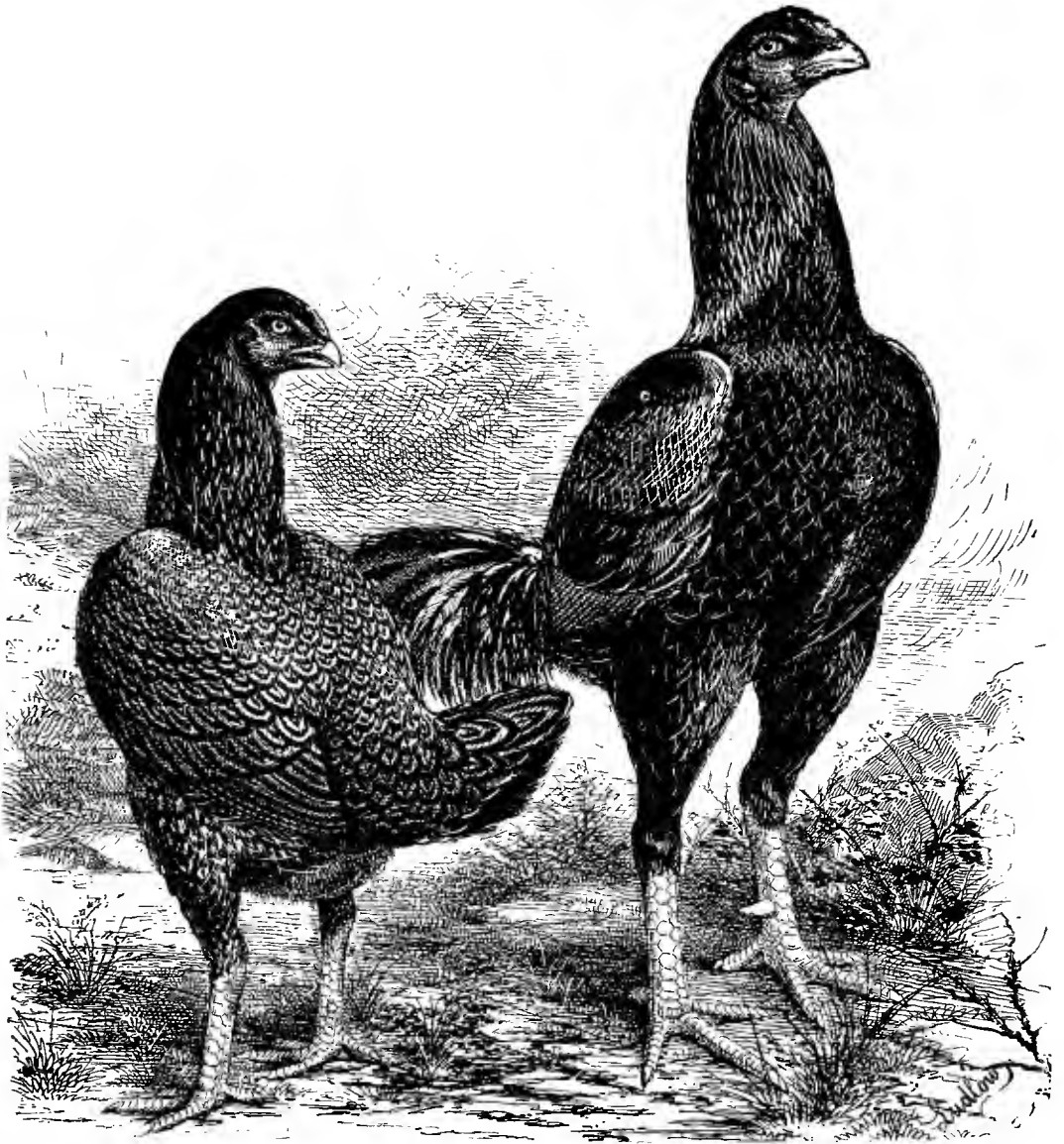
PURE-BRED STOCK v. MONGRELS—VALUE OF EXTERNAL CHARACTERISTICS—EGG PRODUCTION—LAYING OF VARIOUS BREEDS—WEIGHT OF EGGS—TABLE PROPERTIES—QUALITIES OF BREEDS—COLOUR OF FLESH AND SKIN—WEIGHT OF MEAT, BONE, ETC.—CONSUMPTION OF FOOD—DESCRIPTION OF BREEDS—CLASSIFICATION OF BREEDS.



WHILST the poultry fancier must necessarily regard as all-important external characteristics, devoting his attention to the perfection of feather or other arbitrary points, the poultry-keeper should make economic qualities the object of his consideration, only studying external points in so far as they can be the embodiment of those qualities for which he is seeking. It would be a futile waste of time and space to discuss whether pure-bred stock is preferable to mongrels. The entire position of the United Kingdom as a great breeding centre has been built up on its pure races of horses, cattle, and other varieties of stock. If mongrelism were to be preferred, then all the efforts of breeders for the last hundred years have been in vain, and when we abandon the system the better will it be for all concerned. But whilst it may be conceded that sometimes pedigree and high-class breeding is carried to an extreme, and that competition for prizes does not tend to encourage reproductiveness, the benefits of our system are too apparent to need repetition. What applies in the larger branches of stock equally does so with poultry, and we believe that it is imperative for pure races to be maintained. Without them we should waste our energies in breeding, whereas now we can conserve the qualities for which we are seeking, and by judicious breeding obtain results which would have been impossible under other conditions. External points should be regarded as determining the internal qualities of any breed only so far as they show that it has been bred to a given type. The colour of plumage is no indication as to whether a fowl is a good or bad layer, nor are the fifth toes on the Dorking and the Houdan related to their edible qualities. But correct colour of feathering tells of continuity in breeding, and although there are as good table fowls as the Dorking and better than the Houdan, who carry no super-numerary toe, we know that when these fifth toes are

met with there is a fowl in which one or other of these breeds must have a very large share. Whilst, as we shall afterwards indicate, first crosses may be recommended for reasons which will then be given, we are very strongly of opinion that purity of stock should be maintained in all its rigidity, at the same time avoiding an extreme to which many fanciers are prone to go, namely, destroying economic qualities in their haste to secure perfect show points. The most skilful breeder would be he who could retain the one and engraft on to it the other. There is, however, one fact which deserves notice, namely, that qualities overborne by external characteristics are not lost, but merely suspended. Lewis Wright emphasizes that "the knowledge, enthusiasm, and patient perseverance of the fancier are necessary to improve and maintain any breed in perfection for even the utilitarian. But," he continues, "it may still be asked, if in the fanciers' hands these breeds have lost some of even the original economic value they had, how then? The answer to this is very simple, and consists in the fact that however much these qualities have diminished, they usually reappear in all their original perfection in the first cross; and as farmers or market breeders usually employ such first crosses, which are better for nearly all purposes, every practical end is secured. Thus, supposing a strain of Brahmas to have deteriorated in laying, and a strain of Houdans to have suffered in the same way, through long breeding to merely fancy standards, and omitting to select the best layers, the chickens produced by crossing these two families will, in almost every case, reproduce the faculty in all its original perfection."* We therefore strongly urge that the basis of all breeding for economic purposes be pure stock, and that whatever crossing be made shall be within the power of the breeder.

* "The Illustrated Book of Poultry," p. 115. London, 1885.



INDIAN GAME.

EGG PRODUCTION.

In determining what variety is most likely to suit his needs and conditions, the amplitude of choice is very apt to perplex, and may easily lead to confusion through wrong selection. Fortunately, there is a large amount of experience as a guide, and by means of this a right selection can be made. Some years ago Mons. E. Lemoine, of Crosne, a noted French poultry-breeder, whose establishment we have visited, published a most elaborate and valuable series of statistics, showing the qualities and characteristics of fowls. These we translated at the time, and though, as Mons. Lemoine pointed out, they must not be taken as exact, so far as other places are concerned, because every place varies in its conditions, but as the result of three years' careful observations and conscientious testings, these figures are important, and the only statistics afforded of this nature up to the present time. There are, unfortunately, several prominent breeds not included in the list, and whilst we have not similar tables for these, we can indicate relatively their position by other experiments made.

Mons. Lemoine's tables show: (1) Number of eggs per annum; (2) average weight of egg; (3) weight of food consumed per day; (4) quality of flesh; (5) weight of meat on fowl at six months old; (6) ditto on bone of fowl at six months old; (7) characteristics; (8) colour of chicken when hatched; (9) weight of chicken when hatched; and (10) increase of weight for first twenty days. We have not the space requisite for the giving of all the tables prepared by this gentleman, interesting though they are, but will refer to them from time to time.

LAYING OF VARIOUS BREEDS.

Respecting the egg-laying powers of the respective breeds, the following are given by Mons. Lemoine:

Spangled Hamburgs	...	239	per annum.
Pencilled Hamburgs	...	225	"
Brown Leghorns	...	190	"
Cuckoo Leghorns	...	190	"
Black La Bresse	...	160	"
Gray La Bresse	...	150	"
Barbezieux	...	150	"
Courtes Pattes	...	150	"
White Leghorns	...	140	"
La Flèche	...	140	"
Silver-gray Dorkings	...	130	"
Houdans	...	125	"
Crèveœur	...	122	"
Langshans	...	115	"
Buff Cochins	...	115	"
Du Mans	...	111	"
Brown-red Game	...	100	"

These figures must not be taken as absolute for all conditions and circumstances, and in other places would doubtless be considerably modified. For instance, we

have always found the white Leghorn equal as a layer to any other of that family, and we think Mons. Lemoine places the Cuckoo Leghorn too high. It has also been pointed out that the Langshan is much superior as a layer to the Cochin in nearly every place, and that few find the Cochin lay 115 eggs per annum. Such facts do not weaken the effect of Mons. Lemoine's researches, but confirm them as being the result of a careful test. They further go to prove that no one breed can be relied upon to suit every condition. Some varieties there are which adapt themselves to the greater variety of circumstances, but a breed has yet to be discovered which will do equally well, no matter what the condition of food, of atmosphere, or of soil may be. The omissions from this list are important, and we wish that such varieties as are named below had been included in Mons. Lemoine's figures. Personal inquiries have led us to the belief that the numbers we now give will represent the laying powers of breeds not named above, *under favourable conditions*. We say this because good housing and feeding will add considerably to the number of eggs laid, and still more to the weight of each egg.

Andalusians	...	...	150	per annum.
Black Minorcas	...	...	180	"
Plymouth Rocks	...	...	120	"
Scotch Greys	...	...	140	"
Wyandottes	...	...	140	"

Water-fowl are not included in Mons. Lemoine's tables, and we have been unable to secure sufficiently reliable data to go upon as to the laying powers of ducks and geese.

WEIGHT OF EGGS.

It is very evident from Mons. Lemoine's statistics that his birds were excellently fed, for the weights of eggs recorded are much greater than would ordinarily be the case. In order to make a comparison, we have obtained weights of eggs from a large number of breeders, which we now give parallel with those of this French authority. In some cases we are unable to make the comparisons because of omissions on one side or the other:

	<i>English,</i>			<i>French,</i>
	<i>per dozen eggs.</i>			<i>per egg.</i>
	oz.	...	...	<i>oz. gr.*</i>
Aylesbury Ducks	34	...	...	—
Barbezieux	—	...	...	2 208
Black La Bresse	—	...	...	2 362
Black Hamburgs	19½	...	...	—
Brown-red Game	24	...	...	2 99
Brown Leghorns	22	...	...	2 99
Buff Cochins	24	...	...	2 20
Crèveœur	—	...	...	2 331
Dark Brahmas	28½	...	...	—
Dark Dorkings	27½	...	...	—

* There are 437·5 grains to the ounce.

	<i>English,</i> <i>per dozen eggs.</i>	<i>French,</i> <i>per egg.*</i>
	<i>oz.</i>	<i>oz. gr.*</i>
Du Mans... ..	—	2 113
Emden Geese ...	87	—
Game Bantams ...	13½	—
Gray La Bresse ...	—	1 395
Houdans	26	2 83
La Flèche	—	2 208
Langshans	27	2 69
Malays	21	—
Minorcas	28½	—
Partridge Cochins	25½	—
Pekin Ducks	39	—
Plymouth Rocks	27½	—
Rouen Ducks	39	—
Scotch Greys	29	—
Silver-gray Dorkings	27½	1 411
Spangled Hamburgs	—	1 303
Toulouse Geese ...	80½	—
White-crested Polish	23½	2 7
White Dorkings ...	26½	—
White Leghorns... ..	27	2 99
Wyandottes	25	—

We do not pretend that as a rule poultry kept on ordinary farms, and fed in the usual manner, will reach such high averages as are here given; nor do we think it desirable that they should do so. At present eggs are sold by number, not weight, though a box of small ones will not realize what a box of average size will fetch. This is a rough-and-ready fashion which makes it desirable to produce eggs of an average size, as near 2 ounces each as possible. Some day eggs may be sold by the pound, when the benefits of extra good feeding will be secured, which is not the case at present, and it is useless giving away to the consumer what he does not pay for. Only one observation more is here needed with regard to the kind of eggs marketed, and that is, in many places a better price can be obtained for tinted than for white shelled eggs, in spite of the fact that the former are smaller in size than the great majority of the latter. The prejudice in favour of tinted-shelled eggs is largely, but not altogether, a mere fancy, for we believe they are the richer of the two. Still, it is mainly a matter of taste, and was explained to us by the manager of a large London dairy company as being due to the fact that in West-End houses eggs are merely an incident on the breakfast-table, but that for this reason a small, pretty-looking egg is all that they require. In his case Langshans just fitted the requirements of his trade, and he used eggs largely from that breed in the winter season. An apparently small matter like this frequently makes a considerable difference in the returns.

* There are 437·5 grains to the ounce.

TABLE PROPERTIES.

When we come to consider the question of table poultry, there are several points to be regarded. It is not enough that a fowl should have fine flesh, but it is necessary to know whether it is an easy fatterer; if it develops rapidly or the reverse; and whether it is at all delicate. As a rule, the table breeds are scarcely so hardy as are laying and general purpose varieties. Mons. Lemoine thus classifies the respective breeds in his tables:

QUALITIES OF BREEDS.

- BARBEZIEUX.**—Flesh fine; requires mild climates and dry soil; develops slowly.
- BROWN-RED GAME.**—Suitable to all climates; develops rapidly; moderate sitter.
- BUFF COCHIN.**—Very tame; suitable to all climates; develops slowly; excellent sitter, but too unwieldy.
- COUBTES PATTES.**—Flesh good; suitable to all climates; develops moderately.
- CRÈVECŒUR.**—Flesh delicate, white, and fine; requires mild climates; develops rapidly; fattens easily.
- DU MANS.**—Flesh fine and white; suitable to all climates; develops rapidly.
- HAMBURGH.**—Suitable to all climates; requires large run; very rare sitter and mother.
- HOUDAN.**—Flesh very fine; suitable to all climates, especially on calcareous ground; develops rapidly with crossing.
- LA BRESSE.**—Flesh very fine, exquisite flavour; suitable for all climates; develops rapidly; fattens easily.
- LA FLÈCHE.**—Flesh very fine; requires mild climate and dry soil; develops slowly, fattens easily.
- LANGSHAN.**—Flesh excellent; suitable to all climates; develops moderately.
- LEGHORN.**—Flesh indifferent; develops moderately; suitable to all climates.
- SILVER-GRAY DORKING.**—Flesh exceedingly fine; requires dry soil and mild climate; develops very rapidly.
- These comprise all the breeds which it is necessary to reproduce from Mons. Lemoine's valuable list, but the omissions are very important, and it is desirable to supplement that gentleman's information, which we now attempt to do.
- ANCONA.**—Flesh indifferent; very hardy; suitable for all climates; develops quickly.
- ANDALUSIAN.**—Flesh indifferent; requires dry soil and mild climate; develops quickly.
- BRAHMA.**—Flesh moderate; hardy; develops slowly.
- CAMPINE.**—Flesh indifferent; hardy and active; develops quickly; most suitable for sandy soils.
- COUCOU DE MALINES.**—Flesh excellent; hardy; develops quickly; suitable for all districts.

- FAVEROLLE.**—Flesh good; hardy; develops quickly; suitable for all climates.
- INDIAN GAME.**—Flesh excellent; develops rapidly; suitable to most climates.
- MINORCA.**—Flesh indifferent; suitable to milder climates; develops fairly.
- OLD ENGLISH GAME.**—Flesh excellent; develops quickly; suitable for most climates.
- ORPINGTON.**—Flesh fair in black variety, better in buffs; develops slowly; very hardy; suitable for all climates.
- PLYMOUTH ROCK.**—Flesh moderate; suitable for all climates; develops quickly.
- REDCAP.**—Flesh indifferent; hardy; develops quickly; most suitable in hilly districts.
- SCOTCH GREY.**—Flesh good; develops slowly; requires dry soil; as a rule a non-sitter.
- WYANDOTTE.**—Flesh fairly good; suitable for all climates; develops quickly.

COLOUR OF FLESH AND SKIN.

These statistics give no further particulars as to the colour of the skin or flesh, which is a most important point, more especially in Europe; though from a different standpoint it is equally important in America. On the Eastern Hemisphere white-fleshed fowls are regarded as the best, and dark or yellow skinned or fleshed fowls can never command anything like the same price. With this preference we entirely agree, and for quality of flesh and delicacy of flavour we should look to the best of white-fleshed varieties. The American demand for what are termed "broilers" is very great, and for these fowls it is not so essential that the flesh be white, though we think they would be none the worse with that colour of flesh.

Taking the lists we have just given, the following are the respective colours of the flesh or skin:

White-fleshed fowls—Crèvecoeurs, La Flèche, Du Mans, La Bresse, Houdans, Courtes Pattes, Barbezieux (a dark-fleshed fowl would not be tolerated in France), Dorkings, Old English Game, Scotch Greys.

Yellow-fleshed fowls—Leghorns, Plymouth Rocks, Indian Game, Brahmas, Wyandottes, Cochins. Such breeds as Langshans, etc., cannot be called white-fleshed nor yellow-fleshed in the same way as are the others named above, but might, perhaps, be classed as yellowish-white or cream-fleshed, as also Coucou de Malines.

Dark-fleshed fowls—Hamburgs, Game, Minorcas, Andalusians, Orpingtons.

Here it is desirable to mention that in Britain there has been a strong prejudice in favour of white-legged fowls for table purposes, it being thought that black-legged fowls were not nearly so fine in flesh. Consequently, with the exception of one breed of old Game fowls, the only variety fitting this prejudice was the

Dorking. Happily, the prejudice is dying out, for it has been abundantly proved that two or three French breeds are quite equal to the Dorking in table properties, and of these there is not one with white legs and feet. The colour of the pedal limbs is not influenced by, or does not influence, that of the flesh and skin on the body.

WEIGHT OF MEAT, BONE, ETC.

We now come to a most important consideration, namely, that of the relationship between meat and bone, or other non-edible elements, important because, no matter what the size of the fowl may be, or however rapid his growth, if this is in the direction of bone or offal, no real purpose will have been served. What in table poultry is required is flesh, with only as much bone as will carry the flesh, and as little offal as possible. Here, again, we must turn to Mons. Lemoine's observations, but as yet we have none to supplement his omissions; these, however, we hope to obtain later. Mons. Lemoine shows the relative weight of meat and of bone, etc., on a fowl six months old.

	Weight of meat on fowl six months old.			Weight of bone, etc., on fowl six months old.		
	lb.	oz.	grs.	lb.	oz.	grs.
Barbezieux ...	4	10	92	4	15	0
Cochins, buff ...	4	9	0	5	4	327
Courtes Pattes ...	3	10	99	2	8	316
Crèvecoeurs ...	4	9	66	4	14	197
Dominiques... ..	3	11	66	2	8	279
Dorkings, silver-gray	5	4	282	4	13	403
Du Mans	4	6	64	2	11	11
Game, brown-red ...	3	15	233	2	7	301
Hamburgs, pencilled	1	15	335	2	7	224
" spangled	2	3	236	2	7	301
Houdans	3	7	0	2	10	140
La Bresse, gray ...	3	7	67	2	8	163
" black	3	7	375	2	8	240
La Flèche	3	5	339	2	9	269
Langshans	5	4	359	5	1	78
Leghorns	3	15	233	2	10	140
Polish, spangled ...	2	12	348	2	8	18

CONSUMPTION OF FOOD.

In this relationship it is important to learn how much food each variety of fowl will consume, because it may be that it pays to feed well, in order to secure good results, though the table given below shows that the heaviest eaters are not those who produce the greatest amount of flesh or eggs. We remember reading what was said by an observant poultry-keeper when Cochins were first introduced, for he remarked as to this breed: "Well, sir, if you do get many eggs from them chaps' bodies, you mun put a lot of grub in their bellies." The following are Mons. Lemoine's records:

		<i>Weight of food consumed per day.</i>	
		oz.	grs.
Barbezieux	... ..	6	391
Cochins, buff	... ..	17	296
Courtes Pattes	... ..	6	391
Crèveœurs	... ..	7	31
Dominiques	... ..	4	336
Dorkings, silver-gray	... ..	6	391
Du Mans	... ..	7	0
Game, brown-red	... ..	4	275
Hamburgs, pencilled	... ..	4	152
„ spangled	... ..	4	122
Houdan	... ..	6	391
La Bresse, gray	... ..	5	254
„ black	... ..	6	391
La Flèche	... ..	6	391
Langshans	... ..	7	31
Leghorns	... ..	4	398
Polish, spangled	... ..	4	28

From these figures it will be seen that the Cochins are by far the heaviest eaters, and probably with them would be associated all the heaviest type of Asiatic fowls. Of the others, the table varieties come next, and the laying breeds are the smallest eaters.

DESCRIPTION OF BREEDS.

It is not necessary that we should go into very great detail as to the individual characteristics of different varieties of poultry, but our purpose will be served if we indicate the leading points, and for facility of reference we give these in alphabetical order, omitting such as are of no practical use to the poultry-keeper who is seeking to produce either eggs or poultry for market.

ANCONAS.—A mottled-plumaged variety, nearly resembling Leghorns; excellent layers; medium-sized body; very hardy and precocious.

ANDALUSIANS.—A member of the Mediterranean family, which has been described as having a 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; in the hen also large, but falling over on one side; and the cocks have large, sickle-shaped tails. Andalusians are clean-legged; colour, slate, except on the cock's neck and back, where it is dark purple, nearly black.

BRAHMAS.—Large, full-feathered birds, feathers extending down the legs and feet; small, neat heads, with pea combs; two varieties—darks and lights.

CAMPINES.—The great egg-producing breed of Belgium; resembling our pencilled Hamburgs, except that they have single combs; remarkable layers; small-sized bodies; two colours—gold and silver.

COUCOU DE MALINES.—A large, upstanding breed, quick in growth, and fattening well; largely of Brahma type; cuckoo plumage; hardy.

CRÈVEŒURS.—A French breed of great size; great

breast development; carries a medium-sized crest of feathers; legs black, but clean, *i.e.*, not feathered; plumage entirely black.

DORKINGS.—Body large and deep, and when viewed sideways almost forming a square, breast well forward; neck short and head medium; legs clean, white in colour and carrying a fifth toe; four varieties—darks, silver-grays, whites, and cuckoos.

FAVEROLLES.—New variety introduced in Normandy; made from admixture of Houdan, Brahma, and Dorking blood; good layer and fattens well; slightly feathered in legs; single-combed, but uncertain in colour as yet; very hardy.

GAME.—What are known as modern Game are not so good as the old-fashioned fighting type, which are close, compact, and hard-feathered; bodies medium in size, broad in breast; legs clean, and rather long; several varieties, of which the white-legged are preferred for table purposes. The old English type of Game is best for profit.

HAMBURGS.—Small-sized, well-shaped bodies on longish legs; large sickle tail; full hackle, with neat head, and rose-comb; five varieties—blacks, gold-spangled, silver-spangled, gold-pencilled, and silver-pencilled, all very rich in colour; save the blacks, they lay too small eggs to be of marketable value.

HOUDANS.—Of French origin; large size, broad and massive; clean legs, pale in colour, carrying a fifth toe; head crested; plumage mottled black and white.

INDIAN GAME.—Large, somewhat heavily-boned fowls, but carrying a large amount of flesh on the breast; partridge in plumage, which is very rich in colour; clean, yellow legs; long neck and legs; small tail.

LA FLÈCHE.—Large French fowls; massive in body, deep in breast; clean black legs; neat head, with forked comb; plumage entirely black.

LANGSHANS.—Large Chinese fowls, on rather long legs; full tails, carried high; slightly feathered on the legs; comb single; plumage entirely black.

LEGHORNS.—Of the Mediterranean type; active fowls of great precociousness; legs clean and yellow; several varieties, white and brown being oldest and best known; other colours are cuckoo, black, pile, duckwing, and buff.

MINORCAS.—Also of the Mediterranean family; two varieties—namely, black and white, but the latter seldom seen; one of the most valuable breeds we possess as egg-layers.

ORPINGTONS.—Really clean-legged Langshans, which they resemble, except that the legs are not feathered. A Buff Wyandotte has lately been introduced, really a refined variety of the Lincolnshire Buff, found in East of England.

PLYMOUTH ROCKS.—A breed of American composition; large in body; rather big in bone; clean yellow legs; four varieties—barred (cuckoo), whites, blacks, and Buffs, the first named being most popular.

REDCAPS.—Original type of the Gold-spangled Ham-

burgh; similar in colour, not so even in markings; very large comb; hardy, and most prolific layers.

SCOTCH GREYS.—Most nearly like the Dorking in shape, and has white or speckled legs; plumage black and white.

WYANDOTTES.—Another breed of American production, and one of the most recent; comb rose; legs clean and yellow; large-sized body; plumage laced; in four colours or varieties—silvers, golds, whites and buffs.

CLASSIFICATION OF BREEDS.

The following is a list of breeds classified according to their leading or general qualities:

Laying (or non-sitting) Varieties.

Hamburghs.	Andalusians.
Campines.	Redcaps.
Minorcas.	Houdans.
Leghorns.	Scotch Greys.
Anconas.	Barbezieux.

Table Varieties.

Dorkings.	Crèveœur.
Indian Game.	Coucou de Malines.
Game.	Courtes Pattes.
La Bresse.	Du Mans.
La Flèche.	Faverolle.

General Purpose Varieties.

Plymouth Rocks.	Orpingtons.
Wyandottes.	Brahmas.
Langshans.	

It will be seen that we only include in the above list such breeds as are known in this country, and which are suitable to those conditions under which the British agriculturist must work. Several of the French varieties already named are not to be found here, and most probably would not easily adapt themselves to our climate.

CHAPTER V.

SELECTION OF STOCK.

CHOICE OF BREEDS—LINING A FOWL—BREAST AND EGG-ORGAN DEVELOPMENTS—SELECTION OF BREEDERS—
INFLUENCE OF THE PARENTS—CROSS BREEDING—HOW TO CROSS—THE BEST CROSSES—IMPROVEMENT OF
PRESENT STOCKS—ONE PEN CROSS—SIZE OF FLOCKS.



N the previous chapter we have dealt very fully with the question of breeds, showing the special characteristics of each, and classified as far as possible their respective qualities. There should be no difficulty in determining what breed is best suited to the requirements of any reader, and the choice is sufficiently large to provide for all needs. But as there are great and widespread variations between the breeds of poultry, there are also important differences between individual members of one variety, due to the fact that they have been bred under different conditions and for different ends. For instance, if one breeder of Dorkings set himself to improve the laying qualities of his fowls, and for several years selected for breeding only those who had proved good egg-producers, he would succeed, no doubt, but probably at the expense of the table properties. On the other hand, if a second breeder devoted his care to the quality and quantity of meat carried by his birds, at the end of, say, ten years both of these families would still be Dorkings, but they would vary considerably in their qualities. This is a point which must not be lost sight of, for there are great and important variations in respect to economic qualities in all varieties of domestic poultry, though not more so than is found amongst our races of horses and cattle.

LINING A FOWL.

We want, therefore, some further guide as to the economic merits of fowls, so that in the absence of actual knowledge of any family its merits may be rightly gauged. Such a method is to our hand, as will be seen below. Of course, there are ordinary outward signs which seem to tell us of internal qualities, as, for instance, large combs are usually found on the best laying varieties, and no really first-class table fowl is found with feathered legs. But these are not enough, and they may be induced by breeding for points without

any commensurate improvement in the corresponding quality. Consequently, we have been led to seek for some other method of determining the economic merits of fowls, and the following is the result of our observations:

When we come to examine the structure of fowls, we are at once met with a fact that the best quality of meat is found on the breast. The object of all who seek for first-class table fowls is flesh on the breast, with as little as possible elsewhere. This is secured by expanding the muscles covering the sternum, and, as a consequence, development is almost entirely in that direction. On the other hand, if we seek to develop the laying powers of a hen, there is enlargement of the egg organs, for one of the best-known facts in connection with every form of life is that use increases, and disuse diminishes, size; or, as Darwin puts it: "Increased use or action strengthens muscles, glands, sense, organs, etc.; and disuse, on the other hand, weakens them. . . . The flow of blood is greatly increased towards any part which is performing work, and sinks again when the part is at rest. Consequently, if the work is frequent the vessels increase in size, and the part is better nourished."* Now, as the egg-organs of a fowl must necessarily lie in the posterior part of the body, if they are specially developed, it will be found that the entire part is large as compared with breeds or families bred for table or breast properties (Fig. 3). But it must be here pointed out that the posterior part of a hen must always be greater than that of a cock, for the simple reason that she has to provide for egg organs, and he has not. Therefore, in lining fowls this fact must be kept in view. To test, therefore, the respective qualities of any fowl, a median line should be drawn from the point of the shoulder where the neck joins it to the thigh. If a greater bulk of the body lies in front of this

* "Animals and Plants under Domestication," vol. ii, p. 285.



PAIR OF FAVEROLLES.

Bred by, and the property of, Mr. F. J. Wood, *The Willows, Newmarket, Wilts.*

To face page 18.

imaginary line, the fowl may be classed among table varieties, and its position therein will be determined by the extent of its development, though, of course, quality

the parents impress upon the chickens their own characteristics. Good points are reproduced, and if the breeding has been careful, these are improved upon.



FIG. 1.—TYPE OF GENERAL PURPOSE FOWL.



FIG. 2.—TYPE OF TABLE FOWL.

and flavour of flesh are also to be taken into consideration. On the other hand, if the greater bulk of its body lies behind this imaginary line (Fig. 3), that will indicate laying qualities, these also being determined by extent. There are, however, several races of poultry whose outline is represented by the letter Y, or by the letter U upon legs (Fig. 1), in that they are almost equally balanced upon both sides of this imaginary line. Such we place in the general purpose class; that is, they do not excel either as layers or table fowls, and according to their development upon either side will be their merits in the directions named. We have carefully observed large numbers of fowls since we were led to adopt this method of testing the qualities of poultry, and have found it most reliable—nay, the only true way of determining what is a most important point.

SELECTION OF BREEDERS.

The selection of birds for breeding is a very important matter, more important than is generally regarded, as

But bad points are also reproduced, and may be aggravated unless great care is taken. By skill and know-

ledge the former *can* be increased, and the latter decreased, if not altogether removed; but it must be borne in mind that the bad qualities are apt to return if vigilance is relaxed. The poultry-breeder needs to have a clear idea as to his aim, and he must ever keep that end in view. Those who have high-class exhibition poultry are most particular regarding the choice of stock birds, and will take an amount of trouble which may be regarded as unnecessary by such as are unaware of the importance of this matter. Years of careful breeding can be upset by one injudicious cross, and though the poultry-farmer need not be so particular as those

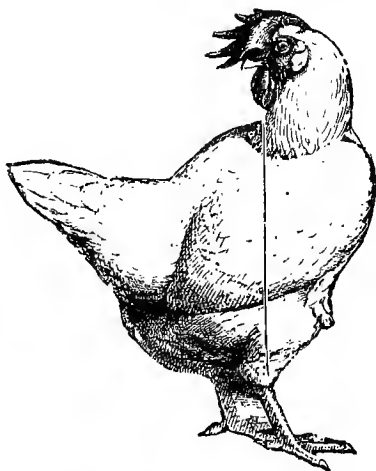


FIG. 3.—TYPE OF LAYING FOWL.

who breed merely for feather, yet it is necessary to exercise considerable thought regarding the question. It would be foolish, indeed, to spoil a good strain for want of a little forethought and trouble.

INFLUENCE OF MALE.

As the male parent influences external structure and characteristics as well as the shape of the bird, the first thing, therefore, is to see that the cock selected for breeding purposes shall be large, and by this we mean size of frame, not merely fat and feathers. A fat bird is seldom a good breeder, and there is many a fluffy-feathered one which appears to be of a large size, which when taken in the hand is found to be very light. A small bird will never breed large ones, and thus the point is most important. Then the bird should be looked at to see if there are any grave defects—that is, whether deformed in body or limbs—possessing characteristics that are regarded as blemishes in the special variety to which it belongs. However good a bird might be in other respects, it would be very foolish to select a bird so affected, as it would transmit its fault, and probably in an intensified form, to its descendants. A bird weak or deformed in its organs of locomotion would be a bad one to breed from, and, in fact, it may be taken as a rule that the bird which is shapely, of good size, and looks best, is to be preferred for breeding purposes. Many birds with defects such as we have referred to are of no use for laying or table purposes, and if bred from, these defects will not only be perpetuated, but intensified, until it will be very difficult to get rid of them. In choosing a cock to breed layers, we should select one firm and close in body, of a good size, though not abnormally big, well developed behind, as referred to above, clean and tall on leg, and active in its habits; whilst for the production of birds for table purposes it is better to pick one heavy in body, shortish on the leg, and deep in breast.

INFLUENCE OF FEMALE.

The hen, as we have seen, influences the internal structure and vital organs. Thus, it will be found that a good layer will produce good layers, a good mother good mothers, and a ready fattener those most suitable for table purposes, if—and the “if” is an important item in the calculation—the male bird is selected accordingly. With respect to hens, what has been said applies equally as with males to the selection of shapely, well-made, and good-sized birds, for though a hen may have a fault in the organs which she does not influence so much as the cock, yet that defect will almost certainly be transmitted to a greater or lesser degree. We need scarcely add that no bird with the slightest sign of disease or hereditary complaint should ever be bred from. Stamina and good condition are of equal importance to anything else in a breeding fowl, and it is courting failure to neglect these points. Consanguinity is also to be guarded against, as breeding-in soon debilitates and reduces the size.

Each of the sexes exercise a certain and defined influence upon their progeny, and knowing this we have a sufficient guide to enable us to select those we require.

The male parent influences the external structure—shape, outward characteristics, and movements of bird; whilst the female parent controls internal structure—constitution, temper, fecundity, and habits. Here are defined lines upon which to proceed.

CROSS BREEDING.

It has been found from long experience, and of the fact there is really no doubt, that for the poultry-keeper, whose object is profit, judicious crossing is a decided advantage to his pocket, in that it assists the securing of a better result from his venture than if he restricted himself to pure breeds alone. The reason for this is not far to seek, as the tendency of all pure-bred fowls that are at all carefully bred is to improve in outward characteristics at the expense of inward qualities, and this tendency must certainly be combated if success has to be attained. French poultry-breeders have managed to preserve the characteristics of their fowls, and at the same time maintain, if not improve, the economic qualities; but it is to be noted that they place the latter first. This must not be taken to mean that the outward characteristics are neglected, but that they do not make the improvement of these their chief aim, regardless of what effect may result in other ways. They know that birds which have special outward characteristics are best either as layers or on the table, and thus they look for these points and breed to them. But they give the points a much greater breadth of meaning than do British fanciers, and in judging go upon a different plan to that followed here. In a purely fanciers' show the judge regards as all-important shape, size, colour, comb, legs, and general contour, and does not usually care whether the birds are likely to make good table fowls or first-rate layers. Across the English Channel judging is exactly reversed; the points which denote economic qualities are looked for first of all, and then an examination is made for externals. At the great Paris Show we have seen good-looking La Flèche thrown out because they were rather coarse in comb, a fine comb being regarded as the sign of a superior-fleshed table fowl. A Crève with white feathers is there discarded as in an English show, these being thought a sign of impurity; but the crest is not allowed to settle matters entirely, as is too often the case here, the result of which is seen in diminished size of the fowls and lessened fecundity.

From what we have stated, it will be seen that the system of breeding adopted in England—that is, amongst those who go in for keeping show fowls—is to place first those qualities that are of the lesser importance, and hence it is that we find a deterioration in profitable qualities among some of our varieties. Recrossing very largely remedies this, for it is found that first crosses between suitable breeds at once give us hardier and more prolific birds than were either of the parents. This crossing, strange to say, is very beneficial

between two pure breeds when it is the first cross, but if persisted in afterwards, as is too often the case, without rhyme or reason, it soon results in injury to the whole stock. A pure-bred cock introduced into a lot of mongrels will improve them, but a bird so introduced that is himself a cross will not have nearly so much influence. This fact needs to be repeated continually, for farmers and others seem very slow to realize it. The thing is, however, self-evident to all who have in any way tested the question, and it is this fact which accounts for the poor, miserable specimens that we see in so many farmyards. These have generally been crossed for years without thought, except that perhaps a new cock has been introduced now and then, just as fancy dictated—sometimes a Brahma, now a Cochin, then a Game, and so on, until the produce is a mixed-up lot, and the cleverest ornithologist would be puzzled to tell what breeds have been concerned in the business.

These results, as seen in only too many farmyards, show that, whilst judicious crossing is undoubtedly beneficial, without proper consideration it is positively injurious, and does more harm than good. For instance, a Brahma has a large frame, fairly good meat, though this meat is not in the right place, is a moderate layer, and a good mother. To cross it with a Cochin, which is as large in frame and something of the same shape and type, would at once injure the quality of the flesh and impair the productiveness as a layer of eggs, and do no good as far as the size is concerned, only showing improvement in one point, if that be an improvement, namely, in the sitting quality. Leghorns and Minorcas are good layers, small eaters, non-sitters, and, being essentially laying fowls, are only moderate in quality of flesh. To cross in Game would certainly improve the quality of flesh, but it would at the same time injure their laying powers, reduce size of the eggs laid, whilst the progeny would be uncertain sitters, and not such as we should care to entrust with valuable eggs. In order, therefore, to obtain the benefits from crossing, it must be done in a proper manner, and the characteristics and qualities of the fowls mated be so blended as to best secure the object in view, or the result is certain to be a great disappointment.

HOW TO CROSS.

From what we have here stated, it will be seen that one of the first things to do is to ascertain the characteristics of the fowls which it is proposed to use, both as a breed and as individuals. In all the pure breeds there are leading points, as already indicated, that we can look for, and which are to be found in all varieties specially noted either as layers or as table fowls. For instance, all the best layers are noticeable as having large combs—large, that is, for the size of the fowls themselves. Leghorns, Minorcas, Andalusians, and Anconas have large single combs, Hamburgs and Red-

caps large rose combs, and Houdans large leaf combs, in every case this being a very prominent feature. We do not say that the comb is the unvariable sign of good laying qualities, for some Dorkings have large combs, and sometimes Cochins also, though in both these cases the comb is not nearly so large in proportion to the size of the fowls as in those breeds just mentioned. With these exceptions, it will be found that size of the comb is a pretty sure indication as to laying qualities in the birds; and in looking out for good layers this will be found a pretty safe guide when found in conjunction with a rather small body.

On the other hand, qualities which indicate the best table fowls are to be looked for in the body rather than on the head, though, as we have already mentioned, in France a small neat comb is regarded as the *sine quâ non* of a good table fowl. Dorkings, Crèves, Game, and Indian Game, which stand in the forefront of this section, have thick-set bodies, showing the greatest depth from the breast to the back, and have flesh upon the bodies rather than upon the thighs. Game fowls are now bred long on the leg for show purposes, but for producing table fowls we prefer the Old English Game type, which is much shorter in the leg and fuller in body. Both Dorkings and the best varieties of the French breeds are, or should be, of this stamp. Birds with a lot of flesh on the thighs are not well furnished with meat on the breast, and as the quality of meat on the former is decidedly inferior to that on the latter, such fowls are by no means so good for table purposes. Hence it is that Asiatic varieties, *i.e.*, Brahmas, Cochins, etc., are not regarded as first-class on the table. What is known as depth of keel should always, therefore, be looked for in selecting birds intended for table purposes.

General purpose fowls are those which, whilst not excelling in any one quality, are yet good in all. These are very useful where it is found that a fowl which is at once a fairly good layer and yet a passable table bird, pays best. Of course, in such a case as this the profit will not arise from the one quality, but from a combination. It is necessary in crossing, therefore, to remember that what is wanted is to have sympathetic breeds put together—that is, breeds which will reproduce their good qualities in an even stronger form in their progeny. Unless care is taken to secure this, the crossing will only result in greater hardness of the fowls, but will not in any way add to the profit from them. This hardness may be at the expense of some intrinsic merit, and thus be purchased dearly. We do not say that if a man has a good table fowl which he wishes to make a better layer without losing the good table quality, he cannot succeed. But, unless he exercises very great care in the selection, he will injure what already characterizes his fowls. As a rule, we may take it as certain that a really first-class layer will not be a good table fowl. There is a further point

to be kept in mind, namely, that as far as possible colour should be kept in view. Fowls of all colours never look nearly so well as those which have some uniformity of type; and though this is by no means an important matter, still it is desirable to regard colour in cross breeding.

VARIOUS CROSSES.

Below we name some of the best crosses :

FOR TABLE FOWLS.

Indian Game—Dorking.
 Old English Game—Dorking.
 Indian Game—La Flèche.
 Old English Game—La Flèche.
 Indian Game—Houdan.
 Old English Game—Houdan.

FOR LAYING FOWLS.

Minorcas—Black Hamburgs.
 Minorcas—Leghorns.
 Leghorns (white preferred)—Black Hamburgs.
 Leghorns—Houdans.
 Leghorns—Scotch Greys.

FOR GENERAL PURPOSE FOWLS (Winter Layers).

Leghorn—Plymouth Rock.
 Leghorn—Wyandotte.
 Leghorn—Langshan.

IMPROVEMENT OF PRESENT STOCKS.

When it is desired to rapidly improve present stocks, it is best to buy fresh birds and commence *de novo*, for a cock and six hens will in one season breed sufficient chickens to stock any farm of ordinary dimensions. The pullets so bred will be ready in the autumn to take the place of the oldest hens, who can be killed off just before moulting, a further supply the following season being substituted for any remaining of the older type. To secure the best results, no hen should be kept after she is twenty-seven months' old, that is, ere she enters her second adult moult, for every year after her second a hen's moult becomes more prolonged, and she is longer in resuming laying.

A much cheaper method, and one which will probably recommend itself to all who have a fair number of birds on hand, because it is less expensive, is to buy a few male birds of the breed or breeds selected, and run them with a number of selected hens, breeding from these alone. If it is wished to make the table properties stronger, a cock bird of the following varieties should be introduced: Indian Game, Old English Game, Dorking, or La Flèche. If the laying is to be improved, obtain a Minorca, Leghorn, Andalusian, Scotch Grey, or Redcap cock; or if the birds are to be made better all round, secure a Langshan, Wyandotte, or Plymouth Rock cock. In this way the quality of poultry can be improved year by year, but a fresh stock bird of the same variety must be introduced every season. A couple of cocks with twenty young hens would be sufficient to produce several hundred chickens in one

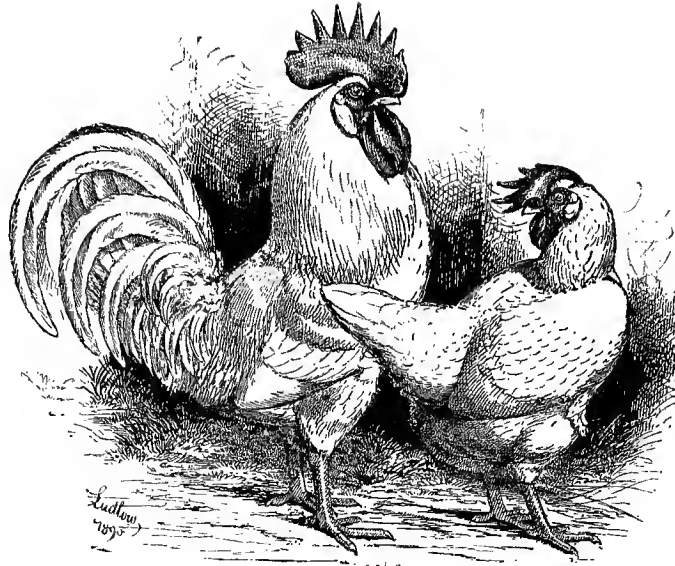
season, the cockerels of which could be killed off for market poultry; and those of the pullets which are best in size, most rapid in growth, and most nearly resembling their fathers, should be again selected for breeding the following spring, when they should be mated with a couple of fresh two-year-old stags of the same variety as those used the year before. By continuing this process year by year, ere long the breed will become almost pure, though there will constantly reappear traces of the mongrel blood. Still, these will be fewer and fewer, for pure blood is usually greater in its prepotency. After the second or third year, two year-old hens only should be mated for breeding with a young cock, but pullets may be put to run with an old cock. Of course, if a fresh breed be introduced, all the previous efforts may be largely upset.

ONE PEN CROSS.

To many farm poultry-keepers it appears at first sight almost impossible to keep more than one pure stock of fowls, and to this notion we may attribute some, at least, of their apparent fondness for mongrels. The difficulty is an imaginary one. It is only necessary to keep the breeding-pens separate for about three months of the year, after which time all the adult hens may be run together. And this separation does not necessarily involve a heavy expense for fencing, etc. Two pens can be kept on a ten-acre field, provided that each has a male bird, with very small danger of intermixing if each pen is kept separate until cock and hens have had time to know each other. Thus, the business of maintaining pure breeds is much easier than generally supposed. At the same time, for the practical poultry-keeper there are certain advantages offered by a cross, especially one which combines egg-production and table qualities. There can be no doubt that the maintenance of a pure type tends to enfeeblement. This is seen in every form of animal and plant life. In our judgment, the advantage of pure breeds far more than compensates for the tendency just referred to, for without them we shall find more rapid degeneration due to other influences. But the fact must be kept ever in mind: crosses give us at once greater vigour, and when judiciously carried out frequently make for increased economic qualities—at any rate, for one or two generations. It will be seen, therefore, that there is a basis of reason for the general idea that crosses are better for practical purposes than pure breeds, though we could not accept such a statement without limitation of its application.

An objection is frequently raised to the system of cross breeding, in that it is supposed to be necessary to keep two lots of pure-bred fowls in order to supply the necessary stock, or to buy birds with which to cross every season. Our present purpose is to show how this can be avoided, and yet the same results obtained.

If we suppose that it is intended to cross White Leg-



WHITE LEGHORNS.



BLACK MINORCAS.

horns with Plymouth Rocks, a start should be made by purchasing an over-year cock, good in size, well developed, round in body, and by no means flat-chested. He should be active, and show all eigne of perfect health. A little straw tint in the plumage will be no disadvantage for the work we have in hand. The pullets should be Rocks of the year, well grown, with a fine head and not too large a comb, and if shortish in the leg they will be all the better. Small, stunted, or seedy specimens must be avoided on both sides.

Mating these together, the progeny will be half bred, that is, partaking of Leghorn and Rock elements equally, though probably the majority will show white plumage, thus taking in this respect after the male parent. The following June or July the White Leghorn cock may be sold, or otherwise got rid of, as he has accomplished his work.

A year after we may use the same Rock hens for breeding, in which case another White Leghorn cock must be secured, though he had better be a year-old bird. But if it is desired to use any of the half-bred pullets, a different plan must be followed. Under the latter circumstances a Plymouth Rock cock should be bought and mated with them. The result of this will be that the progeny will be three-quarters Plymouth Rock and one quarter Leghorn, but the influence of the latter breed will probably be more potent than these figures indicate. Out crosses usually exercise a greater influence than is generally supposed.

The following year, supposing that these last-named pullets are to be employed as breeders—and we do not see why they should not be, for crossing in the way indicated will minimize the danger of using pullets, especially if a two-year-old male bird be mated with them—a White Leghorn cock must be secured. By this means we shall redress the disproportion of Rock blood, and bring the progeny to the same exact half-bred state as in the first year. This process can be repeated year by year, simply using alternately a Leghorn, and a Plymouth Rock cock. Thus cross breeds can be secured with the minimum of trouble and expense, and a selection can be made from the pullets so long as they are mated with a pure-bred cockerel.

To make our meaning clearer, it is here put into tabular form :

<i>Year.</i>	<i>Cock.</i>	<i>Hens.</i>
First	White Leghorn	Plymouth Rock
Second	Plymouth Rock	$\left. \begin{array}{l} \frac{1}{2} \text{ Leghorn} \\ \frac{1}{2} \text{ Plymouth Rock} \end{array} \right\}$
Third	White Leghorn	$\left. \begin{array}{l} \frac{1}{4} \text{ Leghorn} \\ \frac{3}{4} \text{ Plymouth Rock} \end{array} \right\}$
Fourth	Plymouth Rock	$\left. \begin{array}{l} \frac{1}{5} \text{ Leghorn} \\ \frac{4}{5} \text{ Plymouth Rock} \end{array} \right\}$
Fifth	White Leghorn	$\left. \begin{array}{l} \frac{1}{4} \text{ Leghorn} \\ \frac{3}{4} \text{ Plymouth Rock} \end{array} \right\}$

and so on. Of course, it is important that the male birds purchased of the same breed shall be unrelated to those previously used. This is at times more difficult than at first may be supposed. We have no stud books in poultry, and pedigrees are not kept except privately by a few breeders, so that birds purchased hundreds of miles apart may be of the same blood. Inquiry upon this point is therefore desirable.

As it is wise for the poultry-keeper to systematize his operations, and he should never keep any birds for laying beyond two and a quarter years, it will be necessary for him to renew half his stock annually, killing off the older hens, and using in their stead young pullets of the year. To do this he must know which are two year and one year respectively. The plan suggested above will help him, if he is observant, by the colour of the plumage, though this is not a certain guide. The better way will be to ring the birds, using either copper rings or lead bands. These need not be numbered, but all hatched one year can be ringed on the right leg, and next year on the left. He will know that two years hence the birds having rings on the right leg are to be got rid of, and the chickens will be marked in the same way. The year after it will be the left-leg birds, and so on.

SIZE OF FLOCKS.

For a reason which has not yet been explained, it is found that hens lay much better when kept in small flocks than if a large number are massed together. Twenty-five is a good average. Fifty may be preferred, as there is a less cost for houses, but the former number will give better results. Certainly they should not exceed fifty. We have frequently seen as many as two and even four hundred running together and sleeping in the same house, but the system is to be deprecated. The simplest mode of dividing them is by placing small houses about the fields, each to accommodate the number stated. If a male bird is run with every separate flock, it will be found even during the breeding season that they will not mix, the stag taking care that no other interferes with his harem. We could give many instances where the average of eggs produced was very much higher when the birds were divided into small flocks than when massed together, and they can be kept under much closer observation. It is, moreover, a mistake to breed from a large lot of hens mated with several cocks, for then improvement is very doubtful. We should breed only from the best selected, and placed by themselves for that purpose during the breeding season.

CHAPTER VI.

POULTRY-HOUSES.

FOWLS IN NATURE—CHANGES UNDER DOMESTICATION—IMPORTANCE OF HOUSING—GENERAL PRINCIPLES—PERMANENT BUILDINGS—VENTILATION—LIGHT—HEATING—SHELTER SHEDS—FLOORS—PERCHES AND NESTS—DAMP AND DIRT—RUNS—FORMS OF POULTRY-HOUSES—PROTECTION AGAINST MARAUDERS—COTTAGERS' POULTRY-HOUSES—CHICKEN-HOUSES.



OWLS in a state of nature are accustomed to roost in the trees, and all the shelter they obtain, which is very little, is just what can be secured on a hillside or in a belt of woodland. Accustomed to this condition of things, they grow up hardy and healthy, or, if there be any weakly ones, they fall before the inexorable law of "survival of the fittest," and those who remain are, so far as stamina is concerned, the pick of the lot. Such birds have everything in their favour, for their natural climate is warm and favourable to them. Freedom, natural food, and natural conditions combine to make them hardy. They live according to their own instincts, not the whims or prejudices of their owners.

It will be seen, therefore, that when we alter this state of things by domestication, it is imperative that we should provide for a change which must come over the birds. Everything is altered. Instead of freedom there is restriction; instead of natural food—namely, that which the instincts of fowls teach them to obtain for themselves—we substitute artificial, and as a consequence the first effect is to enfeeble the race, making it less able to resist unfavourable circumstances. But whilst this is true, it is difficult to see how it can be otherwise. Domestication of any animal has a tendency at the outset to weaken all bodily powers. Therefore we must prepare for the result, allowing Nature to adapt herself to altered circumstances, which she will do if not hindered. We must seek by a careful study of our fowls, their habit and nature, to attain that happy mean in which they can be kept healthy, and yet be guarded by such conditions that when unfavourable circumstances arise, circumstances which they would meet by their own instincts, they may be protected therefrom. The stamina of a fowl is its reserve force. If we weaken this we must substitute some other without the fowl itself, or when a strain comes upon it there will be collapse.

Thus it will be seen that the question of housing is of great importance. It is possible to keep fowls healthy by allowing them a large measure of freedom, and some of the hardier varieties could thrive out of doors all the year round, but they would not be fully domesticated, and we should fail to secure that profit for which we are seeking. Their reserves which now go to produce flesh and eggs would be spent in keeping themselves warm, and the whole object of domestication would be sacrificed. It is essential, therefore, that they be well housed, so that the qualities for which they are bred may be conserved and developed, and especially that we may obtain eggs in winter. Badly-housed poultry will never pay for the trouble taken with them, any more than would badly-sheltered dairy cattle.

GENERAL PRINCIPLES.

Dealing with general principles first, we find that in housing the primary point to be regarded is the giving of sufficient air space for the number of fowls to be kept upon any place. Overcrowding is always an economic mistake. Something can be done by a proper system of ventilation to overcome the evils of overcrowding, but even perfect ventilation can never make a house that is only capable of holding comfortably a dozen birds suitable for twice that number. Nor is there any excuse whatever for either farmers or cottagers sinning in this manner. If too many birds are placed in a house, they rapidly exhaust the oxygen in the air, and it soon becomes foul. By creating a strong draught this may be prevented; but draughts are dangerous, and serious evils would follow the adoption of such a plan. A gentle current of air, imperceptible except when tested, is all that can be safely applied; and only as many fowls should be kept in a house as such a current can deal with. On the other hand, too large houses are equally injurious. In these there is during the winter season always a great bank of cold air which the fowls are unable to withstand, and which

has to be fought against all night long. We know what it is to enter a very large room unwarmed during cold weather, and the chill there experienced is just what birds have to bear if roosting in a huge house such as we have sometimes seen. It is desirable in the roosting-place to allow 2 square feet of floor space for each fowl. The height of the roof should be proportionate to its size. In no case do we like them less than 6 feet high, and structures intended for twenty to twenty-five birds can with advantage be a foot or 18 inches higher.

PERMANENT BUILDINGS.

These remarks, however, do not apply to permanent stone or brick buildings, more especially if they adjoin dwellings or cattle-sheds, for they then are warmed by a gentle heat. Under these circumstances there is no reason why they should not be twice the size in area,

and never thrive at all. The walls, windows, door, and roof of the house should be air and water tight in every way, and the ventilation be so arranged that the birds will never roost in a direct current of air. The simplest way is to make a chamber in the roof, with loosely-fitting boards as its floor, and louvre boards or ventilating-holes at each end of the gable, if there be one, or near the highest point of the roof, if there be no gable, which, of course, will be higher than the perches. By this arrangement, when the foul air rises, as it will do, it is carried away at once by the current passing through the chamber. Another way is to put one or two ventilators in the walls level with the roosting-places, but covered on the inside by a box or spout, with only the upper side open, so that the incoming current of air will be directed upwards, and will carry off the vitiated air through holes in the walls near the roof.

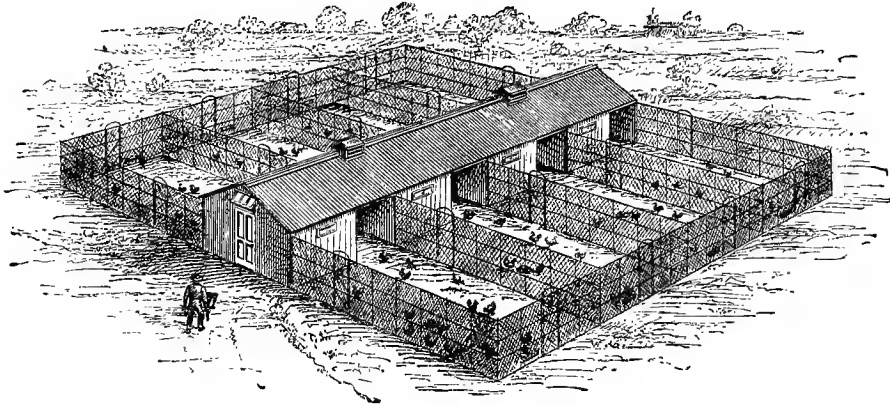


FIG. 4.—COMPLETE POULTRY ESTABLISHMENT.
(Barnard, Bishop, and Barnards, Limited, Norwich.)

and half as high again. In fact, if there are any permanent buildings on the farm which can be devoted to this purpose, it is much better to utilize and adapt them to the requirements of poultry. Such houses do not usually require much alteration, as they are generally large and roomy; and if they be dry and are dealt with on the general principles we are now laying down, nothing could be better. But they must be dry, and this is a point to be always insisted upon.

VENTILATION.

Ventilation is the next matter requiring attention. By ventilation we mean a current of fresh air passing through the house, but a current properly directed in its course. We have seen many poultry-houses, every board of which was ill jointed, and the entire building more like a sieve than anything else, letting in both wind and water. Draughty buildings of this kind are worse than no house at all, and it is small wonder that fowls kept in them are scarcely ever free from disease,

LIGHT.

A great mistake is made in erecting poultry-houses by either having no window at all, or one not more than a few inches square. It is impossible for a dark place to be warm without the application of artificial heat, which is undesirable for other reasons given below. And a dark house is more liable to be both damp and foul. There is no greater purifier than light, especially sunlight. As afterwards referred to in connection with chicken-houses, there should always be a good window, about 2 feet square, on the east or south-east side of the house, to receive the morning sunshine, sometimes the only sun we get in winter. This makes a wonderful difference to the comfort of the inmates.

HEATING.

The question is frequently raised as to whether it is desirable to artificially heat a house. At the outset this seems a wise plan, giving that warmth which is

so necessary in winter. But experience has shown that its disadvantages more than counterbalance the benefit, for the birds are made tender and easily take cold. In a large house with a centre compartment, where can be put a stove so that a gentle heat will be given and the birds cannot crowd around it, there should be no difficulty in the adoption of this method, provided that the heat is properly regulated, and not permitted to rise above 50° F.—we mean 50° after the birds have been some hours in the roosting-place. But for small separate houses, where the source of heat would have to be in the roosting-place, we must discourage any adoption of this system. It is better to lose a few eggs rather than enfeeble the inmates. Such natural heat as can be obtained by proximity to buildings and natural shelter must be sought for, and the house itself should be sufficiently substantial to afford the requisite protection. In the British Isles we have not, as a rule, very severe winters, and the difficulty is hardly so great as on the Continent and in America.

SHELTER SHEDS.

An excellent method of giving protection to the fowls is providing for them a shelter shed, which may either be joined to the roosting-house, as shown in Fig. 5, or as a separate erection (Fig. 11). Fowls do not appear fond of remaining in the house during the daytime, and frequently will prefer to remain huddled together in some corner or under a hedge even on the most unfavourable day. The cost of a shelter shed, which must be large enough to hold the flock, is not great, as it need not be more than 4 feet in height, and may be open at the front, and it will soon repay the cost. The ground should be thickly covered with dry earth or ashes, and it will thus serve a further purpose, namely, as a dust bath, but these must be renewed from time to time. Where the fowls are allowed about the farm buildings, they can usually obtain sufficient shelter without any special erection. When employed the shed should be placed where it will not be unduly exposed to wind and rain. In America it is customary to build a shelter shed larger than the roosting-place, but as part of the structure, and this is an excellent arrangement. An example of this is given in the complete poultry establishment shown in Fig. 4.

FLOORS.

In portable houses it is necessary to have wooden floors, but these should be substantial and well put

together, so as to prevent any upward draught. There can be no question that a house with a raised floor is colder than when the walls rest on the earth. This is due to the fact that cold is atmospheric, and the nearer we get to the ground in winter, the warmer is the air. When unavoidable, the wooden floor should be covered 4 or 6 inches thick with peat moss litter or dust, which if raked over daily and forked up once a week will serve for months without renewal. Peat moss litter is a deodorizer, an absorbent, holding the ammonia in suspension, is warm, and when done with makes a most valuable manure, not losing any of the properties in the droppings. So soon as a manurial smell is experienced it should be renewed.

For permanent houses the ground should be dug out as described on p. 31, and this kept covered with peat moss litter.

PERCHES AND NESTS.

Perches are best made of fir poles about 3 inches in diameter, and sawn in two. If ordinary deals are employed, they should be rounded off at the edges. The best size is 2 inches by 1½ inches. It is better to place the perches about 20 inches apart, all on the same level, and not more than 2 feet from the ground. Nothing can be more objectionable than the old ladder form running into the roof. In the first place, nearly all the birds struggle to be on the top row; then, there is more danger of draught up there; further, in small houses they frequently hurt themselves flying down; and, finally, as referred to above, the nearer the earth they perch, the warmer will they be in winter. There should always be a bank of air, at least of 4 feet, between the roof and the backs of the fowls. Much disease is caused by chills taken by the cold striking through the roof on to the backs of the fowls when perching near thereto.

Nests may be formed of bottomless boxes, and easily removable, so as to be kept clean, or they will become harbourages for vermin. Fixed nests are an abomination. Where twenty-five or more birds are kept in one flock, it is an excellent plan to provide a separate laying-house, connected with the ordinary roosting-place, where the birds can be undisturbed. Boards placed across the corners, or boxes as already mentioned, will give the necessary accommodation. It is better for the nests to be in a quiet and rather dark place.

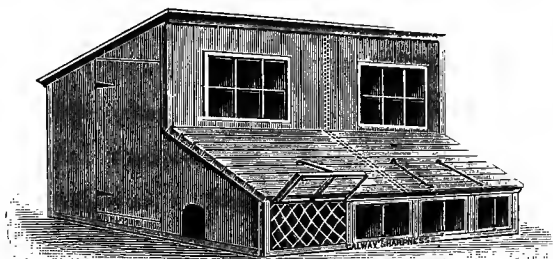


FIG. 5.—VELMEAD POULTRY-HOUSE.
(W. Calway, Sharpness.)

DAMP AND DIRT.

It is necessary to say a few words on the question of damp and dirt. The former we have already referred to, but although everyone theoretically condemns them, there are comparatively few poultry-keepers who pay proper attention to these important points in management. Damp, either from defective walls or a bad floor, is an evil that must be combated. For this state of things there is no excuse, as dampness can be easily avoided. If neglected, it will be fatal to success, for to it are due many diseases affecting the respiratory organs; and from the accumulation of dirt we have numerous diseases affecting the stomach and bowels. Foul odours arising from a floor covered by the droppings of fowls poison the atmosphere, and make the inmates fit subjects for the first trouble that may appear. Insects are encouraged by dirt, and when they are numerous fowls can never thrive. Such pests are often present when they are not suspected to be there. We have seen a house with sliding floor to facilitate cleaning—a useful arrangement. All poultry-houses should be limewashed out three times a year, in early spring, mid-summer, and autumn, for this keeps the air sweet, and destroys parasitic life, which is so troublesome to fowls. The wash should be made with fresh air-slaked lime, to which, when mixed, may be added a half-pint of Calvert's carbolic acid to each pailful, and if some lump tallow or fat be mixed with it, the wash will not rub off on the clothes, and the fat is also destructive to parasites.

RUNS.

When fowls have to be kept in confinement, the question of runs is of great importance. The danger is in the ground becoming tainted, which is a fruitful source of disease. Unless the grass can be kept growing, so as to maintain the ground sweet, there is no alternative but to change the ground. Of course, if the space is sufficient, especially when the ground next to the house is laid down in gravel, there is no difficulty; but otherwise it is better to have two runs, using each alternately, and by planting the one vacated with clover seed, vegetables, or six-week turnips, it can be made fit for re-occupation in a few weeks. A long, narrow run

is better than if made square, for then the portion next to the house receives nearly all the manure, and if in gravel or ashes these can be renewed. Whatever the method adopted, the run must be kept sweet. Fig. 15 shows an excellent form of fencing where the lighter breeds of poultry are kept. The netting is 3 feet 6 inches high, and three strands of wire are fixed above, so that if the fowls attempt to fly over they strike the wires, but the same purpose is obtained as with a higher fence.

FORMS OF POULTRY-HOUSES.

Having explained the principles applicable to all poultry-houses, it is not necessary for us to describe any special application of them. These must be determined by the purse or wishes of each individual poultry-keeper. In Fig. 4 is seen a complete poultry establish-

ment, with eight compartments, and it can be built to any size. It is especially suitable for breeding or laying pens, but the runs should be at least 120 feet long. Fig. 5 represents a house built to the author's designs, embracing roosting-place and covered run.

Upon farms there is no question that portable houses are preferable, as they can be moved about from place to place as occa-

sion may demand. Figs. 6, 7, 8, 9, and 10 illustrate different types, Fig. 9 being a house made in sections and to fit a trolley, from which it is, however, entirely separate, and these houses can either be used singly, or are made to fit together, forming a portable complete establishment. These portable houses can be put out on grass or arable land according to the season of the year, and one farmer we know declares that the benefit from this course, by the manuring and cleaning of the ground, is very great, whilst the fowls are kept after harvest by the grain that would otherwise be wasted. Another farm, which is largely given up to dairying, has a large number of these houses placed about in the fields. Fowls do not interfere with cattle, or cattle with fowls, and the maintenance of several hundred head of poultry does not necessitate the reduction of the cows by a single one. On a third they are placed near the various buildings or labourers' cottages; in this case, however, they are not portable. And on yet another

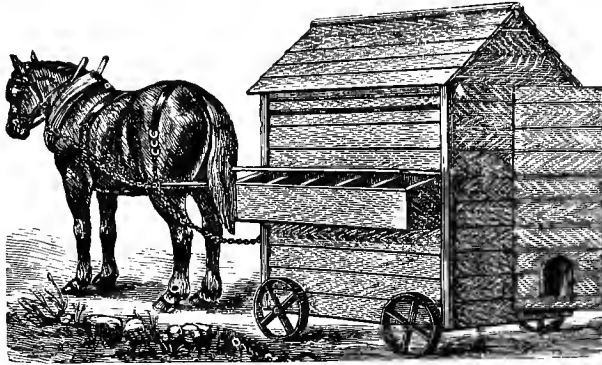


FIG. 6.—FARMER'S POULTRY-HOUSE.
(Boulton and Paul, Norwich.)

farm, which is mainly devoted to grain, the houses are placed in corners of the fields where grain is growing, and though for a yard or two around the ground is bared, that is all the damage done. The birds wander

early in the morning. Under these circumstances it is better to have houses either part of farm buildings or adjoining the labourers' cottages. If this be done, then the required protection can be given, and the proximity of some one is generally a sufficient warning to both biped and quadruped. By housing in this way, closing the trap-door is sufficient, for it can be opened very early, just as soon as the fowls wish to be out. There can be no question that fox preservation is a great hindrance to poultry-keeping. Mr. S. Sutcliffe, of Halifax, has

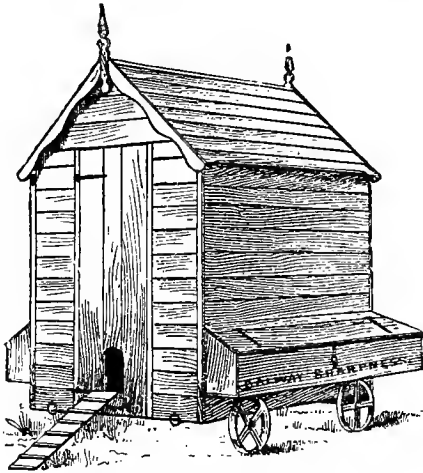


FIG. 7.—FARMER'S POULTRY-HOUSE.
(W. Calway, Sharpness.)

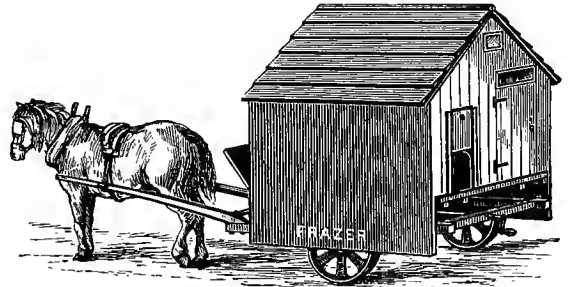


FIG. 8.—TROLLEY POULTRY-HOUSE.
(Frazer and Co., Norwich.)

in and out among the grain-stalks and growing roots, not only doing no harm, but a very great deal of good. It is commonly thought that fowls would injure growing crops, but if readers try this plan during the next season they will find that after the plants are about 6 inches above the ground there is no risk whatever in doing so, and only good will result from it. The plan adopted on French vineyards has already been recorded.

PROTECTION AGAINST MARAUDERS.

Sometimes it is necessary to protect the fowls from marauders, either man or beast; then some enclosure must be provided, as they should not be kept shut up in the house until some one goes to open it, if that means an hour or two after daylight. The early bird is said to get the worm, and fowls obtain many worms

patented an excellent trap-door (Fig. 12), with sash-frame, which cannot be opened from the outside, but the bird by stepping on a platform liberates the catch, and it thus opens. This differs from that shown in

Fig. 13, in that the latter is connected with a food-trough opened at the same time, but affords the same protection.

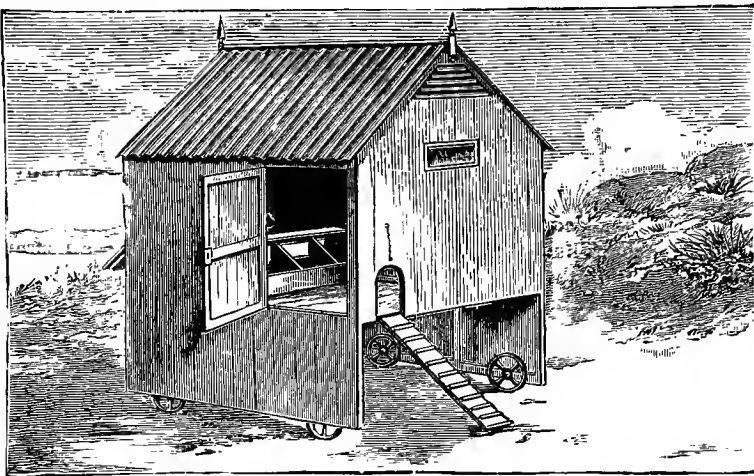


FIG. 9.—PORTABLE POULTRY-HOUSE.
(Spratt's Patent, Limited, London.)

COTTAGERS' POULTRY-HOUSES.

As a rule, cottagers will prefer to adapt some outhouse for this purpose, or erect a roosting-place near to their dwelling. The observations already made apply

equally here, and all we need add is a warning as to the danger of keeping too many fowls in a house, so often done by small poultry-keepers. Fig. 14 shows a house suitable for this class of poultry-keeper. A capital house for half a dozen fowls can be made

out of a sugar or other cask, which may be purchased for 2s. or 2s. 6d. In buying it should be seen that the staves are all in good order, for if this be not the case the whole will be at fault. The bands, top and bottom, should also be examined. It must be properly cleaned out, and, if a sugar hogshead, it ought to be placed in the sun to dry, or, if it be winter, in a warm shed. Probably the drying will reveal some

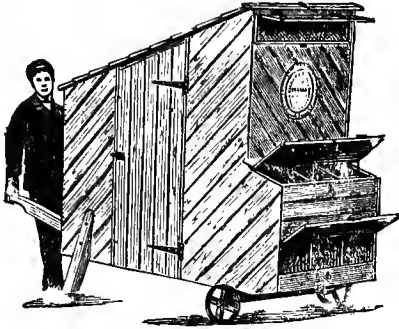


FIG. 10.—WHEELBARROW HOUSE.
(R. Mallen, Swaffham.)

weak places. These, if not very large, should be covered with pieces of tin, and any interstices closed up with clay or putty. It is well worth a little extra trouble to have this properly done. The top must next be fitted on, part of it being formed into a door sufficiently large to allow of the barrel being cleaned out, and also a trap-door for the fowls. We have generally made

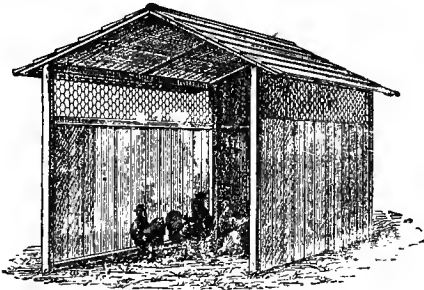


FIG. 11.—SHELTER SHED.
(Barnards, Norwich.)

the former by permanently fixing half of the top, and hinging the lower half to it, the latter, of course, forming the door, which will be complete with a button, bolt, or padlock. If the trap is to be at this end of the house, it had better be in the door itself, but if the barrel is to stand where both ends are accessible, it is the better plan to put the trap in the bottom, and make the nest next to the door. The inside should have a good coating of lime, in which some carbolic acid has been mixed, and the outside be tarred. When perfectly dry it should be placed on bricks, or blocks of wood, so as to raise it a few inches above the ground.

CHICKEN-HOUSES.

Where a large number of birds are to be reared, and more especially if early in the year, a chicken-house is indispensable. Chickens can, in one of these houses, be reared with ease at all seasons, as they are completely protected from bad weather, and the attention

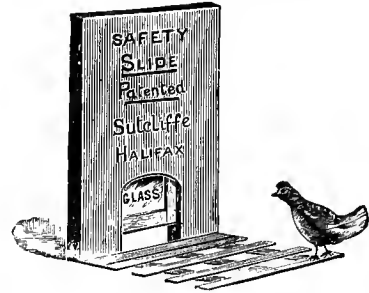


FIG. 12.—SAFETY TRAP-DOOR.

given them means that they are much more comfortable than if outside. Not only so, but the chicken-house can be used as a place for hatching, and, after chicken-rearing is over, for fattening or as an ordinary fowl-house.

It is always advisable to have a run in front of the house, two-thirds of which should be laid down in grass,

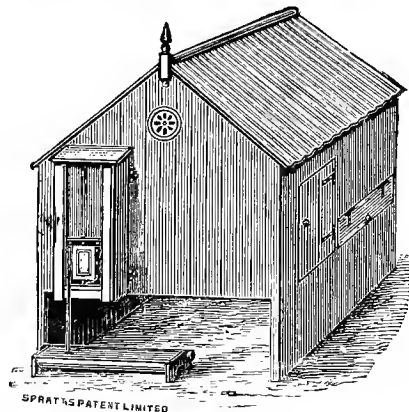


FIG. 13.—AUTOMATIC TRAP-DOOR AND FOOD-TROUGH.
(Spratt's Patent, Limited, London.)

and the other third—that next to the house—in gravel. The larger the run, the better—up to half an acre. When the season is well advanced, the coops may be placed out of doors altogether, or out during the day and inside the house at night. The best position for a chicken-house is facing the south or south-east, as then it obtains all, or nearly all, the sun. It should be built with a roof sloping from front to back, about 7 feet high in front, and 5 feet or 5 feet 6 inches at the back.

Whether the house is built of wood or brick, the front wall should be nearly all glass, and if this front can be made entirely of wood and glass, that is to be preferred; or the 30 inches next to the ground may be of wood, made to open upwards and outwards, and the

or windows generally to be found therein are useful for little more than making the darkness visible. Should corrugated iron be used—and it is doubtless one of the best and cheapest roofing materials that can be employed—it must be lined with wood, as it is a rapid

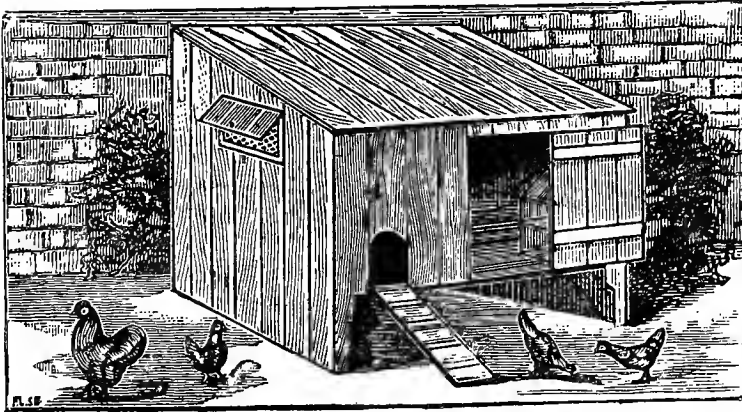


FIG. 14.—COTTAGER'S LEAN-TO POULTRY-HOUSE.
(Mr. W. Calway, Sharpness.)

upper portion of glass, the latter a fixture. This answers very well if the coops are set well back in the house at night, or when it is closed up; but we prefer all the front to be of glass. In any case, the lower part must be made to open, so that the birds can go in

and out when the weather is seasonable. It is always well to have a large window in the east end also, and thus from early morning till late at night every ray of sunshine falling on the house must enter therein. It is a fact that in this country we do not use glass nearly enough in our poultry-houses, and the 6-inch skylights

conductor of heat and cold. Consequently it is very hot in summer and very cold in winter, and if used alone is objectionable on that account. It is scarcely necessary to say that a chicken-house should be well built. If wood is used, deals 1 inch

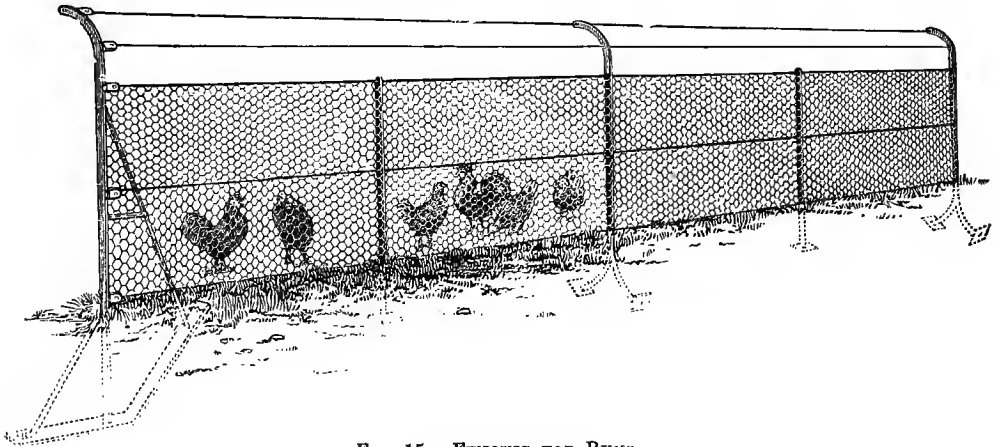


FIG. 15.—FENCING FOR RUNS.
(Barnards, Norwich.)

or 1½ inches in thickness ought to be employed. After they are put together, several coats of tar should be given to make it waterproof and warm. We prefer the width to be not more than 8 feet, as then the maximum of space is obtained for the coops, and a larger surface given for the reception of the sun's rays

and out when the weather is seasonable. It is always well to have a large window in the east end also, and thus from early morning till late at night every ray of sunshine falling on the house must enter therein. It is a fact that in this country we do not use glass nearly enough in our poultry-houses, and the 6-inch skylights

than in a squarer building. Of course, if some existing building is to be employed, it must be adapted in the best manner possible. The floor should be dug out

to be used for hatching or fattening. Upon this shelf the hatching-boxes or fattening-pens may be placed, though we should prefer devoting a part of the house

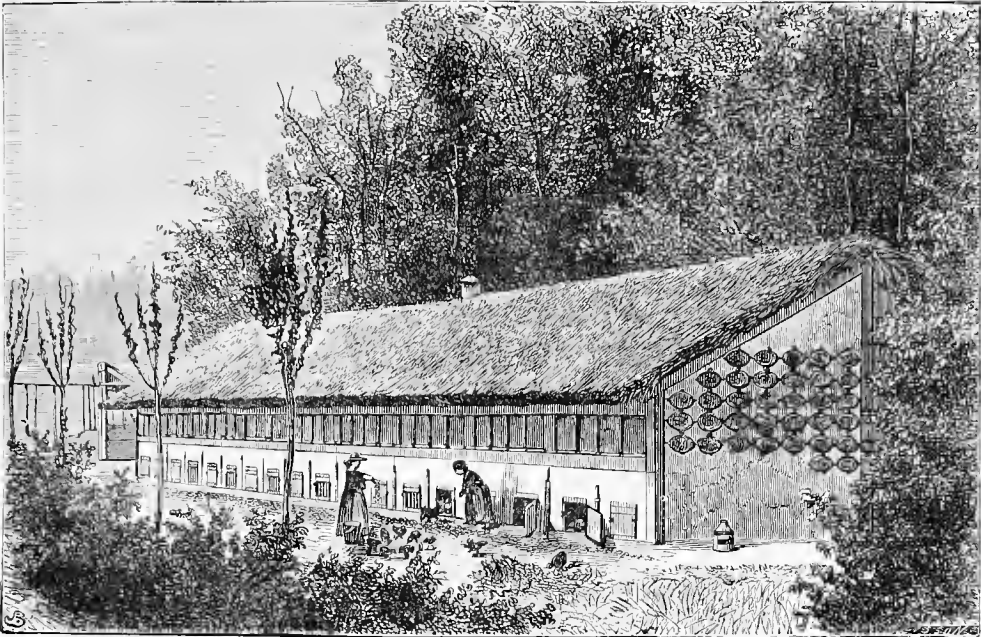


FIG. 16.—MONS. LEMOINE'S CHICKEN-HOUSE.

about a foot, and half filled in with coarse gravel, broken brick, or burnt ballast, and, after being well hammered down, covered over with as much sand or peat moss litter as will raise it 3 inches or 4 inches above the level of the ground outside. Sand will serve without renewal for one or two seasons if it is raked over daily, and dug up once a month, but litter will need to be oftener renewed. Upon no account should a brick or cement floor be employed, and if there already it will be better to have this removed. They are both much too cold for chicken-rearing.

A shelf should be put up against the back-wall of the house, about 3 feet above the ground, if it is intended

to the hatching operations, and having boxes for sitters on the floor. Wherever possible, bushes or trees should be at hand, for not only do they give abundance of shelter to the chickens, but amongst them the young birds will find plenty of insect life, which conduces greatly to their rapid growth.

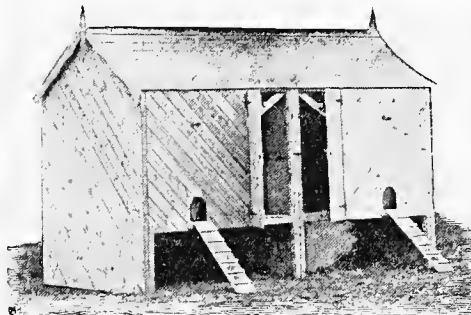


FIG. 17.—DOUBLE POULTRY-HOUSE.
(R. Mallen, Swaffham.)

Fig. 16 gives illustration of house employed by Mons. Lemoine at Crosné (France), one of the most complete we have ever seen. It is thatched, and very comfortable. Each hen has a separate compartment, and the chickens can run about outside at will. In Fig. 17

is shown a house suitable for growing chickens after they are taken from the hen.

CHAPTER VII.

FORMATION OF THE EGG AND CHICKEN.

WHAT IS AN EGG?—MALE BIRD NOT NECESSARY FOR EGG PRODUCTION—SHAPE OF EGG SHELL—MEMBRANES—ALBUMEN, OR WHITE OF EGG—YOLK—PROCESS OF PRODUCTION—SIZE OF EGGS—FORMATION OF THE CHICKEN—ELEMENTS NECESSARY—INFERTILE EGGS—PROCESS OF DEVELOPMENT—FUNCTIONS OF THE YOLK-BAG—EXIT OF THE CHICKEN.



ANY of the most familiar things around us we are most ignorant of, and it will doubtless be interesting to readers to know the process of formation of an egg, for, although this is one of the commonest articles of food, yet there is a great want of knowledge as to its composition and formation. It has been well described as "a mass which forms in the ovaries and oviducts of a large number of animals, and which in a common envelope encloses the germ of the future animal, with the liquids destined to nourish it during a certain lapse of time, when the vital impulse has been communicated to it by fecundation and incubation." This is true so far as fertile eggs are concerned; but though the object of the egg is undoubtedly to envelop the germ, yet impregnation of an egg by this germ has no influence upon the actual laying thereof, and a hen will lay at the proper season independently altogether of her being mated with a male bird. Millions of eggs are laid every year which would never hatch, simply because they contain no germ, not having been fecundated.

It is a very common idea, but an erroneous one, that in order to keep hens laying they must have a cock bird running with them. That such is altogether wrong is easily proved in practice, as there are many who keep fowls without a male bird, and yet have an abundant supply of eggs. This is, of course, different from the case of most animals, for, as a rule, impregnation is the incentive to reproduction; but it must be remembered that an egg with a germ only represents the first stage, and its voidance does not, as in the birth of animals, mean actual appearance of the living being itself. There is consequently a further process for its completion.

HOW AN EGG IS FORMED.

The form of an egg is well known (Fig. 18), with its two diameters, one of its length and one of its breadth,

a small end and a large one. Eggs vary in weight according to the breed and age of the hens, but eight to the pound, or 2 ounces each, is regarded as a fair size. The outer envelope or shell is white or coloured according to the species, and is composed of carbonate of lime, phosphate of lime, and animal gluten. Salts of lime give the shell its hardness, and cause the particles to adhere. Soft eggs are those that have no shell, or which have too thin a shell, and are deficient in salts of lime. Hence the necessity for introducing lime into the food of the fowls. It is surprising where a hen finds all the carbonate of lime necessary, for if she lays 100 ordinary sized eggs in the year, she will have produced about 22 ounces of pure carbonate of lime. Thus, as Mr. P. L. Simmonds, F.L.S.,* observes, if a farmer has a flock of 100 hens, they produce in eggshells about 137 pounds of chalk annually; and yet not a pound of the substance, or perhaps not even an ounce, may be found on the farm. The materials for the manufacture are found in the food consumed, and in sand, pebbles, brick-dust, pieces of bone, etc., which hens and other birds are continually picking from the earth. Their instinct is keen for these apparently innutritious and refractory substances, and they are devoured with as eager a relish as the cereal grains or insects. If hens are confined to barns or out-buildings, it is obvious that the egg-producing machinery cannot be kept long in action, unless materials for the shell are supplied in ample abundance. If fowls are confined in a room, and fed with any of the cereal grains, excluding all sand, dust, or earthy matter, they will go on for a time and lay eggs, each one having a perfect shell, made up of the same calcareous elements. Vauquelin, the distinguished chemist, confined a hen for ten days, and fed her exclusively upon oats, of which she consumed 7,474 grains in weight. During this time four eggs were laid,

* *Journal of the Society of Arts*, December 9, 1887.

the shells of which weighed nearly 409 grains. Of this amount, 276 grains were carbonate of lime, $17\frac{1}{2}$ phosphate of lime, and 10 gluten. Of course, it is more than likely that there was some amount of reserve stock of shell-forming substances in the body ere the hen was shut up, and that if the experiment had been continued longer shell-less eggs would have been laid. Still, it is a fact that there is only a little carbonate of lime in oats.

The shell is porous, or permeable by the air, without which the chick could not live during the process of incubation. The white, fragile, outer envelope is composed of mineral matter, but is not the light, compact covering its appearance would indicate, for it is completely perforated with a multitude of minute holes or pores. When examined by the microscope the shell has a sieve-like appearance, very much resembling the white perforated paper sold by stationers. By means of these holes there is a constant evaporation going on from the time it is laid until it is consumed. This evaporation depends upon the conditions under which the egg is kept, and will vary in accordance with these conditions, being much more rapid in hot weather than in cold, and in warm places than in cool. It is for this reason that eggs are not so easily kept in summer as in winter. If by any means this evaporating process can be stopped, and no other influence of an antagonistic nature be brought into play, the egg remains sound and good

for a great length of time. The substance used to close the pores of the egg must not be soluble in watery fluids, or liable to be readily removed. By means of chemical agencies the holes on the shells of eggs can be closed or filled with lime placed in contact in solution, and the contents preserved sweet and good for months.* With this question we shall deal later on.

Within the shell are two membranes or skins, the outer one of which adheres to the shell, and the inner one slightly to the outer. But towards the large end of the egg the two are separate, and this forms the air chamber. The white of the egg partly consists of

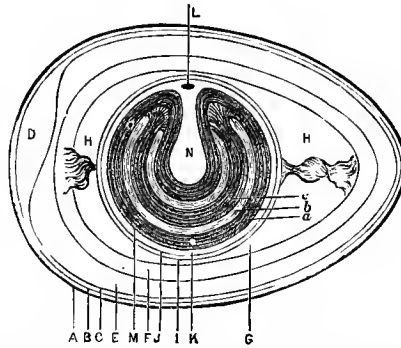
albumen, and is a transparent liquid, free from smell when the egg is fresh, and tasteless. The albumen coagulates on the application of heat at 140° , and is insoluble in water. Chemical analysis has demonstrated that it is composed of carbon, oxygen, hydrogen, azote, phosphorus, and sulphur in various proportions. A part of the oxygen and hydrogen evaporates during incubation, or when the egg gets stale. In the white there are three distinct and separate layers of albumen: the outer (a liquid), the second in which chalazæ terminate, and an inner layer. The chalazæ are two twisted cords of a more dense albuminous character, which have their origin in the outer albuminous membrane, and take the form of a spiral cord in the direction of the longer axis of the egg. They are well known to all eaters of eggs, and are the portions which cooks

take out when beating an egg. They form a ligament by means of which the yolk remains suspended in the midst of the albumen, with the germ floating upwards, and encircled by the thin membrane known as a membrane of chalazæ.

The yolk is the principal part of the egg, and is separated from the white by a very thin enveloping membrane, called the vitelline membrane, and is slightly lighter than the white, filling the upper part of an egg when it is lying on its side. It is the yolk which ultimately furnishes nourishment for the embryo, and its composition is richer than that of the white. It comprises a

layer of white yolk which does not harden even in cooking, and within this are concentric layers of yellow and white, which curve round the utericle, the interior part of which contains the germinative vesicle. When the egg is perfect the vesicle touches the vitelline membrane, at the upper part of which is found the germ, known from its yellowish-white colour.

The yolk is composed of albuminous matters, of organic salts, of vitelline, of colouring matters (a red and a yellow), of phosphoric acid, and of a fatty phosphoric substance of itself sufficient to support the chick during its earlier stages.



SECTION OF AN EGG.—A, the shell; B, membrane adhering to the shell; C, second membrane, slightly attached to B, except at large end of egg, where they separate and form D, the air space; E, the white or albuminous part of the egg (first layer liquid); F, the white of the egg (second layer semi-liquid); G, the inner white; H H, chalazæ; I, outer membrane; J, very fine vitelline membrane; K, the outer part of yolk; L, germ; M, yolk; N, utericle; a b c, separate layers composing the yolk.

FIG. 18.—FORMATION OF THE EGG.

* *Journal of the Society of Arts*, December 9, 1887.

PROCESS OF PRODUCTION.

The process of production of an egg is a most interesting one. The ovum, or yolk, which, as we have already seen, contains the germ in a fertile egg, is generated in the ovary, and so soon as it ripens there is a rupture of the ligament by which it is attached to the ovary. Then, passing down the oviduct, it is first impregnated, coated with layers of albumen, has the chalazæ placed in their proper position, and finally receives the skins and outer shell. As may be easily imagined, this delicate organization is very easily thrown out of gear, more by over-feeding than anything else.

Eggs are produced from what may be termed surplus food, by which we mean such food as is not absolutely required for sustenance of the bird, and if food be given in excess or of too stimulating a nature, the result is, in the one case, that the organs are clogged up with fat, and the egg-laying machinery stopped, or, in the other, that the ova are produced too rapidly. In the ordinary course of things only one ovum should be generated in twenty-four hours, and the fowl ought not to lay more than five or six times a week. If two ova are produced in one day many eccentricities are the result, which puzzle the poultry-keeper. Sometimes the two ova pass into the oviduct together, and then a double-yolked egg is formed. If this egg is set and the yolks have been fertilized, then come some of those freaks of Nature which are communicated as great wonders. Occasionally two perfect chickens are developed and hatched out of one shell, but as a rule only one ovum comes to maturity, and thus we get four-legged or two-headed monstrosities. Another result of over-feeding is the production of one perfect egg within another. This is caused by an irritation of the oviduct, which, contracting in front of the perfectly-formed egg, instead of behind it, forces it back until it meets another yolk, when the two join company, and, again being coated with the white and the shell, produce the wonder spoken of. Soft eggs result from over-fattening food and too little exercise, the ovum passing down the oviduct too rapidly for the secretions to be properly made, or, on the other hand, they may be caused by absolute want of lime, without which, as we have already seen, the shell cannot be properly made. None of these irregularities are found in wild birds, and these must be regarded as a penalty of domestication. But knowing what dangers to avoid, it is then not very difficult to so feed and manage the birds that their organs may work in their proper and natural order. Birds when wild lay very few eggs, and it is only by the handiwork of man that they have been brought to their present productiveness; but it has been gradually done, and with no apparent injury to them. It must, however, be borne in mind that overstepping the boundary soon brings its own punishment, and therefore great care

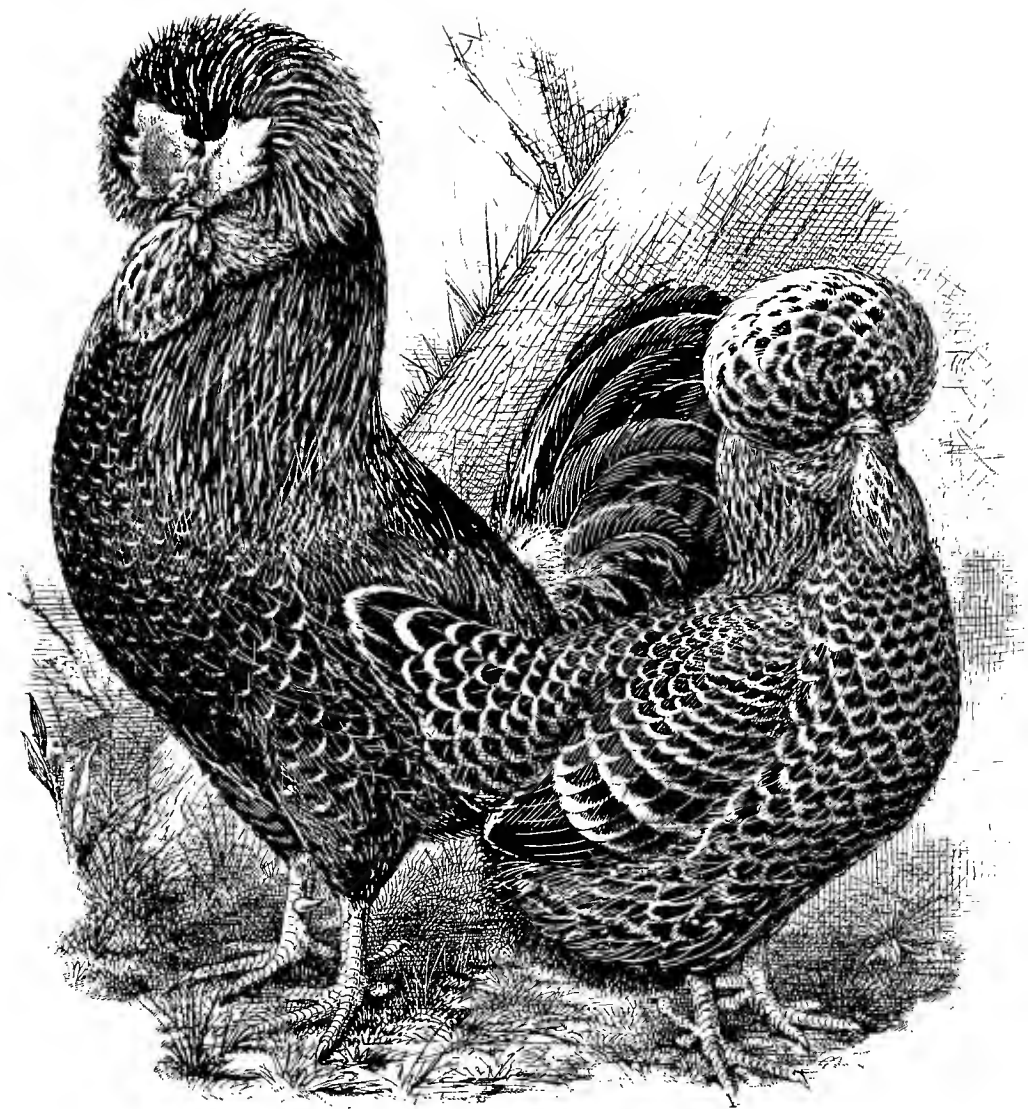
needs to be taken in the feeding of poultry so as to maintain them in full health and vigour.

As will have been seen by the tables already given, there is a great variation in size of eggs laid by different breeds. Nor is this variation relative to the size of body, for many of the largest varieties produce comparatively small eggs, and *vice versâ*. Speaking generally, there is little doubt but that on the whole the size of eggs, and the fecundity of our domestic fowls, has greatly increased within the last forty years. Some varieties may have suffered in both respects, due to close breeding and attention to mere external qualities; but we have many other breeds that have more than taken their places. It may here be mentioned that every egg, whether fertile or not, contains the female germ, but this cannot develop until it is impregnated with the male element. The latter is contained in a cell near the upper end of the oviduct, where is usually a sufficient supply for several eggs, so that a separate impregnation for each egg is not required, as commonly supposed. When fertilized, and whilst passing down the oviduct, the process of incubation really commences, doubtless due to the bodily heat of the hen, and this development is known under the name of segmentation, the single cell partially dividing.

FORMATION OF THE CHICKEN.

The small speck to which reference has already been made contains the embryo chick, and it is one of Nature's great mysteries how this, when subjected to heat and moisture, gradually develops until the fully-formed bird is produced. All the efforts of our great scientists have been baffled in their attempts to discover the secret of generation, and to-day we know little more of this mystery than has ever been known before. We may understand a little better the workings of Nature, and that by observing certain conditions we may expect defined results, but how life is imparted is beyond our ken.

The conditions necessary to the development of a germ are chiefly heat and moisture. Given the presence of embryo within a shell, if proper heat and a sufficiency of moisture are provided, with daily cooling and turning of the egg, these gradually cause development, which results in the appearance of a chicken at the end of twenty-one days. In order that the germ may receive heat, there is a most delicate and beautiful arrangement by which it floats ever to the top. This is secured by the chalazæ, which not only keep the yolk in its place, but weigh down the lower side of it, and however the egg is turned the germ floats at the top. It is for this reason that in working an incubator regular turning of eggs is insisted upon so strongly. When a hen is employed she does the work herself, but if it is not done there is danger that the heat will cause yolk and white to adhere, and as a consequence the embryo dies.



PAIR OF HOUDANS.

Bred by, and the property of, Mr. S. W. Thomas, Cockett, Swansea.

Cock, winner of Cups at Crystal Palace, Birmingham, Worcester, etc.; Hen, winner of two First Prizes at Birmingham, Special at Newport, etc., etc.

Very many addled eggs are so caused by want of being properly turned.

As soon as the fertile egg is subjected to proper conditions, the germ therein at once begins to expand, and within twenty-four hours has very sensibly enlarged. The heat necessary to secure this is between 102 and 106 degrees. Less than the former is not sufficient to bring the germ to maturity, though 100 degrees would start it, and over 106 degrees is most likely, if maintained for several hours, to kill it. Generally we have found that the best plan is to keep the heat as near 103 degrees as possible. That will permit of a little variation without danger, and yet be sufficient to effectually mature the chick.

FERTILE AND INFERTILE EGGS.

A few words here as to infertile eggs will not be out of place to emphasize what has already been stated. By the term "infertile" is meant an egg that has never been impregnated, and consequently one that cannot possibly hatch, for it does not contain an active germ, and without this no amount of heat can develop a chick. The germ must be communicated ere the egg is formed, and must be impregnated, and the egg is meant to be its protecting envelope. The effect of heat upon an egg is to dry up the contents and reduce them to a smaller compass. An infertile egg does not as a rule go rotten, a fact not generally known. Without death there can be no decay, and there cannot be death unless there has been life. Absence of a fertilizing germ means that the contents of the egg are inert and will not become rotten. The only exception to this is when an egg is produced by a diseased hen. On the contrary, when there has been life, but this life has died, all the elements of decay are within the shell, and that which would have been its strength becomes its weakness. The dead embryo—or, if the chick has been more or less formed, the dead chick—begins to decay, and soon the whole contents are a mass of corruption. This fact needs explanation, as many persons have erroneous ideas thereon. We have known purchasers of eggs say, in a tone which indicated that they thought they had been cheated, that the eggs were actually rotten, whereas this fact showed that the vendor had sent eggs which were at all events fertile. Eggs may die at any stage of incubation, but our experience has been that there is most danger between the third and fifth days in the first stage, and between the twelfth and sixteenth days in the second stage.

POSITION OF THE GERM VESICLE.

It is here to be noted that when an egg is properly formed, the germ vesicle always remains on the upper side of the yolk, and at the mouth of the utricule. The reason for this is probably that it may more easily receive the heat necessary to its development. Turn an egg as we like, the germ will be on the upper side.

This fact teaches us, as does the natural method of incubation, that the heat should be applied from above, not below. If the heat has to pass through the yolk as well as white, it will lose some of its power, and at the same time affect adversely the yolk.

INFLUENCE OF THE YOLK.

We must bear in mind the purpose for which an egg's yolk is intended, namely, to feed the chick during the period of its development. Or, as Marshall says: "The embryonic portion is formed from the part of the egg comparatively free from food-yolk, and becomes converted directly into the embryo, while the vitelline portion or yolk-sac, which contains the bulk of the food-yolk, does not give rise directly to any part of the embryo, but forms a store of nutriment at the expense of which the development of the embryo is effected. At first the embryonic portion is very much smaller than the vitelline portion or yolk-sac, but, inasmuch as the embryo grows by absorption of the food-yolk, the yolk-sac diminishes as the embryo increases in size. A time comes when the two are about equal in bulk, and in the later days of incubation the yolk-sac is much smaller than the embryo. By the twenty-first day of incubation the yolk-sac is almost completely absorbed."*

When a fertile egg has been laid, it will be found that the result of what is called segmentation, really a commencement of formation of the embryo due to the heat of the hen's body, has been to form a minute cap over the germ vesicle, on the under side of which is a number of cells. These have no form indicative of their later use, but are very distinct, and under the microscope show various characters. So soon as sufficient heat is applied, the process, suspended in the meantime, resumes its operations.

FIRST DAY OF DEVELOPMENT.

During the first twenty-four hours the embryo develops those parts which afterwards become some of the leading organs of the body, notably the head, the vitelline vein, and neural fold and groove. But at this period it is not easy to distinguish between the embryo itself and the surrounding part, known as the area pellucida. Thus early in the period is formed the amnion, which may detain us briefly. This is a peculiar membrane enveloping the embryo, and forms a cavity in which this lies. It is made in folds, and "when the several folds meet and coalesce above the embryo, they unite in such a way that all their inner limbs go to form a continuous inner membrane or sac, and all their outer limbs go to form a similarly continuous outer membrane or sac. The inner membrane thus built up forms a completely closed sac round the body of the embryo, and is called the amniotic sac, or

* "Vertebrate Embryology," by A. Milnes Marshall, M.D., D.Sc., etc.; London, 1893.

amnion proper, and the fluid which it afterwards contains is called the amniotic fluid, or *liquor amnii*. . . . The outer sac over the embryo lies close under the vitelline membrane, while its periphery is gradually extended over the yolk as the somatopleuric investment of the yolk-sac. It constitutes the false amnion, while the membrane of which it forms a part is frequently known as the *serous membrane*.*

SECOND DAY.

During the second day the sections of the embryo begin to take a more definite form, and various organs commence to assume something of their ultimate shape. The head now becomes more prominent, and grows more rapidly than the remainder of the body, for during the earlier stages there is no relation in size between head and rest of the body, as will be the case later on and after hatching. It may be mentioned that the embryo is firmer and more definite in type than was the case earlier on. It must be explained that up to this point the head is straight, and it is not until later that it assumes the shape afterwards maintained.

It may be stated that between the twenty-fourth and twenty-third hours the front end of the neural canal dilates into a small bulb, whose cavity remains continuous with the rest of the canal. This bulb is known as the first cerebral vesicle, and makes its appearance in the early hours of the second day. From its sides the two optic vesicles grow out. Behind the first cerebral vesicle two others make their appearance very shortly after the first, and still further back two shallow pits are to be seen, the auditory pits constituting the initial stages of the organ of hearing.

The heart is at the first really formed within the head-fold, where the throat will afterwards be found, though that organ has not yet appeared. The heart soon begins to beat, at first slowly and infrequently, but soon assuming more frequent pulsations. Connected with it are the veins, which will be more fully dealt with when we describe the vascular system, but it may be mentioned that during the latter half of the second day the blood begins to flow.

With further reference to the head and brain, Balfour states that "at the beginning of this (second) day the front end of the medullary canal was dilated into a bulb, the first cerebral vesicle, which by budding off two lateral vesicles became converted into three vesicles: a median one connected by short hollow stalks into a lateral one on either side. The lateral vesicles, known as the optic vesicles, have become converted into parts of the eyes; the median one still retains the name of the first cerebral vesicle." On examination, wrinkles are discerned in the head which "vary a good deal in appearance, and shift from time to time, but eventually, before the close of the

* "Elements of Embryology," by Foster and Balfour; London, 1893

second day, after the formation of the optical vesicles, settle down into two constrictions, one separating the first cerebral vesicle from that part of the medullary canal which is immediately behind it, and the other separating this second portion from the third. So that instead of there being one cerebral vesicle only, as at the commencement of the second day, there is now, in addition to the optic vesicles, a series of three, one behind the other; a second and third cerebral vesicle have been added to the first." Towards the end of the second day the fore-brain, with its optic and cerebral vesicles, becomes slightly bent downwards, so as to form a rounded obtuse angle with the rest of the embryo. This is the head-fold, about which more will have to be said.

During the second day of a chick's development is found the first trace of the allantois, a temporary arrangement effecting most important functions during the period the embryo is within the shell, and assuming a more prominent form during the third day. It is part of the alimentary tract with which it opens immediately in front of the gut, which tract is formed by the primitive streak already referred to. "At first it is enclosed within the hind-gut, but on the fourth day begins to pass out beyond the body of the chick, and eventually spreads out over the whole body. On the first half of the fourth day the vesicle is still very small, and its growth is not very rapid. Its mesoblast wall still remains very thick. In the latter half of the day its growth becomes very rapid, and it forms a very conspicuous object in a chick of that date. At the same time its bloodvessels become important. It receives its supply of blood from two branches of the aorta, known as the allantoic arteries, and the blood is brought back from it by two allantoic veins, which run along in the body walls, and, after uniting into a single trunk, fall into the vitelline vein close behind the liver" (Balfour). By the ninth day the allantois has grown enormously, and has spread over the back of the embryo, and quite halfway round the interior of the egg-shell. It lies close to the shell, and is the medium through which the respiration of the embryo is effected. On the twentieth day the allantois dries and shrivels up, and as the chick steps into the outer world it is cast off.

THIRD DAY.

It is usually recognised that the third day is the most important of all, in that so many of the new organs now begin to make their appearance. "On opening an egg on the third day the first thing which attracts notice is the diminution of the white of the egg. This seems to be one of the consequences of the functional activity of the newly-established vascular area, whose bloodvessels are engaged either in directly absorbing the white, or, as is more probable, in absorbing the yolk, which is in turn replenished at the ex-

pense of the white. The absorption, once begun, goes on so actively that by the end of the day the decrease of the white is very striking" (Balfour).

It will be remembered that during the second day of development we saw a commencement of the head-fold, and this change proceeds rapidly during the third day, by the end of which it is entirely folded over, the optic vesicles coming to the centre, as shown in Fig. 19, drawn from a series of excellent photographs from Nature, taken by Mr. Charles Hearson, of Regent Street, London, to whom I am indebted for this and Fig. 20. At first they are comparatively small, but steadily increase in size, finally assuming the prominence and position to be retained during life. The shape assumed by the head has to be modified, for the brain-pan has yet to be filled, the beak and mouth to be formed, although the nostrils and ears are well established. The head is really the first part of the body to assume its shape, and in the earlier stages is disproportionately large, as compared with the rest of the body. The formation of the eye is one of those wonderful processes so prevalent in natural operations, in which the needs of the future animal are provided for by a multitude of marvellous growths and evolutions. To attempt a description of these would involve more space than can possibly be afforded.

The nostrils or organ of smell is found to appear during the third day, at first being two depressions in the under surface of the head, immediately in front

of the eyes. During the same period we find the alimentary canal forming with great rapidity, and this is to some extent connected with the tail-fold, in itself very similar to the head-fold, so far as the method of formation is concerned. Thus, we have the initial stages of the digestive system. And also lungs, liver, and kidneys are found to grow, even though at first very diminutive. All this time, in fact from an early period, the nerves are exerting a very important influence in the bird's structure.

FOURTH DAY.

Coming to the fourth day, and especially the latter portion of it, we find that there has been very rapid progress, an increase of size in the embryo being very

manifest. At the same time the white of the egg has diminished still more, and the embryo is lying almost in immediate contact with the shell. The vascular area by this time is nearly an inch in diameter, and there is a great increase in the quantity of blood circulating through the vascular area. It is not necessary that we should say more respecting the head, other than to indicate that the various parts are quickly assuming a definite form. But the most striking feature to be noted is the growth of the body proper, from which the limbs begin to spring on the fourth day, though they can be very slightly traced towards the end of the third day. At first they are simply conical buds projecting outwards, covered with a sort of cap. The front-limbs are longer and narrower than the hind-limbs, which are comparatively short and broad. The vertebral column is now taking more definite form, but not until the fifth day do we find it anything like complete. And towards the end of this day is formed in

the embryos of both sexes a duct, which in the female forms the oviduct, but is not needed in the male, and consequently disappears.

It is generally conceded that during the fourth day the generative organs also begin to appear, but as yet they are very indistinct, and not until a later period can their distinctive features be determined. Upon this point there is comparatively little real information. Apparently at first they are identical, and at this period are termed primordial ovum, the first traces of the male organ

being discernible about the sixth day. What are the influences towards the determination of sex do not yet enter within the range of exact science, and, being speculative, are outside our present purpose.

FIFTH AND LATER DAYS.

By the fifth day "the limbs have increased, especially in length; in each a distinction is now apparent between the more cylindrical stalk and the flattened terminal expansion; and the cartilaginous precursors of the several bones have already become visible. The fore and hind limbs are still exceedingly alike, and in both the stalk is already beginning to be bent about the middle to form the elbow and knee respectively. The angles of both knee and elbow are in the first

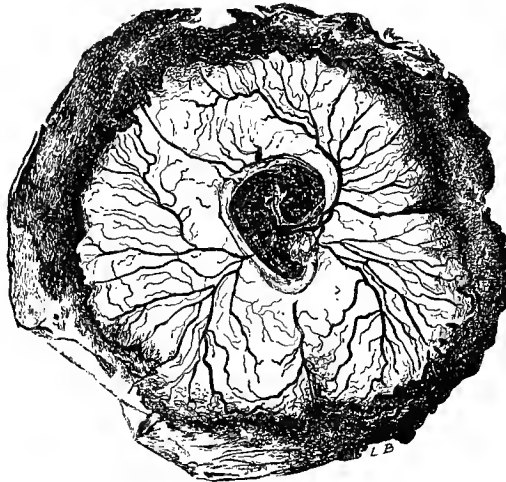


FIG. 19.—EMBRYO (THIRD DAY).

instance alike directed outwards and somewhat backwards. By the eighth day, however, the elbow has come directly backwards and the knee forwards. In consequence of this change the digits of the fore-limb point directly forwards, those of the hind-limb directly backwards. This state of things is altered by a subsequent rotation of the hand and foot on the arm and leg, so that by the tenth day the toes are directed straight forwards, and the digits of the wing backwards and somewhat ventralwards, the elbow and knee almost touching each other. . . . By the tenth day the fore and hind extremities, save for the absence of feathers and nails, are already veritable wings and feet" (Balfour).

The development of the chicken from the sixth day to its appearance from the shell does not require so much description, as it is to a large extent but growth to proper size of the various organs. There are, however, various features which are of very great interest and deserve our study.

One of the proofs of the evolutionary theory is that embryos are so much alike in the earlier stages. Striking and numerous as are the features which render the class Aves one of the most easily recognisable in the whole animal kingdom, the embryo of a bird does not materially differ from that of a reptile or a mammal, even in the points of structure which are most distinctly avian. It may, it is true, be possible to infer, even at a comparatively early stage, from some subsidiary tokens, whether any given embryo belongs to this class or that (and, indeed, the same inference may be drawn from the ovum itself), but up to a certain date it is impossible to point out in the embryo of a fowl the presence of features which may be taken as broadly characteristic of an avian organization. This absence of any distinctive avian differentiation lasts in the chick, roughly speaking, till the commencement of the sixth day. We do not mean that on the sixth day all the organs suddenly commence to exhibit peculiarities which mark them as avian.

There are no strongly-marked breaks in the history of development; its course is perfectly gradual, and one stage passes continuously into the next. The sixth and seventh days, however, mark the commencement of the period in which the specialization of the bird begins to be apparent. Then for the first time

lighter-shaded lines below indicate all that is left of the white. By this time the body walls are definitely formed, and rudiments of the feathers are already present. "The head is still disproportionately large, and the eyes are of enormous size. The beak, which was absent in the earlier stages, has now grown out from the front of the face, and at once gives the head a distinctly avian appearance. The neck is long and slender. The body is much more bulky than before, largely owing to the great size of the heart and liver. The limbs have greatly increased in length, their several segments are well established, and the division of the distal ends into fingers and toes is very evident. The white of the egg has disappeared, a thick and very viscid mass alone remaining at the lower surface of the egg. The yolk-sac is still large, but its walls are flabby owing to the absorption of a large part of its contents as food by the embryo" (Marshall).

From this time onwards the principal business of the chick, for such it may now be termed, is to grow, and it only remains necessary to indicate a few of the changes which take place, bringing about the distinctive type of the species and variety.

As already seen, the feathers begin to appear on the ninth day. Then the sacs in which they are contained commence to force their way through

the skin, and by the thirteenth day these are found all over the body, to the length of a quarter of an inch, and can be recognised as feathers by the naked eye. They, however, remain in the sacs until hatching, when these sheaths burst and are thrown off.

On the eighth day the beak begins to show itself, first as a chalky-looking mass, which by the twelfth day has developed into a horny beak, though still soft. It is not until the thirteenth day that the nails take their form, and by the sixteenth day these, together with the beak, harden considerably.

About the sixth day movements can be discerned in the embryo, but these are comparatively slight until the fourteenth day, for it retains the same position all this time, namely, the body is at right angles to the long axis of the egg. At the period named a definite change of position is to be noted, for the bird now moves so that it lies lengthwise in the egg, its beak touching the inner shell membrane, the air space at the broad end having greatly increased in size. This is the position a chick must occupy in order to make its way out of

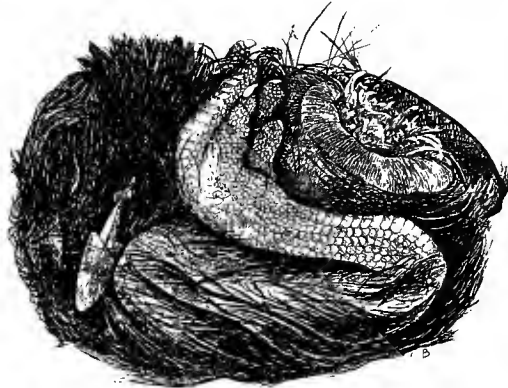


FIG. 20.—CHICKEN IN SHELL (IMMEDIATELY BEFORE HATCHING).

the shell, for if not so placed we shall have a false presentation, and probably inability on the part of the chick to make its way out.

By the twentieth day the chick has grown so as to fill all the shell except the air space. The position is very beautifully shown by Fig. 20, drawn after Nature, and from which the shell and membrane have been removed. By this time the yolk has been almost entirely absorbed, and what remains in the sac is drawn into the body, the walls closing over it at the umbilicus. This yolk serves to supply the chick's need for twenty-four to thirty hours after hatching, for Nature always provides in this manner for the first separate existence on the part of its creatures.

PROCESS OF HATCHING.

We have only now to describe the actual process of hatching. When ready for this work, the chick has only to lift its head and pierce the inner shell membrane, which it can easily accomplish under normal conditions, when it at once commences to breathe the air contained in the chamber. The doing so causes

the pulmonary circulation to become functionally active, and the blood now ceases to flow through the umbilical arteries. As a result the allantois shrivels up, its purpose having been served. The head is lifted into the air-chamber, and the chick has now room to deal blows upon the shell, which repeated upon the same place result in fracture of the shell. Turning round a little, this process is repeated, and so on until the shell is broken round about one-third from the broad end. When completed, by pressing its head against the broad end and its feet against the other portion, it is enabled to throw off the shell, and so it steps out into the world.

Briefly stated, we have here the process of development, but whilst we can observe and describe many of the processes taking place within the shell, the mystery of life itself, as of the influences which give us the great divergences of type in our fowls, are still among the great secrets of Nature, who seems to say, and in no hesitating manner, "Thus far shalt thou go, and no further." We may speculate in this direction, but of positive knowledge there is comparatively little.

CHAPTER VIII.

ANATOMY OF THE FOWL.

SPECIAL CHARACTERISTICS OF BIRDS—SKELETON—STERNUM—SCAPULA AND FURCULA—WINGS—LEGS AND FEET—
 HEAD — DIGESTIVE ORGANS — CRCP — GIZZARD — INTESTINES — VASCULAR SYSTEM — RESPIRATORY ORGANS—
 OVARIES—SENSES.



HERE are five special characteristics which distinguish the skeleton of birds from that of mammals (Fig. 21): (1) The greater lightness of bone, many of the bones containing large air cavities, in order that the bird may be able to rise in the atmosphere, not only by reason of the reduced weight to carry, but also that the air cavities aid in the flight. (2) The marked tendency of bones, at first distinct, to fuse with one another in the adult. This is present to a certain degree in all animals, but to a lesser extent in mammals than in birds. If we compare the head-bones of a chicken with those of a fully developed fowl, we find a marked proof of this fusion. (3) Modifications in the limb-girdles and limbs, fitting the bird both for walking and for flight. (4) Great length of vertebral column, with elongation and flexibility of neck, the neck being equal in length to rest of the column. (5) The rigidity of the body proper, which in itself has practically no movements.

SKELETON.

The body itself differs from that of mammals, as it is broad in front and narrow behind. The backbone is flat, and, together with the vertebræ of the neck, contains the spinal column, but at the posterior end is a continuation known as the pelvic girdle, which consists of three bones, and the whole is spoon-shaped on its inner side, widening out at the back. Below the ilium, next to the body proper, is a depression in which the kidneys lie. The caudal vertebræ has a terminal, called the pygostyle, holding the sickle feathers of the tail. From the backbone spring the ribs, of which there are seven on each side; two of these, the cervical ribs, are short, and not attached to the breastbone, or sternum; the other five, known as the thoracic ribs, turn backwards at first, and then reverse, joining the sternum, the vertebral portions being thicker than the sternal.

STERNUM.

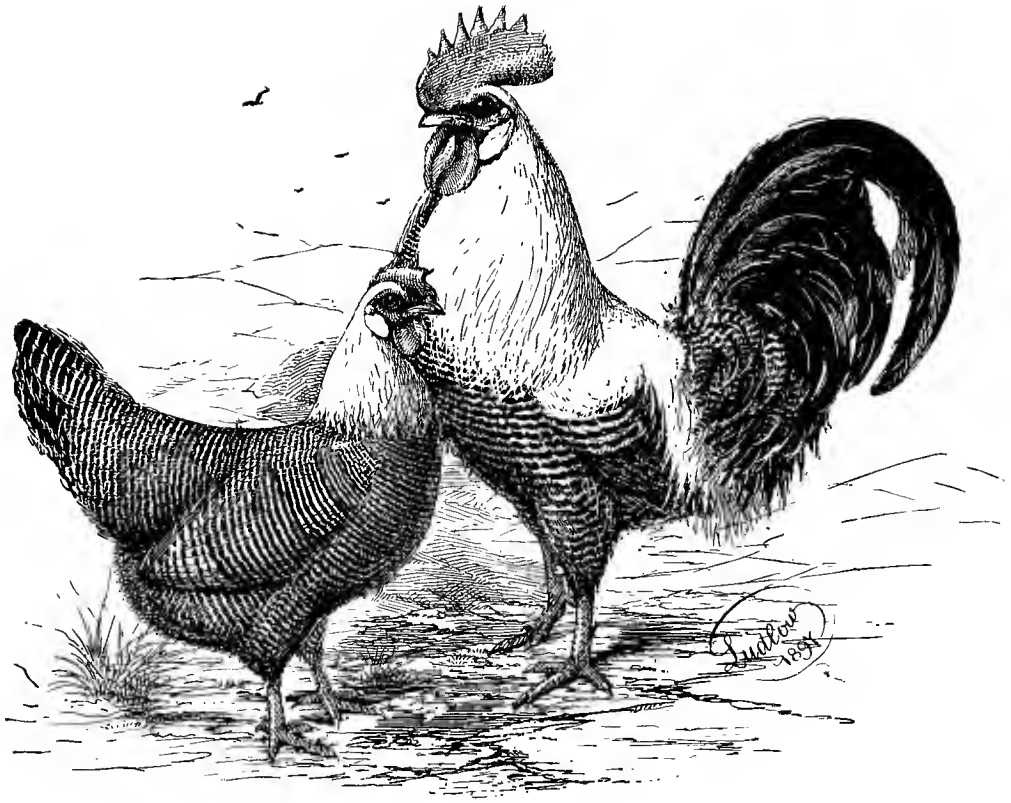
The sternum, or breastbone, is very large, and projects back far beyond the ribs, and over the greater part of the wall of the abdomen. This is a spoon-shaped blade of bone, wide and stout in front, narrowing in the middle portion of its length, but widens somewhat behind, forming a protection to the chief organs, which lie in the cavity between it, the backbone and ribs. The keel is a prominent narrow blade attached to its outer side, slightly thickened in front, its depth depending upon the size of the wings. The object is to accommodate the muscles which work the wings. In some breeds it is greatly abbreviated, due to small wings, and where this is the case the quantity of muscle, or flesh, carried on the breast is relatively small.

SCAPULA AND FURCULA.

Connecting the sternum with the shoulder is a stout straight bone, the point of connection being termed the scapula, known as the coracoid, near which are two clavicles, a pair of slender curved bones, whose upper ends are slightly expanded, forming the furcula, or merry-thought. This furcula is a spring used in working the wings, and it varies in accordance with their size.

WINGS.

The wings of a bird correspond to the fore-limbs of animals, but are carried upon the body. When folded in a position of rest, the three parts are bent on each other like the letter Z, the elbow pointing backwards and the arm upwards. The humerus, or bone of the arm, is single, slightly curved, and expanded at both ends; the forearm has two bones: the radius, slender and nearly straight, and the ulna, much stouter and slightly curved, the two joining at either end; the wrist connects with the manus, or hand, in which can be distinguished a thumb and two fingers, more or less rudi-



PAIR OF SILVER CAMPINES.

Bred by, and the property of, M. Ch. Moons de Coen, Calmpfont, Antwerp, Belgium; Commandeur de St. Sépulchre, Membre de la Société Nationale pour l'amélioration de l'Aviculture en Belgique, etc., Membre de la Société Nationale d'Aviculture de France.

mental. This mechanism, together with the feathers, is the basis of an instrument of locomotion. On the posterior border of the hand, forearm, and arm are the wing feathers, the length of which diminishes nearer the body.

LEGS AND FEET.

The hind-limb, or leg, is formed for walking and perching. It is long, and composed of a femur, or thigh-bone, a cylindrical, slightly curved shaft with enlarged ends; of a tibia, or leg-bone, large, stout, and nearly straight, though in some breeds it is much heavier than in others; of a stout straight bone, known as the tarso-metatarsus; of an ankle-joint; and of four or five digits, or toes, attached to the foot. Four toes is the regular number, but several breeds have five. These toes are: the hallux, or great toe, behind, and the second, third, and fourth toes in front, the third being largest. Each is fitted with a claw. A fowl walks on its toes, not feet, and they have great power in gripping. The spur of the cock is a small, irregular nodule of bone, varying in size, and intended for defence. The thigh is covered with muscle and sinew, differing in quantity, according as a fowl chiefly uses its pedal limbs or wings.

HEAD.

A fowl's head is small in relation to other parts of its body, with which it is connected by a long, thin column of vertebrae.

The characteristics of a bird's skull are: (1) Its great lightness; (2) the marked tendency of the bones of the cranium to fuse together, most of the cranial sutures being closed, and the two outlines of the bones obliterated by the end of the first year; (3) the large size of the orbits, or eye spaces, these being separated by a thin vertical plate; (4) the prolongation

of the face forward into a conical toothless beak. The head is composed of two parts: a cranium and a face. The cranial portion is a somewhat conical box of bone, the base of the cone forming the hinder part of the skull, and the apex being directed forwards. In the aperture thus formed is placed the brain and eyes. The beak is divided into a superior, or upper, and an inferior,

or under, mandible. The jaw, or superior mandible, has, owing to a peculiar union with the cranium, a mobility which is not seen in mammalian animals. The two nostrils are small, and the olfactory capsules remain cartilaginous throughout life. The nasal cavities are separated by a thin piece of bone, and open into the interior of the mouth by a simple slit, long, narrow, and longitudinal, and furnished with small indentations. This slit opens when the bird's head is turned downwards, or in its natural position, and shuts when raised. It is for this reason that fowls when they drink are obliged to raise the head, otherwise the water would run out of the nostrils. The lower mandible is slightly shorter than the upper. Fowls have no teeth in either the upper or lower mandible. The brain is situated in the back part of the skull.

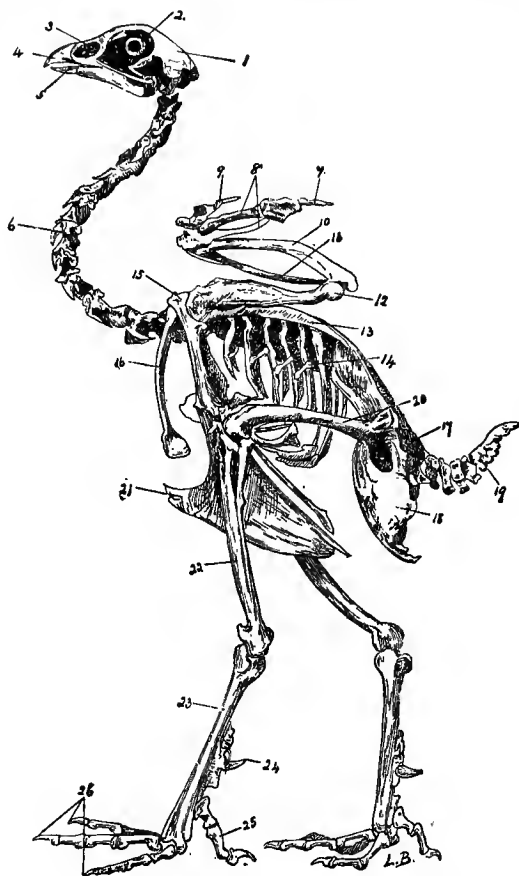


FIG. 21.—SKELETON OF THE FOWL.

- | | | |
|---------------------|-----------------------|-----------------------|
| 1. Skull. | 10. Ulna. | 19. Pygostyle. |
| 2. Eye Cavity. | 11. Radius. | 20. Femur Bone. |
| 3. Nasal Cavity. | 12. Humerus. | 21. Sternum, or |
| 4. Upper Mandible. | 13. Backbone. | Breastbone. |
| 5. Lower Mandible. | 14. Ribs. | 22. Tibia. |
| 6. Vertebrae of the | 15. Scapula. | 23. Tarso-metatarsus. |
| Neck. | 16. Clavicles (Merry- | 24. Spur. |
| 7. Digit. | thought). | 25. Back Toe. |
| 8. Bones of Hand. | 17. Acetabulum. | 26. Toes. |
| 9. Digit. | 18. Ischium. | |

DIGESTIVE ORGANS.

Dr. Lardner thus describes the digestive organs of birds.* The cesophagus at the lower part of the neck enters

the first stomach, called the crop, which is an enlarged pouch enclosed by membranous walls, the form and magnitude of which differ in different species.

* "Handbook of Animal Physics," p. 483. London: Lockwood and Co.

CROP.

The crop is most developed in granivorous birds, less so in birds of prey, and is altogether absent in the ostrich and most piscivorous birds. Immediately below the crop there is a contraction of the canal, followed by the dilatation called the *ventriculus succenturiatus*.

GIZZARD.

Although this enlargement is not considerable, it plays an important part in the phenomena of digestion, its sides being covered with glandular follicles, which secrete a juice analogous to the gastric juice. This ventricle is larger in birds which are destitute of the crop than in those which have that organ. This second stomach is succeeded by a third, the gizzard, in which the chymification of the food is completed. This part of the digestive apparatus is furnished with a muscular tunic, which has great thickness and power in granivorous birds. In the ostrich its strength is so great that the hardest substances are crushed by it. It seems to be endowed with the functions of an apparatus of mastication. The intestine which follows this consists, as in mammals, of a small and large tube of different lengths, the former being much the longer and coiled up in folds, as in mammals. At the point where the small enters the large intestine, two tubes, called cæcums, enter it, which are closed at the upper ends. These are generally long and large in granivorous and omnivorous birds, but little more than rudimentary in birds of prey.

INTESTINES.

The thorax and the abdomen are not, as in mammals, separated by a diaphragm muscle; and the liver, which is very voluminous, fills the chief part of both cavities. It is divided into two lobes nearly equal in size, from which issue two ducts, which, after uniting, open into the intestine. There is generally a gall-bladder, which receives a portion of the bile, pouring it into the intestine by a separate canal.

The pancreas is lodged in the first fold of the small intestine, and is generally long, narrow, and more or less divided.

The spleen is small, and its uses are as little known as in the case of mammals. The kidneys, on the contrary, are very voluminous, irregular in form, and lodged behind the peritoneum in several cavities formed along the superior part of the pelvis. They do not, as in mammals, possess a distinct cortical substance. In that part of the great intestine which corresponds to the rectum, there is an enlargement called the cloaca, into which the liquid secreted by the kidneys is discharged, and mixed with excrements expelled from the intestines.

The nutritive products of digestion, as in mammals, pass from the intestines into a system of lymphatic vessels connected with it, which converge into two thoracic ducts, which discharge their contents into the jugular veins at each side of the neck.

VASCULAR SYSTEM.

The vascular system of fowls consists of a heart with four chambers, from which the blood is distributed by means of arteries. The blood is about 2° warmer than that of mammals, due to the fact that the body heat is retained by the feathers, which are bad conductors.

RESPIRATORY ORGANS.

Respiration is secured by lungs, which are fixed to the back of the fowl, and maintained below by a resisting membrane, which, in order to secure the inhalation and exhalation of air, is moved by muscular power. The lungs are pierced with holes, and thus the air is able to circulate all over the body, even to the bone cavities. The trachea, or windpipe, is long, which, together with the bronchi, has cartilaginous rings. The lungs themselves are surrounded by air-sacs, forming reservoirs, and there are others, nine in all, in the breast and lower part of the abdomen. These give a lightness to the body, and enable birds to rise easily from the ground.

OVARIES.

In the hen are two ovaries, but it is found that only one is active at the same time. In appearance the ovary is not dissimilar to a bunch of grapes, the ovary varying in size from small specks to full-sized yolks, when the bird is productive. As each ovum comes to its full maturity, the process of filling the yolk-sac having been in operation for some time, there is a rupture of the ligament by which it is attached to the ovary, and it falls into the open mouth of the oviduct, a tube about 2 feet in length, and during its passage down this tube it is first impregnated with the male element, and then coated with successive layers of albumen, with the two shell membranes, and finally with the shell, the whole process taking about eighteen hours. At first the germinal vesicle is situated in the centre of the ovum, but as it increases in size it rises towards the upper side. The male reproductive organs (testicles) are two in number, and are found in front of the kidneys.

SENSES.

The brain of fowls is well developed, but the various senses vary very much from those of mammals. The skin is not sensitive, due to the fact that it is covered with feathers. These feathers are composed of a stem with a hollow base, and inserted in a bulb, and attached to the stem are barbs, covered with down, hardly visible, however, to the naked eye. Taste and smell are neither very keen, the tongue being the most sensitive in this respect. Still, at the same time, fowls reject those things which are objectionable to them, but probably this is more due to sight and memory than from any other cause. The sight of poultry, as of all birds, is very piercing. They are also very acute in hearing.

CHAPTER IX.

MANAGEMENT OF BREEDING STOCK AND THE SITTING HEN.

EFFECTS OF DOMESTICATION—CAUSES OF INFERTILITY—ESSENTIALS TO SUCCESS—NUMBER OF HENS WITH COCK—ELEMENTS IN HATCHING—EAST WINDS AND HATCHING—PLACES FOR HATCHING—HATCHING-BOXES—HATCHING-ROOMS—OUTSIDE FEEDING-CAGES—MAKING THE NEST—COOLING EGGS AND FEEDING HENS—DAILY EXAMINATION—HATCHING BY TURKEYS—HATCHING REGISTER—TESTING THE EGGS.



NATURE is a marvellous mother. In all her steps every provision is made for the well-being of creatures born into the world, and no study presents more features for investigation than the production of animal life. There are no wheels missing in this machine, no methods which we could improve upon. There is a completeness which utterly puts to shame all the inventions of man. And with respect to the formation of chickens in the shell, there is nothing more wonderful within the whole realm of Nature. When we look at an egg we are astonished at its form, its symmetry, its strength; but we could never imagine, if we did not know, that the white within an egg contains all elements to form a chicken, and that the application of heat and moisture will produce from it bone, flesh, and feathers, all of which need many various materials in formation. They are produced in different fashions, and, we could almost say, under different conditions.

It must be remembered, in approaching this subject of incubation, that by domestication we have altogether altered the environment of fowls, and we therefore must expect that the same results will not be secured as under natural conditions. Too much is, we think, made of the "copying Nature" theory. The whole aspect of things has been changed, and what would be perfectly suitable in one case is altogether unsuitable in another. Eggs laid by birds in a wild state, so far as our observations go, seldom fail to hatch. But this does not prove that eggs laid by domesticated fowls would hatch as well if set in the same way. It cannot be gainsaid that domestication has resulted in a weakening of constitution, but it has brought an increase of size in all breeds except Bantams, and a stimulation of the laying faculty. Careful poultry-keepers do all they can to overcome this weakening of constitution,

in some cases by allowing full liberty, but it appears to be utterly impossible to obtain the same surety in hatching as is met with in wild fowls.

CAUSES OF INFERTILITY.

In the first place, eggs are less fertile, for an infertile egg would be a *rara avis* in a wild bird's nest. The cause of this infertility may possibly be due to the larger number of eggs produced by birds in domestication, but it also arises from reduced vigour of the male bird. Then, again, a very large number of eggs are lost during the process of hatching by their becoming addled—that is, the germ in the earlier, or the chick in the later, stage dies. Such fatality may be due to several causes, such as want of strength in the embryo, caused by reduced vitality in the cock, already mentioned, to improper conditions under which the hatching is carried on, to want of moisture, or to lack of attention on the part of the hen. One reason why wild birds seldom desert their nests is, that they do not commence sitting until the proper season has arrived, and consequently there is not the same risk of changes in the weather. Also, a hen knows by her instinct what kind of place is most suited to her nest. This might at first be thought to be conclusive that hens should be allowed to sit where they like. But we must remember that domestication has enormously increased the number of fowls, and, therefore, what would be best for them in a wild state, where the nests are few and far between, is not equally so when they are numerous. And, again, if we wish to make poultry-keeping really profitable, it is necessary that hatching should commence early. Therefore, if we permitted the hens to sit just when and where they thought fit, it would mean our being too late. Almost every poultry-keeper who desires to obtain early stock has to depend upon other than his own yard for broody hens early in the year,

or upon an incubator; for if he relies upon his own stock, unless he keeps a breed that makes sitting the rule of life, he will not be able to secure sitters when he needs them. In this point the letting alone, or so-called "natural," system does not work advantageously.

ESSENTIALS TO SUCCESS.

In the sitting of hens there are several things essential to success. We do not mean by this that unless these are observed hatching is impossible, for we have known eggs hatch under the most untoward conditions, and in spite of most disadvantageous circumstances. But such a state of affairs must not be reckoned upon. The first essential to success is vigour and stamina of the stock birds. The dangers of in-breeding have already been pointed out, and one of the most frequent results of this close breeding is that very large numbers of the eggs produced are infertile, or become addled, or die during the early stages after hatching. Many instances could be cited in proof of this contention. Vigour in the stock birds is absolutely necessary, if the progeny are to be healthy and strong, and we require strong, healthy, untainted birds upon good runs.

NUMBER OF HENS WITH THE COCK.

Another matter which requires attention is that there shall be enough, yet not too many, hens running with the cock bird. It is generally known and accepted that too many hens with a cock bird will result in a large number of infertile eggs or of weakened chicks, but there are not many who understand that the same result may be due to the hens being too few. All depends upon the breed and the vigour of the male bird. Some of the more vigorous breeds need from six to twelve hens, according to the season of the year, and less would be hurtful to the hens; whilst there are others, less vigorous, for whom six hens would at any time be too many, and in the colder season two or three are sufficient. There is, of course, also a difference in individual hens of the same breed, and no certain rule can be given that will apply to every case. The best plan is to give the heavier varieties three hens early in the year, increasing up to six as the weather becomes milder; and in the case of the lighter and more vigorous varieties, giving five or six at first, and increasing the number to ten or twelve. If the hens seem to be distressed, and show this by the loss of feathers on their backs, then more hens should be given at once. There is also another cause of infertile eggs, and one which is often unsuspected, viz., that the cock bird does not get sufficient food. His gallantry to the ladies of his harem leads him to see that they are all fed before he partakes of any food, and if there is only a limited supply, or they are fed by an attendant who only throws down as much as the birds appear to eat greedily, then the probabilities are that he will not get

half enough to eat. This is a matter which needs attention, and often explains the laying of infertile eggs.

ELEMENTS IN HATCHING.

Heat, moisture, and occasional cooling are the factors at work in the production of chickens. Heat is, of course, supplied by the hen, who also, if she be a good sitter, will see to the cooling, though, as a rule, it is better not to trust entirely to her for this. But moisture is beyond her control if the place of sitting is allotted to her. In some districts there is no trouble whatever on this score, as the atmosphere is naturally charged with sufficient for the needs of eggs. But in others very great care has to be taken, or dryness of the atmosphere will be fatal to successful hatching. Seasons also differ. A very dry spring will demand more attention being given to the question of moisture than a moist one, and thus the poultry-keeper has to use his brains if he wishes to be successful. There is another influence which must be referred to, as it is a most important one to all those whose places are subject to cold easterly winds. It needs no description to impress this fact upon most poultry-keepers. What is the influence of east winds upon our fowls and their eggs has never been satisfactorily explained, but eggs are less fertile, fertile eggs are very likely to be addled, and hens simply go on strike, unless they are set in places much more comfortable than falls to the lot of the greater majority of human beings. A hen's maternal instincts appear to be lost during such a season, and we have often seen inveterate sitters, who had been known to do their work without interruption during frost and snow, desert their eggs apparently without compunction. If we could learn just what is the cause of all this, it might be possible to find a remedy. As it is, however, we have to give up the thing for the present and simply state a fact.

PLACES FOR HATCHING.

Where there are to be only two or three batches of eggs hatched during the season there need not be much difficulty in providing for them. A hen can be set in some quiet outhouse or shed, where the work will probably go on without any trouble. In this case, if the house or shed can be given up to the hen entirely, it will be best to provide a square box without a bottom, which, standing either upon the earth, if its floor be of that material, or upon sand or earth, if it has an artificial floor, will be the simplest arrangement. This box is best if made to completely cover the hen, but without a front, so that she can leave the nest whenever she wishes so to do. The advantage of a hatching-box like this over a square, open-topped box is that moisture can be given to the earth below during a very dry season without disturbing or alarming the hen. If it is thought desirable, such a box can be made with a door in front, so that if necessity should arise, the

hen can be enclosed. As we shall have occasion to refer to the hatching-box which we have used so successfully, it will be well to give a description. It consists of a box without bottom (Fig. 22), and for ordinary-sized fowls is made about 15 inches square, and 18 or 20 inches high. The material—wood, of course—is $\frac{1}{2}$ or $\frac{3}{4}$ inch boards, and it is built with solid back, sides, and top. The upper part of the front forms the door, which is the width of the box, and 15 inches high. A piece of deal 3 or 5 inches in depth, according to the height of the box, forms the lower section of this front, or, if a 20 inch high box, the bottom piece may be 3 inches, and a similar lath 2 inches wide fixed at the top of the front. The loose portion is made the door, and is hinged at the bottom, fastening to the top by a button. When this door is open it falls downwards, and thus provides a firm footing for the hen in entering or leaving the nest. Three ventilation-holes should be made in each of the sides and back, quite close to the top, and half a dozen in the top, to which a handle can be fitted; but of course these are only needed if there is a door to the box. There are several appliance-makers who sell hatching-boxes with netting stretched across the bottom as a protection against rats, which is a very necessary precaution where these pests are troublesome, and also with doors and backs covered with netting. Such a box as this can be used anywhere, whether one or a score hens are set in the same place, and they can also be utilized as laying-boxes when the hatching-season is over.

Where only a few hens are to be set, we should advise that later in the season (except in unusually cold seasons), say after the early part of May, the hens have their nests made out in the open. Of course, some shelter will be necessary, but if one of the hatch-

ing-boxes be used, all that will be required is either a rough covering or a coop, or the hen can be set in a coop, and then will not need to be disturbed when her chickens come out. On farms there are often sheds scattered about which can also be utilized. One of the difficulties of this plan—at least, in many parts of England—is that foxes are preserved. A capital arrangement in such districts is the double sitting-box (Fig. 23) made by Mr. T. Rothery, Stutton, Tadcaster.

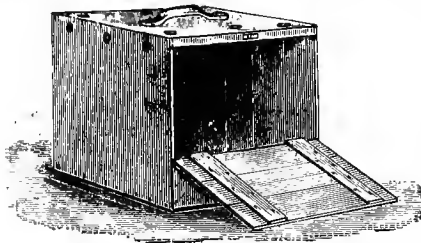


FIG. 22.—CLOSE HATCHING BOX.

Perhaps one of the best plans for those who have large farms is to put the hatching in charge of some of their labourers, so that they can rear the chickens near their residences. The usual plan is to pay a specified sum per bird hatched and reared to a given age. In this way cordial co-operation by those taking charge of the sitting hens is secured. This applies only to

those who go in for poultry-keeping on a large scale; but if poultry are to be made to pay, it is desirable that the attendants should have some direct interest in their success. However slight this interest may be, it will prove a stimulus to greater care and effort, and far more than repay the outlay involved.

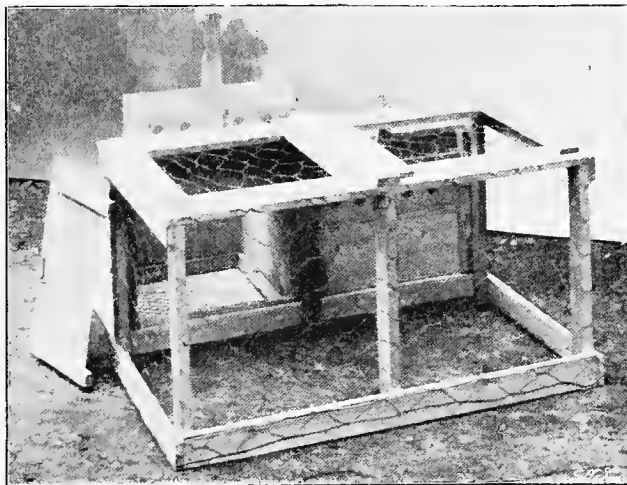


FIG. 23.—DOUBLE SITTING BOX.

HATCHING ROOMS.

By the expenditure of a little trouble arrangements can be made by which a large number of hens can be set in a single room, and it is only by reason of the trouble that we suggest non-adoption of the plan in small poultry-yards. Still, even there, and especially when ladies undertake the work of attending to the fowls, it is much more convenient to have the hens in a room. In selecting a room for the purpose of sitting hens, it is desirable to have one as little subject to variations of temperature as possible, for there is then much less danger from sudden frosts. But it must be sweet and clean. It is necessary that the hatching-room should be perfectly dry. If the atmosphere is

somewhat damp it will be none the worse, moisture being a most important element in hatching operations. Then, again, if it is rather dark hens will sit all the better, but in any case the sitting-room should be darkened if it is not already sufficiently so. The thing to avoid most of all is a hot, dry place, for there it will be almost impossible to succeed in hatching operations.

The plan we have adopted, and with the greatest success, is to place several of the hatching-boxes already described around a loft or room, with their backs to and about a foot from the walls. In a room 15 feet square sixteen or eighteen of the hatching-boxes can be accommodated, and we have had as many as twenty going at one time. Each box should be at least 6 inches removed from its neighbour, so that there may be a free current of air all round, for air is a most important factor in the hatching of

French in idea, and can be confidently recommended. This consists of a house fitted with sitting-boxes in two tiers. These boxes differ from those already described, in that they have lids on top and the hens are lifted off the nest. Outside the house is a covered shed, where the feeding-cages are placed, as described in the next paragraph.

OUTSIDE FEEDING-CAGES.

An excellent arrangement (Fig. 25) is adopted by some French poultry-breeders, which simplifies the work where a large number of hens are sitting at one time. As a rule, baskets are employed with lids on top, and the nests made in much the same way as already recommended. Outside the hatching-room, but under a shed, is a row of half a dozen square coops with barred fronts. Every day each hen is placed in one of

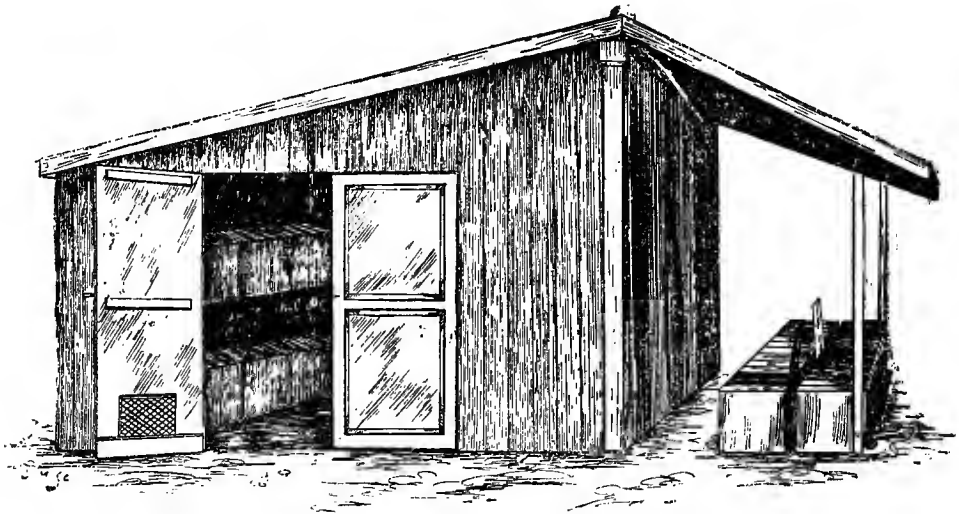
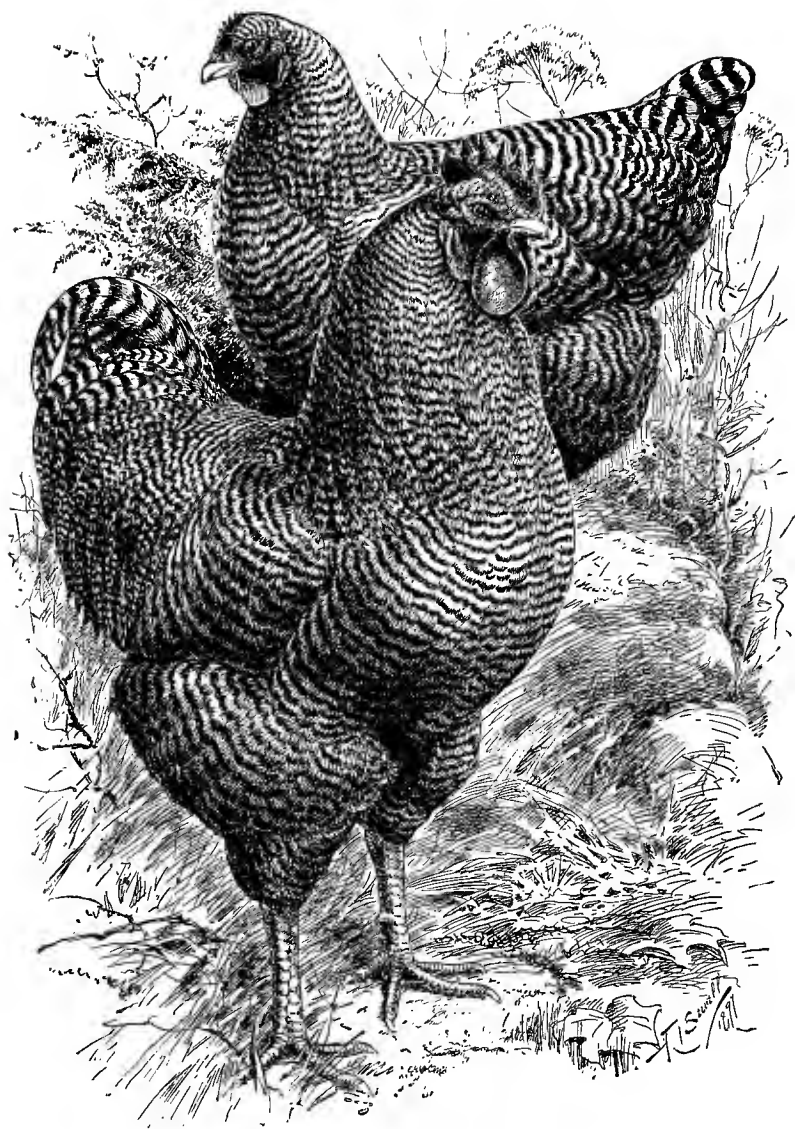


FIG. 24.—HATCHING-HOUSE.

eggs. Thousands of eggs are added, or the chickens asphyxiated, by foul air with which they are surrounded, and which the chicken, if it can be so termed at that early stage, within a shell is thus compelled to breathe. There should be a layer of fine earth or ashes, say 6 or 7 inches thick, on the floor, upon which the hatching-boxes are to be placed. This layer is better if continued entirely around the room, and in no case should it be merely enough for the box to stand upon. The reason for this will be explained afterwards. It will thus be seen that, when the boxes are all placed in position, the doors will face towards the centre, for it is necessary to have doors on the hatching-boxes when this plan is followed.

The form of hatching-house illustrated in Fig. 24 is

these coops for about half an hour, in order to feed and dust herself, during which time the basket or the hamper is left open so that the eggs may be cooled. The floor of the coop is thickly covered with fine dry earth or ashes, which the fowls enjoy, and thus rid themselves of parasites. If six hens be fed at the same time, and each one be removed to the feeding-cages in rotation, there is no danger of returning them to the wrong nest. We may here mention that a mistake is made in not cooling eggs sufficiently. Later observations have shown that with a temperature above 45° an hour is not too long. More harm is done by under than over cooling, for there is much truth in the old saying that "a close sitter is a bad eitter."



PAIR OF BARRED PLYMOUTH ROCKS.

Bred by Mr. A. C. Hawkins, Lancaster, Mass., U.S.A.

Winners at the Madison Square Garden Poultry Show, New York.

MAKING THE NEST.

In making nests within the boxes, a shovelful of earth or ashes is first placed therein, and then hollowed out into basin shape, taking care that all the corners are filled, lest any of the eggs roll therein and are chilled. There are breeders who use damp grass sods, but as the object of both earth and sod is to give that cool dampness which is so essential to successful hatching, earth is to be preferred, as it can be made to fill up the box better. Upon this earth a nest is made of fine straw, oaten straw preferred, and which is all the better if well beaten or rubbed in the hands before being placed in the nest. When completed, the nest should be slightly below the level of the cross-piece at the front. The eggs should have no tendency to roll out, but always strongly incline to the centre of the nest. As a rule, when eggs are placed in a hatching-box, and a broody hen put down before it, she will go on at once of her own accord, but sometimes it is not so. It is always desirable, therefore, in setting hens, when they are put to a strange nest, to let them have a few addled or dummy eggs at first. This is to prevent valuable eggs being wasted. When the nest-boxes with lids are employed they must be placed on the nest. We prefer night for setting hens.

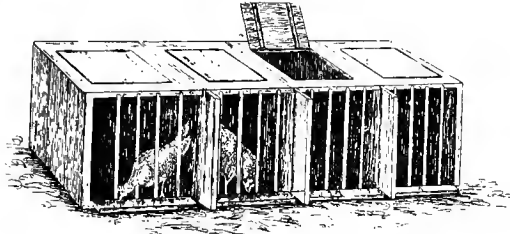


FIG. 25.—FEEDING CAGES FOR SITTERS.

COOLING AND FEEDING.

So far all is right, and there are no difficulties in the business. But if there are twelve or fifteen hens sitting at one time, and all these have to be liberated for feeding and dusting separately, it will be seen that the attention of someone will be pretty fully taken up. The hens must be allowed out daily, and they cannot be let out together, or there will be conflict, resulting in general disaster. This can be obviated by the plan already recommended. If the time of an attendant can be given to the sitting hens, a simple way is to open the door of each box in turn, give the hen half an hour, then close her in, and open the next. Should any not have come off, they must be lifted, both for their own sake and cooling the eggs. The earth or ashes below the box will provide much of the dampness needed by the eggs, but in a very dry place, or during dry weather, it is desirable to keep the earth moist by pouring on it, around the box, a pint or two of hot water daily. This is much to be preferred to moistening eggs themselves. a plan, we think, which does more harm than good.

There is yet another plan which we have at times

adopted with great success. At one time we had a large loft fitted up with pens in which exhibition and surplus birds were kept. These pens were, as a rule, about three feet square, and in double tiers all round the loft. In each of these was a hatching-box, standing it upon earth in the manner already described. Food and a dust bath were placed in every pen, with a dish of water, and every morning the doors of the boxes were all opened for a couple of hours, thus allowing the hens to come off whenever they thought fit, when they were closed again. This plan, of course, greatly minimized labour in attending upon the hens, but it had one drawback, namely, that it did not give an opportunity for that daily observation of each nest which we regard as most important. Fouling of a nest, or accidental breaking of an egg, if not seen to at once, will almost certainly be fatal to success in hatching. And we have always made it a practice to examine the various nests every day. If it were not for this, the plan of setting hens in pens such as we

have described would be the best. It does not answer to disturb a hen when she has been off her nest, for very often she resents it, and in the scrimmage there is danger that some of the eggs will be broken. When a hen has to be lifted off, it is necessary to exercise very great care in doing it, to

avoid breaking any eggs. Hens usually tuck the eggs tightly under their wings, especially when disturbed, and if a hen be lifted off bodily, the chances are all in favour of an egg dropping down upon others in the nest and making a general smash. Therefore, in lifting off a hen, the hand should first be slid under each wing so as to lift the latter from the eggs, and then the hen lifted off by her wings. Properly done, this method will effectually remove all danger of broken eggs from the cause already named. Sometimes an egg is accidentally broken, and the contents adhere to her breast and to the shells of eggs remaining in the nest. If this be the case, a breakage is certain to result unless the matter be put right. Should a hen foul her nest, which will never take place if she be let out at regular periods, the same result may accrue. It is to prevent this kind of thing that we advocate daily examination of nests. And as it is desirable not to allow a hen to be disturbed more than is necessary, this should be done at the time of feeding.

Hens should be fed on hard grain, such as wheat, or barley, or oats; they should be provided with fresh water daily, and have a good dust bath. The latter is most important, as in warm weather hens

are often so pestered with fleas that they desert their nests. For this reason we have found it an excellent plan to dust a little black sulphur, or some carbolic powder, through the straw. Nests should also be made afresh after every hatching, and hatching-boxes should be well limewashed two or three times during the season.

HATCHING BY TURKEYS.

In some parts of France large numbers of chickens are hatched under turkeys, and the same plan has been tried successfully in this country. Should a hen turkey become broody in her first year, when it is inadvisable

easily seen by the attendant. The following is a simple form for this purpose :

Breed of eggs	...	...	...	...	—
Date set	...	...	...	...	—
Date to hatch	...	...	...	...	—
Number of eggs...	...	...	...	...	—
Number fertile on seventh day				...	—
Eggs broken	...	...	...	...	—
Chickens hatched	...	...	...	...	—
Remarks :	...	...	...	...	—

TESTING THE EGGS.

At one time many poultry-keepers had a very decided objection to in any way interfering with the eggs during the time of sitting; but this has been shown to be a merely sentimental objection, for there are very many advantages in so testing them. We ourselves, both when hens were doing the work, and when the eggs were in incubators, have always tested the eggs twice during the process. The first time is on the seventh day, and then by candle light. The object of this test is to see how many of the eggs are fertile, so that those that are clear can be taken away, and as they are still good for culinary purposes, it will be seen that on that account alone there is a very strong argument in favour of the

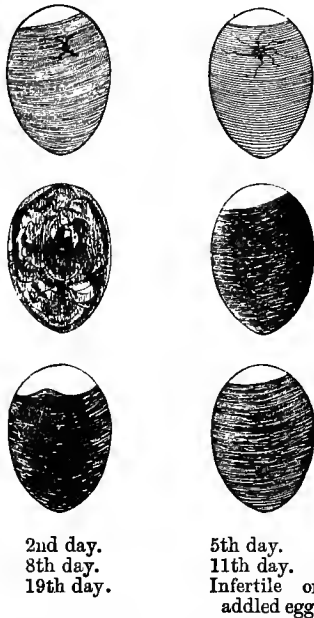


FIG. 26.—APPEARANCE THROUGH SHELL DURING INCUBATION.

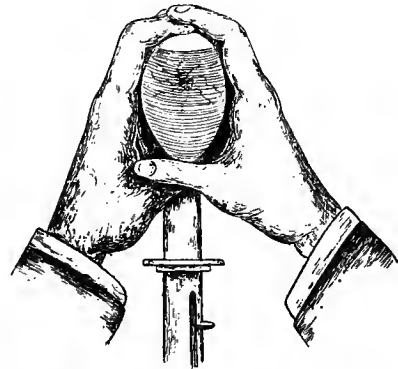


FIG. 27.—HOW TO TEST AN EGG BY CANDLELIGHT.

to breed from her, she may be usefully employed in this manner. Not only will she cover twice the number of eggs, and brood three times the number of chickens that can be given to an ordinary hen, but she is most reliable, is less affected by weather, and ready when called upon at three or four days' notice. Moreover, the male birds can be used in this way as well as the females.

REGISTER OF HATCHING.

It is an excellent plan to have a book containing a register of the hatching operations, so that records can be kept for reference, both present and future. Each sitting-box should have attached to it a card or label

system. In large establishments some hundreds of eggs can be saved every year in this way, which will represent a respectable item in the year's returns. But there is another and still more important argument in its favour, and that is, the space occupied by these useless eggs can be filled up, and the work either of hen or machine be used for such eggs as are of real value for hatching purposes. For instance, if three hens are set at one time—and we always set two or three together—and on the first examination it is found that one-third of the eggs are infertile, when the useless ones are removed there will be just sufficient for two hens, and the third hen can be set again with a fresh batch of eggs. The fact is that this test enables, as a rule, as

many chicks to be hatched with two-thirds the number of hens that would be needed under the other system.

Coming to the method of examination, Fig. 26 represents external appearance of eggs when tested by light during the process of development. First remove all eggs from the nest either when the hen is feeding or after lifting her off for the purpose, and hold them between a candle or lamp and the eye. The best time to do it is at night, and a candle can be placed at a convenient height for the purpose. Then take an egg in the left hand, holding it between the forefinger and thumb, using the other fingers of the hand as a shade to keep the light from the eye. The right hand is next put around the part of the egg left exposed, and the fingers of that hand used also as a shade (Fig. 27). The object is to only permit the light to be seen by the eye through the body of the egg, and a very little practice will enable anyone to hold it properly. Some use cardboard, cutting in it an oval hole scarcely so large as the egg, and there are also egg-testers sold at about a shilling each, made of tin covered partially with black cloth. These are perhaps the simplest, though we have always been able to test much more quickly when using only the hands, as already described. When the egg is fertile, the appearances will be as seen in Fig. 26. In this way we can tell whether the egg is fertile, for an unfertile one is clear to the end, no matter how long it is sat upon. Some people we have met with would not accept this test; they thought that perhaps the chick would develop if sat upon a little longer, but every fertile egg by the seventh day has developed sufficiently to declare itself in an unmistakable manner. We have sometimes been deceived when testing incubator eggs at the third

or fourth day, but never at the seventh, and thus it is better, as a rule, to accept that time as the right one for applying the test.

We come next to the second test, which is made on the nineteenth day, that is, two days before the eggs are due to hatch. This is by means of warm water, and it has a double purpose: first, the discovery of all dead eggs, and second, softening the shell, so that the chick may more easily find its way out. The plan we have always followed is to get a pail or large bowl nearly full of water heated up to 105°, that is, just as hot as the hand can comfortably bear it. If a bowl is used, it should be a deep one, say, having not less than 6 or 8 inches of water in it, and the difficulty of getting one sufficiently deep has generally led us to use a pail. The eggs are removed from the nest and placed in the water, when it will be seen that the majority will float broad end upwards, about two-thirds in and one-third out of the water. Those that sink may be generally regarded as useless and put out of the reckoning, as they are usually addled eggs, that is, eggs which have been fertile, but in which the process of evolution has been arrested at some stage of their progress. Some breeders have stated they have known eggs that sunk to hatch, and when so it is probably due to the chick having broken the inner membrane, and thus the floating power is destroyed. In a few moments some of the eggs will be seen to jump about in a curious manner, caused, it is said, by the effort of the little prisoners to get out. It is better when the eggs have been in three or four minutes to put back into the nest, without drying, those that so jump, and if there are any that do not move it may be generally accepted as fact that they are dead. But the test is not always reliable for the reason stated.

CHAPTER X.

THE REARING OF CHICKENS.

THE PLACE TO REAR—VALUE OF CHICKEN-HOUSE—NO CODDLING OF CHICKENS—CHICKEN-COOPS—SUSSEX COOP—EARLY DAYS OF CHICKENHOOD—FEEDING CHICKENS—SPACE FOR CHICKENS—CLEANLINESS ESSENTIAL TO SUCCESS—THE ORPHANS—DIVISION OF THE SEXES—SELLING YOUNG CHICKENS—PESTS IN THE CHICKEN-HOUSE.



MUCH of the way in which the chicken-yard should be arranged depends upon the place at the disposal of each breeder, and upon the number of fowls he intends to hatch. Where he wishes for only a few batches in the year, he needs only to devote one of the poultry-houses and runs to the purpose of rearing. But where the breeding is on a more extensive scale, it is desirable to have some special provision made for the chickens. Under such circumstances a chicken-house such as we have already described is invaluable, of the greatest service in this work, and is well worth its cost. Fig. 28 shows an ingenious arrangement where space is limited, as the house is fitted with coops and runs at the back.

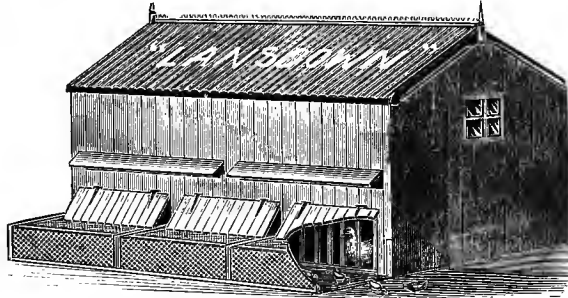


FIG. 28.—HOUSE FITTED WITH COOPS AT BACK.
(Building Construction Co., Manchester.)

there is a slight incline in the ground it will help in carrying off the water. It may here be mentioned that the best soil upon which to rear chickens is not sand. One of the most important elements in the successful rearing and maintenance of fowls is that they should have a proper supply of natural food, such as worms, grubs, etc., which they can best obtain from the earth. Insect and grub life is less found in sandy than in any other kind of soil, and therefore, whilst sand is splendid as an upper coating, from its dry and warm nature, it is not the most desirable for fowl-rearing. Many poultry-keepers make a great mistake on this score, thinking that if they are on sandy soil the matter is all right, whereas they may really be on the very worst place that could be found.

THE PLACE TO REAR.

Wherever the chickens are reared they must have a dry house and run. Damp is fatal to them—more fatal than almost anything with which they have to contend. Of course, the ideal spot for rearing chickens is on the slope of a gravelly-soiled hill, around which there are plenty of bushes and trees. But, unfortunately, the majority of poultry-breeders have not such a place at command, and they have to make the best they can of the place in which they reside. As they cannot make the conditions, they must use and improve them to the best of their ability. Still, it is imperative that the place be dry, and if it is not naturally so, it must be made artificially dry. In temperate zones north of the equator a chicken-yard should face the south, and if

VALUE OF CHICKEN-HOUSE.

A chicken-house is not an absolute necessity, except for those who desire to breed early chickens, whether for the market or for exhibition. Cheap and useful forms are shown in Figs. 29 and 30. When the first batches do not come out before the latter end of March, then no such house is required, for the coops in which the hens and chicks will be placed provide sufficient shelter; but we should not advise anyone to attempt the rearing of chickens in January or February out in the open. As a rule, it is the better plan to bring up chicks in a hardy fashion, and we are very glad to note that there is a reaction against the pampering methods which have been in vogue for some years, and which have been the means of inducing a very serious amount of

disease amongst our domestic fowls. We do not mean by this that we should put chickens out in coops during severe weather, say in January. That would be folly, and courting disaster. But later on it is much the better plan to let the birds rough it a little, and be exposed to the variable weather of April. Fresh air is essential, and in the springtime all living things are

This coop usually has no floor, but in such dry districts as Surrey and Sussex a floor is not needed in any coop. Wherever the ground is at all damp or cold, a floor is an indispensable adjunct to any coop, of whatever kind it may be. This coop may be regarded as old-fashioned, but it is none the worse on that account. Its chief fault is that the front does not give much space for a

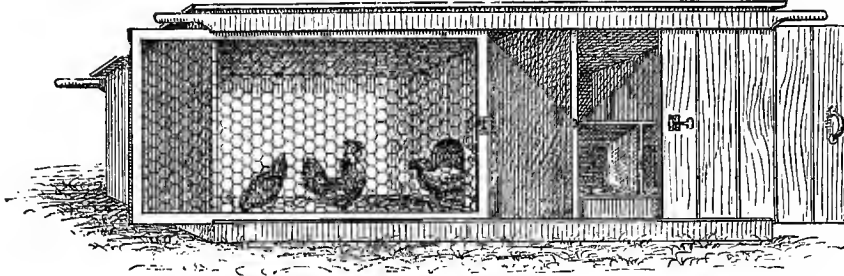


FIG. 29.—BARNARD, BISHOP, AND BARNARD'S PORTABLE CHICKEN-HOUSE.

reproducing themselves, so that it is desirable that there should be freedom.

CHICKEN-COOPS.

Many different kinds of coops are made. The requirements of a coop are that it shall give shelter to the inmates, be warm and comfortable, protected from marauders at night, and easily removed. If only to be used in the chicken-house, as described in the last paragraph, the shape is of small moment. A bottomless box with wooden laths or wire bars at the front will answer just as well as any thing else. But if it has to be put out in the open, then there must be something very much stronger, offering more protection, both against weather and the enemies of chicken-dom.

Amongst the earliest coops made was the ordinary Sussex coop, which at one time was almost universally employed. It is triangular in shape, and presents at front the appearance of an inverted Λ . This generally stands about 24 or 27 inches high in the centre, and is the same width at the ground. The sides and back are solid, but the front is made of upright laths, one of which is loose, so that when raised the hen can get out. Of course the laths, as in all coops, are sufficiently apart to allow the chicks to pass between them.

shelter flap being fitted thereon—an almost necessary part of it either on wet or sunny days. A wire run, of course made the same shape, can be fitted to the coop. Mr. Calway makes a very nice coop of this kind (Fig. 31), without run, and those who wish to buy rather than to make their own will find two or three kinds in the price-list of that firm, as well as such other makers.

A second kind of coop is the square one, which may have either a roof sloping from front to back, or be gabled, either of which form does equally well. The size depends upon the hen, but we have always found 21 and 24 inches square the most useful sizes. All coops should have solid sides and back, and the design will not in any way affect this matter. The front

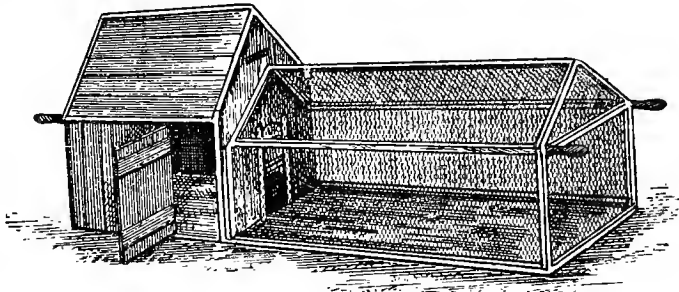


FIG. 30.—CHICKEN-HOUSE AND RUN.
(Potter, Hawthorn and Co., Reading.)

should be formed of wire bars or wooden laths. If the former are employed, all but two should be fixed in the upper and lower frames; but these two (those in the centre) should be rather longer than the rest, and in one piece, the bend being on the top to form a handle. The ends of this long Ω will come to the bottom frame, and should be fixed into a loose piece of wood long enough to nearly touch the next bar on either side of these two; that is, if each bar is 2 inches apart, this piece of wood should be $5\frac{1}{2}$ inches long. A piece of

tin carried loosely round the bar, and then tacked to the wood at each end, will keep the door in position, and prevent the hen making her way out when not wanted. If wooden laths are used, it will be sufficient to make the centre one longer and loose, and then it can be lifted right out. A flap should be made to fit at top of the front for shelter, and be arranged to be flat or at an angle, and another may be placed at the foot to close up at night—though if a wire run is employed this latter is not needed—for then cats or other night marauders cannot find their way in, unless the run be very loose. This ought never to be, for sometimes the chicks get out when that is the case, and cannot return again.

We have mentioned that sometimes a floor is necessary because of the nature of the soil. When this is so, it is important that it be properly made. A fixed floor to a coop is very bad, as it absorbs the damp from the earth, making the hen and her brood cold and uncomfortable, giving rise to colds and other diseases. Not only so, but a fixed floor cannot be cleaned pro-

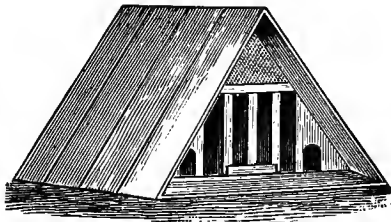


FIG. 31.—CALWAY'S SUSSEX COOP.

perly, and on that score is very objectionable. A floor should therefore be movable, and be raised 2 or 3 inches above the ground. The best method is one that we adopted years ago, and it is, in our estimation, perfect in every way. The boards forming it are nailed on to a couple of pieces of 2 inch scantling, and fit entirely within the coop, the sides resting upon the scantling. In this way the inside of the coop is kept perfectly dry, for however hard the rain comes down it cannot splash within. When it has to be cleaned, lifting the coop leaves the floor lying so that both parts are at once accessible for cleaning. Another advantage is that the coop can be used with or without the floor, as the time of year and season may make desirable. Where the ground is sufficiently dry we prefer not to use a floor, but where one is used the boards should be kept well covered with dry earth and straw. A coop should be limewashed out between every brood's occupation of it, or insects will become a source of trouble and annoyance to both hen and chickens. The hen should always be let out for a short time every day, and be placed where she can enjoy the luxury of a dust bath, as this is necessary to keep her healthy and her progeny free from parasites.

DOUBLE COOPS.

There are many parts of the country where it is possible to place coops out in the open even in winter, except when the ground is covered with snow or hard with frost, especially if natural shelter is available. But to do this a suitable coop is essential. The ordinary form already described does not afford sufficient protection, as the shelter from wind and rain is insufficient during unfavourable weather. Fig. 33 is a decided improvement on the ordinary form, affording side-protection. A much more perfect coop is that illustrated in Fig. 34, which consists of a coop and run combined under the same lid or roof. This should be 4 feet long, 21 inches deep, and 24 inches high in front, sloping down to 18 inches behind. It should be solid on top, back and end, and, if fitted with handles as shown, it can easily be moved from place to place. The lid should be hinged at the back and divided into two portions, one to open over coop and the other over run. The inside has two compartments, one 21 inches

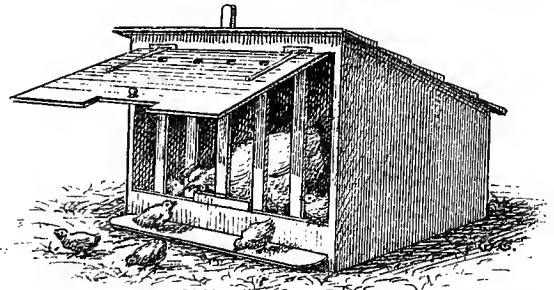
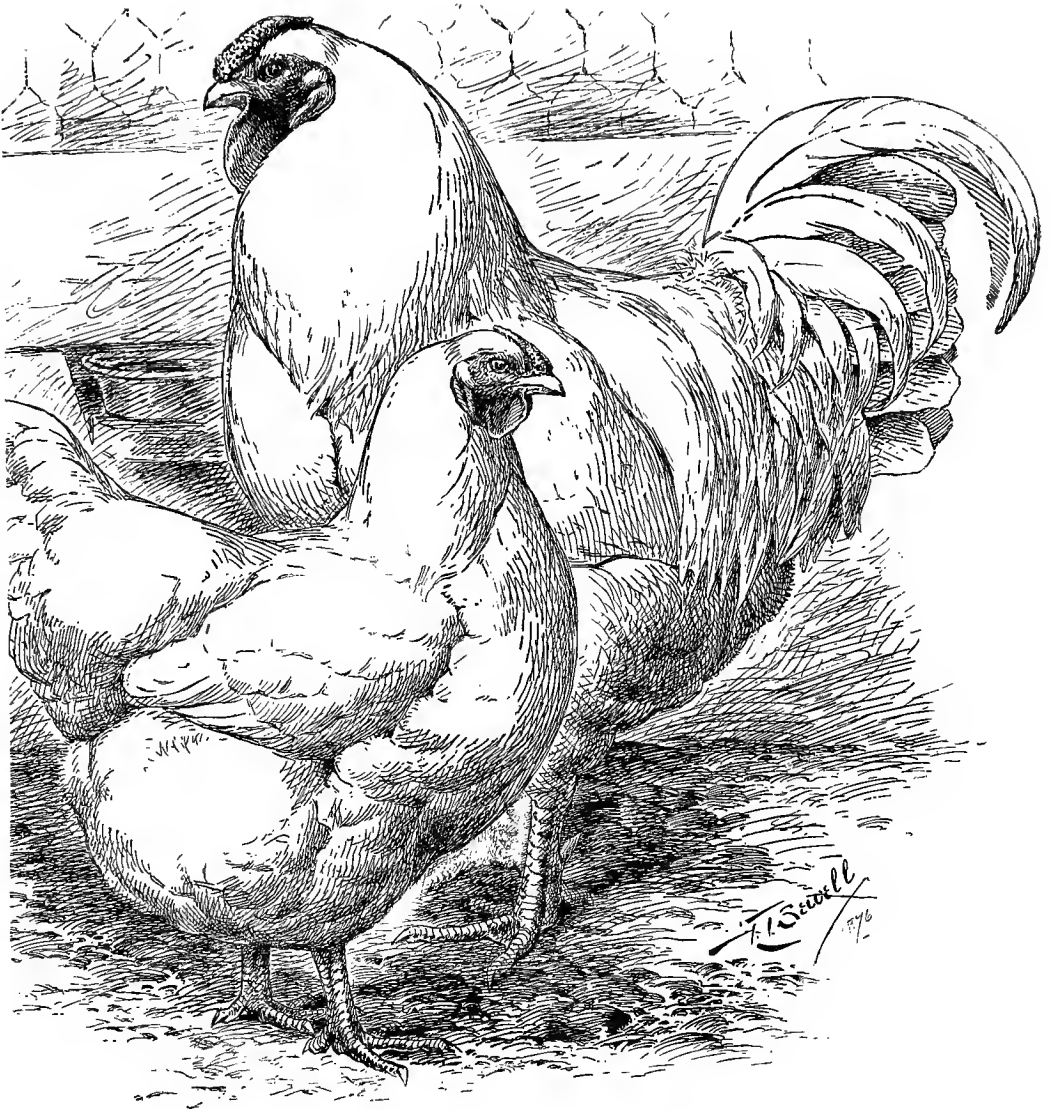


FIG. 32.—BARNARD, BISHOP, AND BARNARD'S SHELTER COOP.

square, forming the coop proper, which may be fitted with floor or not, in accordance with the nature of the soil, and the other a covered run, separated by means of a barred partition, so that the chickens can pass through whenever they desire to do so, but the hen is kept in her own place. This plan is very useful during feeding-time, as special food can be given to the chicks without the mother sharing in it. It is a good plan to make this partition either to open or slide out. By the arrangement named it will be seen that the run will be 27 inches long by 21 inches wide. The coop should have a solid door, but with space for ventilation at top, in front of the sleeping section; but the run must be barred, giving the chickens perfect freedom of egress whenever they wish to come into the open. Of course, the door to the coop must be made to open, so that the hen can come out also if it is desired for her to do so. The great advantage of such a coop as is here described is that perfect shelter is afforded to the inmates, which have at the same time the benefit of perfectly fresh air. If placed with its back to the wind or rain, the



PAIR OF WHITE WYANDOTTES.

Bred by Mr. A. F. Hunter, Cleft Rock Poultry Farm, South Nantick, Mass., U.S.A.

chickens will be warm and comfortable even when east winds are blowing, and, as there is no floor to the run, they have access to fresh ground. The additional cost will be speedily repaid, and these coops can be used at a time of year when the ordinary form is unsuitable without further protection.

USE OF COOPS.

Where there is plenty of space at command and rearing is confined to the spring and summer months, it is not actually necessary to coop the hen at all; but after the first few days, and provided that she is of a similar breed to the youngsters, as mentioned later, they may simply have a place to sleep in at night and be permitted to wander about at will. It is when several broods are to be kept near together that coops become indispensable. We have seen in the South of England sixty lots of chickens in one field, and even when fewer are being raised the arrangement is equally desirable. Hens are very pugilistic when either sitting or brooding, and not only would they fight each other, but, what is worse, will peck any strange chick which comes within their reach. Doubtless every poultry-keeper has had instances of this in his own experience. Hence they must be kept in confinement, or serious loss may ensue.

A most important point in the management of coops is that they be moved on to fresh ground every day. Nothing will more speedily taint a piece of ground than a brood of chicks, and to keep them in health it is desirable that they be given sweet soil to run over. This is most difficult when a large number of coops are being used or the ground is very limited. The former is not difficult to overcome, and it is sufficient to remind readers that the same space should not be again occupied in less than a week. Where chickens are being reared on a very restricted area, and it is impossible to move the coops, then fresh ground should be brought to them and laid down. A grass sod may be given for the birds to scratch about, benefit being obtained both from the natural food contained therein and the exercise obtained in securing the same.

EARLY DAYS OF CHICKENHOOD.

For the first twenty-four hours after a chicken is hatched it needs no more food than has been provided for it by Nature. The yolk-bag, which is absorbed into the abdomen prior to the breaking of the shell, con-

tains all the food needed for the time already stated. We believe harm is often done by forcing young chickens to eat, and it is not improbable that derangements of the stomach are set up by doing this, especially as rich food is often given. When the proper time comes there will be no need to force eating. The cravings of nature will remove all necessity for that. But the hen ought to be well fed, and when the anxiety of her maternal trial is over, she will be ready for and need something calculated to brace her up again.

FEEDING CHICKENS.

The whole question of feeding young chicks deserves the fullest attention, as upon it will largely depend the future of the birds. As already stated, there has been a revolt against pampering, but it is necessary to see that the other extreme is not taken. One would be just as bad as the other. We have always made it a practice to feed chicks the first few days on chopped egg and breadcrumbs, slightly moistened with milk,

but we are fain to confess that we have seen chickens reared without egg at all quite as successfully as any of our own. There are those who say that chickens will do much better on hard plain food than with egg and other such—as they describe them—dainties. We do not think that very early-bred

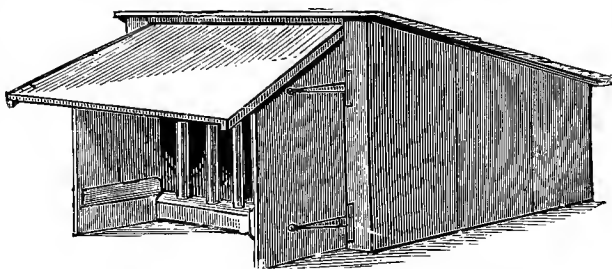


FIG. 33.—SPRATT'S PATENT SHELTER COOP.

chickens would be reared without these kinds of food, but as to the later birds there would not be much difficulty with them, as they can get plenty of insect life, which, it must be remembered, is their natural diet. We lay very great stress upon this point. Many failures in chicken-rearing are due to absence of insects and ground worms, or it may be to their excess, for one of the effects of contamination of the ground by fowls is that it becomes charged with minute life, of which there is either too much, or it is of an injurious nature. The question is one that has not been studied sufficiently. We are familiar with results, but not certain as to causes. If the egg-food diet be adopted, it must only be continued for a few days, say three or four at most, when there should be substituted a plainer food, such as Spratt's Poultry Meal, Chamberlin's Canadian Meal, Calway's Meal, Lambert's Cereal Meal, coarse oatmeal, or coarsely-ground barley-meal. The advantage all these foods have is that they can be prepared with hot water without becoming sloppy or pasty. Fig. 35 shows an excellent arrangement for feeding chickens, as they can enter the cage, but the bars are too close to

allow adult fowls to pass through. In this way better food can be given to the young birds than is required by the adults.

SPACE FOR CHICKENS.

The amount of space given to the chickens must depend largely upon how much is at command. The ideal manner of rearing chickens is to place the coops out in some nice sheltered place, sheltered to the north and east, but open to the south, and allow the hens to go about where they like, of course arranging that the coops shall be well apart. Where foxes and other pests of the poultry-keeper do not abound, this is a good plan, provided that the hens are accustomed to full liberty; then they will only go as far as their chickens can, and the whole arrangement is a beneficial one; but if the hens are usually kept in confinement, to place them out in the open in this way would be most

CLEANLINESS ESSENTIAL TO SUCCESS.

It is scarcely necessary to refer to the importance of cleanliness in the hen-coops, feeding-dishes, etc. But lest anyone might think this is non-important, we desire to remind the reader that want of attention to this point will be fatal to success. The coop ought to be thoroughly cleaned out every day, to have fresh soil placed in it and the straw be renewed twice or thrice a week. This, with a good linewashing after each brood has been taken from it, should keep down insects, which are so prolific a source of trouble. Fowls can never thrive when infested with insects, and the disease known as gapes is due to worms in the throat, which worms are in many cases developed from parasites found on the birds. We have always been very free in our use of carbolic powder, both in the coops and hen-houses, as it is the best preventive of trouble with insects that can be obtained. But it will not do all, and together with the use there must be perfect cleanli-

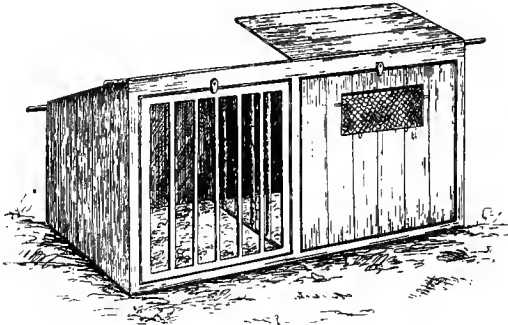


FIG. 34.—DOUBLE COOP.

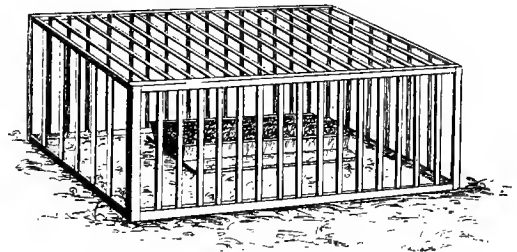


FIG. 35.—FEEDING COOP FOR CHICKENS.

disastrous, for the old birds would so enjoy their liberty, and be thinking of their own pleasure to such an extent, that the poor chickens would have their strength overtaxed. Many are lost in this way, and where the hens are usually kept in confinement it is desirable that they be restrained when in charge of chickens. There is also another point to be mentioned here, namely, that the habits of a hen and her brood must be regarded. For instance, if a hen is set upon eggs laid by herself, or by hens of her own breed, she is not likely to overtax them so much as if of different breeds. If it is her nature to wander, the chicks will have the same leanings. But if, say, a Game hen is put with eggs from chickens of any other or less active races, the probability is that if given her liberty she may lead them too far astray, and thus overtax their strength. These are matters which must determine the question of how much space should be given to the chickens, and if the happy mean can be secured, all will be well. Theoretically, it is best to give the chicks as much space as possible, but there are certain limitations indicated above.

ness. Some arrangements should be made whereby the hens with chickens can have a good dust bath every day. In the summer-time, if at liberty, they can secure this for themselves. Some breeders have adopted the system of anointing the heads of chickens with an ointment made as follows: Mercurial ointment, 1 ounce; lard, 1 ounce; powdered sulphur, ½ ounce; crude petroleum, ½ ounce. This is warmed to semi-fluidity, well mixed, and the heads of the chicks anointed with it as soon as they are dry after hatching. The effect is that the insects will not remain on chickens so treated.

THE ORPHANS.

As a rule, when young birds are about six to eight weeks old the hen begins to get restless and neglects them. She and they must be watched about this time, or the result may be disastrous. So soon as she is seen to be leaving them, it will be better to remove her to the laying-houses again, and make some other provision for the orphans. What this provision will be

must depend upon the season of the year, and, to a certain extent, the nature of her chickens. If the weather is warm, and they are of a hardy race, they may be put at once into one of the special houses similar to those shown in Figs. 17, 29, and 30. In this case it will be desirable to provide special perches, for bent breastbones would result if they were allowed to roost on ordinary narrow perches. These special perches should not be less than 6 inches broad, and have the edges carefully rounded off. At one time we used broad shelves, but the 6-inch perches are in every way as good. Some breeders do not permit their chickens to roost on perches until they are well grown, but make a thick bed of sand or straw on the floor. The objection to this is that so near the ground is generally draughty, and colds may not improbably be the result. In very cold weather, or in the case of delicate varieties of fowls, it will be necessary to provide more shelter for the deserted chickens, and for this purpose the best thing is what is known as a cold mother. This is a frame upon which canvas is stretched, and the canvas is lined with flannel, or flannel strips are suspended therefrom. The frame can either have end-pieces the required height to keep it from the floor, or it may simply rest upon bricks or blocks of wood. The size and height must be regulated by the number and age of chicks which are to be accommodated. Chickens will nestle under, and they will be much warmer than if they were without it. A cold mother seems to be a most necessary part of the equipment of every poultry-yard, where the raising of chickens is regarded as an important work. As a rule, they will not need to be kept in the mother for long, and it will be to their benefit if removed therefrom as soon as the weather becomes at all warm.

DIVISION OF THE SEXES.

The division of the sexes is a matter which many breeders delay too long. In this matter it is not at all easy to define a time when it must be done, for the breeds differ much in rapidity of maturity. We have always regarded as a sign that the proper time has come when the little cockerels begin to attempt crowing. We do not mean that if some cheeky, precocious fellow makes a vain attempt at five or six weeks old the division should then be made, but that as soon as the crowing becomes pronounced it is time to do the work. It is better to err on the side of early than of late division. In the lighter breeds the chicks

are usually ready at ten weeks, and in the heavier varieties two or three weeks later.

SELLING CHICKENS.

On the Continent there is a considerable trade done in selling young chickens, from two days old and upwards. These are sent in specially made boxes (Fig. 36), wherein is a sufficient supply of food, and they travel without injury many hundreds of miles. The convenience of this arrangement is very great, as those who have not accommodation or time for hatching operations can secure young chickens to rear at a small price. Evidently from the extent of this trade it is a profitable one, both to the seller and purchaser. It is satisfactory to note that this business is growing rapidly in Britain.

PESTS IN THE CHICKEN-HOUSE.

The importance of this subject deserves careful attention, as very many chicks are lost through inattention to this point of detail. No bird or animal can possibly thrive if troubled with vermin, the irritation being a sufficient hindrance. The first thing is, of course, to see that the house or coop is well whitewashed out and kept thoroughly clean. Even at the risk of repetition, we must again urge frequent coats of white-wash to be put upon the houses, and if some carbolic

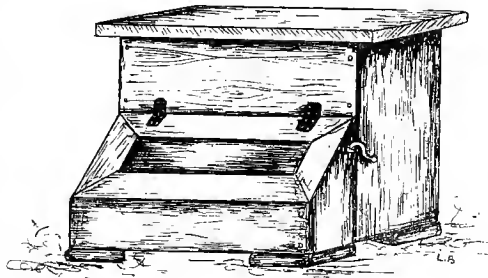


FIG. 36.—TRAVELLING CHICKEN BOX.

acid, say a breakfast-cupful to a bucketful of wash, be mixed with it, or of permanganate of potash, this will go a long way to keep down insects. Coops should have this applied every time they are used for a fresh brood, chicken-houses once every month, and ordinary fowl-houses once or twice every year.

It is scarcely necessary for us to say anything further about the importance of the dust bath, both for the sitting hen and brooder, but it must at the same time be remembered that the chicks almost always get fleas from the hen; and it is found that birds hatched in an incubator and reared by an artificial mother are less subject to gapes than those brought out and reared in a natural way. But it is also important to see that the chicks have a dust bath provided, as they begin at an early age to enjoy it if given them; at any rate, this should be done when they leave the hen, but earlier is to be preferred.

The best way to discover if the birds are troubled with lice or fleas is to examine them on the heads and under the wings and thighs, when the parasites will easily be discovered. As soon as the chicks are seen

to be moping, or a little out of condition, this examination should take place, and many chicks would be saved in consequence. So much importance do some poultry-breeders attach to the question of insects that they always apply petroleum ointment to the head and under the wings and thighs a few days after the chicks are hatched. This is, perhaps, a rather strong remedy, and we think that dusting the birds with flowers of sulphur, mixed with an equal quantity of carbolic or insect powder, will be sufficient. The hen, also, must be examined and treated in the same way, or no good will be done, as she will communicate the pests again

to the chicks. After they have been dusted, put in a pen by themselves for an hour or two in a stable or outhouse, and afterwards pour boiling water over the ground to thoroughly destroy the insects.

Such enemies to chickens as rats, cats, and mice must be fought against in a sterner fashion, and traps are, perhaps, the best things to use. It is a good plan to train a kitten up to be accustomed to the birds, and it will in time be a protector to them. Rats are especially cunning, and require more than ordinary skill to overcome. They often kill both hen and chickens.

CHAPTER XI.

ARTIFICIAL HATCHING AND REARING.

ARE INCUBATORS PRACTICAL?—THE HEARSON INCUBATOR—THE "WESTMERIA" INCUBATOR—OTHER MACHINES—GENERAL HINTS TO INCUBATOR WORKERS—BROODERS—"WESTMERIA" BROODER—HEARSON'S BROODER—SPRATT'S BROODER—CALWAY'S REARER—MANAGEMENT OF BROODERS.



ARTIFICIAL incubation has fascinated many minds. The story of the egg-ovens of Egypt is too well known to need repetition, and many have been the attempts to provide a machine which would be a perfect substitute for the hen. Some of these have been excellent, others far too elaborate or too cumbersome; but within the last two decades there have been introduced several incubators which are at once reliable, inexpensive, and comparatively simple. At first sight the work of hatching by artificial means appears so easy that it is small wonder many inventions have been introduced; but it took a long series of years and many failures ere the difficulties in securing regular temperature, fresh air, and moisture were solved. A machine cannot think; it is unlike the hen in that it does not possess instinct, and thus every difficulty has to be provided for, every need anticipated; but if we get a good machine it will accomplish its purpose.

ARE INCUBATORS PRACTICAL ?

The first point to be settled is, Are incubators of any practical value? To this we can unhesitatingly answer "Yes," if there is a sufficient number of chickens hatched to repay the cost. An incubator for fifty eggs can do the work of four hens at one time, and is ready for work all the year round, without any cessation, so that really it is equal to sixty hens. It will act in winter as well as in summer if placed under favourable conditions. But it is only a machine. Brains must be supplied by the inventor and operator. Given a good machine, worked by an intelligent person, and it is an invaluable assistant. But it must have fair play. We are very strongly of opinion that the best place in which to keep an incubator is a dry cellar or underground building where the temperature will be even, for then there is least stress on its regulator.

USE OF INCUBATORS.

Believing as we do that the future of the poultry industry in this country largely depends upon the adoption of artificial methods of hatching and rearing, it is desirable to indicate our reasons for this opinion. The irregularity of hens at other than the ordinary season has been a frequent complaint, for not only are they uncertain as to when they will become broody, but there is always a certain amount of risk that, should the weather become suddenly colder, they may desert the eggs, which is a very serious matter early in the season and with valuable eggs. Moreover, every hen has to lay a number of eggs before she evinces any signs of broodiness, and these may be more valuable as potential chickens than for marketing purposes. But it is impossible to use them unless other hens are available, or we have an incubator. By machines we can hatch at any season of the year when fertile eggs are to be obtained, and this is an important consideration, for early chickens and pullets intended to lay the following winter. A further recommendation is that with the great increase of non-sitting varieties of poultry, and the gradual elimination of those breeds which set early and often, because they are not profitable, breeders find sitters scarcer every year; many of the most popular varieties, even though they are sitters, by reason of having been bred to develop production, are comparatively late in becoming broody. We do not want, however, to dethrone the hen from her position. The better plan is to use both systems. Until hens are ready to commence work, we must depend upon incubators, but so soon as they show the instinct, then it is desirable to take advantage of the same. It is wise to do this for many reasons.

It is often suggested that chickens and ducklings hatched in machines are not as hardy as when obtained in the natural manner. That it may be so cannot be

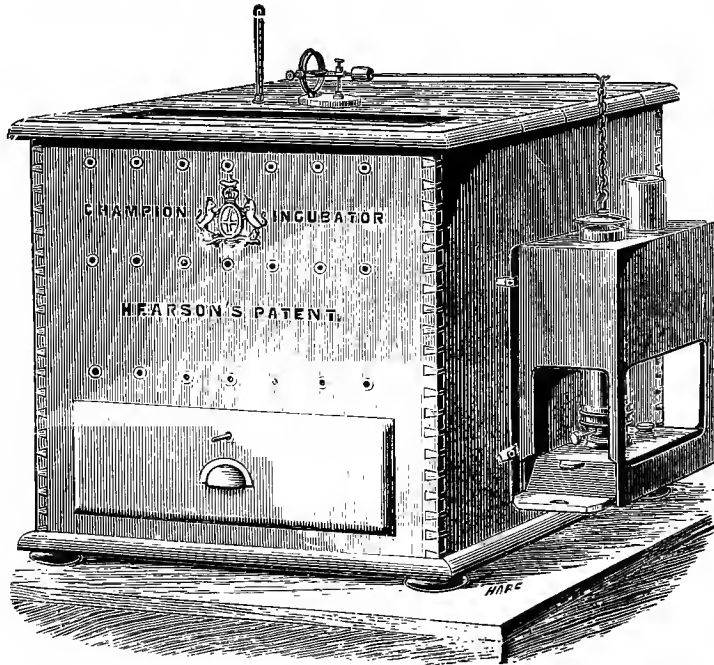


FIG. 37.—HEARSON'S INCUBATOR.

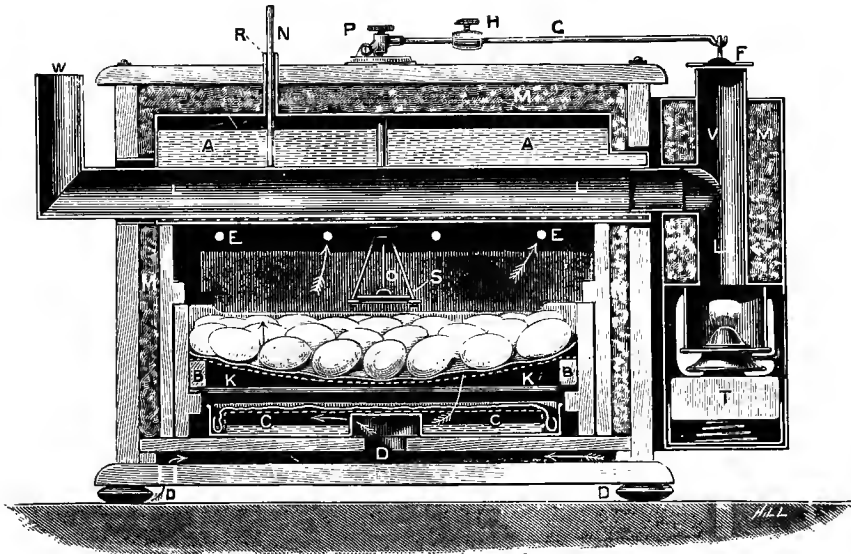


FIG. 38.—SECTION OF HEARSON'S INCUBATOR.

A A.—Tank of water.
 B B.—Movable egg tray.
 C C.—Water tray.
 D D D.—Holes for fresh air.
 E E.—Ventilating holes.
 F.—Damper.
 G.—Lever.

H.—Lead weight.
 K K.—Slips of wood.
 L L L.—Lamp chimney and flue pipe.
 M M M.—Non-conducting material.
 N.—Tank thermometer.
 O.—Needle for communicating the expansion of the capsule S to the lever G.

P.—Milled head screw.
 R.—Filling tube.
 S.—Thermostatic capsule.
 T.—Petroleum lamp.
 V.—Chimney for discharge of surplus heat.
 W.—Chimney for discharge of residual products of combustion.

The overflow tube is the upper one, situated at the right-hand side of incubator, and the lower tube is for emptying the tank.

questioned. Results must depend upon the incubator and its management. Given a good machine well managed, no real difference can be seen, and there are those who believe that any advantage to be found is in favour of the artificial system. In this connection we may remind readers that there is a great difference between an animal and a bird in the methods of reproduction. The former retains the embryo during its stages of development, only giving it birth when fully formed, whereas the final stages in the latter take place after the egg is laid. A hen has only to afford the eggs sufficient heat, to select a suitable place for the nest, and to turn them as often as her instinct teaches her. Given the same conditions artificially supplied, there is no reason why results should not be as satisfactory. In practice it is certainly found to be so.

In France hatching establishments, where eggs can be taken for incubation, are found in several districts, and we are glad that in a few cases the system has been adopted in this country. It may be hoped that it will be greatly extended, and would be of great service.

THE "HEARSON" INCUBATOR.

The incubator which has attained the greatest amount of success is the "Hearson" (see Figs. 37 and 38), and its widespread use in all parts of the world stamps it as an almost perfect machine. It is excellently designed and carefully made, with a marvellously delicate regulator, well applied to the purpose in view. This regulator consists of a small metal capsule, formed of two pieces of thin sheet brass, soldered together at the edges. Inside are about twenty drops of a liquid which boils at the temperature required to be maintained in the drawer (104°). So long as this capsule is not subjected to sufficient heat to make the contents boil, the pieces of brass remain quite close together, but as soon as the warmth is high enough they distend considerably. The power thus generated is used to work a lever, by means of which a cap is raised from the escape chimney, and the hot air from the lamp, instead of entering into a tube running through the water-tank, passes off, and the temperature immediately sinks again. We have known this regulator keep an incubator to within half a degree for weeks, in spite of varying weather, and Mr. Hearson must be complimented upon producing the

simplest and best regulator used for this purpose. The eggs are laid in a concave drawer, upon perforated zinc, below which is a water tray, and as fresh air can only enter from below, and has to pass through a cloth soaked with water, it becomes charged with moisture, by which means this important element is provided for. All that is required is to see that the air is not too cold as it enters the inlet, for then there is danger of too little water being absorbed by it. The Hearson incubator is made in many sizes, from a dozen upwards, but we do not recommend the use of those under fifty-egg capacity, as they are not found so reliable, and the saving in cost is comparatively small.

THE "WESTMERIA" INCUBATOR.

This machine has been considerably altered from its first type, and we have proved its excellence in working. It is fitted with a capsule for regulation, has a capital system of ventilation and moisture supply, and is a well-made, reliable machine.

THE "ACME" INCUBATOR.

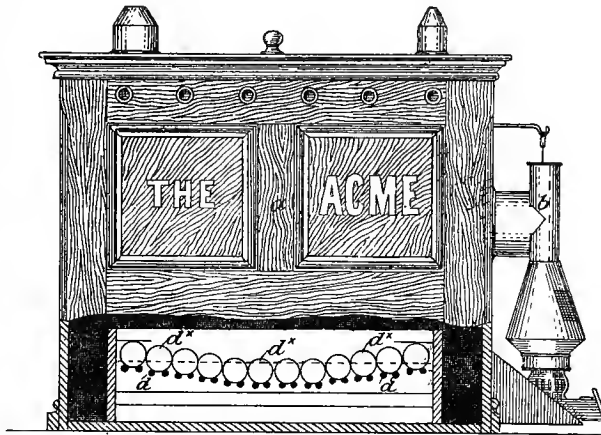


FIG. 39.—THE "ACME" INCUBATOR.

This machine is the invention of Mr. Peter Walsh, Bourne Hall, Poulton-le-Fylde, and is largely used for the hatching of ducklings. Its general appearance is shown in Fig. 39. Regulation is secured by means of a capsule, and this automatically raises the cap which rests on top of the chimney when the heat attains the point at which it is set. Thus, the air escapes without passing through the tank chimney, and the source of heat being cut off, the temperature steadily descends until the capsule collapses, when the first action is resumed. It has a rest for the egg-drawer, which is a preventive of accidents, and a large drying box, whilst fresh air and moisture are secured in pretty much the same manner as described for the "Hearson." The "Acme" has a copper tank, and is well made throughout. Recently it has been fitted with an ingenious turning apparatus which saves trouble.

THE "BEDFORD" INCUBATOR.

Mr. W. W. Greenwood, of Bedford, is the maker of two forms of incubator; one, the "Conqueror," is a hot-air machine, in which no tank is used, and the other, called the "Bedford" (Fig. 40), is fitted with a tank.

With this exception both are on the same principle, and with regard to internal arrangements similar to those already described. The former is, of course, the cheaper of the two, but we think that the extra cost is more than compensated by having a large body of water, as this prevents rapid changes of temperature, and there is consequently less stress on the regulator, which is also a capsule. One essential point is that hot-air machines shall be kept in an even temperature, desirable, no doubt, for all forms of incubators, but essential when a tank is not employed.

THE "FORESTER" INCUBATOR.

Another form of hot-air machine is that known as the "Forester," made by Messrs. Roberts and Co., Lynd-

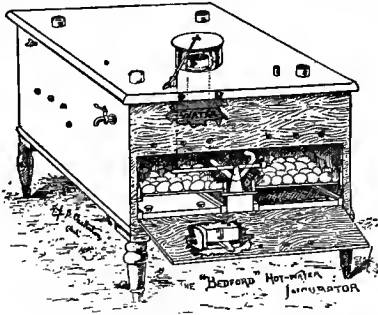


FIG. 40.—THE "BEDFORD" INCUBATOR.

hurst. It is well finished and remarkably cheap. The regulator is a good one, and is made to determine the escape of surplus heat in accordance with the temperature of the egg-chamber. The lid consist of a frame in which glass is inserted, and thus all the operations

OTHER MACHINES.

The "Monarch" incubator is a machine of American origin, and it is very largely used in the United States.

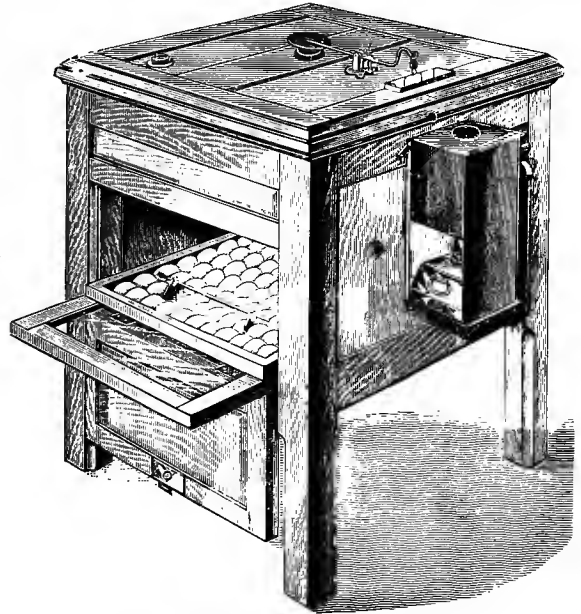


FIG. 41.—THE "CHRISTY" INCUBATOR.

It is now made by Mr. W. Calway, of Sharpness. It differs in several respects from the machines described, both as to regulation and arrangements for moisture. Regulation is obtained by expansion of the water in the tank, and acts directly upon the lamps.

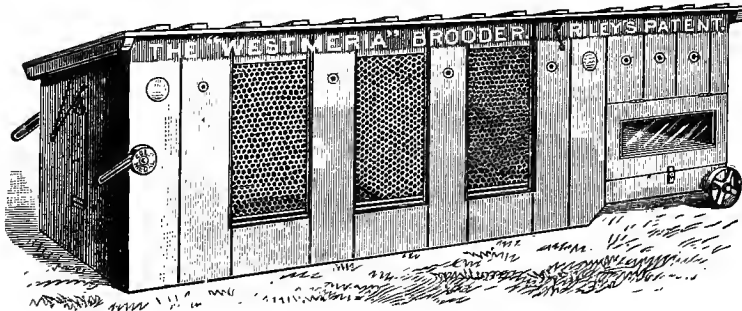


FIG. 42.—THE "WESTMERIA" INCUBATOR.

therein can be observed. The eggs are laid upon wood matting, connected with rods, and can be turned with the greatest facility—the best turning apparatus we have seen. This machine gives excellent results if kept in a warm place, not subject to changes of temperature; otherwise, as it is exposed below, regulation is not only more difficult, but the eggs may be chilled. We have found it hatch well under suitable conditions.

Messrs. E. Spencer and Co., of London, are makers of the "Christy" incubator (Fig. 41), and this is found to be a reliable machine. Regulation is obtained by a spiral thermostat, which has a double action, closing one chimney and opening another, so that the heat can only escape in one direction.

GENERAL HINTS.

The following general hints should be observed by all incubator workers, in addition to directions sent out by makers of each machine :

1. Place the machine where there will be a constant supply of fresh air, but carefully avoid draughts. A sweet, airy cellar is the best place for incubators.

2. If possible, keep the temperature of the room at from 55° to 65° Fahr.

3. See that the water-trays are regularly supplied with water, which should be first warmed.

4. Always warm eggs before putting into the machine by washing in water heated to 80°. This is specially important when there are eggs already in the drawer. The eggs should be well dried before putting in.

5. Mark the eggs with the date when put in, and that when due. Also, if there is no turning apparatus, put signs on two sides, to know how far they should be turned. They should be turned twice a day, but must be once.

6. Cool the eggs twice a day—for ten minutes in winter, and for fifteen minutes in summer, or if the room is warm, but no harm is done by longer cooling.

7. Observe the temperature of egg-drawer whenever the incubator is attended, as a guide to its correct working.

8. Do not open the egg-drawer too often when hatching is proceeding, but when chicks are out, remove the empty shells and place the birds in drying-box.

9. Always keep the lamp clean, properly supplied with oil, and do not burn it higher than is necessary.

10. See that there are no vibrations or jarring shocks in the incubator room, as these cause deformity in the chickens.

BROODERS.

Artificial mothers, or brooders, have for many years proved to be a practical success, even when they were not nearly so perfect in form as they are to be met with to-day. More than twenty years ago we employed a Cheshire mother with the best possible results, and this in spite of many defects which that appliance had, necessitating very great care and watchfulness, specially a lack of provision for ventilation and fresh air. The advantages of being able to rear a large number of chickens together, and of dispensing with the hen, are obvious, simplifying the labours of an attendant, and avoiding many troubles resultant from keeping a

number of hens with their chickens together, which are inseparable from restricted areas. It is convenient to have the chickens within a short distance of each other, and hence the value of an arrangement which minimizes its dangers. Further, there is no risk in a well-made brooder of a batch of chickens being trampled upon, or at their sudden desertion, and, like incubators, they are ready for work at all seasons of the year.

THE "WESTMERIA" BROODER.

At the present time there are several brooders which can be recommended without hesitation, and their increasing use proves that they are found to be all that is claimed for them. Of these we especially name the "Westmeria," the "Hearson," "Spratt's," "Christy's," and Calway's Rearer. The first of these (Fig. 42) is about as near perfection as we have seen, and has achieved remarkable success both for chickens and pheasants. It consists of a small shed-like structure,

with a roof forming a lid. Rather less than one-third of the entire length is taken up with the nursery proper, which is heated by a lamp, the remaining portion being a covered run, suitable for wet weather. A couple of wheels at one end, with handles at the

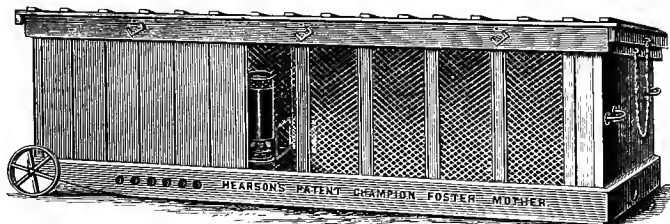


FIG. 43.—HEARSON'S FOSTER-MOTHER

other, enable it to be moved about with the greatest facility, and there can be no question that one of the most important points in successful chicken-rearing, whether natural or artificial, is that the broods shall have fresh ground when placed out in the open air. There are excellent arrangements in this brooder for ventilation, warmth, and light, and we have proved its efficiency and simplicity in working.

THE "HEARSON" FOSTER-MOTHER.

This machine (Fig. 43) is another of the house-brooder type, and is splendidly made, presenting several new and important features. In the first place, the ventilation is very skilfully arranged, the air being warmed on entering, which it does above the heads of the chickens. Second, a small water-tank is provided, so that the temperature is maintained more evenly, and should the lamp go out, the sleeping compartment will keep warm longer than would otherwise be the case. Third, the lamp is placed in the run, and thus it is impossible for any fumes to enter to the chickens, whilst it affords light if the birds have to be fed late at night, as is often the case during the season of short days. The lamp is excellently planned and cannot be blown out. Fourth, sheets of glass are supplied, which can be fitted into grooves provided for the purpose in

front, and additional protection thus given during bad weather. Messrs. Hearson and Co. make another form, but we prefer the above.

Amongst other machines of which we can speak favourably from personal experience are the House-Brooder, made by Spratt's Patent Limited (Fig. 44), which has an extra compartment, and really combines both a hot and a cold brooder, as the chickens can select which they prefer. This is a great convenience, and the chickens will often prefer the cool compartment; Mr.

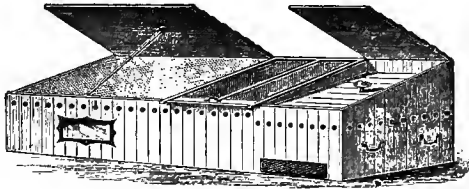


FIG. 44.—SPRATT'S HOUSE-BROODER.

W. W. Greenwood's "Conqueror"; and the Christy "Field Rearer," made by Messrs. E. Spencer and Co., the Minorities, London, E.C. (Fig. 45). The last named is really a brooder placed within a covered run, and is excellent in idea and construction.

CALWAY'S REARER.

A third rearer (Fig. 46) is made by Mr. W. Calway, and differs from all others in that it is round. It is

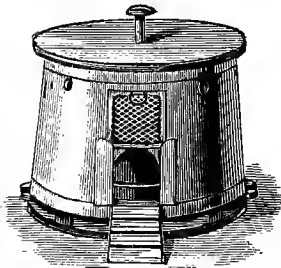


FIG. 46.—CALWAY REAREAR (Outside).

very simple and cheap, the largest size only costing twenty-five shillings. We have used this little rearer for several seasons, and are able to speak highly of it. The circular shape presents several advantages, and the heat is more evenly distributed. This machine had no run attached to it, but recently Mr. Calway has fitted a run, so that this difficulty is now obviated. An excellent plan is to have a run made with small mesh netting on sides, 6 feet long by 3 feet wide, and high enough to cover the brooder entirely. This can be easily moved about. In practice we have found it

a wise plan not to have a large number of chicks together, and the "Calway" is most valuable for small flocks.

MANAGEMENT OF BROODERS.

When working brooders of any kind or make, it is most essential to see that there is no overcrowding, that the temperature is not too high (of which there is considerable danger, causing many deaths), that absolute cleanliness is observed, and that fresh ground be

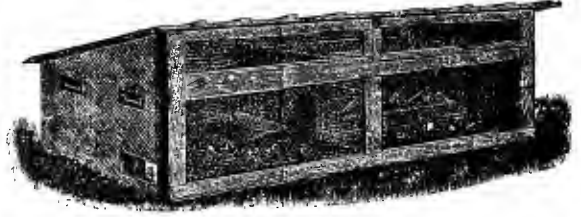


FIG. 45.—THE CHRISTY FIELD REAREAR.

given every day. Given attention to these various matters, we are sure a greater proportion of healthy chickens can be reared than under hens, and with less time necessary for attention to the birds. The chief trouble arises from overheating, and our experience has been that if chickens are coddled they become like hothouse plants, and rapidly die off when exposed. The heat of a chicken-house or brooder should never be so high as to tempt chickens to remain inside.

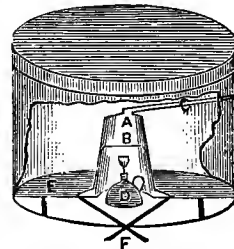


FIG. 47.—CALWAY REAREAR.

A, Heating cone; B, disc to throw heat to side of cone; C, air-pipe; D, lamp; E, platform; F, regulator.

The best heat is 85° (after the chicks are in) during the first few days, gradually reducing to 65°. Fresh air is essential to their growth. During the mild weather it is an excellent plan to lower or turn out the lamp for two or three hours about mid-day. Brooders should be removed on to fresh ground daily, as already recommended for coops, so as to afford sweet ground upon which the chickens may run.

CHAPTER XII.

THE FEEDING OF POULTRY.

WHAT IS FOOD?—WHAT FOOD DOES—VARIETY OF FOOD NEEDED—ELEMENTS OF FOOD—NATURAL FOOD—GRIT—ARTIFICIAL FOOD—ANALYSIS OF FOODS—SOFT AND HARD FOOD—FOOD TABLES—HOW TO FEED—WATER—FEEDING CHICKENS—TIMES OF FEEDING—GREEN FOOD—OBJECT IN FEEDING.



THE question of feeding is of very great importance, dealing as it does with the process of preparing food for human consumption. In connection with the question of feeding, the first question to be asked is, What is food, and what does it do? We cannot do better than here quote from Professor Atwater, who thus concisely says: "The body is a machine. Like other machines, it requires material to build up several parts, to repair them as they are worn out, and to serve as fuel. In some ways it uses this material like a machine—in others it does not. The steam-engine gets its power from fuel; the body does the same. In the one case wood or coal, in the other food, is consumed. But the body not only uses food, but its own substance also, for its fuel. When the fuel is burned in the furnace, only part of its latent energy is transformed into the mechanical power, which the engine uses for its work; the larger part is changed to heat, which the engine does not utilize. A large part of the potential energy of the food, and of its own substance, which the body consumes, is likewise transformed into heat, but this heat the body uses, and must have to keep it warm. And, finally, metal from which an ordinary machine is built and repaired is very different from its fuel, but the same food which serves the body for fuel also builds it up and repairs its wastes."

WHAT FOOD DOES.

From this we learn that the body is the machine, and food the fuel which provides its motive power. But food is more than this, for it repairs the waste of tissue, and restores that which is lost by elimination of heat. What this waste is depends greatly upon the conditions under which an animal exists, and the work it has to perform. In a cold exposed climate there is a great loss of vital force through elimination of heat by the atmosphere. In a very warm climate elimination is due to perspiration, or loss of moisture through

the pores of the skin. A heavy worker expends muscle and force by exercise of physical powers, whereas an animal fed simply to form food for man, of whatsoever kind it may be, has no such demand upon it, and hence it is only the external conditions which reduce the material of its body.

We have learnt, therefore, that food is used to repair waste of the body. The transformation of food into all those elements of which the body is formed is one of the great mysteries of Nature. Give it in whatever form we will, it is taken into the stomach, and there divided up into various elements, some to repair the waste referred to, others to enlarge the body, yet more to expend itself in some cases in formation of eggs and of young. It is not necessary that we should here refer in detail to this process of food formation, as it is enough for our present purpose to know that it is regular and complete.

VARIETY OF FOOD NEEDED.

To rightly understand this subject it is necessary to remember the conditions under which fowls are kept, and that the demands upon the system vary so much, that one food will not do equally well under all circumstances. There is no perfect food for poultry—perfect, that is, in its suitability to all kinds of fowls wherever they may be. Such a food is an impossibility, but the great variety of food which can be found everywhere is a tribute to the variability of our needs. Nature does not work uselessly, and for all things there is some work to do. Animals themselves teach us by their actions that it is instinct to eat whatever the system needs. What is the right food to be given depends upon the conditions under which birds are kept, and the purpose for which they are destined. Food should vary according to the season of the year. A little Indian corn may do good in winter, but it is bad in warmer weather; and such foods as rice may be useful in summer, but would be useless in winter, in that

they do not contain sufficient heat elements. Thus, when we desire eggs, the food should not be flesh or fat forming more than sufficient to repair the daily waste of tissue and heat, but contain elements requisite for making albumen, fat, and phosphates, which form the principal materials in an egg. It will easily be seen that when the weather is cold, the material available for making eggs is considerably reduced by elimination of heat from the body, and therefore if they are to be produced this loss must be made up. On the other hand, if flesh is to be formed, to give egg-making constituents would be waste of food, and fats are chiefly useful in this direction. Again, chickens require different food from adults, because of the necessity to build up the frame and form feathers. And in this connection it is necessary to say that, as far as possible, the food supplied should be well balanced, or there may be a great waste, and for the same reason there should not be too much or too little.

ELEMENTS OF FOOD.

Food has several distinct elements, each of which has a specific influence :

1. Albuminoids, or nitrogenous compounds: form bone, horn, feathers, skin, blood, muscle, eggs. Ratios: growing birds, 15 per cent.; adult stock, 12 per cent.

2. Soluble carbo-hydrates: support respiration and animal heat. Ratios: summer, 55 per cent.; winter, 65 per cent.

3. Fat: gives oily secretions and softens flesh. Ratios: breeding or laying stock, 2 per cent.; fattening, 5 per cent.

4. Woody fibre: of small value.

5. Ash: of small value, except lime.

Dr. Warrington shows that "birds have apparently no power of digesting vegetable fibre; the food passes too quickly through the system for the fibre to be attacked." Hence, bran and the harder vegetable matters are not very suitable as poultry food. He also states that "common salt is well known to be a useful addition to the food of animals. It is stated to quicken the conversion of starch into sugar by the saliva and pancreatic juice. When sodium salts are deficient in the food, salt supplies the blood with a necessary constituent. . . . They are absent in potatoes, and generally absent in grain of all kinds."*

NATURAL FOOD.

In calculating what food must be given, it is necessary to consider, first, that which is obtained naturally. Where fowls are absolutely in confinement everything must be supplied, but when at liberty they obtain an enormous quantity of natural food, by which is meant worms, slugs, seeds, and lime, and the amount

of this must largely determine both the quantity and nature of that artificially supplied.

First let us look at the question of worms, which is of primary importance. At one time it was thought that the best soil on which to keep poultry was sand or gravel, but this is an undoubted mistake. Gravel has certain elements which are very valuable indeed, but pure gravel is almost as deficient as sand in worms and other forms of lower life, which are essential to success in poultry-keeping. Perhaps the perfect soil is substrata of clay, with a top layer of gravel and loam mixed. Failing that, heavy clay is better than sand or gravel. This may appear heterodox, but it is truth, nevertheless. Worms and slugs are essential to poultry-keeping, they being natural food for fowls. What is the opinion of poultry themselves on this matter can be seen by the way in which they seek after and struggle for worms; and one advantage of letting the birds out very early is that then can be obtained a plentiful supply. On French vineyards they follow the ploughs during the periodic upturning of soil on the vines, and every farmer ought to give the same privilege to his poultry. The advantage will be all his own, as they will obtain a large quantity of valuable food, to be obtained in no other way, and they will clean and manure the ground. It is satisfactory to note that this is being more appreciated by farmers. A gentleman in Gloucestershire states that he had arranged with a farmer to pay £2 per acre rent for permitting his fowls to run over a pasture-field in occupation of the farmer. So great was the improvement in the grass, that the latter afterwards acknowledged that it would have been quite worth his while to have paid for the fowls to run on the field, instead of receiving money for permitting them to do so. And in some districts may now be seen fowls following the plough, a custom which should be widely extended. They will render the same service as wild birds, and give greater return to the farmer.

Fowls at liberty also obtain a large amount of grub, insects, and seeds, all of which are valuable as food.

GRIT.

It is important to understand the process of food-digestion in fowls, as of all birds, in order to appreciate the value of grit, by which is meant small stones, which are swallowed for a very definite purpose, and are eagerly sought for.* We have tried the experiment of depriving fowls of grit for several days, and keeping them without food for twenty-four hours, and have found that they would select the grit first and the food afterwards. Birds can frequently be seen to assiduously pick up something from a road-bed over which they may be running. There is no food there, but their instinct teaches them the necessity for grit in order to secure proper assimilation of the food. And

* "Chemistry of the Farm." London: Vinton and Co., Limited.

* For process of food digestion, see Chapter VIII., p. 41.

if we cut open the gizzard of a fowl, it is to find a number of small stones therein. Hard material of this kind can have no attraction in itself, as in the case of food; it cannot possibly satisfy the appetite, and it is not unreasonable to assume that the grit is present for a definite object. At the same time, we believe that a dual purpose is served by the grit. During the grinding process the edges will be worn off, and the secretions to which they are subjected will dissolve the particles so produced if soluble, so that they can be utilized for supporting the frame, and, in the case of hens, supplying material for shell formation. It is surprising how much grit even young chickens will consume, and if not obtainable naturally, it must be supplied. Flint grit is the best, but road-sweepings, broken crockery or glass, oyster and other shells, are all valuable.

We have dealt with this question at some length because there are those who deny the necessity for grit, and it is desirable to make the matter plain, for it is not possible to keep birds in health without this material. One authority says that such is the power of the gizzard in almost all kinds of poultry that hollow globes of glass are reduced in it to fine powder in a few hours. The most rough and jagged bodies do no injury to the coat of the gizzard. Spallanzari even introduced a ball of lead with twelve strong needles so fixed in it that their points projected a fourth of an inch from the surface, and the result was that all the points were ground down in a short time to the surface of the ball.

ARTIFICIAL FOOD.

By artificial foods we do not mean manufactured foods, but those which fowls would not eat if they were in a natural state, such as grain, meal, etc. No one food is sufficient in itself. Not only should it be varied in order to induce animals to partake freely of the food, but in accordance with the climate and temperature in which they live. What is suitable under one set of conditions may be positively injurious elsewhere. We believe that Nature produces in every country the foods most suitable to the animals of which it is the habitat.

The following are the principal foods used for poultry, and their values in constituent elements:

	Water.	Albu- minoids.	Carbo- hydrates.	Fat.	Woody fibre.	Ash.
Wheat ...	12.5	12.0	69.3	2.0	2.5	1.7
Bran ...	14.0	14.5	51.5	4.0	10.0	6.0
Fine Thirds	12.9	14.6	63.8	3.0	3.1	2.6
Barley ...	14.0	10.5	62.0	4.5	7.0	2.0
Oats ...	14.0	13.0	54.0	6.0	10.0	3.0
Indian Corn	11.5	10.0	70.0	5.0	2.0	1.5
Beans ...	13.5	25.5	46.5	1.5	10.0	3.0
Peas ...	14.0	23.0	48.5	2.0	10.0	2.5
Buckwheat	14.0	9.0	59.5	0.5	15.0	2.0
Rice ...	14.0	5.3	78.1	0.4	1.5	0.7
Dari ...	11.31	4.62	68.10	10.06	3.65	2.86
Milk (skim)	90.0	3.7	0.8	4.8	—	0.7
Potatoes ...	75.0	2.0	20.7	0.3	1.1	0.9
Turnips ...	91.35	1.0	5.8	0.15	0.9	0.8

The result of this observation is to show that the best summer foods are oats, wheat and buckwheat; for

winter, barley, oats, buckwheat, and a little maize; for laying hens, oats, barley, wheat and buckwheat; and for fattening, oats and barley, though these require the addition of fat and milk to secure the best results, and rice prepared as described in Chapter XVI. is a splendid food for ducks. Good sound food pays best, and over-sea grain which has been damaged either by heat or salt-water should be avoided.

It may be here observed that there has been a tendency of late years to rely too much on starchy foods, which are very liable, especially when fowls are in complete or semi-confinement, to cause internal fat, and for this reason a greater amount of meat is necessary. Properly cooked flesh given in moderate quantities avoids this danger, but it must not be given raw, and should be in sweet condition. In a later paragraph this subject is further dealt with.

A very valuable article of food for poultry, but which is usually wasted, is fresh bones. They contain 3 to 4 per cent. of nitrogen, 49 per cent. of lime phosphate, and 9 to 10 per cent. of carbonate of lime, and thus are especially valuable for growing stock and laying hens by reason of the soluble lime elements in them. In practice, bones are found to promote laying without being stimulating, and may be given freely two or three times a week. They should be broken up fine, and in America many poultry-keepers buy fresh bones from the butchers for their poultry. Mills are sold for the purpose of cutting up the bones to a proper size.

SOFT AND HARD FOODS.

The best system of feeding is to give soft food, *i.e.*, meals, etc., mixed with water, in the morning, and hard corn about an hour before the birds go to roost. The reason for this is that, after the long fast of the night, if hard corn be given, it takes some time to digest, and thus it is a considerable period before the birds obtain the benefit thereof. Whereas if soft food is given, it passes rapidly through the crop and is assimilated in the gizzard, these organs having comparatively little work to perform. On the other hand, if hard corn is given at night, this takes longer in digestion, more especially as the fowls are at rest, and thus it serves them until the morning. In summer the plan here recommended is of less importance, as the birds are out early and can obtain some food, so that they are not really so hungry when they are fed.

Soft food should be always cooked or mixed with boiling water. We prefer the former method, as cooked food is more digestible, but not many people take so much trouble. It is an excellent plan to have a stockpot for fowls. In most households there is a large amount of waste food, of which the best is not always made. This is usually in the form of material which can only be utilized in connection with soft food for fowls. For this purpose a large saucepan should be employed, and day by day into this all the house-

hold scraps can be placed, including pieces of bread, meat, potato peelings, bacon rind, the outer leaves of vegetables, and, in fact, anything that is ordinarily edible. Of course, it must be remembered that we should not use too much in the way of meat or fat, but common judgment will enable the poultry-keeper to regulate this matter. Each evening a sufficient quantity of water should be added, so as to bring it up to the amount likely to be used in mixing the food next morning. The pan may be placed by the side of the fire and left there overnight. The contents will cook, and in the morning the only thing necessary will be to put it on the fire again for a short time to heat. This may be mixed with meal, and the whole makes a most appetizing morning feed for the fowls, especially in the winter season of the year. The above arrangement is one that can be carried out very easily, and in this way many things that would otherwise be wasted will be turned into use. It may be explained that, if meal be mixed with cold water, not only is it

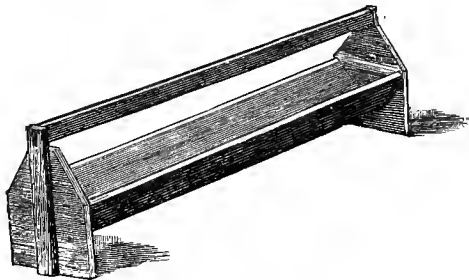


FIG. 47.— FOOD TROUGH.

less digestible, but also the body heat is consumed in raising the moisture to the temperature of the fowl, and thus it is chilled instead of warmed by the food. Better give hard corn always than mix meal with cold water.

One of the best ordinary soft foods is a mixture of barley-meal and middlings (fine thirds), half of each in winter, and one part of barley-meal to two parts of middlings in summer. It must always be made crumbly moist, never sloppy. Another good morning feed for adult stock is to mix equal parts of whole wheat, barley, buckwheat and maize, boiled and mixed with 10 per cent. of meat, the moisture being dried up with sharps.

FOOD TABLES.

The following tables will give suitable mixtures for regular feeding:

(a) *Summer.*

Soft food:

Barley-meal	1 part
Fine thirds or middlings	1 ,,
Potatoes or turnips (cooked)	2 ,, (by weight)

Hard food:

Equal parts of wheat and oats.

(b) *Winter.*

Soft food:

Indian meal	1 part
Pea meal	1 ,,
Bran	1 ,,
Potatoes or turnips (cooked)	2 ,, (by weight)
Meat scraps	1 ,,

Hard food:

Equal parts of wheat and barley.

HOW TO FEED.

Fowls at liberty should only be fed twice a day, except when the ground is hard with frost or covered with snow, when a little corn and vegetables may be given about noon. This is always necessary when they are in confinement. It is desirable to dig up a portion of the run, giving the birds a place in which to scratch. The best method is to feed from troughs, similar to that shown in Fig. 47, the top rail being

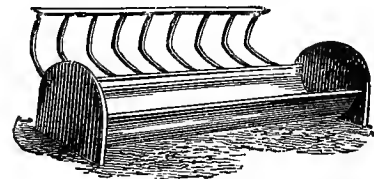


FIG. 48.—METAL FOOD TROUGH.

designed to prevent the fowls walking over the food, and also serves the purpose of a handle. Fig. 48 is a metal trough with lifting railed cover. Throwing food down upon the ground is wasteful, and it is frequently contaminated if lying there for any length of time. The great secret is, only giving as much as the fowls eat eagerly. Feeding to repletion is always bad, and as doctors tell us we should rise from the table with an appetite, *i.e.*, not actually hungry, but feeling that we could eat more if we wished, we should apply the same rule to our fowls, and the doing so will be an effectual prevention of over-feeding, with its subsequent evils. Consequently, any food remaining should be removed so soon as the birds are satisfied.

WATER.

Water is a most important part of the diet. A running stream solves the difficulty at once. Disease is often caused by impure water — disease of the most subtle and deadly character. Water should be often renewed in fountains, but if in open troughs these should not be exposed to the sun. Very often the water-supply for fowls is regarded as a minor con-

sideration, but it has much more to do with their health than is generally supposed. Fig. 49 shows an excellent form of fountain. When these appliances are used they must be kept clean, or soon become contaminated.

FEEDING CHICKENS.

The question of feeding young chickens is all-important, for upon its food must depend whether the bird will thrive well, die a premature death, or be stunted in its growth. It will be well to say here that more harm is done by over than by under feeding, especially amongst small amateurs. They like to give chicks dainty bits, to be constantly feeding them on rich morsels, with the result that they are often killed by kindness. The plainer the diet the better, and anything in the shape of forcing is sure to cause harm. Thousands of chicks die every year from no other cause than that they are overfed or fed on too rich food. Where death does not result, the seeds of disease are sown, and sooner or later these seeds are developed, and trouble is the result.

As soon as possible we believe in giving hard grain as part of food, when it is intended to rear the fowls and not kill them at an early age. But judgment is

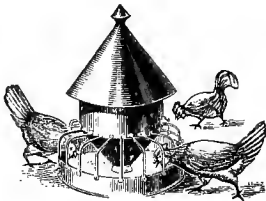


FIG. 49.—PENKETH'S WATER FOUNTAIN.

needed to decide when this can be safely done. We have found that most chickens cannot take whole grain until they have turned three weeks old, and up to that time it is necessary to give them soft food. There is nothing better than the foods already mentioned, which have all the elements of successful chicken-rearing. When the birds are about sixteen or eighteen days old they may have a little *dari* or crushed buckwheat, which may be gradually increased until the soft food is only given once a day. Occasionally in cold or wet weather a little crushed or whole hemp-seed may be given; but this is very rich, and should be used very sparingly. Of course, when the chicks get to be six weeks old they may have small wheat and other grains that are not too large for them to swallow.

A word here as to the artificial foods sold will not be out of place. *Spratt's Poultry Meal* we have used for many years with unvarying success, and upon it chickens thrive amain, formed as it is of the very best elements, making a splendid combination for chicken-rearing. We can also recommend *Chamberlin and*

Smith's Canadian Meal, *Calway's Meal*, and *Lambert's Cereal Meal* for this purpose.

The true secret of feeding young chickens is to give a little plain food and often. All young life needs its nourishment to be frequently given, and chicks are like babies—they must be fed at short intervals. Unless this is done, they are very apt to suffer and be stunted through hunger, and also to gorge themselves when the food is placed before them—the latter a state of things very likely to induce disease. The best chicken-raiser is the man or woman who can get up early in the morning, for birds require to have an early feed, as soon after daylight as possible. This feed should be a warm one. Young chickens under a month old should have a feed last thing at night, say about ten o'clock. This will, of course, have to be given by lamplight, for only in the height of summer would there be daylight

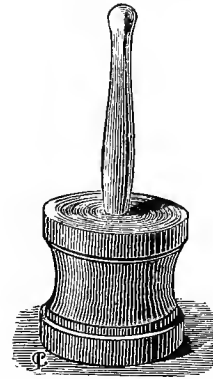


FIG. 50.—FEEDING-BLOCK FOR CHICKENS.

for the purpose. When the birds are over a month old, it will be sufficient if they are fed about half an hour before sunset. Troughs should always be used for feeding chickens, and they must be kept thoroughly clean. Fig. 50 shows a French feeding-block for chickens, the food being piled up around the stick, so that the birds cannot tread it over, and they have to stretch up to reach it. A small trough may be used when they are a little older similar to Fig. 47, but made lower. Water or sweet skim-milk may be given to chickens in suitable vessels, and it is better if slightly warmed in cold weather.

TIMES OF FEEDING.

The times of feeding may be briefly described as follows: When the chicks are less than a fortnight old they should be fed every two hours; for the next fortnight every three hours; and after that time until they are fully grown, say when four or five months old, four times a day. There are those breeders who always keep food before the birds, and this plan

saves a great deal of trouble, but we have never adopted it. Only grain can be fed in this way, as soft food would go sour if left to stand. We think it better for all animals to have regular times of feeding, for picking is one of the worst things for children or chickens. And the plan we recommend is to cease giving the food as soon as the appetite is satisfied, which is especially necessary in the case of chickens. We always like to see birds ready for their meal when it is ready for them. That is a good sign of health.

SUBSTITUTES FOR WORMS.

Reference has already been made to the importance of insect and grub life for fowls. Where this kind of food is absent it must be artificially supplied. In the winter season there is nothing better than the prepared crissel sold by Spratts Patent, or the new preparation sold under the name of "Zebril," which is very valuable for all kinds of poultry, and is a purely animal product, with a very small amount of fat. At other seasons of the year they can obtain this form of food in a natural manner. Dead fowls or other forms of flesh food can also be used for this purpose, and may either be buried under the ground or hung up. In this manner a most important element in the feeding of fowls can be provided for. It is only desirable to state that under no circumstances should a diseased fowl be used in this way, as that would be the means of propagating disease; and it is also desirable that the supply of this kind of food be not excessive. If fowls are in a state of Nature, they have much more exercise than when in confinement, and this is always to be taken into account in making comparisons between food obtained under the two conditions.

GREEN FOOD.

No mention has been made of the importance of green food to the young chickens, but it must not be lost sight of. The sweet juices of young grasses or vegetables have a wonderful effect on the economy of fowls; and though we do not say that chickens cannot be reared without one or the other, we do not think that they can be so reared with the same amount of success. Wherever a good grass run can be given, it is desirable that the birds have the benefit thereof, but it cannot be regarded as essential where tender vegetables, especially lettuces, can be provided. Where

fowls have been kept on ground for several years without its being renewed, the grass may be positively injurious instead of beneficial, but with lettuces this will not be so. The poultry-breeder will do well to grow as many of these succulent vegetables as he can, and freely give them to the chickens. Other kinds of vegetables may be used, and in winter time roots are of great benefit, the latter being given mixed with the soft food. In this way turnips, swedes, beetroot, and potatoes are all valuable. Potatoes and beetroot should be cooked, but turnips and swedes may be cut in two and given the fowls to peck at in a raw state.

OBJECT IN FEEDING.

The remarks which have been made as to the feeding of chickens are intended specially to apply to such birds as are bred for layers or stock fowls. The object with these chickens is to secure a strong frame and good constitution, for which purpose the food must contain all elements for bone and muscle formation, as well as for the making of flesh. When chicks are being reared simply for the table, and will be killed off ere they are ten or twelve weeks old, a different method must be adopted in order to secure success. The object in this case is to secure the maximum of flesh with the minimum of bone and offal, therefore it is necessary to feed with other foods than those already named; and in this case a little forcing is desirable, in order that the birds may be brought to maturity as speedily as possible. After the first fortnight of the chick's life, instead of using grain, soft food should be given as the staple, and in order to induce the birds to eat as much as possible, their food should be well varied. One good food is a mixture of barley-meal, oatmeal, thirds, and Indian, or maize, meal, with some lean meat or "Zebril," and a little stimulating powder, such as the aromatic compound. Then there is the common rice, known in this country as poultry rice. This, if properly prepared—namely, slowly simmered by the side of a fire with plenty of water in the pan—makes a splendid food, as it contains flesh-forming elements to a large extent, and scarcely any bone-forming materials. The breeder should therefore know what he intends to do with the chickens, and in this way be guided as to his manner of feeding them. The entire question of fattening will be dealt with in a succeeding chapter.

CHAPTER XIII.

POULTRY-FATTENING.

FATTENING A METHOD OF RIPENING—FOOD TO BE USED—FATTENING INDUSTRY—CAGES—SHEDS—CRAMMING—
VARIOUS METHODS—FOOD FOR FATTENING—FEATHERS AND MANURE—SUMMARY.



FATTENING is really a method of ripening. Fat or oil laid upon the various tissues throughout the body softens, and has the effect of making them more tender. This is the same process found working in all Nature. Fruits fill out, and are plumpest and sweetest when they ripen. In both cases the ripening, if continued too long, tends to decay; but it is just as reasonable to say that grapes are not good to eat at their prime, because if allowed to hang longer they go bad, as it is to say that the fact of a fowl going back if fattened too long is a proof that fattening is a wrong system. We have also heard it stated that, because fattened fowls are not fit for breeding, therefore no fowls should be fattened at all. This is a nonsensical argument. No one can be more opposed than we are to the over-feeding of breeding stock, for we believe that breeders and layers should be kept in rather poor condition, but at the same time we realize the value of fattening for fowls destined to immediate slaughter. This immediate slaughter is absolutely necessary when birds have been fed up in the way named, for the fat upon their tissues clogs them up and prevents the organs performing their functions properly, so that diseases of various kinds are soon generated. The great Liebig was accustomed to say that all fat is a disease, but this had reference to human beings, who are not intended for slaughter, and his dictum must not be regarded as applicable to the preparation of table fowls.

FATTENING.

In fattening poultry, or, in fact, any other animals, two things are absolutely necessary—first, that the food supplied shall tend to the production of flesh; and, second, that the conditions under which fowls are kept shall eliminate as little of the oil or heat fuel as possible. And it may be well here to explain that, although the term “fattening” is employed, we do not mean by it mere laying on of an excessive quantity of fat or oil, such as was at one time the case with cattle and sheep,

but the addition of the fat is necessary, with as much flesh as can be obtained. Fat, as already explained, softens the flesh, ripens it, and herein its value consists. The reason why the flesh of a ripened fowl is finer in flavour, and more digestible, is that fat takes the place of water in the tissues. This, when cooked, melts and softens the flesh, whereas water evaporates and leaves it dry and harder. Professor Warington, F.R.S., calls attention to the fact that the rates of consumption and of increase are very different in different states of the period. As a fattening animal increases in size the quantity of food it consumes also somewhat increases; the stomach at the same time becomes larger. When the animal becomes very fat, the consumption of food falls off again, and the rate of increase at this point is much diminished. As fattening advances the daily increase in live weight becomes gradually smaller, and the same amount of food will produce a steadily diminishing amount of increase.*

THE FATTENING INDUSTRY.

Prior to the time when the first edition of “Poultry-keeping as an Industry” was published, the fattening of chickens was restricted to the counties of Sussex, Surrey, and West Kent, where it has been carried on for a very long period. In the South-East of England the rearing and fattening of fowls has been among the most profitable branches of rural economy, as shown by the evidence obtained for the Royal Commission on Agriculture. It is estimated that there about 3,000 tons of chickens are marketed annually, in value about £500,000 sterling. So great is the demand that local supplies do not suffice. Vast quantities of Irish fowls are brought over every season, in some years numbering 300,000. Complaint is made by the fatters that they have to pay such high prices for the lean birds that their profits are greatly reduced, but the evi-

* “Chemistry of the Farm.” London: Vinton and Co., Limited.

dences are the fatters make this business pay. It is no uncommon thing, however, for higglers to give up to 8s. 6d. each for early-hatched, well-grown chickens of eight to ten weeks old. One result of the increased attention given to poultry culture is seen in fattening establishments, which have been commenced in several other parts of the country. Of course, these have had to meet with the usual difficulties incidental to the commencement of any new industry, but with perseverance they will succeed, and form an important outlet for the local produce securing better returns for breeders. To those who object to the fattening system, it may be pointed out that we are simply applying to poultry the same principles as adopted in connection with larger stock, and that it is as foolish to kill lean fowls as it would be to slaughter store cattle or sheep. In three weeks from 1½ pounds to 2 pounds can be added to the weight of any ordinary-sized fowl, largely a gain in flesh, and at a cost of about 8d., the improvement in quality of flesh and general appearance being very great.

Whilst it is true that in France the work of fattening is usually carried out by those who rear the fowls, it must be pointed out that, as a rule, French farmers' wives and daughters are more skilful in poultry management than is the case here, and at each place not more than 200 to 300 are marketed in the course of twelve months, the system of disposing of the produce being different. In this country the work of rearing and of fattening is generally dissociated. Fatters scour the district around for birds to fill the cages, buying from the farmers and cottagers who rear them. Carts loaded with pens of fowls form a common sight in Sussex and West Kent, to be met with on every road and lane. Sometimes a man may be met with a cage upon his back, used for by-roads, and he meets the cart at a determined point. These back-cages are made curved, and hold a couple of dozen birds, built in two tiers. When loaded they are no light load. The higglers know just where to go, and when a supply of chickens

will be ready for them. Sometimes half a dozen of these collectors will call at a cottage in one day. The reason why fatters depend upon rearers' rather than their own breeding must be evident upon consideration. If we take an ordinary establishment, with accommodation for fifty dozen birds, and assume that all the cages will be filled during the busy six months of the year, and half filled during the other six months, it will be seen that 23,400 fowls will be dealt with in the course of twelve months. To breed this number would entail an amount of labour and oversight which would alter the character of the enterprise entirely, and

hence it is found better to buy from others. Moreover, there is less danger of disease than if large numbers of chickens were reared on the same ground. But it must be stated that more is being done by fatters in the way of breeding than was formerly the case.

FATTENING CAGES.

There are many different methods adopted by fatters, but one general idea seems to prevail. During the milder months of the year many fowls are partly, and some-

times wholly, fattened in outside cages, placed under the lee of some hedgerow, or where they can be protected from wind and rain. In the Uckfield district of Sussex and in Kent a large amount of fruit is grown, and these orchards are utilized for the accommodation of outside fattening cages. Fig. 51 shows an example, copied from a photograph. These outside pens or cages, as, in fact, are those inside also, are very simply made, consisting of laths of wood, generally about 1 inch wide and 1½ inches apart, except the bottoms, which have the laths narrowed below, so as not to catch the droppings. Each cage should be 16 to 18 inches from back to front, and the same in height, divided by laths into compartments of 15 inches, holding two birds. To each compartment is fitted in front a sliding door. The cages, which are usually in single tiers, are raised about 3 feet above the ground upon what are called stages—cross-pieces of scantling, sup-



FIG. 51.—OUTSIDE FATTENING CAGES.

ported by posts fixed in the ground. In not a few instances everything is of the simplest and cheapest description, and the opportunity is taken of a slack season to put together what further cages are likely to be required either for renewal or extension of operations. They are also made and supplied at reasonable prices. Shelter against wind and rain is most important. A thick hedge is very serviceable against wind, but the tops of the cages should be covered in with a sloping wooden or corrugated iron cover, or branches of trees, which are regarded as best of all, by reason of the fact that they are coolest, allowing for the circulation of air. In front is fitted a long wooden

off completely; and in summer there is very little demand for fully-fatted specimens.

THE SHEDS.

When the birds have been fed from a week to ten days from the troughs, if it is intended to finish them fully, they should be removed to covered sheds, of which there is a great variety. Some are very rough indeed, and evidently built with the one idea of cheapness, whilst others are of a more complete type. In not a few cases barns and other buildings have been adapted to the purpose of fattening sheds, and where this is done they are loftier and warmer during severe



FIG. 52.—IVILLE FATTENING SHED.

trough, made V-shaped, and suspended by cord or resting upon supports, in either case easily removable. The system here described is an excellent one in the milder months of the year, and where there is a fair amount of shelter, but would be unsuitable in the cold season, especially if the district is a bare one.

The usual plan is to keep the birds in these cages for from a week to ten days, feeding them twice a day from the trough. Large numbers of birds are never crammed, but supply a demand for half-fatted chickens, and it is wise to keep this trade in view. The birds are considerably improved as compared with the lean specimens, and should command better prices. In many districts it will be well at first to supply half-fatted chickens until there is an inquiry for those finished

weather than is possible with wooden erections. As examples may be mentioned that owned by Mr. C. E. Brooke, Past Master of the Poulterers' Company of London, at Baynards, Surrey (Fig. 52), consisting of a thatched barn, and one of the best-equipped establishments we have met with either at home or abroad; and that owned by the Manby Poultry Company at Manby, North Lincolnshire. The latter formed at one time the stables of Manby Hall, and makes a splendid place for the purpose. In other cases corrugated iron has been largely employed, but it is not a suitable material unless lined with wood, being a rapid conductor of heat and cold, and we have seen in Sussex sheds during the summer which were oppressively hot. Examples of specially-built fattening sheds are given in

Figs. 53, 54, and 55, the last-named of which has been erected to our own designs, and combines protection sufficient to ensure success, and gives proper ventilation. It may be extended to any size, and has the added advantage of being removable, should occasion require.

There are, however, some fatters in Sussex who do not use sheds at all, but fatten entirely in the open air, giving such shelter as may be obtained from hedges and a rough board covering. At the establishment of Mr. Oliver, near Heathfield, long sheds are employed with open ends. What may answer in a warm situation is inadvisable elsewhere, and it is safer to have a good large enclosed fattening shed. This is the plan adopted in France and Belgium, but in both those countries the buildings are often by no means as roomy as could be wished, and we have visited places which compared unfavourably with the better type of Sussex sheds. A very serious objection to the keeping of fowls throughout the fattening process in the open air is that they take longer to fatten, except in mild weather, the reason for which must be obvious. If exposed to cold, the birds consume more food as fuel, they are more restless than when in a quiet place, and there is

a great danger of disease resulting from bad weather. Of course, the sheds must be properly ventilated, and it is desirable to have large doors at both ends, so that in warm weather there may be a good circulation of air. Under ordinary conditions, it is found that the best results are obtained if the fattening cages are in single tier, because they can be more easily cleaned; but in the Baynards shed, and also that at Gambais, three tiers are used. In the latter cases the pens are rather more elaborate, each bird being provided with a separate compartment. Below every row of six cages is fitted a sliding tray, upon which dry earth, sand, or peat-dust is sprinkled, to catch the droppings, which are removed every day. Unless the most rigid cleanliness is maintained, this system would soon cause disease. Whatever the form of pen employed, it is necessary to remove the droppings daily, to limewash the house out frequently, and to treat the pens in the same manner

between each occupancy. An excellent plan when cages are in single tier is to have a sloping board below the pens, sprinkling upon it fine earth and lime, and scrape it down daily. The use of powdered lime, disinfecting powder, or a solution of permanganate of potash, is advisable, in order to destroy microbes. It is impossible to lay too much emphasis upon cleanliness in the fattening sheds and cages, whether in the open or under cover.

CRAMMING.

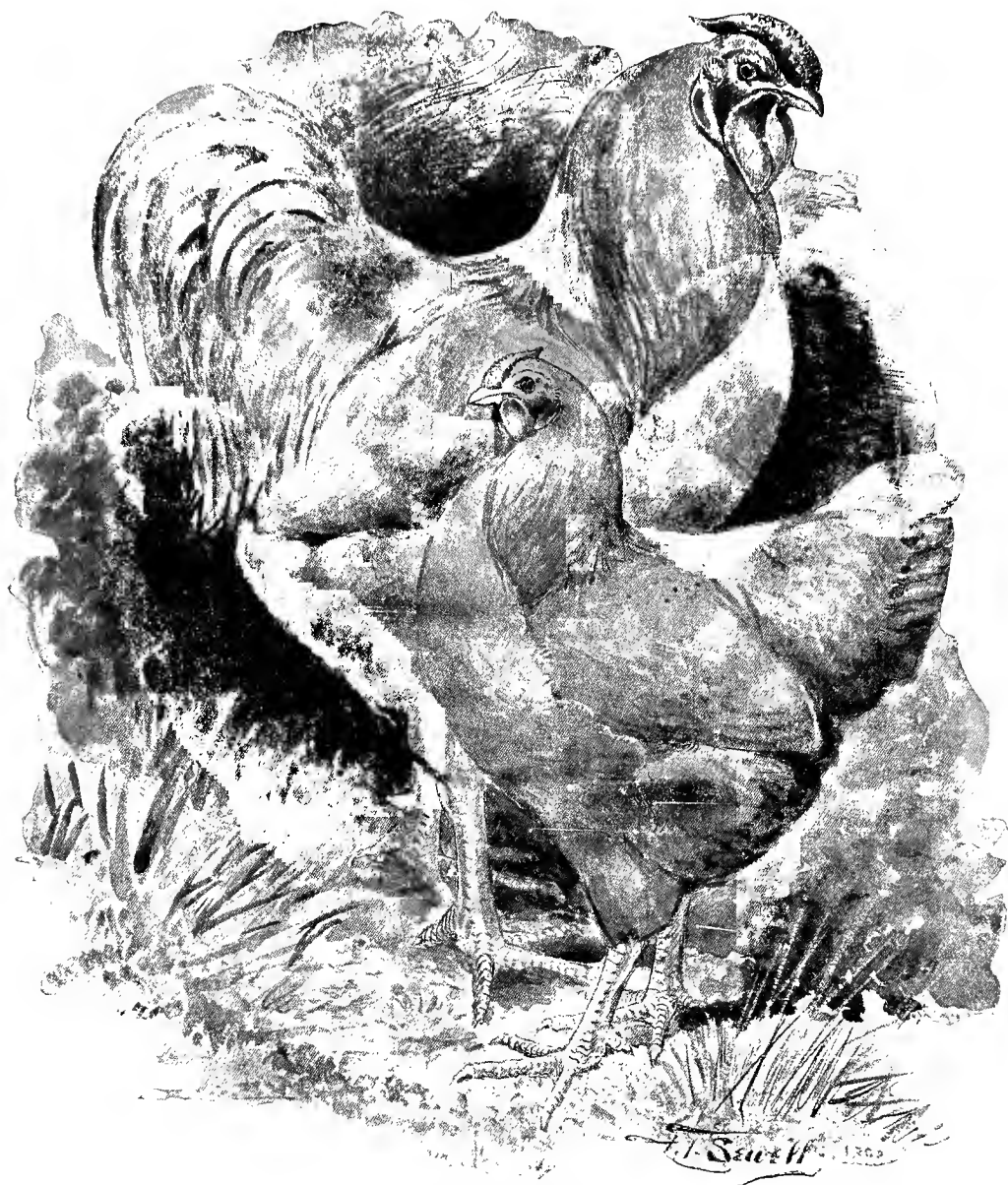
The methods of fattening adopted are four in all: (1) From the trough; (2) by hand; (3) by funnel; and (4) by machine.

1. This system has been already referred to, and it is chiefly employed for the production of half-fatted specimens, which may either be kept in the ordinary pens or in a house and run similar to that shown in Fig. 56, which can be moved on to fresh ground as often as necessary. It will be seen that it is fitted with troughs at either side. One of these appliances, 6 feet long by 3 feet wide, is large enough for a dozen birds, and it is a suitable form for ordinary farmers. In Belgium the famous Coucou de Malines are fattened entirely from troughs, but they are kept in closely-covered sheds during the entire process.

2. Some of the finest fowls which are produced both in England and France are crammed by hand; but the process is slow, so that it is only suitable where labour is abundant and cheap. In a large establishment it would be impossible to get through the work if hand cramping were depended upon. The food is mixed to a thick paste, and formed into pellets or boluses about $\frac{3}{4}$ inch in length and $\frac{1}{2}$ inch thick. There are two ways in which feeding takes place. In the one a sufficient number of the boluses are prepared, and the operator takes hold of the bird's head, either in the pen or out of it—in the latter case firmly gripping it between his body and left arm—opens the mouth with the thumb of his left hand, dips the bolus into a vessel of whey or milk, inserts it into the mouth, presses it down the throat with his finger, and then carries the food into



FIG. 53.—MARTEN'S FATTENING SHED.



PAIR OF BUFF PLYMOUTH ROCKS.

Bred by, and the property of, Mr. James Forsyth, Owego, Tioga County, N. Y., U. S. A.

Winners at the Madison Square Garden Poultry Show, New York.

To face page 72.

the crop by running his finger and thumb down the outside of the gullet. The second plan varies somewhat. The operator sits upon a stool, with a lot of the paste and a bowl of whey or milk before him. The bird is placed upon his knees, its legs held firmly by them, the left hand holding the wings, and he places a small quantity of the food, after dipping it in the milk, into its mouth, allowing it to swallow in the usual manner, there being no actual cramming. Both these methods are very simple. In some instances a combination of the two methods is adopted. The birds are kept in cages, to which are fitted troughs. After each meal the attendant goes round, feels the crop of each

a reasonable price, and splendid quality of flesh is produced in this manner.

4. Cramming by machine is found to be the most expeditious, and the first cost is speedily saved in the labour bill. We have seen an operator feed 250 birds in an hour, so that the duration of insertion is very short. Many people have the idea that this system is a cruel one, but it is not so. A careless or inexperienced operator can hurt the subject, but it does not pay him to do so, as any injury to the throat or mouth would cause inflammatory action to be set up, and it would die. The tube which passes down the throat is made of indiarubber, is flexible, and as the cartilaginous



FIG. 54.—GAMBAIS FATTENING SHED.

fowl, and then crams a few of the boluses whenever it is thought necessary to do so.

3. Cramming by funnel is largely carried out in Southern Normandy. In this case the food is made into liquid form, about the consistency of ordinary cream. A specially made funnel (Fig. 57), the nozzle of which is carefully turned to prevent injury to the bird's throat, is inserted into the gullet until the orifice enters the crop, which can be felt by the finger, and the food is spooned therein until the crop is full, when the funnel is withdrawn. In operation the process requires a much shorter time than it takes to describe, but care must be taken, or there is great danger of choking the fowl. These funnels can be purchased at

rings of the neck are flexible, it enters quite easily. The way in which the fowls anticipate the feeding-time, after the first day or two, shows how they regard the operation. The machines employed are: (1) the Neve (Fig. 58), which is largely used in Sussex. It has a horizontal cylinder, and is operated by a foot lever, but as there is no spring to draw the pedal back again, this must be done by the foot before the tube is withdrawn, otherwise the food will be wasted. (2) The Hearson (Fig. 59), of which the following is an explanation: A is the reservoir for the food; B, the pump cylinder; E, the piston rod; G, the spring bringing foot pedal and piston back again; K, nozzle and food tube; M, stop for regulating quantity of

food; O, lever and treadle. For use in these machines the food is made semi-liquid, about the consistency of very thick cream, which is placed in the reservoir. The operator moistens the tube with milk to make it pass easily, takes the tube in his right hand, the bird's head in the left, the bird itself being held firmly under the left arm; then, with the assistance of the finger and thumb of the right hand, opens the bird's mouth, and slips the forefinger into it to hold down the tongue, quickly inserts the end of the tube, and, holding the neck perfectly straight at its full length, pushes it down 4 or 5 inches (according to the size of the bird); at this

moment the heel of the right foot, which up to this time has been resting on the treadle, is depressed and forces the contents of the cylinder into the crop until it is sufficiently charged. If the crop is full enough, the tube may now be withdrawn, care being taken, however, to relieve the pressure on the treadle for a second or two before taking the tube out, otherwise a small quantity of the food will continue to flow after the tube is removed. The quantity of food can be regulated to a nicety, and the great thing is to cease pressure the moment sufficient has been placed in the crop. A most important point in connection with the

fed in pens without taking them out, the liquid flowing when the spring is released. In this case the nozzle is only placed into the mouth, not passed down the throat. The head must be held well up and the neck stretched to allow easy swallowing.

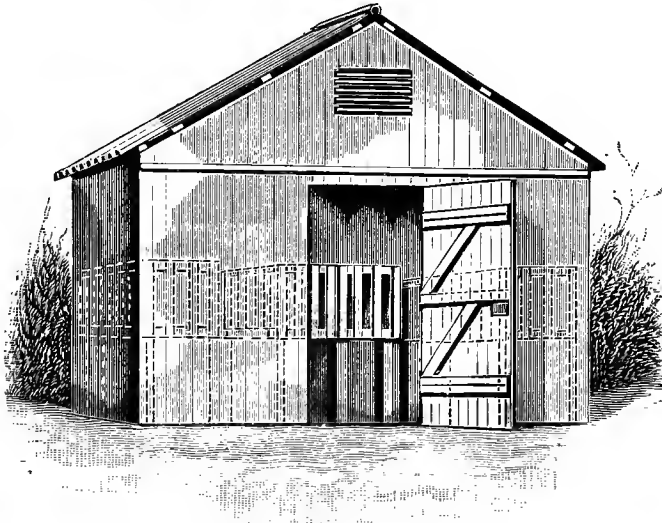


FIG. 55.—MODEL FATTENING SHED (REGISTERED).
(W. Calway, Sharpness.)

FOOD FOR FATTENING.

The food supplied to the fowls during the process of fattening is of very great importance, and upon it must depend both the quantity and flavour of the flesh. This must always be soft food, and never hard corn, as the latter would take longer to digest from the fact that the birds are in confinement, and would

not give the same results. The reason why animals fatten better at rest is well explained by Professor Warrington, F.R.S. He says that economy of food is promoted by diminishing the demand for heat and work.

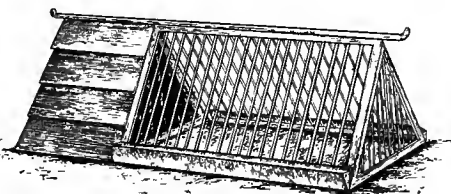


FIG. 56.—PORTABLE FATTENING SHED.

fattening of poultry is to give the food regularly, and if there is any remaining in the crop from the previous meal, not to give any at all. Several of the French cramming machines are for liquid food, and attached to them is a long piece of india-rubber tubing, fitted with a spring tap or nozzle, so that the birds can be

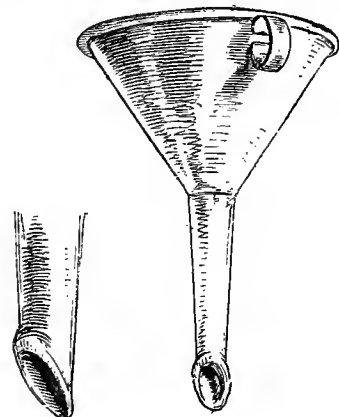


FIG. 57.—FUNNEL FOR CRAMMING.

An animal at rest will increase in weight far more than an animal taking active exercise on the same diet. In the same way the increase from a given weight of food will be less in winter than in spring or autumn, a far larger proportion of the food being consumed for the production of heat when the animal is living in a cold

atmosphere. Hence the economy of feeding animals under cover during winter. If, however, the temperature becomes so high as to considerably increase the perspiration, waste of food again takes place, heat being consumed in the evaporation of water. The temperature most favourable for increase is apparently about 60° Fahr. Quietness and freedom from excitement are essential to rapid fattening; the absence of strong light is therefore desirable.*

In Sussex and the South-Eastern counties the food almost entirely employed is ground oats, which is largely made in the valley of the Medway, several millers making a speciality of this product, one of the leading being Mr. Thomas Lambert, of Hadlow. There is no reason why it should not be produced elsewhere, but up to the present others have not learnt the secret, if secret there be. It is necessary that the stones shall

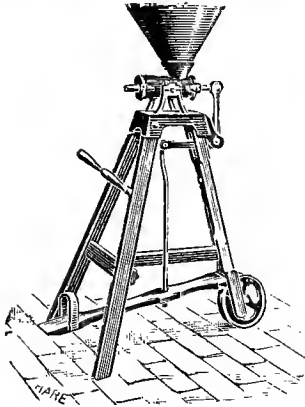


FIG. 58.—NEVE CRAMMER.

be sharp and run very low. Ground oats must not be confounded with oatmeal, as they have not been kiln-dried—at any rate, to the same extent, but are fresh oats ground very fine, husk and all. It is found in experience that English and Scotch oats are unsuitable for this purpose, as they contain too much moisture, and will not grind nearly so fine, unless they are highly kiln-dried. Consequently, the plump, hard Russian oats are preferred, and from them the best samples are produced. The usual price for pure ground oats ranges from £9 to £10 per ton, varying in accordance with the market rates for oats. Cheaper kinds are often sold, but these are usually adulterated with fine thirds, and it is better to obtain the purer, even though the cost may be higher. In Belgium finely-ground buckwheat is universally used, and this gives very good results, and in France buckwheat-meal and fine barley-meal are used very largely, both of which are very good, but by reason of the greater amount of lime in oats they certainly are the best.

* "Chemistry of the Farm." London: Vinton and Co., Limited.

With the meal should always be mixed soured skim milk, buttermilk, or whey, from the curds. In Sussex the first-named is alone adopted, and one of the largest fatters sometimes pays as much as £20 in a week for milk during the busy season. Whole milk would not only be more expensive, but the globules of butter-fat in it are not necessary, and can be substituted at a much cheaper rate. Surprise is often expressed that soured



FIG. 59.—HEARSON'S CRAMMING MACHINE.

rather than sweet milk should be used. In practice it is found that the former gives the better results, the acid generated by the turning of either milk, buttermilk, or whey, causing more rapid action than would be the case if it were sweet. Not only is the milk itself soured, but when mixed with meal, as is usually done immediately after one time of feeding is over, it is allowed to stand for several hours, until a slight fermentation has taken place. The advantage of being able to use what are often waste products is very great, and on dairy farms the skim and butter milk can be thus made of great service.

It is customary in England to give a small quantity of fat during the later stages of the process, and this is found to give a softness to the flesh which is very desirable, but the amount should not be large, or the grossly-fatted specimens which are so objectionable will be produced. None whatever is mixed with the food whilst the fowls are being fed from the troughs, but when put on to the crammer, a quarter of an ounce should be allowed for each bird per day, or a tablespoonful for every ten fowls, gradually increasing it to

double that quantity. Fat may be bought in barrels for this purpose ready for use, but in most of the larger towns butchers' scraps can be purchased at a cheap rate, and should be clarified and stored ready for use when required. It must, of course, be melted and thoroughly mixed with the meal and milk. It is sometimes found, especially during hot weather, necessary to take steps to keep the blood cool. A little flowers of sulphur is useful to this end, but some of the fatters boil nettles, and, after chopping them up, mix in the same manner.

Fowls should always be fed twice each day, and at regular times. The exact hours will vary in accordance with the season of the year. In summer six o'clock in the morning and six o'clock in the evening will be the most suitable, but in winter eight in the morning and four in the afternoon will be better. In this case the evening meal should be rather fuller than that in the morning.

Frequently it is found that birds when first put up fret by reason of the confinement, and, instead of putting on flesh, actually lose weight. To prevent this, they should be kept without any food for the first twenty-four hours, or, if they have come a long journey, for the first twelve hours, by which time they are so eager for food as to forget about anything else. They then take a hearty meal and are content. Or, a little broken maize may be spread on the top of the food in the trough in order to tempt them to eat. When trough-fed, all that remains must be taken away as soon as they are satisfied. Some of the fatters feed only once on Sundays, and this is found to do no harm, though it is more a question of labour than for any other reason.

FEATHERS AND MANURE.

Where larger numbers of fowls are fatted, the feathers and manure form important items, and should be carefully collected and disposed of to the best advantage. Fatters have informed us that they were able to pay their wages by the sale of these articles. Feathers should be sorted and dried; manure must be kept dry, and under cover, and it is in demand by market gardeners, selling at from £3 10s. to £5 per ton. If the fattening establishment is run in connection

with a fruit or ordinary farm, an outlet will be found for it in this way.

SUMMARY.

The following rules have been drafted for us by one of the most successful South-Country fatters:

First, in fattening fowls, the actual amount of food supplied goes only a little way in the production of flesh as compared with the conditions under which the birds are kept.

Second, there is a considerable difference in the readiness with which fowls fatten, even of the same variety. Large-framed birds, well grown, produce the finest specimens.

Third, where first-quality birds are to be turned out, those selected should be placed in a large outside run, and for the first three or four weeks fed on no more than one meal a day. They are then removed to the pens, and the food gradually increased in quantity until they have as much as they can eat, when they are finally finished off by cramming, as already described, this last stage occupying three weeks. The object of the treatment is to gradually build up the flesh upon the frame. This method, however, is not suitable for young chickens, which are fed right off, and is not usual for ordinary fowls.

Fourth, when cramming commences, each bird should be placed in a separate pen, or two to six together in larger compartments, if of the same age and sex, in a quiet, sweet, and, if possible, rather dark room or shed, and for the first few days be fed from a trough, finishing off by the crammer.

Fifth, before a bird is crammed, the crop should be felt, and if there remains any food in it from the previous meal, no food is given until the next time of feeding. Observations should be made as to the quantity assimilated, so as to give a fowl each time as near as possible just about as much as it can digest. Should a bird show any sign of sickness, it should be placed in an open run for twenty-four hours without food. To aid digestion, grit may be given in a dish before each pen, and boiled nettles mixed with the food twice or thrice a week as an aid in keeping the blood cool. Young chickens may be fed thrice a day, but for older birds twice a day is much to be preferred.

CHAPTER XIV.

KILLING, SHAPING AND MARKETING POULTRY.

KILLING FOWLS—FRENCH SYSTEMS OF DRESSING AND SHAPING—LA BRESSE FOWLS—THE SUSSEX SYSTEM—MARKETING—CAPONISING—DRESSING AND TRUSSING.



KILLING fowls is by no means difficult. The best method we know is to hang the birds up by the legs, and then thrust a pointed knife into the roof of their mouth, rather in a backward direction than to the top of the skull. This is in order to reach the brain, for then death ensues very speedily, and with very little pain to the victim. The birds should be allowed to hang until the blood has ceased running, and be plucked immediately, for, it is scarcely necessary to say, it is much easier to pluck a newly-killed fowl than one which has been dead for some time, and is consequently cold. In all cases where fowls are killed to be sent to market they should be plucked by the farmer, and the value of feathers he will obtain will more than repay the labour of plucking, though this is not its object. A special knife should be employed, and Spratt's Patent sell a very suitable one for this purpose.

DISLOCATING THE NECK.

The common method of killing fowls is by dislocation of the neck, and there can be no question that in the hands of an expert operator this plan is most expeditious, and with the minimum of pain to the victim. It is not easy to follow the method from a printed description, and we should recommend all who intend adopting it to learn the actual operation from an expert poulterer, as it is undesirable to make experiments even with dumb animals. However, as a guide to those who may not have this opportunity, we give a description of the process. The bird should be held firmly by the legs in the left hand, which can grasp the ends of the wings also, the head in the right hand between two of the fingers back of the skull, so that the comb lies in the palm, the back of the bird upwards. The legs are then pressed against the left hip, and the head laid against the right thigh near the knee. Next the fowl should be rapidly and firmly extended or drawn to its full length, and at the same

time the head is suddenly bent backwards, by which means the neck is dislocated just below the junction with the head, and death immediately ensues, as all the large vessels are torn across. The operator must not be nervous, nor yet afraid, but perform the work firmly and expeditiously. Muscular contraction will take place for a few minutes, but if the operation is effective no pain is suffered. It is always better to pluck whilst the fowl is still warm, as the feathers then come out easily and the skin does not tear. There is no cruelty involved by doing so, for all sensation is at an end, the brain, which is the centre of all feeling, being completely severed from the body. In plucking, the operator should sit down, hold the legs in the left hand, the head hanging between his knees, so that the blood flows towards the head and gathers in the neck, without making any mess. It is better to draw the feathers with an upward pull, that is, the opposite way to which they lie on the body. A good man can kill and pluck twelve birds per hour.

FRENCH SYSTEMS OF SHAPING.

Next to the feeding of the fowls the most important part of the French system is the shaping, for this has much to do with the appearance of the birds when offered for sale. There are two principal methods adopted: one, used almost solely in connection with La Bresse fowls, and the other that which is nearly universal. The former method, which is adopted to give the La Bresse fowls their peculiar shape, is entirely confined to that breed. As soon as the fowls are killed they are plucked, and whilst warm are wrapped, first in a fine linen cloth, and then in a coarse one, both of which are specially shaped. These cloths are drawn very tightly, and the outer one is stitched up and then damped. The birds are kept in these cloths for twenty-four hours or more, by which time when taken out they are long in shape, with pointed ends, and are perfectly round, the legs and wings being pressed tightly into the

sides of the body. The flesh of the La Bresse is very white, and the skin thin and delicate, so that the dish, however peculiar it may appear, is very tempting indeed.

The other method, which is most generally used, utilizes a shaping-board of a different construction from anything we have seen elsewhere. The board is about 2 feet in length and 8 or 9 inches in width, this size, of course, depending upon the fowls to be placed thereon. As soon as the fowl is killed it is quickly plucked, and the head, legs, and lower bowel most carefully washed. The bird is then turned breast downwards, the hocks having already been tied with the wings through them; the rump is supported by a block of wood, and the crop by a pad, to keep the fowl level; a wet cloth is very tightly drawn over the back, and the tapes attached to it for the purpose tied down to nails or pegs on either side of the shaping-board. The whole is well drenched with cold water and left to set. Such a system brings out all the best qualities of the fowls, and secures the meat so that it can be easily carved.

THE SUSSEX SYSTEM.

Shaping is carried out in Sussex as part of the process, but in a very different manner to that described above. There can be no question that the appearance of the fowls is greatly improved thereby. This is one reason why Surrey fowls look so much superior to those not finished off in the same way. This system is,

moreover, so simple that it can be adopted at very small expense, shaping-boards being very easily made. Fig. 60 shows a shaping-board built in three rows, and capable of holding 30 to 36 birds at one time. For smaller producers it can be built with one row, and the cost of material for construction of the larger size would not be more than four shillings. Each trough is made V-shaped, the front of which is rather narrower than the back. These troughs consist of only twelve pieces of wood, namely: (1) The two upright ends, 36 inches by 7 inches; (2) three troughs, each made of two pieces, at right angles, the back board 6 inches wide and the front 5 inches, and 30 inches long; (3) the bottom stay; (4) three loose boards, half an inch shorter than the troughs and 4 inches wide. It is better to use plain deals five-eighths or three-quarters of an inch thick, and fit the whole firmly together.

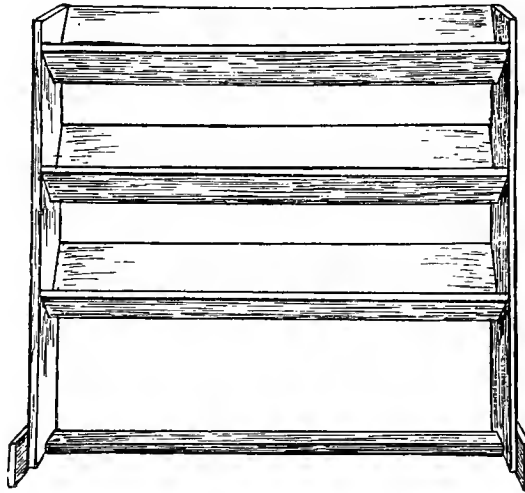


FIG. 60.—SUSSEX SHAPING-BOARD.

The *modus operandi* is as follows: As soon as the birds are plucked, which should be done carefully and thoroughly, the hocks are tied loosely together, so that the legs are flat against either side of the breast. Before doing so, however, some of the more skilful fatters draw the meat upwards by means of the hands, and this undoubtedly improves the appearance of the bird, though it must be done carefully to prevent breaking of the skin. The operator strikes the stern against a wall, thus flattening and making it fit the shaping-trough more easily. Each bird is laid in the trough breast downwards, with the neck and head hanging over the front. The first bird is pressed firmly against the end of the trough, and a glazed brick or weight laid by the side to keep it in position. When the second and succeeding birds are placed in the trough the weight is moved along until quite full. It is necessary that they should

be packed firmly and tightly in this way. Next a loose board, 4 inches wide, and half an inch shorter than the trough, is laid upon the back of the fowls, just behind the wings. Upon this are placed three or four heavy glazed bricks, or two weights (56 pounds for preference), and the fowls are allowed to remain in the trough for several hours, in fact, until they are quite cold and set. When taken out they have the appearance as shown in Figs. 61 and 62. In all such matters it is desirable to study appearance, and what are the market requirements.

For the London trade it is necessary to send birds so shaped in order to secure the best prices. Of course, shaping does not add one iota to the weight, nor anything to the edible value. But it is none the less important, for the eye is the inlet to the pocket as well as to "the soul."

Whatever the system of shaping adopted, it is necessary that the bird be plucked carefully, and it is customary in some parts to employ the services of persons called "stubbers." If any of the feathers, and especially the short quills, are left in the flesh, they will, of course, materially depreciate the appearance. We desire to urge upon every producer the duty to himself and the industry at large of turning out the fowls in the very best manner possible. Some fatters are very fond of breaking the breastbone of fowls, and this is frequently done in Sussex. It is a most objec-

tionable practice, and one that ought never to be adopted. As a rule, all Surrey and Sussex fowls are singed immediately they are plucked and stubbed, and when properly done there is no objection to this custom, as it is simply clearing the skin of surplus hair and feathers. But the flesh must not be blackened. Straw only should be used.

MARKETING.

In all industries the ideal would be that producers and consumers should come into direct contact with each other, and in former days this was the case to a greater extent than now. But with the growth of great centres of population, and rapid intercommunication between all parts of the country, this can only be to a limited extent. Whenever possible, and this ought to be so to a greater degree than is generally supposed, direct sales should be made, to which end markets should be encouraged. But however much we may

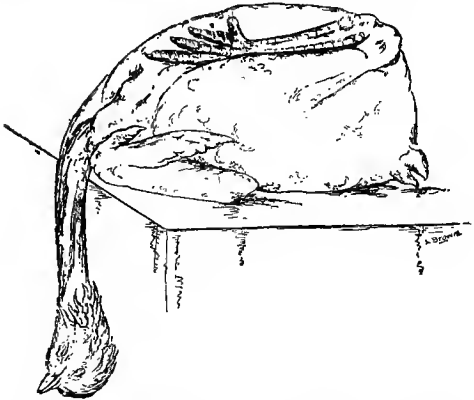


FIG. 61.—SHAPED SUSSEX FOWL (BREAST UPWARDS).

declaim against the middleman, he is a necessary factor, and so long as he is kept in his right position, that is, an intermediary between one class and another, and not a dominator, he serves a most useful purpose, earning well the commission allowed him, and saving more than his cost. But if the result is at once to depreciate the return obtained by producers and enhance the cost to consumers, then we have a very serious state of things. In practice we know that better prices can be obtained for the great bulk of table-poultry from salesmen and dealers than in any other way, more especially by those who have good birds to sell. Complaints are chiefly rife amongst those who send forward mediocre or poor qualities of any produce. We are bound to recognise, therefore, that it is to "the trade" we must look for help in this direction, and the greatest success will be achieved by producing for it, unless where there is a good local demand retail.

The time of year when poultry is marketed is an essential consideration. Again and again when com-

plaints have been made as to the small prices received for chickens, it has been found that no thought had been given to the ruling rates at different seasons of the year. Chickens are worth, as a rule, about twice as much in April as in August, and in this connection it is necessary to bear in mind that when the game comes in the demand is greatly reduced and the prices correspondingly lower. Messrs. Brooke Brothers, of the Central Markets, London, have kindly furnished us with the average values of Sussex poultry sold by them during one complete year, as follows :

	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>
January	3	6		
February	3	6		
March	3	9		
April	4	6 to 5	0	
May	4	3 to 4	9	
June	3	9		
July	2	9		
August	2	6		
September	2	9		
October	2	6		
November	2	9		
December	3	0		

These figures show that the average for the first six months was 4s. 1d. per head; for the second six

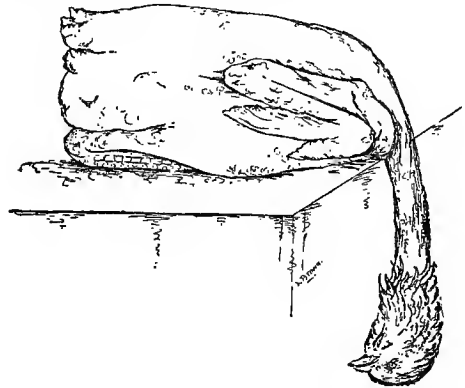


FIG. 62.—SHAPED SUSSEX FOWL (BREAST DOWNWARDS).

months 2s. 8d. per head; and for the entire year just over 3s. 4d. per head. But they include all qualities, and many of the best fatters would secure a much higher return. The point to be kept in view is that the best prices are obtained during the earlier months of the year, and the great bulk should be marketed by the end of June.

PACKING.

Much carelessness is shown in the packing of dead poultry, and this needs care. We have seen crates of chickens opened, and their value materially reduced by reason of bad packing, many of the birds

being "barked," or otherwise damaged. They ought to be packed firmly and evenly, and if this is done they will carry long distances in perfect safety. In this country specially-made crates, or "peds," as they are called, are employed, which combine lightness with strength. These (Fig. 63) are lined out with straw, and there are layers of the same material between each row. The birds are placed with the sterns to the sides, and in double rows. In France linen cloths, which are first dipped in milk, are often employed, and for the better class of fowls they are to be recommended. It may be mentioned that some of the railway companies are willing to supply hampers free of charge for conveyance of the dead birds.

In order to obtain the best results, chickens should always be killed where they are fattened, otherwise much of the benefit obtained by the system will be lost. A fattened fowl will lose a considerable portion of its added weight if sent to market alive, due to the change of condition. The same thing is found in connection with larger stock. In these days of refrigerating chambers there is no difficulty in keeping dead poultry for several days, in order to avoid glutting the market.

SUMMARY.

To obtain the best results in connection with the fattening of chickens the following points are to be kept in mind :

1. We must have the right kind of fowl. As before mentioned, nearly all fowls can be improved by fattening, but there are those which specially lend themselves to the process, and take more kindly to it. The prejudice in favour of white legs has to be reckoned with, although it is not wholly justified. Several of the finest French table-breeds have dark legs, and they are equal to anything we have in flesh qualities. But yellow-legged varieties always take a second or third place.

2. To obtain the best prices we must have early hatching and late. We must study the market returns, and endeavour to place the produce when rates are highest. As a rule, there is an abundant supply when the demand is small, and we must try to remedy this state of things.

3. There must be a system of fattening and killing by the fatter. Sufficient has been said to show the importance of this system, which is carried out in connection with larger stock, and should be universally

adopted for poultry. As a rule, it will be found that having separate fattening establishments will give the most satisfactory results.

4. The fowls should be properly shaped, neatly plucked, and carefully packed.

CAPONISING.

Before leaving this subject it is important to deal with the question of caponising. There can be no question that the system of caponising is one that deserves considerably more attention than it has ever received in this country. If for no other cause, it would have been reasonably expected that pecuniary motives would have led farmers and large poultry-keepers to adopt the system, for cockerels caponised, and pullets made into poulardes, grow to a very much larger size than those not so treated, and it is true that the quality of meat is much improved; not only so, but male birds which could not be kept together without great danger of constant conflicts will live in peace and amity. This latter reason would of itself be sufficient to warrant the adoption of caponising to a

considerable extent, for the pain suffered by a bird is so infinitesimal, as compared with the result of a single fight, that the benefit altogether outweighs any objections on this score. But when there is the additional inducement of getting very much larger size in the fowls, with very little outlay—for the birds thrive better and lay on flesh more rapidly, not being so restless in temperament—it is most surprising that the plan has not been very largely adopted. In France capons are very numerous indeed.

Therefore, upon the ground of profit, it is strongly recommended that all male fowls intended for table in the autumn should be caponised, because the surplus cockerels can thus be made the most of, and will realize for the breeder more than they otherwise would. When this position is accepted, there next comes the question of how it should be done, for probably the objection to what would appear to be a surgical operation is what weighs with many who have never adopted the system. They have a very right and proper objection to the giving of pain. So have we. And if it were not that we know the pain is momentary when the operation is rightly performed, we should be the last to countenance, much less advocate, such a system. Granting,

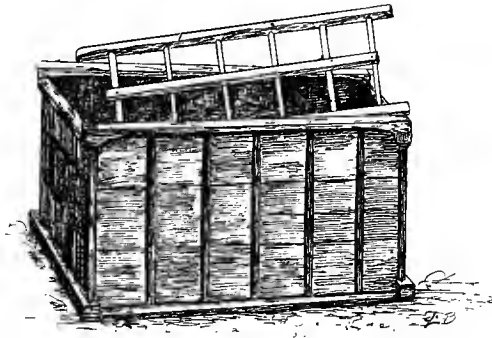


FIG. 63.—SUSSEX PACKING-PED.

therefore, what we have been saying has been accepted by the reader, the next point is—How can the act of caponising be performed? In reply to which question we give the method which has been perhaps the most successful, namely, that introduced by Farmer Miles, an American, who was over in this country a few years ago, and who then explained his system. The instruments used are special ones, and can be bought from makers of surgical instruments. Spratts Patent advertise a set, which we have found all that is necessary.

HOW TO CAPONISE.

The best birds to operate upon are chickens which have never yet crowed; and when about three or four months old is the right age. They must be kept without food for thirty-six hours or more before being operated upon. A good light (sunshine if possible) should be chosen to operate in, and the full light should be allowed to shine in the chicken's side when opened. First take two good thick pieces of string, or thin cord, 3 feet long; to one end of each attach a weight, or any equivalent in the form of a brick or stone, fastening the other end of the string to the chicken's legs. Then lay the bird on its left side, and drop the weighted end of the string over one side of the operating-table. Now tie the free end of the second string round the bird's wings near the body, and drop the weighted end of this string over the other side of the table. The chicken will thus be properly secured, and the operator must stand so that its back will be towards him. The small feathers from hip-bone to ribs, over the last rib, must now be plucked off, and the ribs and feathers all round should be wetted with a sponge dipped in quite cold water, or ice can be used if preferred, as this wetting will serve to keep the feathers out of the operator's way, and will also numb the sensations of the fowl, so that it does not appear to feel the operator's knife. Stick the knife in half an inch deep between the first and second ribs from the hip-bone, and cut downwards and forwards to the end of the ribs. Turn the knife, and cut nearly up to the back-bone. Now put in the spreader, which is one of the instruments used, tempering the tension by a rubber band provided for the purpose, to suit the size of the fowl, and with the spreader open the ribs, after which split the inside striffin that covers the bowels. The upper testicle will now be exposed, and should be grasped by the grippers, which should be given one entire turn over so as to separate the testicle from its attachments, except the spermatic cord, and pull the testicle out. Treat the lower testicle in the same way. It is necessary to be careful not to rupture the large vein under the testicles, and also to get the whole of the latter out. The bird may be untied and allowed to go without the incision being sewn up, but for a few days it should not be allowed to fly up to roost. Birds may in this

manner be caponised in any number, and without loss of more than one or two per cent. Large breeds of poultry when caponised young and well fed until ten or eleven months old, and then fattened, will weigh 12 to 15 pounds each, and the meat on them will be found of the tenderest and most succulent description.

It is to be noted that the chief dangers found in practice with all systems of caponising is in tearing the veins near the testicles, which results in the bird's bleeding to death, and in the losing of the testicles amongst the intestines, which latter is almost certain to cause inflammation and death. These seldom happen, except through want of care or inexperience, but it is important to have a good light in order to prevent it as far as possible. The want of care can be avoided, and to overcome want of experience it is better for a novice to make his first experiments on a dead chicken, so as to learn exactly the position of the place to be cut, and of the testicles. A little study of anatomy in this way is highly useful, and, in fact, it would be cruelty for any novice to commence operations on a living bird. The first time must necessarily partake of the nature of an experiment, and therefore there should not be any risk of giving unnecessary pain. For all operations firmness and confidence are necessary, without which a bungle is sure to be made, and these are not to be had except there is actual knowledge of the subject and of what has to be done. This actual knowledge can only be obtained by experience.

DRESSING AND TRUSSING.

Fowls which are being marketed in the usual manner must never be drawn or cut in any way, as the final work is performed by the poulterer in accordance with his customer's requirements. When chickens are sold direct to consumers, it is better if they can be delivered ready for cooking. Cooks are not nearly so expert at this business as they were formerly, and, further, they naturally prefer to have a bird which does not entail the labour necessary if it is sent undrawn. In some parts of the United Kingdom the method adopted by poulterers is by no means the best, and the following explains, as far as possible in print, the system which gives the most satisfactory results. For this purpose a special knife is required, as the *Encore Poultry Knife*, made on the author's suggestion by Messrs. Thomas Turner and Co., of Sheffield, a trussing needle (12 inch preferred, as then it can be used for turkeys, which are trussed in the same manner), and some fine, strong string:

For Roasting.—Presuming that the chicken has been properly plucked, lay on its back with feet away from the operator, (1) nick the skin of each leg just above the joint so as to cut the sinews; (2) trim the pinions, cutting off the skin on outer side, so as to remove all marks of feather pits; (3) lay chicken on its chest,

with stern towards operator and head away from the body; (4) make a transverse cut in skin of neck about 2 inches from back, and lay skin thus loosened backwards, exposing vertebræ; (5) cut off neck and head where neck joins the back, and leave about 2 inches of neck skin—this can be done by the knife named above without cutting under skin; (6) now turn bird round sideways, breast upwards, and laying back the neck skin to expose the front of breast; (7) press the thumb firmly down the A-shaped orifice thus exposed, cut out crop, and insert finger into body, loosening internal organs all round from breast-bone and carcass; (8) carefully cut out merry-thought; (9) turn bird round in the hand, make a transverse cut across the vent immediately below the 'parson's nose,' and an angular cut at each side, which prevents the sides cracking when the bird is being drawn; (10) insert forefinger and find 'trail,' which cut off, loosen the fat over gizzard gently but firmly, and draw all the intestines through vent, taking care not to break any organ; (11) now place chicken on the table, breast upwards, and insert long needle between thigh behind leg-joint, pressing to corresponding place on other side, using fine string, and drawing through; (12) lay fowl over on table, and insert needle in first joint and hand of wing, draw through and pass string over back, repeating on reverse side, here pull

tight and tie up; (13) insert needle through body at end of back-bone, carry over leg and under the breast, but it is unnecessary to pierce the meat on breast; (14) carry string round other leg and tie, the legs standing away from behind the body; (15) chop off the toes; and (16) when the fowl is smoothed over by the hands it is complete."

"*For Boiling.*—With the exception that it is unnecessary to cut the legs, (1) proceed exactly as described for roasting to 10; (11) insert first and second fingers of one hand through vent, and loosen the skin on thigh down to hock on both legs. This is an easy operation, only needing a little care to prevent tearing the skin; (12) make a cut through skin on inside of each leg about an inch above hock knuckle; (13) take chicken in hand, turn lower leg, or shank, under thigh, feel with finger inserted under skin for cut, and draw leg under skin, repeating this process on other side. The feet only will now protrude, and they should be cut off; (14) insert needle through front of body and stitch wings as in roast (11 and 12) chicken, but the wings may be shortened and inserted under skin, as are the legs; (15) pass needle through thighs behind, and tie up on back in front of stern."

The process of boning can only be learnt practically, and we therefore do not attempt to describe it.

CHAPTER XV.

MARKETING AND PRESERVING EGGS.

WHERE FOREIGN EGGS COME FROM—THE EGG TRADE—VALUE OF EGGS AS FOOD—QUALITY OF EGGS—FLAVOURING EGGS—AGE OF EGGS—RAPID MARKETING ESSENTIAL—PACKING EGGS—SORTING—PRESERVATION OF EGGS—PRESERVATION BY LIME, SALT, ETC.—FRENCH METHODS—FREEZING EGGS—FERTILE OR NON-FERTILE EGGS.



E have already given statistics to show the great increase of egg imports during the last generation, and it is interesting to learn whence comes all the mass of food represented by these figures, and how it is consumed. The figures are given in detail on page 3. There seems no limit to the demands of the English stomach. Since the St. Gothard tunnel was opened from Switzerland to Italy the traffic has been something astounding. The competition of routes led to a great reduction of rates, and eggs are brought from Northern Italy to London for much less than used to be charged from Northern France. Whilst the railways in the latter country were asleep, others have been awake, and the result was the French trade suffered. After a time French producers awoke, and, as we shall presently see, have risen to the occasion. A new outlet has been found for the farmers and cottagers of Northern Italy, and tons of eggs arrive daily in England brought by the St. Gothard route. Previous to the opening of the tunnel, the imports, though greater every year, had not risen by leaps and bounds, and those of us who are interested in the question began to think that this slower increase was due to the larger number of fowls kept at home. This may have been true in some measure, but not entirely so, for as soon as there is a more abundant supply, the whole of it is absorbed without any great reduction in price or glut in the market. Of late there have been vast imports from Russia. That there has been a great increase in the home production of eggs no one can deny, and the signs are that it will still more increase. If the home produce of eggs could be doubled at once, there would even then be plenty of room for all the imports that now come. If the increase of people in all great centres of population continues, so will that of demand for eggs, from the recognition of their value as an article of diet, and we need a very large addition to imports or home production every year. Great as is

the consumption of poultry produce in Britain, it is overshadowed by that of America, where some time ago it was estimated that £58,000,000, or 290,000,000 dollars, is annually spent on eggs and poultry alone.

THE EGG TRADE.

The demand for eggs is a varied one. First, there is that for domestic purposes, which is ever increasing, the consumption of eggs growing year by year. They have come to be more and more regarded as a valuable article of diet, especially for children and invalids, containing as they do all elements necessary to sustain life and nourish growth. Eggs used for domestic purposes may be divided again. There are the new-laid eggs used for boiling and poaching, and in our great cities, especially London, the prices which these realize are very high. For guaranteed fresh eggs the retail prices range from 1s. 6d. to 3s. per dozen, according to the season of the year. These eggs, which are either English or French, are from one day to a week in age, and must be perfectly fresh, without the slightest sign of taint. In order to secure so important a consideration, many means have been devised by the great London dairy companies, but they find it very difficult to discover a reliable method. That found most effective is to have every egg received marked, so that whence it has come can be easily discovered. Then, if there are many complaints of the eggs from one man, he is first warned, and if the same thing occurs again, buying from him is stopped. In this way the interest of producers is found to be in honest fulfilment of their contract. As the best prices are paid, purchasers naturally insist upon receiving only really fresh eggs. Next to these stand cooking eggs, which are generally from Ireland and Denmark. These are not quite equal in flavour to new-laid eggs, and, whilst neither stale nor tainted, have not that fresh look or taste which the others show. They are

eaten by millions, but could not be put on the tables of those who know what a really fresh egg should be. In many houses these are used principally for cooking, and the retail price ranges from 1s. to 1s. 6d. per dozen. And finally there are the box eggs, themselves of various grades, which are eaten by our poorer classes, when they indulge in the luxury of an egg, but would not be accepted as fit for cooking, much less for eating, by many. These can at all seasons be bought at from 9d. to 1s. per dozen. A considerable portion of the commoner qualities of box eggs are used for manufacturing purposes. Thousands of boxes are taken by leather-dressers, and there are several other trades that consume vast quantities of the eggs which figure in import returns. The prices of this class of eggs range from 5s. to 8s. per long hundred. The quantity used in this way is something incredible, and there will always be a large demand on cheap foreign eggs for this purpose. We have at times been astonished to see the piles of eggs in some of our great leather establishments, and if the numbers so used could be given, they would to some extent explain the enormous exports that come week by week into England.

VALUE OF EGGS AS FOOD.

It is generally accepted that weight for weight an egg contains more nutriment than any other kind of food. There is no bone, no gristle, no great amount of water, and the only portions which are not edible, the shell and outer membrane, are a very small percentage of the whole. Thus there is the very modicum of waste or refuse. Eggs, as a rule, average eight to the pound, and we believe that a dozen eggs, even though they cost 2s., are cheaper as an article of diet than 1½ pounds of beef-steak. The two will cost alike, but in point of real nutriment we believe eggs have the advantage. Eggs can be served in scores of different ways, and can be presented in the most palatable forms. They enter into the composition of innumerable dishes, are relished equally by the invalid and the healthy; together with milk they should form the principal diet of children; and are, in brief, one of the most valuable of our foods. It is true they do not suit all stomachs. Those who are known as bilious subjects dare not eat many eggs, but apart from such people, there are few to whom a new-laid egg does not appeal with a great power of temptation.

QUALITIES OF EGGS.

It is often supposed that the more tinted the shell, the richer the egg. This may or may not be the case. We are inclined to think that the shell in some way is affected by influences which enrich the egg. Be that as it may, it is a certain fact that some eggs are much richer than others, and that some varieties lay better eggs than others. Common observation will show this.

Eggs are selected by their size and smoothness of shell when all are alike in point of freshness, whereas the real test ought to be the flavour and quality of their contents. To many people an egg is simply an egg, and nothing more; but there are eggs *and* eggs. There is really as much difference between the flavour of a well-fed Langshan egg and that from a black Spanish hen, as between the meat coming from these respective birds. The meat on the former is rich and well flavoured, that on the latter is dry and insipid; and the eggs are pretty much the same. If some of our scientists would go thoroughly into the subject, and tell us the quality of eggs produced by each variety of our domestic fowls, they would render an incalculable service to the community at large. Doctors would then be able to discriminate between one and the other, and, in ordering their patients these invaluable comestibles, could tell which to select. A bilious subject who dare not eat a Cochin or a Game egg might partake of a Minorca or a Spanish egg with less risk. Eggs can be influenced by the food consumed, and the whole question is full of possibilities. All eggs are not alike, they each have distinct qualities, and it should be the object of poultry-keepers to encourage the buying of eggs by their breeds, for in that way will the best qualities obtain top prices. Perhaps some day we shall see eggs in shops labelled according to their breed as well as their freshness.

FLAVOURING EGGS.

A suggestion has been made that much might be done in the way of improving the flavour of eggs. We know that food must have a very great influence on the produce, and every poultry-keeper can realize the difference between his well-fed hens and those which came from badly-fed fowls. But this suggestion goes farther. It is said that a new industry might be created in the raising of poultry and domestic animals upon certain kinds of food which will impart to their flesh new and palatable flavours. It is well known, for instance, that the exquisite flavour of the Canvas-back duck is due to the wild-celery it feeds upon in the Southern marshes, and the delicious Congo chickens owe their superior excellence to the pineapples they eat. The grouse of the Far West plains is aromatic with the wild-sage; wild-ducks and other sea-fowl have a fishy flavour; and the fish fed to swine may almost be said to be eaten over again by the consumer of their pork. Milk is especially affected by whatever is eaten, as every farmer can testify, whose cows give bitter milk when they eat the leaves of the burdock, etc.

Though this is from an American source, the suggestion is not to be dismissed as a piece of Western exaggeration and imagination, for it has sound theory at the back of it. The quality of both eggs and fowls is affected by the conditions under which they are kept,

and the soil upon which they are placed, as well as the food they eat. Thus, we find that the fowls of some districts are much better than those of others. Therefore it is quite possible to feed for flavour, though whether it is practicable from a commercial point of view must be left to the determination of practical experience. Of course, whatever food is used would have to be such as would not injure the fowls, or the harm done would more than counteract the gain secured. The limitations of this country do not permit of the same scope as in some others, but as heather-fed honey is so much superior to that produced by bees under cultivation, and as mountain mutton is so much richer and finer in flavour than that from fields and pastures, so there must be eggs and poultry which are



FIG. 64.—ROBINSON'S HONEYCOMB EGG-BOX.

the best of their kind because of the places where they are produced.

AGE OF EGGS.

The age of eggs can be told by their density, which decreases as they get older. Suppose that 4 ounces of common salt is dissolved in $1\frac{1}{2}$ pints of water; if a new-laid egg be put into this liquid it will sink to the bottom; an egg one day old will not go quite to the bottom; an egg three days old will be suspended in the liquid; beyond that age it will rise to the surface, and the older it is the more it will rise in the solution. A simple method, known in the trade under the name of "candling," is by the size of air space, which in a perfectly fresh egg is very small, not larger than a shilling. As the egg loses part of its contents by evaporation of moisture every day after it is laid, this air space increases in size, until a month afterwards it may be that it occupies one-eighth of the whole. If the egg is held between the eye and a light, the size of air space can be easily discerned.

RAPID MARKETING ESSENTIAL.

The first consideration in marketing eggs is that they shall be placed on the consumer's table as speedily as possible, as they rapidly begin to deteriorate. This is a matter too often forgotten, and we have been in extensive egg-producing districts where they are only sent out once a week. When the producers themselves bring their eggs to market this will probably be the case always, as it is now in Britain and Ireland. But the better system is that adopted in France, where egg-dealers send men round daily, or every other day, and by this means secure the eggs perfectly fresh. It is possible for an egg laid in Normandy to be on the consumer's table in London within ninety hours. This regularity and systematic collection accounts for the favour in which French eggs are held and the high price they obtain. Few English eggs, even though they have to travel only a tithe the distance, are marketed so rapidly as three days after being laid, whilst the



FIG. 65.—POCOCK'S PATENT EGG-BOX.

greater proportion are from a week to a fortnight old ere they reach the consumer. Our personal observations in France have shown us how well carried out is this system, and we believe that if egg-dealers would collect eggs, and not wait for them to be brought in by poultry-keepers, they would find a source of profit, and at once lift up our home produce to a higher standard of excellence. It has already been done in some districts, but why does not an enterprising young man in each district take up this collection as a matter of business? That he would be able to make it pay we have no doubt, for producers would rather sell eggs at their own doors than carry them to market.

PACKING.

The methods of packing eggs adopted vary greatly. We are all more or less familiar with the large square Irish cases, and also the long, coffin-like foreign boxes. The former vary in capacity from 1,200 to 4,200 eggs. They are strongly made, and are usually sent back again as empties. The latter uniformly hold 1,200,

and as they have a double division in the centre, any retailer desiring to buy 600 secures half a case without any need for repacking, the box being sawn in two. There can be no question that the latter is by far the more preferable plan, and these cases are being adopted by Irish packers, as they are more convenient, and there is no trouble with empties, for the boxes are not returned, and prevention of repacking pleases purchasers better than the old Irish method, which was wasteful and troublesome. There has been a serious revolt among traders against the Irish method of packing, not only because of the trouble and annoyance caused by the return of empties, but also that the way in which the eggs were packed and the dirty condition of the material has caused great deterioration of the contents. Unless this is attended to, Irish eggs will lose once more the position they have partly regained. Many foreign eggs are now packed in wood-wool, and if of the right kind, where straw is scarce, it is an excellent substitute, though not so good. Where eggs are sent short distances, and especially if forwarded direct to retailers, they are usually packed in large baskets holding about 1,200 or less. But when the quantities are comparatively small, and speed is imperative, there are now several forms of egg-boxes which are simple and convenient. These boxes are sometimes fitted with springs, which hold the eggs in position, and prevent their jarring against each other. Fig. 64 is the honeycomb box, made by Mr. J. Robinson, of Clitheroe, and the divisions being in the form shown, it is most economical in space, saving carriage. Felt between each layer keeps the eggs from breaking. The Dairy Outfit Company, of King's Cross, London, make a series of excellent boxes (Fig. 65), with felt layers, which carry the contents most securely. And the Dairy Supply Company, of Bloomsbury, London, also make a very good box for this purpose.

In all the commercial boxes, if we may so term them, the eggs are packed between layers of straw, sufficiently thick to keep each row separate. The eggs themselves must be laid close, to prevent their rolling about, or breakages will certainly occur. And the box must be full, so that when it is nailed or screwed down it will be firm and compact. One most important matter is that the straw shall be clean and sweet. Eggs are very susceptible to external influences, and if they are packed in dirty or fusty straw they will assuredly be affected thereby. Inattention to this matter, and the sending out of dirty eggs, due to want of clean straw in the nests, has done much to injure Irish eggs in the eyes of English consumers. A large dealer in Yorkshire recently showed us the difference between a

Danish case and an Irish box of eggs. In the former every egg was even in size, they were beautifully packed in clean straw, and the top layer was arranged with all the coloured-shelled eggs in the centre, forming a diamond, whereas the Irish were carelessly packed, the straw was neither even nor clean, and there were three or four sizes of eggs in the box.

SORTING.

One more matter needs to be emphasized, namely, the importance of sorting all eggs marketed. On the Continent this is regarded as a matter of course, and all eggs are graded. The process is to use a piece of board or card in which are three perforations, sufficiently large to fit different-sized eggs (7 to 9 to pound—Fig. 66). All eggs sent out together are of the same size in each box, and they are branded, according to their size, firsts, seconds, and thirds. Abnormally big eggs are discarded; very small ones are kept and sold at home. A single small egg will spoil the appearance of an

entire box, and depreciate its value, whilst a big egg will dwarf all others in the box, even though every one of them weighs more than 2 ounces. We are glad to know that some merchants at home have already adopted this

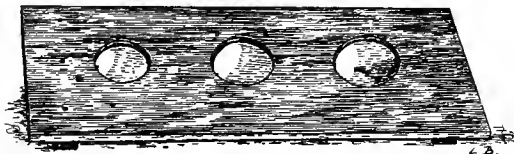


FIG. 66.—SORTING BOARD.

system, and we would strongly urge upon every producer of eggs that it will pay him better to keep the little and big eggs at home, and maintain an even standard for those sent out by him. An egg is certainly still the same, whether it weighs 1 or 2 ounces, but the customer neither wants to be annoyed by tiny eggs nor demoralized by large ones. The day may yet come when eggs will be sold by weight, as has been proposed in one American State, and that would be the fairest way; but a sufficient plan is to grade eggs, and obtain more for those that are large than an all-round price for big and little. Very often the price is fixed by the smaller egg rather than the larger. There is, however, one exception to even such a rule as this. The winter laying breeds of poultry lay a smaller, though a richer, kind of egg, but they have tinted shells, and this makes up for lack of size. There are in all our large centres of population many purchasers who want a pretty-looking egg to form one dish on their table, and to them size is of secondary consideration. But as a rule size will always be taken into account to some extent.

THE PRESERVATION OF EGGS.

The fact that eggs are more plentiful at one season of the year than at another has led to the trial of many methods of preservation. It seems to promise a large

profit if eggs can be kept from the time when they are plentiful and cheap, to be sold when they are dear, and it is small wonder that the means of making this augmented profit has been diligently sought for. We do not think that the result has been as satisfactory as could have been wished, but it is a fact that enormous numbers of eggs imported from the Continent during the winter season have been preserved, or pickled, as it is called. These too often are far from being what we should like to eat, but there are many people who are by no means fastidious in this matter. Perhaps they have something of the Chinese taste, for denizens of the Celestial Empire regard eggs as the more dainty when they ten months old. That, happily, is not the case with Western nations, who as a rule prefer to have them as fresh as possible. Though we think that the methods adopted for preservation of eggs are by no means as successful as could have been wished, yet there are ways in which they can be kept for a considerable period, and be good for culinary purposes, and not objectionable to many palates for eating in the ordinary way.

LIME.

There are several methods of preservation adopted on the Continent, but the most commonly used is as follows: The eggs are placed in tubs or large vats as soon as possible after they are obtained from the poultry-keepers. Some vats hold hundreds of dozens, and are kept by dealers who buy them in from the fowl-owners. A preparation of lime and water is made by mixing about 20 gallons of water with 4 gallons of fine slaked lime, to which a gallon of salt is added. When the water appears to have taken into solution as much lime as it is capable of holding, it is then poured over the eggs so as to completely cover them, and it is usual not to pack the eggs quite up to the top of the vat, so that there may be 2 or 3 inches of water above the top layer. It is, however, found necessary to add from time to time a little more lime, or by keeping a cloth of lime on top touching the water, in order that as that in solution is absorbed, or loses its effect, more can be taken up. Unless this is done the preservation will not be successful, for water alone will not be sufficient to keep eggs in a fresh state. The same end can be secured by throwing a handful of the fine lime into the vat every few days, but this is a rougher method, which may lead to trouble if not very carefully done. We once knew a test made of this lime-water process, but instead of putting the lime-water only into the barrel, a thick sediment was allowed to remain at the bottom. When the time came to take out the eggs, the whole was a solid mass, and they would have had to be taken out with an ice hammer, if they had been got out at all. The great object, therefore, in preserving eggs by this method is to supply enough lime for the preservation, but no more. When eggs

are taken out of the pickle they are carefully wiped and packed in straw. Properly preserved, it is difficult for anyone not accustomed to the buying and selling of eggs to know them from ordinary ones. They have not, of course, that bloom by which a fresh egg can always be known, but there are not ten persons in every thousand who know anything about the bloom.

SALT.

Eggs can be preserved in dry salt, and so preserved keep good for a very long time. Salt effectually keeps away the air, which is a most desirable thing with all eggs to be kept for long, and prevents mildew or the growth of fungi. There is a slight taste given to the egg when salt is used, but this is not at all objectionable. Mr. Tegetmeier some time ago recommended a plan of keeping eggs in salt, which deserves to be repeated here. He suggested that a wooden box should be used, with the bottom in one piece, fastened on with well-greased screws. A layer of salt, 1 inch deep, should be first placed in it, on which the eggs should be put on end, close, but not touching. More salt should then be put in until the eggs are well covered. This must be well shaken down, and a second layer of eggs treated with the salt as before, and so on until the box is filled. The box when filled must be closely packed up to the top with dry salt, and fastened down. If put in a cool place the eggs will keep for weeks, and it is an advantage to be able to continue filling the box as long as is necessary, for the salt prevents air getting to the eggs. When they are to be used the bottom is unscrewed, and the oldest eggs can thus be used first. The only disadvantage which we know from the use of salt as a preservative is that it absorbs some of the moisture in the egg. Thus it is that eggs so preserved are found to have their contents loose. For table use this would at once raise a prejudice, and it would be impossible to market such eggs, as it is generally supposed all that rattle inside are stale. But there can be no objection of this kind when they are only to be used for cooking purposes.

SULPHUR AND LAMPBLACK.

Some time ago we came across the following method, which the writer stated had been a perfect success with him. A mixture of sulphur and lampblack was made. A lot of eggs were placed within a common churn, one with a single hole in the side. On the top of the eggs was placed a saucer full of the sulphur and lampblack compound. This was set fire to by a match, the churn cover put on, and a sheet draped over the whole to keep in the fumes. Next morning when opened out the eggs were found to be entirely coated with black, but so effectually had they been preserved that six months afterwards they were quite fresh. Whether the fact of the shell being blackened would not be objection-

able to many need not be here discussed, for it is not likely anyone would prepare eggs in this manner for marketing.

OTHER METHODS.

Experiments made during recent years have shown that there are several other ways of preserving eggs. At one of the competitions in connection with the Birmingham Show a lot of eggs won that had been preserved in the following manner: Each egg was first wrapped in fine tissue paper, leaving a screw of the paper to hold by. A mixture is made of sperm and wax, or suet and wax, heated to 100°. Each egg is dipped in this, and then left to cool. When the first coat is dry the process is repeated. The eggs are kept in fine flour, and the result showed that they can be kept for two or three months in this way, though it is only right to say that at one of the London Dairy Shows eggs kept by this process were found to be unfit for eating. This must have been due either to some fault in the eggs, or the method of preserving had not been properly carried out. This process, however, like many others, may be adopted by those who have plenty of time at their disposal, and do not mind trouble, or who perhaps like it all the better because it is uncommon and involves trouble, but for the majority of poultry-keepers it would be of no use whatever. There are other ways of this kind, such as coating the eggs in wax or paraffin, but they are open to the same objection as that just named. For the great majority of readers any process which involves a great amount of trouble is simply out of the question.

FRENCH METHODS.

Mons. Cadet de Vaux suggested the plunging of eggs for twenty seconds in boiling water, in order to coagulate that portion of the albumen nearest the shell, and then to pack them in vessels half filled with sifted cinders; this process, by the way, has been well known in some parts of Scotland for many years, and yields excellent results, but if neglected for a second or two the eggs are liable to harden. For home production the French peasantry have for ages preserved their eggs in a very simple fashion. They take a wooden case or a large barrel, and pack them in thick layers of sawdust, fine sand, chalk, bran, cinders, or coal-dust, so that they do not touch each other. In the maritime provinces the peasants use layers of ashes, moistened with salt water. The late Dr. F. Grace-Calvert found by experiment the following results in the action of different substances in the preservation of eggs: In dry oxygen gas eggs are unaffected unless punctured; moist oxygen decomposes the eggs. In moist hydrogen or nitrogen eggs will keep three months. Eggs, pierced or whole, are perfectly preserved in carbolic acid, dry or moist. In chlorine-water (1 to 500) eggs keep three months in a

closed vessel; in a solution of dilute chloride of lime eggs would not keep two days; lime-water and sulphate of lime keep them a little longer; carbolic acid (1 to 500) preserved them about six weeks. Eggs immersed in an iodine of calcium solution were, after a month, not to be distinguished by smell or taste from perfectly fresh eggs. M. Durand, a chemist at Blois, steeps them in a solution of silicate of potash. This, being very viscous, is kept liquid by adding warm water. The eggs are placed in a vessel containing the silicate, and afterwards dried. Then the part upon which the eggs rested is covered, because the silicate may have fallen off at this place. When each egg is completely covered all over, the eggs are placed in any receptacle, and may be left for a year if necessary, without any fear of their spoiling. Within recent years egg-powder has been produced, not a chemical combination, but the contents of eggs dried or condensed. It is stated that these are, for omelettes and other cooking purposes, quite equal to new-laid eggs.*

FREEZING.

Eggs can be kept in a cool place for a considerable period without any special preservative, and we have known eggs so kept quite good for cooking at the end of three months. But this system depends most of all upon the place, and it is not applicable to all. There can be no question that if anyone has an ice cellar, some portion of which can be given up to keeping eggs, they do not need any other preservative, and we believe that frozen eggs retain more of their original qualities than those kept by means of any of the preparations which have already been described. The reason for this is not far to seek. When an egg is frozen everything is held in suspension, and no process of change or decay goes on. Therefore we should advise those who have a cellar of this description to use the opportunities at their disposal, as they need not trouble themselves any more about the matter. All that will be needed is to fit up some shelves in which are perforated holes large enough for the eggs to stand up in, but not to go through. Or coarse wire lattice may be used, of a mesh that will effect the same purpose. The Dairy Outfit Company, of London, make a very good refrigerator for this purpose. The disadvantage of this system is that if the eggs are not properly defrozen they crack, and it is often difficult to avoid their cracking in any case. They should be very gradually brought to their normal condition, first by placing them in an atmosphere but very few degrees warmer than the cellar, and, after giving two or three hours there, gradually placing in yet warmer air until the ordinary temperature has been reached.

* Mr. P. L. Simmonds, F.L.S., in *Journal of Society of Arts*, December 9, 1887.

ORDINARY METHODS.

There are many poultry-keepers who only wish to preserve their surplus eggs for a few weeks, and in this case it is not necessary to use any preservative, or even to freeze them. All that is requisite is to have a cool cellar, larder, or closet, fitted with the perforated shelves already described. The eggs should be placed broad end downwards on these shelves, but they may with advantage be turned about twice a week, keeping them, however, almost all of the time with the broad end downwards. The reason for this is that when so kept the air space does not increase in size, and the eggs seem to keep better. It is a very good plan to arrange eggs in uniform rows from front to back, so that those laid first can be used first. We once knew a poultry-keeper who had large stoneware jars for keeping his eggs in. These would each contain about a hundred, and the eggs were placed in regularly every day as they were laid; as soon as one was full, it was emptied into another jar, so that the first laid were in that case at the top. This gentleman never appeared to take any special care in the matter, and yet his eggs were wonderfully fresh when three or four months old; but he had a very cool cellar where the jars were kept, and that is the explanation. Without a cool place it could not have been accomplished in such a free-and-easy fashion.

Claim has been made that eggs can be preserved if the air coming to them is first filtered, so as to remove all germs therefrom. In this way the eggs are packed in cotton-wool or wadding, and it is stated that this succeeds very well indeed. We have never tried this process, and therefore cannot speak of it, but are not inclined to place much reliance upon it, for the reason that it is not enough in egg preservation to keep germs away that are without, for in most eggs there are the germs of decay within the egg itself. Still, this is only theory, and we should be very glad to have some well-authenticated experiments recorded.

Gypsum is said to be a good preservative of eggs. They should be packed in finely pulverized gypsum, and the only experiment recorded shows that they were kept for six months. But this was in a cool place, and the cold air may have had just as much to do with effective preservation as the gypsum. In fact, it is most desirable that whatever process is adopted the storage should be a cold one. This we regard as of supreme importance, and to our mind it explains the reason why some processes succeed at one time and in one place, and fail in another.

FERTILE OR INFERTILE EGGS.

In this matter of egg preservation there is a consideration that has never yet had its due weight, namely, the fertility or infertility of the eggs to be preserved. We

have only once seen it suggested that infertile eggs might keep much better than those which have the germ of life within them; but a little thought will show that this may be a most important matter. The idea was suggested to our mind by remembering the fact that infertile eggs never go rotten when sat upon by hens. They dry up and become fusty, but it is only the fertile egg that goes actually rotten. In the former there is no germ of life to die and become putrid. In the latter it is death of the living organism which causes rottenness. This germ must have actual life within it, for the life cannot be put there after the egg has been laid, and the presence of life gives all elements required for putridity. We do not feel that there need be any doubt that the preservation of eggs may depend greatly upon whether they are fertile or infertile. As already explained, the former have within them the germs of rottenness, and the latter have not. Therefore we should strongly advise those who intend putting eggs down for winter use to only use infertile ones. Though we cannot go so far as to lay down as a fixed rule that for which we have been here contending, there is so much of reason and of probability in it that we feel quite justified in going as far as we have done. There can in no case be any advantage in preserving fertile eggs, for they can never be used for hatching, and there is little or no difficulty in arranging that the eggs be infertile.

To summarize the methods of egg preservation, we should be inclined to place the lime-water system first as best for practical purposes, whether for home use or for sale. It involves the least expense and trouble. The egg is least changed when preserved in lime-water, as there is little or no evaporation. Next to that we should be inclined to think that the freezing process would come, but it would not be suitable for those who produce eggs for the market on a small scale, as the expense would be too great if an ice-chamber had to be specially erected; therefore it is only available in a very few instances. The other methods given can be adopted if preferred, but some of them at least are more interesting experiments than practical methods. We lay very great stress upon the question of fertility or non-fertility, for we believe that infertile eggs will keep where fertile ones will not.

IMPROVING THE EGG TRADE.

There are several points which it is desirable to emphasize in connection with the egg trade, and we ask the attention of all who are interested in it.

First, we want more eggs in winter. To accomplish this we need early hatching, so as to get pullets and hens into profit by November 1; good housing and feeding; and must keep only young birds—that is, not more than twenty-seven months. Every egg laid in winter will probably reduce one in the spring and

summer, when they are much cheaper. Thus prices will be equalized.

Second, larger size and greater evenness. The former will result from selection, the latter by sorting, as already explained.

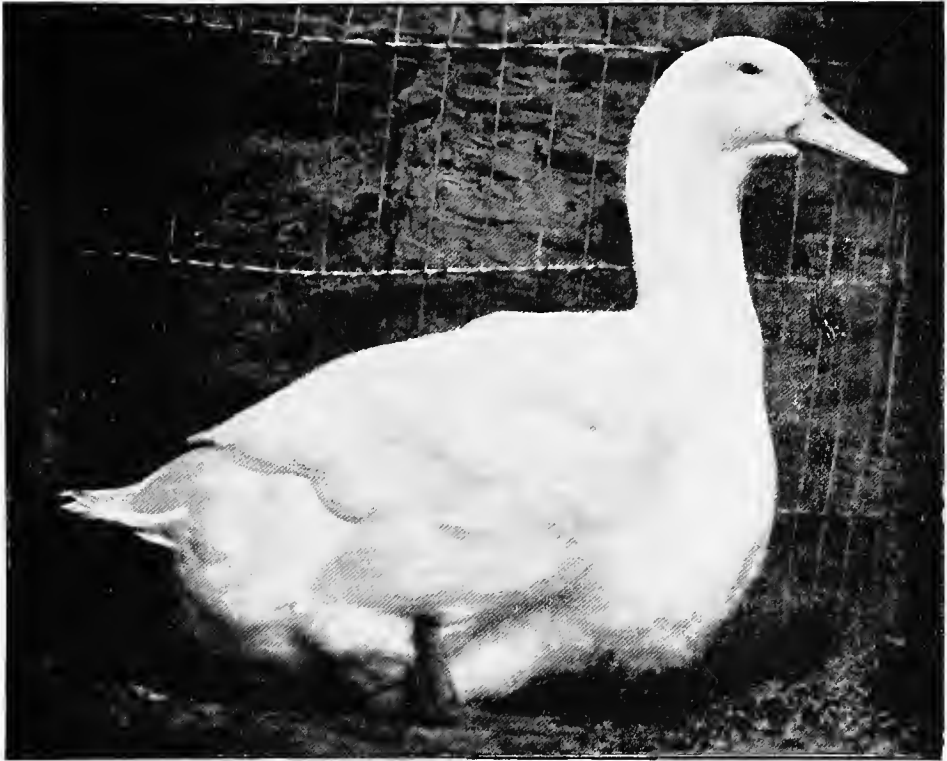
Third, clean nests, in order that the eggs themselves may be clean. A dirty egg should never be sent to market, for not only does it lose caste in appearance, but it will not keep so long as one with a clean shell. It is better to wash eggs than market them in a dirty condition, but this takes the bloom off the shell, and we should endeavour to avoid the necessity of doing so.

Fourth, better packing is required. The boxes should carry the eggs safely, but, at the same time, unless the packing material is sweet and clean the eggs will be tainted ere they reach their destination. Few

articles of food are more susceptible than an egg, and yet this fact is seldom realized.

Fifth, there must be speedy marketing and no holding. Rapidity of marketing has already been dealt with, and we simply call attention to it again. But in some parts of the country in the autumn there is a very bad custom of keeping eggs several weeks, to obtain a better price. With a perishable product this is a foolish thing to do, as it destroys confidence, and unless sold as stale eggs, which is seldom the case, it is defrauding the purchaser. The true as well as the honest policy is to sell an egg for what it really is.

Sixth, we need to get out of old ruts. By opening out new connections we can obtain better prices. Grumbling never accomplishes anything. It is those who act that succeed. How this may be done is referred to again in Chapter XX.



AYLESBURY DUCK.

Bred by, and the property of, Mr. John Gillies, Erdington Mills, Chirnside, N.B. Winner of cups, 1st prizes, Royal Agricultural Show, Leicester, Birkenhead, Dairy Show, Crystal Palace, Leeds, Liverpool, etc.

To face page 90.

CHAPTER XVI.

PROFITABLE DUCK-KEEPING.

VARIETIES OF DUCKS—AYLESBURYS—ROUENS—PEKINS—INDIAN RUNNERS—EARLY BREEDING—SELECTION AND BREEDING—FEEDING—WATER FOR DUCKS—GREEN FOOD—HOUSING—DUCKS AT AYLESBURY—REARING—FATTENING.



Of the many varieties of ducks the greater number are purely ornamental, and not more than four can be named which are to be recommended for practical purposes. Each of these have individual qualities which make them very valuable. Their qualities may be described as follows: For early maturity, Aylesburys; for great size and later development, Rouens; and for egg-production, Pekins and Indian Runners.

AYLESBURY DUCKS.

The name is derived from the fact that this duck has been so largely bred in the Vale of Aylesbury, where it is supposed some quality in the soil is specially suitable to them. This is undoubtedly so, but it has also been abundantly proved that other places can produce as fine birds as this district of Buckinghamshire. No finer duck can be found than the Aylesbury, more especially as it matures with wonderful rapidity, for we have often killed ducklings weighing 4 pounds at eight weeks old and under. It is pure white in plumage, an excellent layer, and very hardy, with great richness of flesh. It is heavy in body and short in leg, the appearance being that of a boat, supported midway, or perhaps a little behind the centre; the bill is long, and in the best specimens of a delicate flesh-colour; the legs are of a deep orange, and the only difference between the drake and duck is that the former has two curled feathers in its tail, and is rather the larger; drakes will reach 10 pounds, and ducks $8\frac{1}{2}$ pounds, when fully matured.

ROUEN DUCKS.

The name here given is a misnomer, and it is now accepted as a corruption of "Roan" or of "Rowan," the latter term being used for fields kept up until after Michaelmas, in order that the corn may sprout for the stock. In plumage Rouens are almost identical with

the Mallard or Wild-Duck, and the drake shows all that richness of colouring found in its wild progenitor during winter; but in summer both adopt a more homely garb. The Rouen grows to the largest size of any duck found in domestication, but for that reason it cannot be matured with equal rapidity to the Aylesbury. It is, therefore, more suitable for fattening in time for winter consumption. Specimens have been seen at Birmingham Show weighing 22 pounds 4 ounces the couple. It is an excellent layer, has very fine flesh, and is extremely hardy.

PEKIN DUCKS.

This variety is of Chinese origin, and has rendered service in giving a needed stamina to the varieties we had when it was first introduced. Whilst of itself it has no quality equal to those of the Aylesbury and Rouen, save that it is a somewhat better layer, it is very valuable indeed for crossing purposes, and the progeny mature more rapidly than will pure-bred Aylesburys, and grow to a larger size; herein its value consists. It is white, with a canary tinge in plumage, has a deep orange bill and legs, and is readily distinguished from the English duck in that its legs are placed well back, giving it a somewhat penguin appearance. It matures fairly well, but never attains the size of those varieties already named, though in appearance it may do so, as it is very profusely feathered.

INDIAN RUNNER DUCKS.

This is a smallish-sized duck, which is receiving a considerable amount of attention, more especially as an egg-producer, in which direction it is specially strong, and the eggs are not quite so large as those produced by other varieties. It is parti-coloured, the neck and sides being white, the rest of the body being coloured, fawn being usually preferred. By reason of small size they are not usually bred for table purposes, though

excellent in flesh qualities, but they do not fatten very well. They are excellent foragers, very active in habit, are small eaters for ducks, and very seldom become broody.

CROSSES.

A cross which can be recommended—Aylesbury and Pekin—is excellent for early maturity, and very hardy. Another good one is between the Aylesbury and Indian Runner, the latter a small duck, which is delicate in flesh and a wonderful layer. The latter cross, however, does not give birds quite so large as the first-named.

EARLY BREEDING.

One of the most important matters in connection with duck-keeping is the securing of the best prices by having ducklings placed on the market early in the season. In order to do this they must be bred early, but with many duck-keepers the difficulty is to obtain eggs in late autumn and early winter. If ducks, or other fowls, are allowed to breed when they like, if the stock ducks are themselves late hatched, if they are fed carelessly, the probabilities are that eggs will not begin to appear before March, when it is altogether too late to hatch ducklings if we are to get good prices for the birds. Therefore those who desire to be successful in the production of ducklings for spring marketing should proceed to work in the autumn. That the business is a profitable one cannot be doubted. It is estimated that about £70,000 is annually paid to the duckers of the Aylesbury and Leighton Buzzard districts for ducklings; and as ducks can be reared at small cost, are very hardy, and will thrive almost anywhere if they have a reasonable share of attention, and as good prices can be obtained in the great towns of Britain, there is a large margin of profit to the producer. The following are prices given us by Messrs. Brooke Brothers, obtained by them in Smithfield Market: January, 6s. to 10s. per couple; February, 6s. 6d. to 11s.; March, 9s. to 18s.; April, 7s. to 12s.; May, 6s. to 8s.; June, 5s. to 7s., per couple.

DUCKS AT AYLESBURY.

In Britain the Vale of Aylesbury is the great centre of duck-breeding, and the following extract from an article by the writer details the methods of culture there:

“The great majority of the ducks reared for the market at Aylesbury come from the hands of the better-class labourers, some of whom have raised themselves into a very comfortable position by their diligence and thrift. Operations are usually commenced in December, but sometimes in October and November, when the eggs for producing the earliest batches are ‘set.’ As a rule, the breeders do not keep the adult birds themselves, but on all the farms in the district flocks

of ducks are kept, and contracts are made with their owners for a constant supply of eggs during the coming season. These are at a uniform price, but there is great variation if bought without such contract. In May 2s. per dozen would be a fair price for duck-eggs, but in December 12s. per dozen might have to be paid. It is a matter of supply and demand, though the value of a duck egg in December is also measured by the fact that the possible duckling within it may be worth 6s. or 8s. in May, whereas the other would not realize more than a quarter that sum. The eggs are taken by breeders and set under hens, for ducks are very seldom employed for the purpose.

“The hatching hens are accommodated in outhouses and sheds, and there is a cottage, which is, however, by no means singular, where 150 hens are at work on maternal duties at one time. Every day they are fed and the nests examined, but this is simple compared with the labour involved at the end of four weeks, when the young ducks begin to appear. Ducklings have one special characteristic, in that they need no brooding, so that the progeny of half a dozen sitters can be placed under charge of one hen, and proud she will be of her large brood. From the very first the feeding has in view the development of flesh, and not bone. Consequently only those meals which are strongest in flesh and fat formers are used. For the first few days hard-boiled eggs, rice, and bread are given, after which barley-meal, mixed with scrap or tallow cake, grains, and toppings, form the staple diet. On such feeding as this the growth is simply marvellous. They can be seen to grow. Kept in batches of about fifty, they are fed with the greatest regularity. And it must not be forgotten that in every pen is placed a trough of the famous grit found only in the Vale of Aylesbury, and for which almost miraculous powers are claimed. To it is attributed almost all the merits of the Aylesbury duck, the quality of its flesh, the rapidity of growth, and the delicate pink of the bill, which is one of its distinctive marks. The birds appreciate this grit, and duckers use large quantities of it. Some of the ducklings sent to market have never known what it is to be in water, but, as a rule, they are now and again permitted a bath or a swim, and this gratification of their inherent instinct makes them more contented, and they thrive all the better for it. The pens in which they are kept are none too large, but there is reason in this, and fresh straw is supplied every day, their greatest enemy being cramp, to which they are very subject if exposed to draughts or the place be too damp.

“The skill of the feeder is exemplified by the rapidity with which he can have the ducklings ready for market. They are enormous eaters, and every day of life means a serious addition to the cost. Besides, the earlier they are ready the more certainty of securing the best market, and the vacating of space for other batches. The majority of the ducklings sent from Aylesbury are

seven or eight weeks old, but it is possible to have them ready at six weeks. They must be killed as soon as they are ready, and not kept a day longer than the hour when they are ripe, or they will rapidly go back. Killing and plucking are carried on at great pressure, for it is no uncommon thing for a ton of ducklings to be despatched from this district in a single day. This would represent about 7,000 birds, and the annual amount paid to the district is estimated to be nearly £40,000. Some time ago upwards of 8,000 ducklings were seen in one Buckinghamshire village, and whilst there are no statistics obtainable as to the annual product, those best qualified to judge say that the trade is steadily increasing. The duck which is almost alone reared in this district is known all over the world."

SELECTION AND BREEDING.

The first point to be regarded is selection of the stock birds, which is of great importance, not only with regard to breed, though that is a most necessary consideration, but also as to age and time of hatching. For early ducklings there is nothing better than the Aylesbury, as a pure breed, for it is a rapid grower and fatter; but a cross between the Aylesbury and Pekin, using a Pekin drake to Aylesbury ducks, is often found harder. It is better to obtain the ducks good and from an undoubted source, so that they may be pure. They should be large, well grown, and early hatched, because for securing spring ducklings it is necessary to use ducks of the year, or the eggs will not be laid early enough; therefore ducks hatched about March should be chosen. To them should be mated drakes of the previous year, and the doing so will in some degree counteract breeding from immature stock on the one side. Too early breeding is a great mistake when the production of stock or even laying birds is concerned; but when the produce are to be killed for table no harm is done, and it is the only way to obtain what is required. Whether ducks are selected from amongst the present stock or purchased, it is most important that they be well grown, large-framed, and healthy. Any not coming up to these requirements should be rejected. The birds so chosen need not be mated until the end of October or beginning of November, and in this way, if the supply of eggs comes as expected, one or two broods may be hatched before Christmas, by which time a large number of eggs should be undergoing the process of incubation. Hatching may be either under hens or by means of an incubator; but as to this we speak anon.

FEEDING.

The treatment of ducks when mated is of great importance, for all preparations will be useless unless there is a supply of eggs. Food given must be good and plentiful, but certainly not of a fattening nature,

or the ovaries will become so clogged with fat that the birds will be unable to produce eggs; hence Indian corn should not on any account be used, except in very small quantities, because of its fattening quality. The staple food should be barley-meal, mixed with about half its bulk of thirds or pollard, if the barley-meal be good and floury, but if it be of commoner quality, then so much of the thirds need not be used. To this may be added a little oatmeal, but very little is necessary, as it is too expensive for this purpose, and in order to obtain a supply of early eggs it is absolutely necessary to give meat in some form or other. Butchers' offal, liver, and scraps are all good, if well boiled, chopped fine, and mixed with the meal. But where these are not available, or in too limited quantities, there is nothing better than tallow greaves, or scrap-cake, as it is called in some places, it being rich in the elements required. This should be broken up and boiled or simmered for a couple of hours, until it is quite soft, when it and the liquor in which it has been boiled should be mixed with the meal. Another excellent plan is to make a contract with hotels for taking all their waste scraps, and this can generally be done on satisfactory terms. Whatever is used in this way is better boiled, and then mixed with the meal; but it is important to warn against use of diseased meat, which ought never to be employed. Some duck-raisers give boiled horseflesh to their birds, and if sound nothing can be better; but so many horses obtained in this way are diseased, that it is necessary to utter a warning against their use. Of course meat given must not be too abundant, or the desired end will be missed, as the birds will become too fat; but, if fed judiciously, meat will give that necessary stimulus to the egg-organs that is needed in winter, and yields elements required for a constant supply of eggs. Before mixing the meal there should be added a small quantity of seasoning, and for this purpose the best article we know is called "Aromatic Compound for Poultry," sold in small tins. The meal should be well and thoroughly mixed, adding as much boiling water as is required to make it into a crumbly mass, for on no consideration must it be given sloppy. It is better to feed from troughs, as this prevents waste of food; and what is left can be removed when the birds are satisfied. Stock ducks ought to be fed twice a day: first, as early as possible in the morning, and, second, about an hour before they retire for the evening; the former should always be as soon after daylight as can be. It is an excellent plan to throw a handful or two of oats into the water in which the birds swim or bathe during the day.

WATER FOR DUCKS.

With regard to the question of water, we are firmly of opinion that in order to succeed in breeding ducks it is necessary to have water in which the stock can

swim. Without this the young birds intended to be used later on for breeding will never be strong or healthy; but it is not difficult to make a duck pond if there be an insufficient supply of water naturally. There can also be no question but that the ducks which have a good pond do not cost nearly so much to keep as do those which have not this privilege. This can be seen by the time which ducks spend in scouring the bottom of their tank or pond, where they find worms galore, and other important elements in their natural food. When they are seen with their heads in the water and tails uppermost they are engaged in this work. Of course it is well known that many ducklings are bred whose parents have no water except perhaps a shallow tub; but the best birds are not to be produced in this way, and we strongly recommend a pond for the breeding stock. Ducklings to be killed at an early age should not have liberty or be allowed to enter a pond, but a bath (Fig. 67) is useful two days before killing to cleanse the plumage.

GREEN FOOD.

In addition to what has already been stated with

regard to the feeding of ducks, it must not be forgotten that they require plenty of green food. Of course if they have full liberty, and the land on which they are running is good, the probabilities are that they can obtain for themselves all they require in this respect. If not, it must be supplied, and it is always desirable to give ducks their full share of garden stuff available—cabbages, turnips, and tubers, the latter to be cooked. Too often this question of supplying green food is neglected, and the result is unsatisfactory.

HOUSING.

The question of housing ducks is not nearly so important as that of providing for ordinary poultry and turkeys. They are by nature very hardy, are used to sleep by the side of streams, and seem able to resist cold very easily. Still, if they are to lay in the winter season they must be comfortably housed. One *sine qua non* is that they shall have plenty of room in their sleeping-place, and not be closely huddled together. In this respect they cannot be treated as may fowls, and it is essential that they be not overcrowded, and have plenty of fresh air. Therefore, a house that would easily accommodate fifty fowls should not have more than thirty to thirty-five ducks, and smaller houses in which are placed the breeding-pens should be arranged accordingly. Fig. 68 shows a cheap form of house for a

dozen ducks. As they sleep on the ground, perches are not required, consequently there is not the same fear of draughts overhead. During the winter season an unused stable, shed, or barn is best to house ducks in, but they will do equally well in a hen-house if provision be made for giving a supply of fresh air. Around the house, whatever kind it may be, must be arranged a run, so that the ducks can be confined without being actually imprisoned in the house. The reason for this is their persistent habit of laying away, which they will assuredly do if not kept within bounds. Under no circumstances should they be allowed out until nine or ten o'clock in the morning, by which time they will have laid. Many eggs are lost by inattention to this matter, as ducks lay on the water, and the eggs are lost. Both the house and the run should be well littered, and the litter is excellent as manure. At one time straw was always used for this purpose, but it is

not nearly so cheap as peat-moss litter, which keeps cleaner, and is equally valuable for manure.

In mating up the ducks, not more than three ducks should be allowed for each

drake, and it may be well in the winter season to have two drakes for five ducks. If more are given there is great danger that the eggs will be infertile.

HATCHING.

In the great duck-rearing districts of England and France hens are almost exclusively used for the hatching of duck eggs, and very few indeed are given to the ducks themselves, except late in the season. Ducks are not very ardent sitters, and only seldom show the desire to incubate. Incubators are very little used for duck-hatching, but why this should be so we have as yet not been able to understand. That ducks' eggs will hatch in an incubator equally as well as hens' eggs there can be no question, it being only necessary to give them sufficient moisture, and to sprinkle them daily, to prevent the shell and outer membrane becoming dry and tough. One gentleman, who has experimented in this direction, writes us: "I am rather puzzled why the people in the Aylesbury district do not use incubators, because it seems to me that the incubator is eminently suitable for ducks, on account of their (the ducklings) not requiring any brooding. I have raised ducks that were simply hatched out by the incubator, and put in an old rabbit-hutch, with a piece of carpet over a spar floor, no hen being used at all, or any kind of foster-mother employed. Out of six ducks

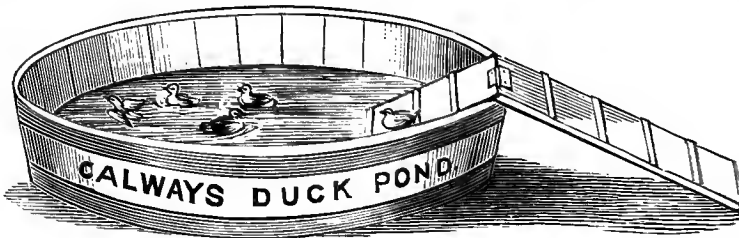
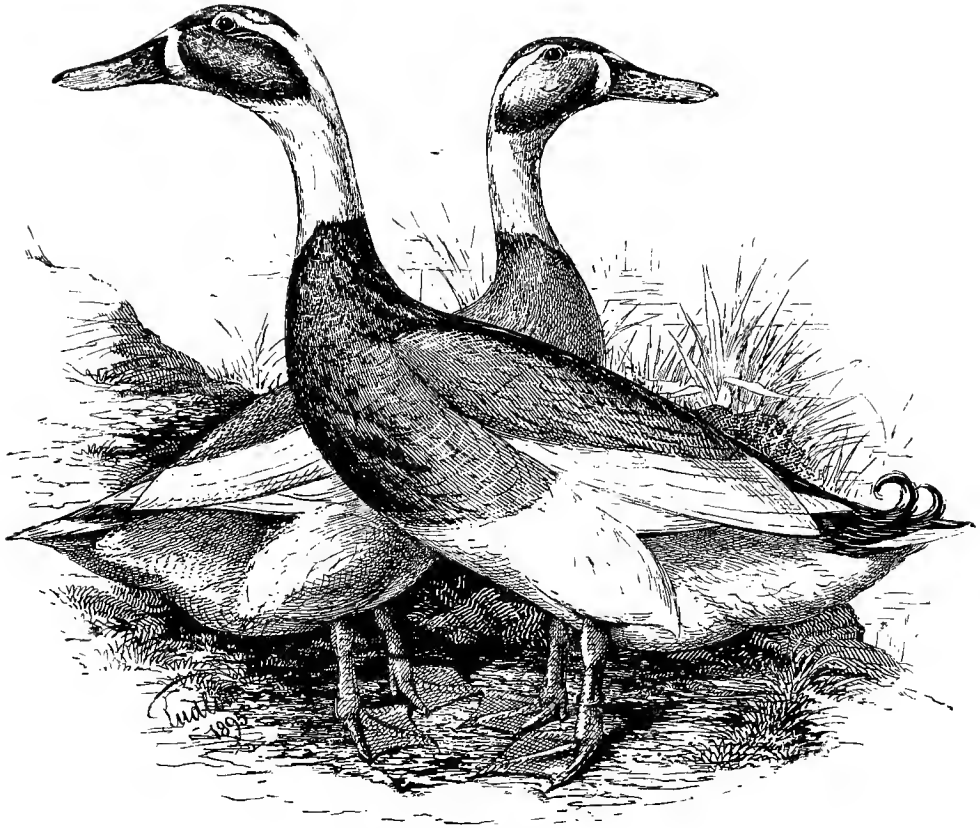


FIG. 67.—DUCK POND.



INDIAN RUNNER DUCKS.

treated in this way experimentally, I raised the whole to a suitable size, but one of them has died. The other five are now large birds, and the only difficulty seemed to be in connection with the introduction of them to the general flock. We tried to put them among the other birds the other day, and they resented the intrusion of apparent strangers." This letter bears out the opinion already expressed as to incubators for ducks; but we should recommend that, as far as possible, hens' and ducks' eggs should not be placed in an incubator at the same time. They can be hatched together, for it has often been done; but as the latter need so much more moisture than the former, there will be too much for ordinary eggs. The reason why incubators have not been employed in the Aylesbury district is simply indisposition on the part of duckers to adopt new methods. They have been used to hatch under hens, they make a very good profit out of the business, and consequently they are indisposed to change or try anything new. The use of incubators would minimize their labour greatly in the winter season, when broody hens have to be sought for. But at all times of the year there is a supply of these natural incubators, for the poultry kept in the district is of the Asiatic and Dorking type, in the former of which especially the maternal instinct is very largely developed. But high prices have to be paid for broody hens in winter, and the cost of an incubator would speedily be repaid. As to the difficulty mentioned in the last sentence of the above correspondent's letter, this would not apply in the usual way, as ducklings would be added to the general stock at an early age. The same trouble is found if ducks are hatched under hens and kept by themselves until fully grown. It should be mentioned that when ducks' eggs are hatched under hens they must be plentifully supplied with moisture. The ground below the nest should be kept damp; but in addition it is an excellent plan to dip the eggs daily in water to about 102°. During the earlier stages they must not be allowed to lie in the water, simply dipped in, but after the fifteenth day they may be left in the water for a minute or two. In this way moisture required by the egg is secured, and that drying and toughening of the shell, which would effectually prevent the egress of the duckling, is avoided. This is a most important matter, both with eggs under hens and in the incubator. When the ducks are allowed to hatch their own eggs, they will usually have a swim at least once a day, and then they come back with feathers all wet, in addition to which they select a damp place for lay-

ing. We must, therefore, follow their example. With this exception the arrangements for hatching ducklings are the same as for hens' eggs, it being remembered that they take twenty-eight days. In winter it is desirable to place the nests in a warm position, so as to be affected by the external atmosphere as little as possible.

REARING.

Rearing ducklings is one of the simplest processes in connection with poultry-keeping, for, as a rule, when they are once hatched they will thrive amain without any special care or attention. Ducklings need no brooding, and, in fact, are far better without it. After they are properly dry they should be placed in a warm room or house for a day or two, and fed on chopped egg mixed with bread-crumbs, and moistened with milk, varied with boiled rice. Often when so treated they will almost be seen to grow, but no attempt should be made to force them to eat until they are a day old.

After a few days they are removed to roomy sheds, which are usually divided into compartments, and must be well lighted and airy, though warm. We have seen

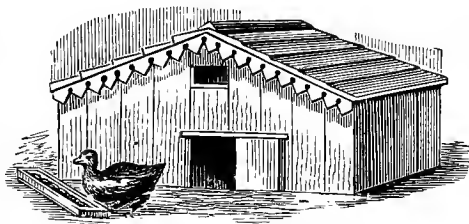


FIG. 68.—DUCK HOUSE.
(W. W. Greenwood, Bedford.)

in a single shed upwards of 2,000 ducklings, divided into flocks of about twenty-five each by L-shaped boards, so as to prevent overcrowding. These L-shaped boards, when fitted against each other, form perfect squares. As the birds grow the spaces are increased in size, and after a time the ducklings are often put out into sheds with open runs attached, about 100 in each flock. In one large establishment we have visited, two long, low sheds are employed, divided by 18-inch boards into a dozen compartments, each of which holds 100 birds. The ducks are allowed out into the runs for feeding three times a day—at 7 a.m., 12.30 p.m., and 5 p.m.—then put back into the shed. They are not given any water for swimming in, as a rule, though there are exceptions to this arrangement. Water for drinking is given in troughs, which are half filled with a special gravel or coarse grit.

The food is, of course, varied in accordance with the individual ideas of breeders, but hard-boiled eggs, as already mentioned, are usually employed, though some breeders employ toast soaked in water. After three days to a week of this feeding the birds are put upon rice, which is properly boiled; and for this purpose Burmah rice is preferred, as it has more feeding in it than other kinds. Next they are given rice and toppings, which is the local name for fine sharps, or

middlings. During the later stage of the rearing process they are fed upon barley-meal and toppings.

Absolute cleanliness is imperative if disease is to be avoided, and care must be taken that they have plenty of fresh air, for a close, reeking atmosphere is fatal to them. Food-dishes and water-troughs must be regularly cleaned out, and all food not consumed after each meal should be removed. There is nothing better for the birds to sleep on than peat-moss litter.

The manner of treatment here described should be continued till the ducklings are five weeks old, by which time they should have grown to a large size. Now a different plan must be adopted, for the frame thus built up must be covered with the flesh, and feeding must be to that end. The ducklings should be divided into flocks of about twenty each, as near as may be alike in age and size, each of which should be placed in a pen 4 feet or 5 feet square in a roomy shed, where they can have plenty of fresh air, and yet be kept warm and comfortable. These pens should be hedged out with peat-moss litter to a thickness of 5 inches or 6 inches. In the Aylesbury district straw is used almost exclusively; but probably in process of time this will be discarded for peat-moss litter, especially as straw is yearly becoming more valuable. If it is possible, these pens should be ranged round the sides of a yard, or in a building adjoining a paved yard, into which the ducklings can be allowed out thrice a day for feeding, as it would not do to place the food in their pens. The best manner is to feed the birds from long wooden or metal troughs, of which there should be a sufficient number to allow every duck to find a place. The quantity of food can only be gauged by the appetites of the ducklings, and the attendant will soon find out how much is necessary without allowing any waste. It is a great deal better to be rather short than permit them to sicken themselves. No water must be supplied until they have eaten, and then only in small quantities; and they should not be allowed to swim until a day or so before they are to be killed, when a bath will clean their plumage.

FATTENING.

The food supplied during the final three weeks should be of a fattening nature, and, as already stated, at Aylesbury large quantities of greaves, or scrap-cake, is used for this purpose. Whilst there should be variety in the food, so as to tempt the appetite, we believe that rice, properly prepared, is the finest of all for this purpose, as it is cooling to the blood, lays on flesh without bone, and is easy of digestion. The best rice for feeding is the coarse kind with its husks, called in some places "paddy" rice. It can often be purchased at 8s. to 10s. per cwt., or less, and at that price is a cheap food for fattening. The method of preparation is important, as it must never be given uncooked, and can easily be spoiled in the preparation. If the proportion

of 1 quart of rice be taken, 3 quarts of water should be added, and 1 pound of broken greaves, with a little seasoning powder. The whole should then be placed in a pan or copper, and allowed to simmer (not boil) until the rice has swollen and absorbed all the water, which it will do in two or three hours. The rice should then be broken up, and given to the birds when it has cooled down somewhat. For variation, Indian-meal mixed with thirds or pollard may be used. In this case the greaves, or meat scraps, should be boiled, and then, with its liquor, mixed in the meal, all making a crumbly, friable mass. Too often the importance of green food during the process of fattening is forgotten, but a supply of such as may be available should be given every day. Fresh nettles, boiled and mixed with the food, are largely used. Fresh lettuces are also good, but they are not to be obtained at some periods of the year, and then cabbage should be substituted. Green food is cooling to the blood, and tends to keep the birds healthy. Another most important matter is that of supplying grit, for without it the ducklings will be unable to digest their food properly. The quantity they will consume is proof of its value, and a boxful should always be within their reach. The best kind is made from fine granite, and it should be broken to the size of wheat. If what are known as road-scrappings can be secured nothing can be better for this purpose, as they contain an abundance of grit.

DUCK-FARMING IN LANCASHIRE.

Many people have the idea that there are special conditions found in Buckinghamshire and Bedfordshire not to be met with elsewhere. That the valleys and flats in the counties named are suitable for this work must be conceded at once, but there are multitudes of other places where the industry could be carried out with equal success. An instance of this is to be found in North Lancashire, where a farmer, Mr. Peter Walsh, of Bourne Hall, near Fleetwood, has for the last few years gone in very extensively for duck-rearing. His place is not one which at first sight would appear to be the best for the work. The aspect is north-west, looking over Morecambe Bay, but the soil and atmosphere are moist, though, of course, much exposed.

Mr. Walsh had read a great deal about duck-rearing around Aylesbury and Leighton Buzzard, although he had not himself seen the process there. Feeling that what could be done in one place might be accomplished in another, he determined to try, and certainly has succeeded admirably. Commencing in a moderate way, he has gradually increased until his annual output is about 11,000 ducklings, and is one of the largest producers for the Lancashire and Yorkshire markets. The hatching is carried on chiefly by means of incubators, and we have seen as many as twenty-two incubators at

work at one time. The machine used is known as the "Acme," invented by Mr. Walsh. It is referred to in Chapter XI.

The farm upon which Mr. Walsh lives is a fairly large one, and he keeps his own breeding stock, buying eggs, however, when they can be obtained. In this respect he differs from the duckers of Aylesbury. The breeding ducks are found in different parts of a very large sheltered and shady orchard, where they have full liberty. When the land becomes foul they are removed to another part, and thus both the land itself and the birds are benefited. It is remarkable how greatly improved the grass has been where the birds have previously been penned, and as Mr. Walsh is a breeder and feeder of both horses and cattle this is an important advantage.

As already mentioned, in the Buckinghamshire duck-feeding centres large quantities of tallow greaves are used for mixing with meal to feed the birds; but Mr. Walsh adopts another system, and, so far as the results are concerned, with evident advantage. His food consists chiefly of ground oats, but instead of the tallow greaves he obtains from the Blackpool pork-butchers their surplus fat, for which he pays them 1d. per pound, and there can be no question that this is much finer and better than the scrap-cake from candle-makers or tallow-refiners, whilst the cost is if anything rather less, and he knows what he is getting, which is not always the case with the other stuff. It, however, has to be prepared, and is melted in a large

boiler kept for the purpose, and when strained is run into large bacon-boxes. We may mention that the Sussex chicken-fatteners use fat very similar to this, and when sweet and good it can be thoroughly recommended. The ground oats and fat are mixed to a proper consistency, and fed to the ducklings twice or thrice a day; and as their main object seems to be eating, they rapidly dispose of the food, to the manifest advantage of both themselves and their owner. Under such treatment it is not to be wondered at that they turn out juicy and plump, and are rapidly ready for market. The chief demand is from Manchester and Leeds in the spring, and Blackpool during the summer, that favourite watering-place being able to absorb almost anything in the way of food.

All the birds fatted at Bourne Hall are killed on the spot, and so rapid is the process that they can be killed at noon, plucked and packed, and arrive in Manchester by nine o'clock the same evening. The cost of carriage to Manchester is by no means so great as might be imagined, namely, 1d. per bird, and the railway company provide the hampers. It may be mentioned that this is the price charged for carriage from Aylesbury to London by the Great Western and North-Western Railway Companies. It is evident that the railway companies are desirous of encouraging the traffic. From what we are informed by Mr. Walsh, he has met with no special difficulties other than those incident to every business, and he is well satisfied with what he has already accomplished.

CHAPTER XVII.

GEESE.

GEESE MOST PROFITABLE—TOULOUSE—EMBDEN—PLACES FOR GEESE—HATCHING—REARING—FEEDING GOSLINGS—
THE TRADE IN GEESE—NORFOLK GEESE—FATTENING—KILLING AND DRESSING—GEESE IN FRANCE.



AMONGST the most profitable fowls which the farmer can keep are geese, as they cost little or nothing to maintain after the first month or two. They are excellent foragers, and do not leave much that is edible for any stock that comes after them. They are especially useful on the stubbles, and in some parts of Britain are employed in "stubbling" the farms. It is only necessary to keep them away from fresh pastures, as they will nip off young grass closer than will sheep. It has been frequently stated that cattle will not feed on a pasturage that has been overrun with geese, but we have yet to learn that this is by any means a universal experience. On waste ground or open lands geese can be kept for a mere nothing, and as they bring a good price during the later months of the year, they can be reared and fed very profitably. They are not of so rambling a nature as are ducks, nor do they eat the garbage which those fowls delight in, and when kept in large numbers it is desirable to have someone to watch them.

Whilst there are several varieties of the goose, it will be sufficient for our purpose to name only those two breeds which are found to be most serviceable for profitable purposes, namely, the Toulouse or gray, and the Embden or white, each of which have special qualities, and are therefore serviceable for various periods of the year.

TOULOUSE GEESE.

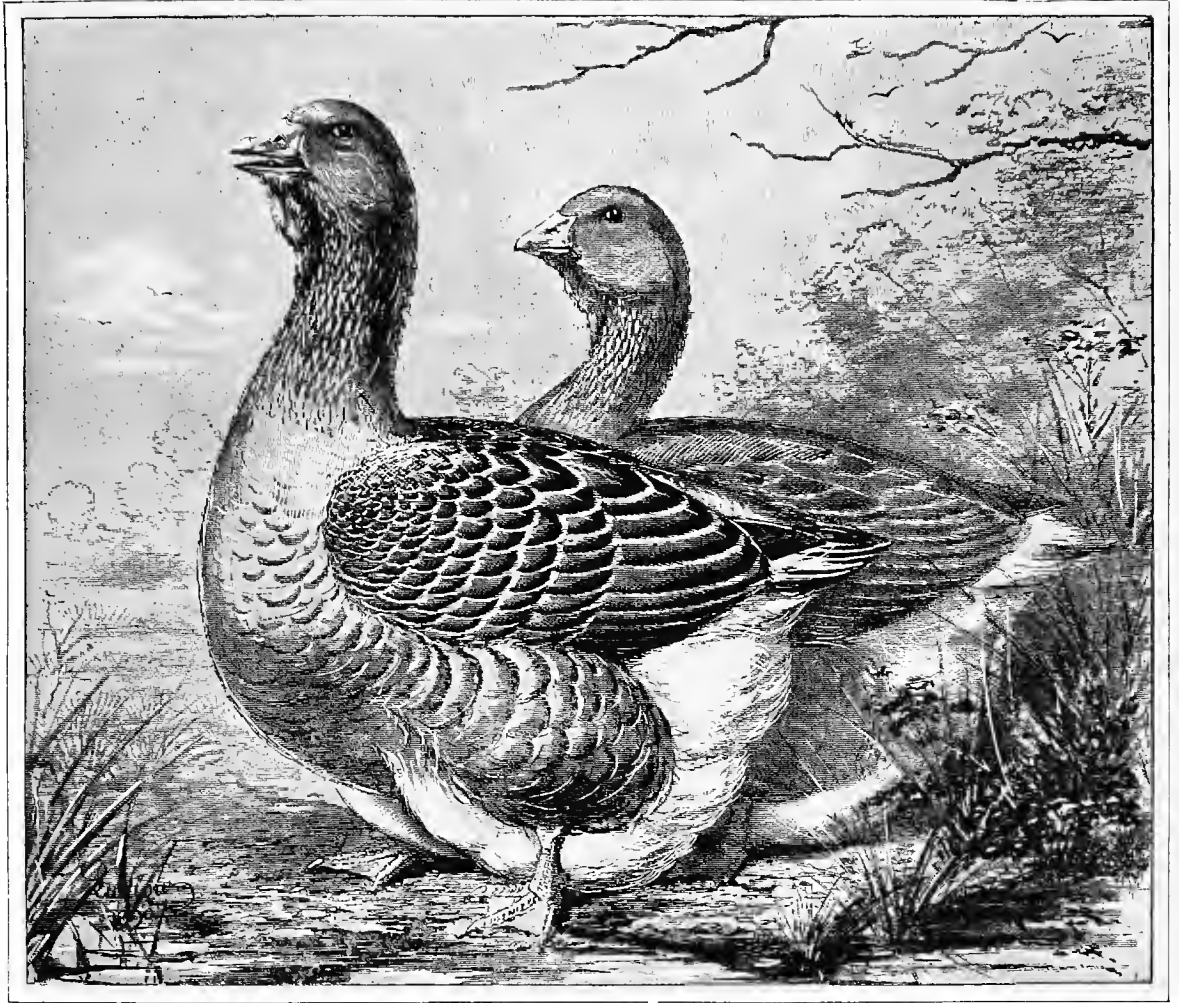
As already stated, this variety is often called the "gray" goose, and it is most common. Large numbers are sent to market annually. Both male and female should be very massive in proportions, with deep, perfectly divided double breast, touching the ground and extending well in front of the legs. This gives the bird, when standing at ease, a square appearance. The head and bill are very strong, joining with a curve which imparts to the head a pleasing and uniform expression; the throat is "dewlapt"; the colour of bill and feet is a

dark orange; the head, neck, back, and thighs are a dark-shaded brown-gray, the outer edges of each feather distinctly and boldly laced with a very light, almost white shade of gray; the breast is of the same colour, but descending even lighter between the legs, from which to the tail is perfectly white; the tail is white, with broad gray band across centre of top; the wing flights are a very dark-shaded self-coloured gray.

Toulouse geese are, as a rule, non-sitters, but wonderfully good layers. As to their other qualities, a large breeder some time ago wrote that "Toulouse goslings grow bone very fast, and being loose in skin they soon fill the eye. But they are very deceptive weighers when young and raw; even under very favourable circumstances many strains will not gather flesh and fat until fully matured, when they can be fed to an enormous size and weight, unsurpassed or unequalled by any other variety. They are, therefore, not so well adapted for early maturity, and are seldom fit for the table before Christmas, previous to which they dress very loose and blue in appearance, and are quite out of season as green or Michaelmas geese. Used, however, as a cross with any other variety of geese, the produce mature and fatten very rapidly." Specimens of this breed have been exhibited at Birmingham Show weighing 50 pounds 9 ounces the pair, and 20 pounds is a common weight for birds two years old.

EMBDEN GEESE.

This variety is entirely white in plumage, with flesh-coloured bill and orange-coloured legs and feet. It is not quite so squat in appearance as the Toulouse, and somewhat more erect, but in other respects is very similar. In consequence of the colour of plumage, it is necessary to give the Embden more water than is required by the Toulouse. The Embden does not usually attain the weight of its rival by several pounds, but matures much more rapidly, and is consequently of greater service for the autumn demand, being almost entirely used, either pure or as a cross, for green geese.



TOULOUSE GEESE.

Allowed to mature, it attains to nearly the same weight as does the Toulouse, for in the year when the weights enumerated above were recorded, a pair of Embdens scaled 48 pounds 12 ounces. The quality of flesh in both varieties is very equal. One advantage possessed by this breed is that its feathers are more valuable, being pure white, and where there are enough birds kept to make their feathers worthy of regard this is an important consideration. Unlike the Toulouse, the Embden is an excellent sitter and mother.

PLACES FOR GEESSE.

The best places for keeping and breeding geese are on the borders of commons, moors, or waste lands, and there is an abundance of places in all parts of the country where flocks might be kept, thus utilizing ground of no value at present, and by providing profitable labour for farmers and cottagers add to their incomes. All they will need for food, except when fattening up, will be a little corn or meal morning or night, and they will forage for the rest; but it is better if the number kept is sufficient to let a boy drive them to their feeding-ground and tend them during the day. They should be under cover at night in a comfortable house, and with good straw bedding. A pond or stream is by no means imperatively needed, but when it can be given is conducive to their well-being. Fig. 69 shows an excellent form of house for geese or turkeys.

HATCHING.

Young geese commence laying about the middle or end of February, and although it is much better to breed from more mature birds, yet if early broods are required the latter cannot be waited for, as they are considerably later in commencing to lay. When the strain is a good one—strong, and not at all in bred—then the eggs from young birds can be taken without fear, and will hatch out well, the only drawback being that they do not grow quite so fast as those from older stock. In the case of white geese, if the eggs are left in the nest, as soon as about fifteen are laid the mother will show a desire to sit; but if they are removed regularly, she will probably lay nearly twice as many before desiring to do so. The latter is the plan usually adopted, and half the eggs are generally set under ordinary hens, such as Cochins or Brahmans, giving four to each. Some breeders never allow a goose to sit at all, considering that they are not safe to trust, being so heavy and clumsy. If this plan is adopted, the eggs must be regularly sprinkled in the nest, as the shells

are very hard and thick, or otherwise the young birds will not be able to break through. Some geese lay two clutches of eggs in one season, but they have to be early bred and from a good strain to do this.

The time of incubation for geese is thirty days, and it is better not to disturb the nest during the time, except in case of accident, as the mother is very spiteful and pugilistic. Should her mate be near, it may even be dangerous to do so, as they have great power in their wings, and can deal a tremendous blow. A regular attendant, however, soon becomes familiar to them, and he need not be so careful.

REARING.

As soon as hatching is over, plenty of food and water should be placed near the goose, so that she may satisfy her own appetite, and then both her mate and herself will attend to the little goslings. It is well known that the management and food during the first few weeks of any animal's existence determine very largely its future size and the

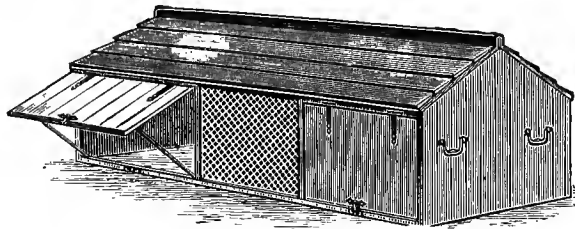


FIG. 69.—HOUSE FOR GEESSE.
(Spratt's Patent, London.)

rapidity of its growth. Of course, there are great variations in breeds as to their capacity for putting on flesh freely and rapidly, but very much can be and is determined by early treatment and management. No bird that is neglected and half fed during the earlier stages of its existence can possibly thrive, and it is essential to begin from the first with proper feeding. Goslings are about the easiest of all domestic poultry to rear, and when once hatched require very little looking after. They are unlike chickens, in that they do not require brooding. When hatched, place them in a roomy coop or crate, but it is better not to give a large run at first. The coop must be situated in a sheltered position, as the sun's rays are very fatal to young goslings. Of course, if there are plenty of bushes or trees about, this is very simple, for the coop can be placed under their lee; but if the situation is open and bare, some shelter should be improvised. The coop can then be made with a large eaved roof, but in addition hurdles, in which has been interlaced furze, should be provided, and if freely scattered about these will be welcomed by the goslings. It is an excellent plan to cover the coop with furze, as that keeps it cool. In all cases the coop should be bottomless, for the goslings are unable to hold their feet on a wooden floor, and are very apt to injure themselves by slipping about. It is not necessary to go to much expense in the making of a coop, for they can be built at a very reasonable cost; they do not require to be

built very strong. Goslings are not usually hatched until the weather is open and mild, and are not delicate by nature; but the coop should be made roomy, as the youngsters grow very fast. When about ten days old they can be liberated from the run, and will prove splendid foragers.

FEEDING GOSLINGS.

The early feeding must all be in the direction of building up a frame on which the flesh may be laid. The best food from the first is wheat and oatmeal, or barley-meal and wheat. The whole grain should be scalded and dried up with meal. Variations may be made by giving ground oats, or by boiling potatoes and drying them up with the meal. When about two months old the birds may be fed on raw grain and sliced potatoes, and these will suffice until the time for fattening arrives. They are also very fond of young grass, green onions, chickweed, and an early cabbage hung within their reach in the run will be highly appreciated. No other special provision is necessary except the giving of water, which must not be forgotten.

Young goslings, if the fields are clear of their crops, should be allowed to wander about most of the day when the weather is at all fine, but they ought to be placed under the care of a lad so as to prevent their wandering away too far and overrunning themselves. A lad can easily keep them in order and bring them home at night. Before going out in the morning they should have a feed of barley-meal made into a paste, and at night another feed, but this time of whole oats steeped in water. This, with cut grass, cabbage leaves, turnip-tops, or other green food of a similar nature, will be all they need in the way of food; and as for water, unless there is a running stream, a tub or trough sunk in the ground is as much as they need have. They must be kept under cover at night, and an empty barn, dry shed, or large outhouse littered with straw is best. In bad weather they need not be let out at all.

THE TRADE IN GEESE.

In this country geese are amongst the most profitable of poultry, and during certain seasons of the year there is a large and unfailing demand for them. It is true that turkeys have taken the first place which was once occupied by geese, and are preferred by many for great festive seasons, but commensurate with this change there has been a great increase in population and in wealth, and this has much more than compensated for the change. Green geese are regarded as a great delicacy, and at the Christmas season vast quantities of fattened birds are sold. The finest of these are home-grown, principally the product of the Eastern counties of England, and of Cumberland, very fine ones coming from Ireland. We have also supplies from France and some other parts of the Continent of Europe, and of late

years large shipments have come from Canada. Consequently the prices for inferior qualities, such as we receive from abroad, have been very low through flooding the markets, and geese can generally be bought at sixpence or sevenpence per pound. These lack the flavour of our home-grown geese, and are evidently not very carefully fattened. The lesson to be learnt is that in order to succeed the very best should be produced, for which there is always a good demand. The trade done in them is very great, and one Leeds poulterer has informed us that he received 2,500 Irish geese for his Christmas trade in a few days.

NORFOLK GEESE.

If we look to the great geese-raising district of England, we shall learn something of the method adopted where the best specimens are bred. In Norfolk the trade resolves itself into two great branches—green geese and Michaelmas, the Christmas trade being really a continuation of the latter. Farmers, as a rule, do not attempt fattening, which process is left to the dealers, who lay themselves out for it. In March and April dealers begin to get in their gosling supplies from the farmers, or cottagers near the commons, and as a rule these goslings are about five or six weeks old, and very thin. They are fed for six or seven weeks under stages on barley-meal, maize, wheat tailings, and brewers' grains mixed, which food soon makes them ready for the green geese market. These stages or pens give them sufficient room to move about, but not too much, and they are kept there for all the period, being allowed out now and again for a bath and for cleaning the pen. Michaelmas geese take their places under the stages in August, and the endeavour is made to have them ready for market before the Irish and Dutch supplies begin to arrive. On turnips geese are found to be capital substitutes for sheep, and when a dealer has a turnip-field he not unfrequently hurdles off a portion and eats it off with them. They first eat the tops, and then the bulbs of softer turnips; but when they are put upon swedes, the man in attendance gives each turnip a chop. Geese will eat a field cleaner than sheep, and their manure is equally good. When fed in this way they need nothing more than a trough of water, and the finishing process consists in putting them under stages for a month, and feeding them on brewers' grains and meal. Gravel or grit should always be supplied as an assistance to digestion. Mr. H. Digby, whose success as a breeder of exhibition geese has been very great, speaks in the highest terms of Spratt's Patent poultry-meal for giving goslings a good start.

In the autumn large numbers of young Irish and foreign geese are offered for sale in nearly every market town, and at reasonable prices. These have been sold by breeders to dealers, the former having in many cases no accommodation for fattening, and farmers whose grain is off the land will do well to purchase a number

of these birds, which can be put out upon the fields, where they will pick up a great proportion of food required by them for the next few weeks. After roots, also, they can be put on the land. There are many opportunities which the farmer possesses of keeping these birds, and they need as little care as almost any kind of farm stock.

FATTENING.

Geese are altogether different from ordinary fowls, or even ducks, in one respect, and a mistake is sometimes made in the final fattening off, by putting each bird into a separate compartment. Geese never thrive in this way, and instead of getting fatter actually pine away. They appear to be miserable without company, and each lot should be killed together, or the ones left behind rapidly lose flesh. Some birds fatten quicker than others, and as they are seen to get into ripe condition, which can best be decided by the state of their appetites, they had better be killed off. As soon as they are as fat as they will be, the desire for food begins to slacken, and then it is that they should be despatched, or they will lose flesh instead of gaining it. The food should be soft in the morning and corn in the afternoon, a large trough of clean water being always at hand, but not so that they can get into it. The soft food may consist of barley-meal mixed with Indian meal and pollard, and the corn of wheat and barley, which are better if steeped. Plenty of grit must always be provided.

When the system suggested is regularly carried out year by year, arrangements can be made with breeders to supply goslings in the autumn. Never mind if thin and lanky, those faults can soon be remedied, but avoid any that have the least appearance of being stunted in their growth, for such do not thrive well, never attain the size required, though they may eat nearly as much as the others. Goslings in summer may be bought at about half a crown each, or even less in quantities, and six or eight weeks' fattening, at a cost of sixpence per week, will bring them up to a dozen pounds weight and upwards, according to the length of time they are so fed. Thus, it will be seen that the margin to pay for trouble, and as profit, is a sufficient one. Fig. 67 shows a tub which can be used so that the birds can have a bath now and again.

KILLING AND DRESSING.

Mr. J. S. Rawson, a well-known breeder of geese, thus describes the best methods of killing and dressing: "Before killing a goose, it must be kept without food for at least twelve hours, though fifteen or eighteen hours will do no harm; this clears the crop of all food, a very necessary point to be attained. Having fasted the goose for the time required, the next part of the business is to kill it as expeditiously and in as painless a manner as possible. There are two or three ways of accomplish-

ing this, but the best is by piercing the brain with a knife. Secure the bird's legs with a piece of twine, and then feel for the correct spot at which to insert the knife. At the base of the skull, and at the point where the head is joined to the neck, will be found a hollow place without any bone to protect it; here is the vulnerable point. Now hold up the bird by the legs, and with a stick or short piece of wood give it a smart blow at the back of the head, thereby rendering it unconscious. It must now be held between the knees, the head being grasped in the left hand, bill down, and neck somewhat bent, so as to get a better chance of finding the base of the skull. This having been done, a sharp-pointed and strong pen-knife is inserted in the hollow place before mentioned, and a quick stab or cut given. If this is properly done, one of the chief arteries is severed, and the bird quickly bleeds to death, care being taken that in the meantime it is firmly held, and prevented from throwing the blood over its feathers or the clothes of the operator. As to the time for plucking, that is a matter on which opinions differ, some people preferring to do it at once, whilst others aver that it is better policy to let the bird grow quite cold before it is taken in hand. In the former case the feathers will be found to come out much more readily, and the time occupied in plucking is thereby very considerably diminished; but, on the other hand, the skin and flesh being more tender, greater care is required during the operation to prevent the membrane being torn. The usual plan is to leave the head unplucked, and thus let it act as a sign-board to tell the nationality of the bird, whether it be a large duck or a small goose. Care should be taken of the feathers, and these ought to be separated into three lots, the first containing down only, the second small and fine feathers, and the third division strong quills. The latter may be peeled and the feathers afterwards mixed with those of the second division.

"If the poulterer requires the geese *ready trussed* as is not unfrequently the case, the following is the method to be observed:

"After plucking the goose, it must be carefully singed, drawn, and wiped out with a damp cloth. Then cut off the neck as near the back as can be done, leaving the skin long enough to draw over the stump. Next cut off the feet at the first joint, and do the same with the wing pinions. To make the bird look plump, press in the breast bone, and run a small skewer through the lower part of each wing. Now draw up the legs, and skewer them through the centre, into the body; when this done, two more small skewers are needed to complete operations by fixing the shank of each leg to the side-bones. It is now in proper shape for the spit, the only thing that requires doing being to cut off the vent and make a hole large enough to pass the rump through, in order to keep in the seasoning when served at table. The goose should now be laid upon a stone or marble slab, and if the dressing has been done

shortly after killing, it will be necessary to allow it to stiffen and cool before packing for market. To improve the colour of the flesh, it is a good plan to wrap it in a cloth which has been dipped in old milk, and afterwards wrung nearly dry. Geese, and in fact every kind of poultry, ought to be killed at least twenty-four hours before they are packed to go away, and great care should be exercised in the latter operation, in order to prevent bruises, or disfigurement of any sort. In following out the above directions, the giblets must not be overlooked. These delicacies should be put on one side, together with the liver and gizzard, and sent along with the goose to the poulterer."

GEESE IN NORMANDY.

For our Christmas markets vast quantities of geese and turkeys are imported from Normandy, and in December, 1897, there were landed at the ports of Newhaven and Southampton no less than 2,213 tons of these two species from the province of France named. The following observations were made by the author during a visit to La Sarthe.

The La Sarthe country is a very fine one, with much more of cultivated, or rather arable, land than is met with in Northern Normandy. It consists of plains and valleys, very rich, well cultivated, and essentially picturesque. Therein poultry are largely kept, and the skill with which the fowls are produced indicates that desire to excel which is the greatest promise of success in any pursuit.

Whilst all kinds of poultry are bred largely, in the winter season geese and turkeys (more especially the former, for turkeys are bred to a greater extent to the north-east and south-east) specially predominate. Farmers all around the district breed geese considerably; but the great centres are Sille-e-Guillaum and Brulon to the west, and Ballon to the north. Still, this rich, succulent bird is to be met with on all sides, and his somewhat discordant cry is heard everywhere. The places just named are where a great amount of fattening is done, and thereat the goose is as much looked to as are ducks in Bedfordshire and Buckinghamshire, and chickens around Heathfield and Uckfield, in Sussex. Our observations show that the great bulk of the geese are a very apparent cross between the white and the gray.

As already stated, the farmers breed geese to a considerable extent. Not that there are huge flocks to be met with, but on most farms 50 to 100 birds are annually produced. They are in the autumn sold to fatteners, who vary greatly in the number they feed off. We visited one place in the Ballon district, where 200 to 300 are handled at a time, whilst at other places five to ten times that number are fed. The best quality is said to be produced at Sille-e-Guillaum and Brulon, whilst the largest come from Ballon and the district around Montbizot, the station for Brulon.

The premises in which these are fattened are, in many cases, not very presentable, and certainly do not compare at all favourably with those used by the East Anglian farmers for the same purpose. But when we consider the houses and farm buildings generally in France, and compare with them such as are to be met with at home, it is scarcely to be wondered that this should be so. As a rule, old sheds of any sort or kind are turned into fattening places for the geese; and even open pens are employed, though with them are rough sheds into which they can go at night. Of course, geese are by nature dirty, and the places where they are kept are by no means attractive. Nor are they so clean as might be the case were more care taken in this respect. In short, the whole condition of things approximates more nearly to the methods adopted in some parts of Ireland than to what is usual in the hands of our best English feeders. That a dirty state like this is desirable, much less essential, to poultry-rearing and fattening cannot be conceded for a single moment.

The method of feeding adopted by fatteners is very interesting, and in this respect there can be no question that French producers deserve every praise. They realize the importance of properly finishing off their work, and some of the fattened geese we have seen in Le Mans were really remarkable for colour, firmness, and quantity of flesh. But, be it noted, the finest specimens do not come to England. Buyers at home will not give the prices which can be obtained in Paris, and hence the birds are sent to the French metropolis, where there is always a large demand for the best of everything in poultry flesh. This is true in other districts also, and of other products. Really fine geese sell in Le Mans for from 1s. to 1s. 3d. per pound. These prices can be matched in Norwich Market before Christmas; but, with the carriage and other expenses, it will be evident that Le Mans birds would be more expensive in London than those from Norfolk, and they would be "foreign," which counts for something.

To produce the finest geese, the birds are divided into flocks of twenty, each of which has a separate pen, and are fed upon steeped buckwheat. The food is placed in long troughs, which are filled with water, and upon it they are fed three times a day. So far as our observations go, no milk is used, yet the flesh is beautifully white, without any trace of fat, and has a firmness which is most desirable. We were assured that meal, even buckwheat-meal, does not produce the same quality as when the whole grain is employed. Personally we have found steeped oats one of the best things for fattening geese, and the same principle is thus observed. The process of fattening occupies three to four weeks, and when killed the birds are either sent direct to the merchants or sold in Le Mans Market, and these merchants pack and bring over to London.

CHAPTER XVIII.

TURKEYS.

VALUE OF TURKEYS—VARIETIES—CAMBRIDGE—NORFOLK—AMERICAN BRONZE—CONDITIONS FOR KEEPING—HOUSING—IMPORTANCE OF SIZE—BREEDING—HATCHING—REARING—FATTENING—KILLING AND DRESSING.



It is no doubt a fact that the turkey is more difficult to rear than any other class of domestic poultry; but the result, with a fair amount of success, is always most satisfactory, because of the price which can be obtained for well-developed specimens. They are always expensive to buy, and, in spite of a large number imported from abroad, the price realized for these birds is maintained at a high figure. There is no class of meat, save game, which is so uniformly dear as the turkey, and consequently raisers find them repay the care which they undoubtedly need during the early stages of their growth, when they entail considerable trouble. Past this stage they are as hardy as any of our domestic poultry.

There are three principal varieties of the turkey, namely, the Cambridge, the Norfolk (or black), and the American Bronze.

CAMBRIDGE TURKEYS.

This variety is very extensively bred in East Anglia, and most farms there produce a flock during the year. The Cambridge is larger than the Norfolk, for which reason it is preferred for Christmas marketing, and as it partakes of the Bronze in colour, it is not unreasonable to suppose that size has been secured by crossing with the American Bronze, more especially as the turkeys were at one time gray in plumage. The Cambridge turkey is very handsome indeed, has a good, upright carriage, a commanding appearance, a full tail, and a broad, well-fleshed breast. They grow well on suitable places, and attain to a large size.

NORFOLK, OR BLACK, TURKEYS.

The variety known by this name is entirely black in plumage, and is certainly very handsome. It has similar characteristics to the Cambridge, but is not quite so large in size. It is finer in flavour, but it is usually more delicate, and great care has to be exer-

cised during the early stages of the young turkey's growth. Perhaps want of crossing, which has given both size and stamina to Cambridge turkeys, is sufficient to account for this delicacy.

AMERICAN BRONZE TURKEYS.

This is our handsomest, as well as the largest of turkeys, and many have been introduced in Europe of late years. They are characterized by both vast size and beautiful plumage, but they have not so fine a flavour as our English breeds. They have a long, graceful neck, a broad and full breast, a deep, well-rounded body, drooping wings, and a large fanlike tail, the colour being a dark, lustrous bronze on the back, neck, and tail, with deep black breast and body, which is pencilled with white. The cock turkey is very much larger than the hen, and the sexes usually weigh about 27 pounds for the males, and 16 pounds for the females, but as high as 50 pounds have been reached. The object in using this variety has been to attain size, for a specimen weighing 30 pounds will realize several pence per pound more than one half that weight. This is merely a question of fancy, for we prefer one which is 12 to 15 pounds rather than bigger birds. Still, this demand is one which pays producers. Some time ago we saw a London poulterer's price list, in which turkeys from 7 to 10 pounds were quoted at 10d. per pound, increasing to 1s. 3d. per pound for 16-pound birds, but as high as 2s. was asked for big specimens at Christmas.

On the Continent white turkeys are largely bred, but they are not kept much in Britain, and cannot be recommended to farmers, as they are usually small in size.

CONDITIONS FOR KEEPING.

For successful turkey-breeding it is requisite that the soil shall be a dry one, and unless that is the case, it is of no use whatever embarking in this branch of poultry-

farming. A cold or damp, heavy soil is fatal, and no amount of drainage will make it fit for the purpose. We must at the outset warn those who have not a light, dry soil against trying turkey-breeding, for they will only entail loss and trouble on themselves; nor should the run given to the young birds have too long grass, but it is better to have it short, and kept so.

HOUSING.

A good dry house is absolutely necessary, and it is better to have this separated from the regular fowl-house, for turkeys are aristocrats, and refuse to associate with their smaller brethren, upon whom they look with contempt as altogether beneath them. Being strong and powerful, they do not fail to harass the ordinary fowls if they have an opportunity of doing so. There need be no division of runs, for outside the hens can look after themselves, but separate houses are certainly needed. Here we must caution the breeder against overcrowding, and, if possible, in stronger terms than we have before, for turkeys suffer very greatly if not given plenty of room. Better by far have too few than too many. A good type of house is shown in Fig. 70.

IMPORTANCE OF SIZE.

The great point to be aimed at in turkey-breeding is large size, for the larger the size the more per pound can be obtained when killed, and therefore, in selecting breeding stock, the chief considerations are good frame, bone, and substance. Small birds are dear at a gift, and should not be accepted at all. It may be that desire for excessive weight has tended to make turkeys delicate, but if so this can be overcome by keeping large-boned birds only, as these will be better able to bear a large amount of flesh. A turkey hen at six months should weigh 9 or 10 pounds, and, if purchasing, we would not buy under this weight. A healthy bird can easily be known, as the gills and head are of a bright red colour, and the habits are very active. Do not buy old birds, whose legs are very scaly, or if the tuft of wiry hair in front on the breast is very bushy, as they will not be of much service.

BREEDING.

The turkey does not attain its full maturity until the third year, and, of course, it is better to breed from full-grown birds than from young ones, but the latter lay very much earlier than the former, and consequently are frequently used on that account. If these are good strong birds in their second year, they may be bred from, and the produce will come in useful for early sale. It is best to change the male bird every season,

and the cock bought in the early spring can be fattened and killed off the following Christmas, when it will be no worse for its service, and probably will bring almost as much as was given for it. If this plan is adopted, some of the young hens can be kept for breeding purposes, whereas if no change in the cock is made, this cannot be done. The farmer should never use a cock of his own breeding for stock, if in the least related to the hens, for turkeys are delicate to begin with, and inbreeding will make them more so. Eight hens are sufficient to give to one cock, and it is to be noted that one service will fertilize a whole clutch of eggs.

HATCHING.

About the beginning of March the hens will begin to lay, and it is necessary to watch them closely, or they will lay in strange places. Take the eggs out daily, only leaving a dummy in the nest, and keep them packed in bran in a cool place until the hen is ready,

which can easily be known by her persistently remaining on the nest. Some people prefer to let the turkey sit where she likes, but we think it better to keep her in a safe place, and no better plan can be adopted than making a large sitting box and treating her in the same fashion as sitting hens. It may be necessary to lift her off every day, but turkeys are comparatively gentle birds, and will bear handling. The time of hatching for turkeys is

twenty-eight days, and it is better not to interfere much with the eggs, except to examine them on the tenth day by candle-light.

REARING.

When the young birds are hatched, leave them overnight without removal. Next morning lift the mother gently, and place her in a large, dry and comfortable coop, and her brood can then be put with her. See that the old bird has plenty of food and water, and feed the young ones on hard-boiled egg chopped fine, with boiled rice and soaked bread, which must be given to them five or six times in the day, the first feed to be as soon as possible after daylight, and the last about six o'clock in the evening. When a week or ten days old, begin to throw down a little dari or buckwheat, and, most important of all, plenty of young onions chopped fine. Any kind of tender green food is useful, but onions are absolutely necessary. The great requisites for successful turkey-rearing are: (1) a dry, comfortable house and run, and (2) good and proper feeding. On cold or wet days, mix a little aromatic compound in the soft food, and give every day for the first three months a little chopped meat, Spratt's crissel, or Zebri. Bone-meal

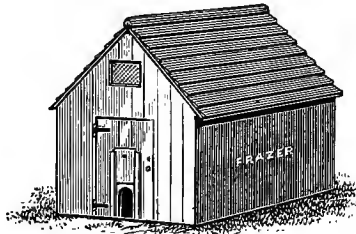
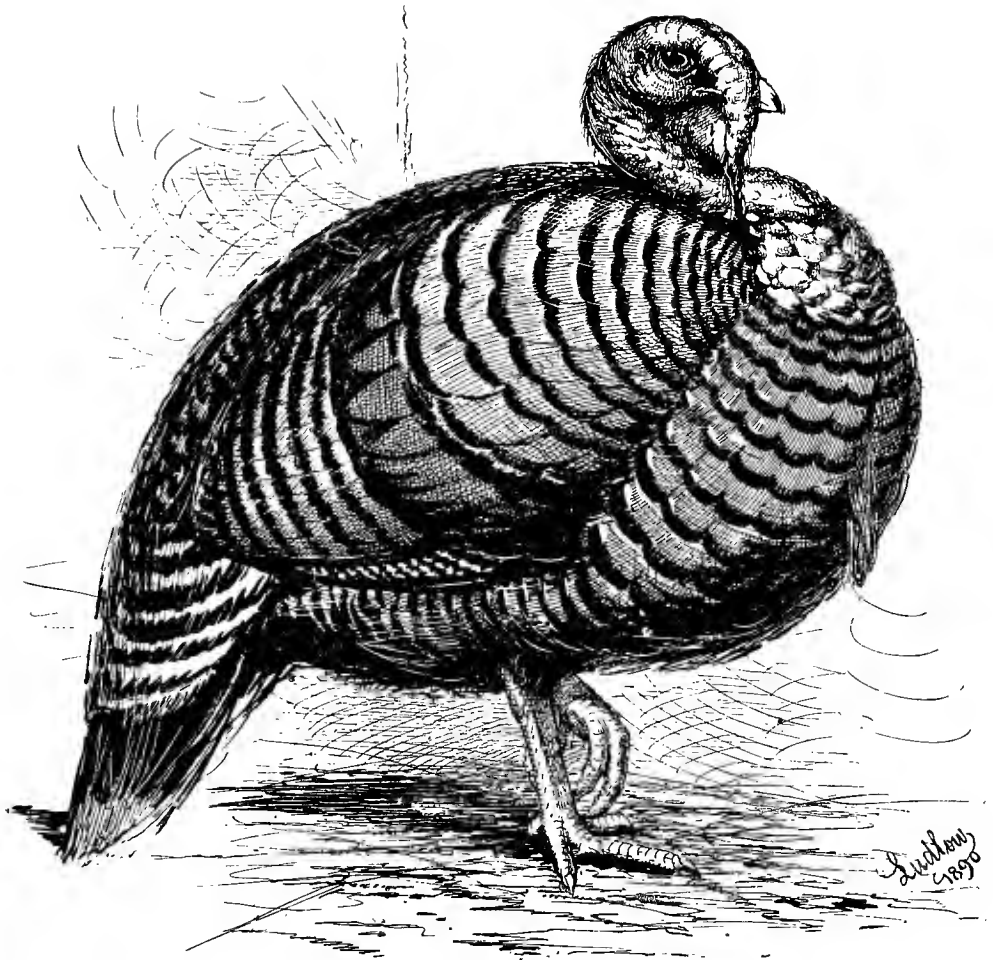


FIG. 70.—TURKEY HOUSE.
(Frazer and Co., Norwich.)



BRONZE TURKEY COCK.

or fresh bones should be mixed with the food, and there should be a plentiful supply of grit. It is necessary to move the coop every day or the ground will become tainted. When the young birds are about a fortnight old, let the hen out of the coop for about an hour a day, which may be gradually extended in time, but do not let her take the chicks among long grass, nor give her too wide a run, or she will tire them out.

The following hints on rearing are by Mr. W. Willis Harris, author of "How to Breed and Rear successfully the Turkey," and are of an eminently practical nature:

The cause of the great mortality amongst turkey chickens—and that is what disheartens so many—is due in ninety-nine cases out of a hundred to their owners neglecting them during the first two months of their chickenhood, and to a want of knowledge of the true habits of the birds.

The chief things to be remembered in rearing young birds until they are eight or ten weeks old, or twelve if late hatched, may be classified as follows: (1) climatic, (2) physiological, and (3) sanitary conditions.

1. The climate should not be of too humid a nature, and a clayey soil should be avoided. Turkeys do best, *ceteris paribus*, when reared upon a soil of a gravelly or sandy nature, as they require abundance of sharp grit to assist digestion. Clay is not only cold and damp, but if birds be brought up on it, sand must be provided and scattered about the rearing-ground in the vicinity of the coops for the young chicks, and after the first year it will also be necessary to supply the adult birds with sharp grit. Until the young birds have "shot the red" they must be protected from rain and wind, a slight shower or boisterous gale proving fatal, and it is equally necessary to shade them also from direct rays of the sun during very hot weather.

2. The chicks having very small crops, it is absolutely necessary to feed them very frequently, *i.e.*, every two or three hours from sunrise to sunset. The first meal, after emerging from the shell, should consist of raw eggs beaten up with milk, boiled to a custard, or the eggs boiled hard, and either chopped up fine or pressed through a piece of an old wire blind. This food should be given them for at least a week, and then dandelion, minced up with the egg, and varied with biscuit-meal, should form their diet for another fortnight. They also do well upon Indian corn bread, mixed with egg before baking. After three weeks the egg food may be discontinued, and the five meals a day may consist of: (1) oatmeal porridge, (2) biscuit-meal, (3) maize (cooked the same as hominy), (4) boiled rice, and (5) a mixture of small grain, such as dari, groats, canary, millet, and hemp seed, given for their last meal at night. As the birds grow older they may be fed less frequently, ground oats and middlings taking the place of the other meals, and wheat, barley, oats, and maize substituted for the smaller grain. Dandelion, mustard, lettuce, young nettles, and clivers should be given *ad libitum*,

and when the chicks are cooped with the hen, insect food or a substitute must be provided—either Spratt's crissel, bullock's liver, boiled or raw, passed through a sausage machine, or ants' eggs, the *sine quâ non* of successful turkey-rearing being a continual supply of animal food in abundance when the birds are young. Dandelion acts as a prophylactic against liver disease, which young turkeys are more liable to than the chicks of ordinary poultry; nettles keep their blood in order; hempseed given when the heavy feathers are coming assists their plumage; rice given occasionally prevents or checks diarrhœa; and insect food, being the natural, is therefore the best stimulant they can have. If fed on moist food the first three weeks, they require no water, obtaining sufficient from the dew off the grass if allowed full liberty. Until three months old the poults should not be allowed to perch, but kept bedded down upon straw; and when first allowed to roost it is better to cover the perches—which should be flat, and about 6 or 7 inches wide—with pieces of old sacking stuffed with straw or hay, so as to prevent the heavy cockerels having crooked breasts. To fatten turkeys they should be allowed full liberty, and fed with as much ground oats as they will eat three times a day, the gobblers being separated from the pullets, as the latter fatten much quicker. If the birds have been kept going from the first, two to three weeks' good feeding is sufficient for the pullets, but the gobblers require about another fortnight.

3. Turkeys, both young and old, require plenty of pure fresh air, and should never be kept in a close building. The coops for the chicks, if shut up at night, must be well ventilated and kept scrupulously clean. Water must always be fresh, clean, and kept in the shade, and should be renewed several times a day.

FATTENING.

This treatment is continued until about the 1st of November, after which time they are fed as soon as liberated in the morning with a good feed of soft food, usually consisting of barley and wheat meals. When satisfied they wander off to the fields until feeding-time in the afternoon, when they are provided with all the food they care to eat. About November 20, that is, five weeks before Christmas, begins the final stage of the process. The turkeys are put up to fatten in a dry, comfortable shed, which must be large enough for the number of birds to be accommodated. Then the northern and eastern sides of this shed should be well closed in, but the southern and western sides may be wire-netted, thus affording the inmates plenty of air. Broad perches are provided, and must not be more than 3 feet above the ground. Food and water are placed in troughs conveniently situated, and away from the perches. When put up to fatten, the turkeys are given all the food they will eat. The morning feed

consists of barley-meal and wheat-meal. Some farmers who are very particular, and have good customers, mix the meals with milk, and give milk to drink instead of water, an inexpensive addition if skim milk is used, and one which considerably improves the flesh. Although not much used, there can be no doubt that the addition of a little pure fat to the soft food is highly beneficial, softening the flesh. Cooked potatoes can also be added to soft food with advantage, and this applies to all fowls put up for fattening. The afternoon feed consists of whole barley, oats, and a little maize, and these are more easily digested if steamed or soaked in hot water. When fully satisfied all food should be removed, the troughs emptied, both morning and evening, and washed after the morning meal of soft food. In every case there must be a plentiful supply of coarse grit and sand available to the fowls, and a little slaked lime or old mortar will be an improvement. Without grit the turkeys cannot possibly digest their food properly, and without effective digestion flesh-production will never be complete. Turkeys can be crammed by machines, as are fowls.

KILLING AND DRESSING.

The usual method of killing a turkey is to first fasten the legs and wings with soft string, which must be strong enough to bear their weight. By means of that fastening suspend them to a beam, head downwards, so that the head will fall about midway on the operator's body. Pass the left arm around the turkey's body, so that its tail will point behind. Take its head in the right hand, with fingers under the throat, and thumb at the base of the skull; now give a sharp, sudden, strong jerk downwards, and a sharp twist upwards and sideways, and death will be instantaneous, though there may be considerable muscular exertion for a time. If it is thought desirable to bleed, it can be secured by cutting the throat, but this must be done at once. Turkeys can also be killed in the same way as fowls, already described.

Mr. Sapwell thus speaks of killing and dressing in Norfolk: "Norfolk has for many years had a great reputation for the quality of the turkeys it produces, and to obtain the highest possible price in the London market it is essential that the birds be dressed in the Norfolk style. The Norfolk style is that the turkey should be killed by having its neck broken; it should be rough-plucked, but not drawn, the feathers left on the back of the wings and on the top of the rump; the wings are then crossed on the turkey's back, and the feathers left form two pads, on which the bird rests on the poulterer's shop-board. The birds should never be killed until after a day's fast, and a handful of barley-meal rubbed over the skin while it is warm adds to the white appearance which is so much desired."

AMERICAN EXPERIENCE.

"A Farmer's Daughter," writing in the *Albany Cultivator*, says: "After the young turkeys are old enough to take a wide range, they are fed twice daily, having a generous breakfast and supper of bread-and-milk, with some sort of dry grain as dessert. This ration is continued until the turkeys are about four months old, when, as they seem to prefer the grain, once a day only, in the morning, are they given soft food. This now consists of boiled cracked corn or stale bread moistened with sweet milk, and the whole made stiff with one-third wheat bran. If the sweet milk be heated to the boiling-point, they cannot devour the mess fast enough, for there is no flavour more delicious to a turkey's palate than that of boiled milk. As a grain food they are very partial to sorghum seed, and I have never had any bad results follow its liberal use; and once a day after the frost comes they should have some sort of green food, as cabbage, turnips, or specked apples, of which they can manage a large quantity without detriment, but rather to the improvement of their health. If I want to make them perfectly happy on a chilly morning when the ground is white with frost, I give them a troughful of porridge made of sweet skimmed milk, boiled and thickened with fine corn-meal. This is so very much to their taste that their morning meal must be offered first, else it will be left untouched.

"After four months of age, growing turkeys may be allowed all the corn, wheat or oats (equal quantities of each being preferred) that they will pick up *with avidity* twice daily; but they should be compelled between times to take a wide range and gather for themselves that variety of green food and 'roughness' without which they cannot be healthy.

"The severe frosts have, I know, destroyed all tender vegetation, but in their rambles over the pastures and grass lots the flock will be able to find tender blades of grass and clover, of which they are especially fond, sufficient for their needs. Unlike chickens, turkeys thrive best when deprived of meat, being allowed instead an unlimited quantity of butter-milk.

"At this age the young turkeys are growing tall very rapidly; the gobblers, in fact, look as though they might be on stilts, being mostly legs. Their appetite is simply insatiable, prompting them to make away with a large quantity, as well as a great variety, of food; for being busily engaged in making bone, muscle, flesh, and feathers, all at the same time, a liberal supply of material must be stored away for selection.

"When properly cared for, I have had turkeys of five months to weigh—the gobblers 19½ and the hens 14 pounds; and at nine or ten months of age they weigh respectively—the gobblers from 25 to 30 pounds, and the hens from 16 to 18 pounds."

CHAPTER XIX.

DISEASES AND GENERAL MANAGEMENT.

DISEASES—"PREVENTION BETTER THAN CURE"—APPETITE—INTRODUCTION OF FRESH STOCK—CLEANLINESS—DIVISION OF DISEASES—RESPIRATORY—BLOOD AND DIGESTIVE ORGANS—ZYMOTIC—NERVOUS SYSTEM—COMB AND SKIN—LIMBS—CROP AND EGG ORGANS—PARASITES—VALUE OF HOSPITAL—EGG-EATING—FEATHER-EATING—MOULTING—SEPARATING THE SEXES—MALE BIRDS—OLD HENS—MANURE—FEATHERS—ACCOUNTS.



THIS chapter must take the form of an *omnium gatherum*, dealing not only with the question of disease, but also with several subjects which could scarcely be included before, yet these are of great importance to all poultry-keepers, dealing as they do with those details which are essential to success.

First is the question of

DISEASES.

One of the most remarkable features of modern poultry-keeping is the great development of diseases in various forms. This is shown by the great number of questions asked in the various specialist poultry papers every week. It is true that this fact in itself would scarcely show so great an increase in disease, for at one time when a fowl was ill it either had its neck wrung or was treated with some such mixture as soot and butter, or with a dose of castor-oil. There was little or no attempt made to define the disease, to discover its nature, and thus to find a successful method of treatment; consequently the result was seldom satisfactory. It is not, therefore, to be assumed because this definition of diseases has been attempted, and, through means of publicity, made known, that disease is more prevalent. But still, from careful watching of poultry matters for many years, we have little doubt that there has been a great development of disease.

It is not a very pleasant thing to think of disease being so prevalent, and too much thinking of it would not help us in egg or fowl eating. It is true that many diseases are not hereditary, and these the more prevalent. But there are many diseases which are hereditary, and we are by no means certain what effect upon the human frame eggs from such birds have.

"PREVENTION BETTER THAN CURE."

Our object in saying this is to point out how desirable it is that fowls should be kept healthy, not only for

their own sakes, but for the sake of those who consume their produce. We do not say much about the birds themselves, as they are always cooked before eaten, and if there were any apparent disease they would be rejected. It is quite true some diseases would not have their injurious effect destroyed by cooking, but these are very seldom met with in poultry. Only seldom has there been a poultry epidemic, and it is this form of disease that would be most to fear.

The first care should be to select perfectly healthy birds for breeders. No matter how good a bird may be (and this applies equally to cocks and hens) in other respects, unless it is sound and healthy it should not be used for breeding. The temptation to neglect this is greatest amongst fancy poultry, but there is no excuse for it whatever with fowls kept for economic reasons. With them stamina is of the first consideration, and we advise the killing of those birds which show the slightest taint of any disease that is chronic in its nature. Of course, it would be folly to destroy a good hen because she had a bad cold or a touch of indigestion. These can be cured, and are not structural in their effect. But when there are signs of actual disease of lungs, or liver, or other vital organs, or if the blood is impure, then as a mere matter of pecuniary interest to kill is the cheapest as well as the best method.

The vast majority of diseases in poultry are due to bad management, which may be divided into four sections: (1) Bad housing, including cold, damp and ill-ventilated houses; (2) overfeeding, rich feeding, and impure water; (3) want of exercise, combined with an improper system of feeding; and (4) close breeding, which results in enfeeblement of the system. Each of these four parts of management has been previously dealt with, and they should be carefully studied by every poultry-keeper. That all can be prevented is undoubted, but so long as the system of feeding on rich

food in large quantities, of keeping birds in small, ill-ventilated houses, upon foul or damp ground, is continued, so long will diseases be generated and propagated; but if healthy stock only be used for breeding, and proper attention paid to management, disease will be exceptional.

THE APPETITE.

The appetite is an unfailing guide to the state of a fowl, as it is to that of any animal. In health it should be even, regular, not capricious or fitful, varying in the frequency of its return only according to the habitual period for meals. As an indication of disease we find the appetite deficient or absent, excessive and irregular, fitful and capricious, with craving after unnatural substances, and absolute repugnance to proper food. Absence of appetite may be attributed (1) to organic derangement of the stomach or to weakened digestion, but (2) more frequently to overcharge of the stomach, or pressure of injurious or indigestible substances, even in moderate or small quantities; (3) to fevers of various kinds, which can be determined by heat of the body; and (4) to emotional or other exciting causes. Excess of appetite frequently attends nervous complaints, and is often attendant on worms in the intestines. It may also be a sign of poverty in the blood, and is usually associated under these conditions with vomiting or continued relaxation of the bowels, owing to the deficient distribution of nourishment.

INTRODUCTION OF FRESH STOCK.

In connection with this subject of disease prevention, it is most important to speak as to the introduction of fresh stock birds, by which a previously healthy poultry-yard may be decimated. Additions to the poultry-yard should be made with the greatest care, both as to the choice of birds to be introduced, so far as their breeding and characteristics are concerned, and their state of health. As to the latter consideration, it is to be pointed out that frequently a strange bird has been the means of introducing disease into a previously healthy yard—disease that has taken months to eradicate. The system adopted by careful breeders is to keep purchased fowls by themselves for two or three weeks, so that any incipient disease may have time to declare itself, and that the condition of the bird may be fully observed. The time thus apparently lost by keeping a fowl apart from the others will be well spent by the security afforded.

CLEANLINESS, ETC.

It is only necessary to mention how important is absolute cleanliness in houses, coops, and every form of appliance. Labour expended in this way will repay itself a hundredfold in preventing disease. Such preparations as Calvert's carbolic preparations are invaluable, not to cover up filth, but to sweeten the atmosphere, and by killing germs prevent disease. We have

previously referred to the importance of a dust bath for all fowls, but it is desirable to mention it again.

DIVISION OF DISEASES.

The diseases of poultry may be classified under the following heads:

1. Respiratory.
2. Digestive and Blood.
3. Zymotic.
4. Nervous.
5. Comb and Skin.
6. Limbs.
7. Crop and Egg Organs.
8. Parasites.

Recent investigations in medical science have proved that disease generally results from the presence of microbes, but few of those found in poultry have yet been studied. Attention has been given to some, and we may hope that others will soon be subjected to observation. The following notes do not profess to approach the question from the medical standpoint, but embody practical experience in dealing with poultry. The ordinary poultry-keeper requires some simple remedy, or to know when it is better to kill the sufferers.

1. Diseases of the Respiratory Organs.

Catarrh.—One of the commonest diseases amongst poultry is cold in the head, or catarrh, which in some cases develops into what we know as influenza. This is the result of damp or exposure, and may be induced, as in the human subject, by an unexpected change in the weather. Generally the first symptoms are a ruffling of the feathers as if the bird felt cold, and then sneezing and running at the eyes and nostrils. If this be not dealt with, the eyes begin to swell, and unless the treatment succeeds the nostrils will become stopped up with mucus, and the eyes almost, if not entirely, closed. In this latter stage the complaint is very infectious, and even if taken early it is often difficult to prevent it affecting a whole yard. Of all things, warmth is the most essential to overcome catarrh. If kept warm there need be little trouble in conquering it during the early stages. Soft food of a nourishing nature should be given, and this may be sprinkled with pepper or ginger. If taken at the first, nothing can be better as medicine than camphor (pillules are the easiest to administer), but later on doses of homeopathic tincture of aconite is to be preferred. If the discharge from the nostrils becomes very profuse, we should recommend homeopathic tincture of arsenicum. In addition to that which is given in the form of medicine, the nostrils and eyes of the bird should be washed twice a day with warm water, in which about one-sixth of vinegar has been added.

Bronchitis.—This is a further stage of the same affection. In cases where there is an inherent weak-

ness of the lungs or chest, cold often develops into bronchitis, but we have seldom found it take this form (except there has been very great neglect) unless there is such weakness. It has been suggested that the use of unslaked lime in poultry-houses causes bronchitis, as it irritates and inflames the throat. Fortunately, simple bronchitis is not difficult to discover. It is generally indicated by a rattle in the throat and a cough. If the breathing is listened to, there will be rapid respiration discernible. Usually cold in the head is not present, and the skin is dry and hot. There is dulness, and in the majority of cases loss of appetite. If not arrested, all these symptoms increase, until the breathing can be heard some distance away from where the bird is roosting.

With bronchitis medicine is of comparatively little avail. Warmth—moist warmth—is required, for dry air aggravates the disease. Steaming the apartment or pen in which the fowl is placed is most useful, and the water should be medicated with hops, poppy-heads, or a few drops of carbolic acid. Warm, soft food must be given, and a little aromatic compound added to this. To the drinking-water may be added five drops of nitric acid, sweetened with sugar. A remedy has been introduced which can be had through any chemist. It is called *euphorbia pilulifera*, and is a vegetable remedy. Sometimes there is a form of laboured breathing which is more like asthma than bronchitis, as it is unaccompanied by any cough. It is less dangerous, and partakes more of a chronic nature. For it the *euphorbia pilulifera* should be employed, as it is equally efficacious for that form of complaint.

Consumption.—This is another development which follows neglected cold, or results from the unfavourable conditions in which fowls are sometimes kept, due to a tendency to lung weakness or a bad state of the blood. It will never arise unless there is such neglect or hereditary tendency. In the latter case the disease should be stamped out, whilst the former may be avoided by the exercise of ordinary care. The symptoms of consumption are easily discernible, and not to be mistaken. There is the pale face, the incessant hacking cough, the gradual wasting of the system, which so painfully mark this fell disease in the human subject. In spite of ample and nutritious feeding, the slow but sure decay goes on, often aggravated by rapid breathing and diarrhoea, especially in the later stages. It is quite possible to prolong life for a time by the use of nutritious food, and of such medicines as cod-liver-oil or Parrish's Food; but no cure can really be effected when once the disease has secured a hold upon the system. Better by far is it to kill off all such stock, for to breed from hens so affected might lead to serious trouble. However valuable such specimens may be, the best plan is to get rid of them forthwith.

Inflammation of the Lungs.—This disease is known also as pneumonia. Sometimes catarrh (or cold) or

bronchitis develop into what is the most immediately dangerous of all respiratory diseases, namely, inflammation of the lungs. And it may suddenly develop without any apparent preliminary warning. As in human beings, its progress is very rapid. The high temperature is like a consuming fire, and soon burns out the life unless it can be reduced. We suppose there is generally some weakness of the lungs, either permanent or temporary, to permit the existence of this state of things, but it is certain that fowls are attacked with pneumonia who have not themselves or their progenitors shown any signs whatever of chest or lung weakness. Probably keeping birds in confinement, especially if the house and run be close and not properly ventilated, tends to weaken the respiratory organs. A blow, especially on the back or chest, by which the lung is injured, may induce this disease. Amongst the exciting causes are sudden changes of temperature, exposure to cold when the state of the body is not what it ought to be, and extraordinary exertion. The symptoms differ from those of consumption in that not only is there a constant cough, but also a congregation of mucus, and, which is the most certain indication of the disease, rapid breathing with that catch in it which is ever indicative of inflammation. There is also the high temperature already spoken of, and as the disease proceeds, the breathing increases in rapidity, the mouth is filled with a sickly malodorous, slimy substance, the poor bird is huddled in a heap, and it is not long ere death comes and relieves it of its misery. When discovered, and found to be pneumonia, the first object should be to reduce the inflammation, and for this purpose there is nothing better than homeopathic tincture of aconite. This should be given every hour until the most distressing symptoms abate, when every two hours will be often enough. After six hours have passed the aconite should be alternated with bryonia. In the way of medicine it is very seldom that more than these are needed. The next object is to see that the strength is kept up, and for this a little strong beef-tea given several times a day is the very best thing. It may be varied by beaten egg, in which a few drops of brandy have been mixed. Probably when the disease is passing away there may be an attack of diarrhoea, but this need not be regarded unless much prolonged. When a dose or two of chlorodyne should be given. After the inflammation has been overcome, the system needs to be built up again by the use of Parrish's Chemical Food, and cod-liver-oil, which may be given separately or mixed. We have used with the greatest benefit as a tonic capsules of cod-liver-oil with quinine, and can recommend them as most effective, and very easily administered.

Roup.—Roup is one of the most troublesome diseases with which the poultry-keeper has to contend. It is really a combination of diseases, as it embraces a cold in the head and probably a microbe of tuberculosis. In

many instances the scrofula or stomach derangement has been previously quiescent, but cold having been induced by a sudden change in the weather or from exposure, disease is developed and takes the form of roup. Externally there are all the symptoms as in catarrh, namely running at the nostrils, sneezing, or cough, and in many instances a puffing up or swelling around the eyes, in the worst forms there being a cheesy substance below the eyelid, sometimes entirely covering up the eye. In yet other instances there is nothing but running at the nostrils to indicate the presence of roup, and the heavy, mopy appearance of the fowl. But it is very easy to distinguish between common roup and cold, for in the latter case the mucous is thickened, and together with the breath is very offensive. In order to cure the disease, it is necessary not only to get rid of the cold, which can generally be done by the treatment named for cold, and keeping in a warm place from draughts, but also to deal with the tubercles. This needs patient treatment, as it is in the blood; doses of iodide of potassium may be given, and sulphur in one form or the other. The face, eyes, nostrils, and mouth should be well washed out with solution of chlorinated soda or permanganate of potash (4 grains to 1 ounce of water). The following remedy for this disease is given in *Farm Poultry*, and has been highly spoken of: "If a chicken is troubled with roup, clean out the pus, if in the mouth, with a wooden spatula; if you make it bleed a little do not be alarmed. When this operation is done, wash the mouth with cotton wadding attached to a little stick of wood, saturated in peroxide of hydrogen. If a little is swallowed it will not matter, as it is a non-poisonous liquid. This done, use a little aristol, which is an odourless brown powder; drop a little on each sore place; repeat this operation morning and night for three days, and all will be done. Should the chicken's face be swollen, which is also roup, take a very sharp knife and cut a little incision in the swollen part of the face, squeeze the open cut slightly to try to extract the root; if it cannot be done, wash well with peroxide of hydrogen and leave the wound open. Next morning or night you will find that the core has come out. Wash well with peroxide, and the aristol powder to close it up. Should all matter not be out, even by a gentle squeeze, omit the aristol till next day."

2. Diseases of the Blood and Digestive Organs.

Indigestion.—Many fowls suffer from a form of digestive derangement which is simply indigestion, and which may be cured if treated properly. The symptoms are an indolent appearance, as if the bird were unable to exert itself; a bad, or depraved appetite, generally the former. The food is hardly touched at all, and there seems no desire for natural food. The face, if examined, has generally an unhealthy look, and the feathers lose their brilliancy. The droppings are scanty

and foetid, though there is sometimes an attack of diarrhoea. The breath is usually bad.

The first step to be taken is to give a mild aperient with a view to removing anything from the bowels or intestines, as sometimes a slight obstruction is the exciting cause. Six hours afterwards an ordinary rhubarb pill may be administered, followed by the same at an interval of two days for a week. We have also known very great good result from the use of homeopathic medicines. The right ones to use for indigestion would be, when there is apparent sickness, nuxvomica, and when there is a dizziness, chamomilla. In both cases the dose should be two drops of the No. 3 tincture, in a wineglassful of water, and a teaspoonful of this given three times a day. The food should be limited, and of the plainest nature. It is better cooked. A little green stuff may be added to the soft food, and powdered wood charcoal mixed in the food assists the cure.

Diarrhoea.—The exciting causes of this complaint are very numerous indeed, and it is impossible to enumerate them all. But, fortunately, the thing itself is so apparent that no one who takes the slightest interest in his stock can fail to discern it at once. The most frequent causes are improper feeding, cold, and presence in the intestines of some irritant. It is, however, well to note here that slight looseness, by means of which Nature sometimes corrects herself, should not be stopped. This is often the prevention of a serious disease, and the use of a strong astringent would be productive of very serious harm. We should first suggest the use of bone-meal mixed with the soft food. This is not only useful as a cure, but a great preventive of diarrhoea, especially with chickens, and it should always be mixed with the soft food given to them. Boiled rice, in which some powdered chalk has been mixed, is also very useful in the earlier stages. If neither of these is successful, stronger measures are necessary. We have been most successful with chlorodyne, giving two drops in a teaspoonful of water twice or thrice a day. This is usually effective in stopping the progress of the complaint. The fowl should be fed entirely on soft food, with very little green stuff after the diarrhoea has passed away.

Dysentery.—This is really an aggravated form of diarrhoea, and often follows neglect. The symptoms are the same, only in a worse degree, and the evacuations are generally tinged with blood. The first object must be to stop the discharge, and for this purpose five drops of laudanum should be given mixed with the same quantity of carbonate, twice a day. The food should be rice, well boiled, and the sufferer must be kept warm and dry. It is only fair to say that dysentery is very difficult indeed to cure.

Liver Disease.—Perhaps the most troublesome complaint—one which generally follows the use of Indian corn—and at the same time the most insidious disease

that affects fowls, is liver disease, of which there has been a very great development during the last few years. This disease assumes three forms, but the worst feature in connection with it is that it may be existent for a long time without its presence being at all suspected. Very often the first evidence is only noticed a few days before the bird succumbs, when it is seen to be rather dull and listless. The most certain sign is when the bird mopes about, and instead of having a bright red coral face, which is the best indication of health, it is rather yellowish or purple. As soon as these indications are noticed, the food should be reduced in quantity and quality, avoiding everything of a rich or fatty nature. The best things to feed on will be whole barley or wheat in small quantities. It will also be as well to give some aperient medicine, preceded by a couple of grains of calomel every other day. The object is to reduce the system at once, or the disease will speedily be aggravated. Should any of the birds die, it will be better to examine them and see if liver disease is present, which can very easily be discovered, as that organ will be soft and very easily broken, or have cheesy lumps upon it.

When the nature of the disease has been discovered, steps must be taken to prevent its development, and the poultry-breeder must try to eradicate it from his stock. As liver disease is hereditary, fowls with any suspicion of it must never be bred from. When treated in time, there is no doubt that the disease can be removed, but if neglected it becomes chronic. There are many things which can be done to prevent the birds becoming affected at all, one or two of which we have already indicated, namely, feeding and the giving of exercise. But perhaps the most prolific cause of disease is overcrowding, and consequent tainting of the ground. Of course, upon farms, where there is an abundance of room, liver disease need not be feared, unless the feeding is very bad. If suspected, any good liver pill, such as Carter's, can be used with advantage.

Anæmia.—Sometimes, but not often, fowls are affected by poverty of blood, and usually this is the result of bad conditions or of unsuitable food. The first thing is to give them plenty of fresh air and as much exercise as possible. Good, nutritious food is essential, plenty of green stuff, and doses of Freeman's Concentrated Steel Solution can be given with advantage.

Tuberculosis.—This consists of minute tubercles throughout the blood. These may remain dormant for a considerable period. There are few means of discovering the process of development, for, as a rule, little or nothing is known until the trouble is fast running its course to a fatal issue. In this way it is the progenitor of consumption, liver disease, roup, canker, skin diseases in various forms, and of many other complaints. In each of these cases the tubercles find a weak spot and there deposit themselves. The causes

are many. The tendency is undoubtedly hereditary. Predisposing causes are impure air, resulting from want of ventilation in the poultry-houses, uncleanness, wrong feeding, the giving of rich food especially acting as an inducement to the formation of tubercles in the blood.

As may well be imagined, the cure of such a disease as this is necessarily attended with very great difficulty, and we do not hesitate to say the attempt will fail in many instances. When tuberculosis pure and simple is discovered, wood charcoal, iron, phosphorus, or iodide of potassium, should be employed. These must be given in small doses, say twice a day, and the cure, if success is attained, must not be looked for very rapidly. The food must not be of a stimulating nature, and be limited in quantity. The greatest attention as to housing and sanitary arrangements is absolutely necessary, and if the place is at all damp it should be drained. But as a rule birds affected are not worth the keeping.

Worms.—Very often when birds are troubled with worms it is difficult to discover what is the matter with them; the chief, or perhaps the only, thing noticed is that they mope or hang about. When worms are present, the safest and best proof is by an examination of the droppings, in which worms will generally be seen if the bird is so troubled. The cure is, happily, not a very difficult one. The best remedy, so far as our experience goes, is capsules of turpentine, one or two of which, followed in twelve hours by a dose of castor-oil, have always been sufficient to expel the troublesome parasites from the system.

3. *Zymotic Diseases.*

Cholera.—One of the most dreaded of all the diseases to which fowls are subject is that known as fowl cholera, and it does not appear that any country is free from it. So serious has its ravages been upon the Continent of Europe that such great scientists as Pasteur and Koch have given a considerable amount of attention to it. In America it has at various times been epidemic, while occasionally in the United Kingdom it has swept off vast numbers of poultry. Fowls affected with cholera speedily succumb, showing all the symptoms of high fever and rapid emaciation.

The causes of this dreadful disease are many and various, and there can be no question that it is terribly contagious, the epidemic spreading like wildfire when once it has been admitted into a stock of poultry, and the chances of stopping it are very few indeed. We have known it introduced by the purchase of a fowl suffering from cholera. But the important thing for every poultry-keeper to remember is that even cholera is powerless if the birds are perfectly healthy. The causes which may be said to engender chicken cholera are foul water, rotten food, fetid earth, and impure air; in fact, those conditions which always engender disease

of one form or another. Its greatest ravages have been among very highly bred and highly fed exhibition poultry, and poor, in-bred, miserable fowls. Some French writers seem to think that the healthiest go off first, but we do not think that this opinion is borne out by the facts of the case.

So far as curative measures are concerned, unfortunately very little can be done. The period is so short, and the disease runs its course so rapidly, that the fowl is dead sometimes within a few hours, and generally within two or three days. The only really efficacious medicine is chlorodyne and carbolic acid, and upon these we should almost entirely depend. The appearance of chicken cholera should be taken as a sign that the methods of feeding or management are wrong, and attention will need to be given towards prevention of its spreading.

M. Pasteur advocated the practice of inoculation as a preventive against chicken cholera. The French savant's method of operating is a little complex, but an American writer some time ago described a very much simpler method. In this he says that a hen should be vaccinated with the cholera, and in eight days he system will be thoroughly inoculated. Then cut off her head and catch all the blood in some vessel, pouring it afterwards upon paper to dry. A half-drop of this dried blood is sufficient to vaccinate a fowl. Catch the fowl to be operated upon, and with a pin or knife make a little scratch on the thigh, just enough to draw blood. Upon this place a bit of the paper upon which the virus has dried, and let the chicken run.

Diphtheric-Roup.—This disease has at times run rampant, taking the form of an epidemic, destroying vast numbers of fowls, as it is highly contagious. It is characterized by the formation of a false membrane of the mouth and throat. It generally commences with headache in the human subject, with sickness, diarrhoea, and chilliness, and is soon followed by great prostration and the formation of dirty whitish patches on the back of the mouth, at first small, but soon coalescing so as to form a membrane whose appearance has been compared to that of "damp, dirty wash-leather." When this membrane begins to peel off there is a most offensive odour, and frequently there is inability to swallow.

Mr. F. V. Theobald has given considerable attention to this subject,* and makes the following valuable suggestions as to its prevention and treatment: "One of the most important steps to take in regard to the disease is to ensure the complete isolation of the affected bird, as the disease is highly contagious. As a rule, it appears in an epizootic form amongst poultry. This can often be prevented, however, by the immediate isolation of the patients and the application of salicylic acid to the fowls' drinking-water, which should

be very limited, and watering the ground of the poultry yard or pen with a 2 per cent. solution of sulphuric acid. About 1 pint of 10 per cent. salicylic acid (dissolved in alcohol) to an equal quantity of water should be given the fowls for drinking for some days, as the acid destroys any of the wandering germs that may possibly take up their abode in the fowl's mouth. Those that are suffering from this complaint should be at once attended to. The mouth should, as far as possible, be freed from all the growths. One form can easily be removed with two needles from the mucous membrane. The membrane under the growth will be found to be white and unhealthy; many of the parasites may remain on this; thus, touching it with a strong solution (10 per cent.) of boracic or, better still, salicylic acid should invariably be practised. The whole mouth should also be well cleaned out, the birds given only a limited quantity of water, with the salicylic acid. I have found most obstinate and advanced cases give way under this acid. In the case of those firmly-embedded growths under the tongue and upon the sides of the mouth, more difficulty will be experienced in treatment. The way I have followed, generally with success, is to paint the white spots with iodine, or by the employment of lunar caustic burn them away, at the same time dressing the spots and mouth with either boracic or salicylic acid as before. In its *early* stages the disease can be easily cured, but if once allowed to get either into the œsophagus or trachea, the case, of course, is hopeless. So long as the mouth only is invaded, the disease is amenable to the above method of treatment."

Gastritis.—This is inflammation of the stomach, and is a most dangerous disease, running its course rapidly. The causes are: over-stimulating food, poison, irritants in the stomach, or internal injuries. The symptoms are not easy to enumerate, as many of them apply equally to other diseases, but they may be stated as intense thirst, constipation, quick breathing, and prostration. To allay the inflammation, the best medicine is homeopathic tincture of aconite, which should be given four or five times a day. A little salad-oil is useful to overcome the constipation, and this may be given either in the usual way or injected. The food must be good and nutritious, and to allay the thirst lime-water and milk may be given.

Enteritis.—A large number of animals die every year from this disease, which is inflammation of the bowels. The sufferer is found to be completely prostrated, squats down with plumage ruffled and wings drooping, whilst it appears unable to keep its eyes open. There is great heat, intense thirst, and rapid breathing, whilst the evacuations are generally slimy. It runs to a rapid issue, and generally cure is doubtful. The sufferer must be kept warm, and salad-oil given to it, followed by warm milk or arrowroot. Bad conditions here, again, are the usual cause, and the external

* "Parasitic Diseases of Poultry." London: Gurney and Jackson, 1896.

symptoms are not very different to gastritis. The most noticeable is that there is an absence of retching, which is generally present with the former, and the bowels are alternately loose and constipated. The same treatment can be used, with the exception of lime-water, which should be omitted.

4. Diseases of the Nervous System.

Apoplexy.—Overfed and unduly fat birds sometimes die of apoplexy, due to an overflow of blood to the head. As a rule it is discovered too late to apply any remedy. When, however, the sufferer is yet alive, a pill compound of jalap and calomel (2 grains of each) should be administered, and again twenty-four hours afterwards. Food must be simple—soaked toasted bread, with a little lean meat, or oatmeal soaked in Zebril. When the attack has passed, tonics should be given, but care must be taken to reduce the surplus fat.

Paralysis.—Paralysis is often taken for rheumatism, though, of course, it is an entirely different disease. The causes which induce paralysis are usually two: First, injury to the spine or brain; and, second, pressure upon the spine through fatty deposits thereon. Cure in cases of paralysis may be said to be impossible, for though there may be temporary relief, there is no certainty that the disease will not actually return, as it does in nearly every instance. Besides, if it did not actually return, the bird would never be the same again, and there would be either a weakness in the limbs or a fault in the plumage. Upon no account whatever should a bird which has been attacked with paralysis be bred from. Sometimes paralysis is simply due to constipation, in which case it can be removed by a strong aperient.

Vertigo.—This is a form of nervous affection which may be regarded either as a minor kind of apoplexy or as a premonitory warning thereof, as it arises from the pressure upon the brain. It is really giddiness, for the sufferer runs round and round in a circle, and there seems to be a loss of control over muscular action. The cause is a pressure upon the brain, but not of so serious a nature, though if neglected it is likely to become so. It is a good thing to revive the bird by holding it under a stream of cold water. This has the effect of stopping the pressure in the majority of cases. As soon as the patient can swallow it should have a little brandy-and-water, followed by an aperient. The cause of vertigo is the same as in the case of apoplexy.

5. Diseases of the Comb and Skin.

White-comb.—This is generally due to overcrowding, to bad feeding, and the absence of green food. The comb becomes covered with scurf, which, if not checked, in process of time extends down the neck, and the feathers fall off. It is really a form of scurvy. When white-comb appears there should be immediate attention to the food, and a wholesome and liberal diet,

pure water, grit for the assistance of digestion, and an abundance of vegetables, should be given, with strict regard to cleanliness. A good aperient should be given two or three times, and some sulphur mixed with soft food. The comb should be anointed with a little vaseline. Afterwards the birds, when cured, should have a good tonic.

Sores.—When eruptions break out on the comb, the treatment must be chiefly internal, though the sores should be touched daily with a little olive-oil in which a few drops of carbolic acid have been mixed. The internal treatment should consist of first an aperient, and then powdered vegetable charcoal; mixed with the food being the easiest way to administer the charcoal, though made up into pills is perhaps the most effective.

Eczema.—This is one of the most ordinary forms of skin disease in all domestic animals. It has been described as “an inflammatory condition of the skin, characterized by the formation of a number of papules, which soon burst, leaving an excoriated surface. The discharge soon dies, and hard dark crusts are formed. There is always a great deal of irritation present, the result of the inflammation.” This disease is chiefly found in those fowls which are kept in close, confined runs, and are very highly bred. The disease generally declares itself in the wattles, which are covered with a number of small scabs or crusts, and have a very unpleasant appearance. There is a general dulness about the bird, which has neither spirit nor appetite. As the disease is due to a vitiated condition of the blood, mere local treatment would not be enough. A dose of some cooling medicine should be given first of all. This may be either Epsom salts or sulphate of magnesia; to be followed by pills made of these ingredients: Calomel, 2 grains; Barbadoes aloes, 8 grains; gingerine, $\frac{1}{3}$ grain. This should make three pills. The skin must be washed with a lotion made of 1 dram of carbolic acid and 6 ounces distilled water, applied frequently with a sponge. Locally there should be the application of benzoated oxide of iron twice a day, or in severe cases, when the scabs are hard and firmly attached, they may be removed, after first softening with hottish barley-water, and the parts dressed with a preparation made of oxide of zinc and olive-oil, $\frac{1}{2}$ ounce each; tincture of arnica, 2 drams; spirits of camphor, 1 dram; pure carbolic acid, 10 minims; and rose-water, 7 ounces; the whole to be applied with a feather or brush three or four times a day. The supply of vegetables or green food needs to be abundant.

Scabies.—This may perhaps be termed mange, as it is really the same as the disease of that name found in various animals. It is due to parasitical causes, and is therefore allied to the itch in human subjects. An insect burrows under the skin, and sets up a severe inflammation, attended with intense itching. The parts chiefly affected are the head and feet, these being

the bare places and where the skin is exposed. After a time the disease generally spreads to the body, and the feathers become loosened, often dropping out. No good can be done until the parasites are destroyed, which may be effected by any reliable mange lotion. Mercurial ointment or vaseline is very efficacious. The former must be carefully used, and we prefer the latter, as there is less risk of blood-poisoning from its use. Fowls affected with scabies should not be allowed to mix with other fowls, as these would in that case be certainly affected.

Scaly Legs.—Yellow-legged birds are very subject to a form of elephantiasis, to which the name of scaly legs is commonly given. There are two forms of it. The one is due to the presence of a small insect on the legs, and this kind is very contagious. The other arises from a deficiency of the oily secretion, thus causing the skin to dry up and split into divisions like scales. Both are easy of cure. For the parasitic form the remedy is, after washing the legs and scrubbing them with a nail-brush, to apply sulphur ointment or Freeman's ointment. These persevered in will effect a cure. For the other kind a preparation made of equal parts of vaseline and zinc ointment, and applied daily, will be the best remedy.

6. Diseases of the Limbs.

Leg-weakness.—Young birds, especially of the heavier varieties, are often troubled with a failure of the legs which prevents their moving about freely. Usually it takes the form of squatting on the ground by the bird. If not treated at once, the joints become stiff, the toes curl up, and when the sufferer does try to walk it can only do so on its elbows, or first leg-joints, which soon, from the friction, become enlarged, and have the skin worn off on the under side. This weakness may be caused in various ways. Very often it is simply due to a more rapid growth of the frame than the legs are able to bear, and when this is the case no one can be blamed for it, as climatic influences may have been at work that could not be foreseen. But too frequently it is the result of forcing, or of a wrong system of feeding. It is most important that in all efforts to obtain size the development of both frame and flesh should go on at the same time. In a few instances we have known leg weakness to come from keeping the young birds on wooden floors. The first step should be to cease at once the giving of all food that has the slightest tendency to increase the flesh, and to give that which will go in the direction of bone formation. It will help in case the fowl is fat if an aperient be administered, but not if it has already been reduced in bulk by the complaint. A tonic will do much to remove this. To increase the circulation the legs should be rubbed with turpentine, according to the directions given under the head of "Cramp."

Cramp.—This is also a complaint that chiefly troubles

young chickens, and it is seldom found to affect adult birds. It can at first be distinguished by a somewhat awkward walking on the part of the chickens. Toes, instead of being spread out, as is usually the case, begin to draw together, and unless steps are at once taken to remedy the trouble they become useless and the bird cannot walk. The cause of cramp is damp and want of proper exercise, the remedy for which is obvious. To cure present cases a tonic should be administered, with nutritious food, and the feet may be rubbed with turpentine after they have been soaked in warm water. Encasing them with flannel soaked in turpentine is also a good thing, but is only needed in very severe cases. When the feet are being bathed the toes should be worked gently with the hand in order to increase the circulation of the blood. If the complaint is treated early, very often the mere removal to a wooden floor for a few days will put all right, though this is generally when the chickens have been reared on a clay or heavy soil.

Rheumatism.—That which would be treated as cramp in young fowls, when found in adult birds becomes of a more serious nature. This disease is not simply cramp, though that is a part of it, but has combined with it poisoning of the blood. Cold and damp are the exciting causes, by the action of which the excreting power of the skin is checked, and some of the humours which would in an ordinary way be eliminated from the system by the process of insensible perspiration are retained, and blood-poisoning is caused. Of it there are two kinds—the acute and the chronic—the former being known by the swelling of the joints and evident pain therein, accompanied by much heat and fever. If the affected parts are touched, the bird will seem to suffer therefrom, and its pain in walking is very evident. In chronic rheumatism there is much less swelling, heat, and pain, but the latter is more continuous. The chronic form is more difficult to cure. The bird is stiffer in its gait, and walks like a decrepit old man. The treatment of rheumatism must be twofold—that is, both external and internal—the latter being specially needed to touch the affection of the blood. For this sulphur in some form is perhaps the best, and the easiest way to administer it is by mixing flowers of sulphur in the soft food. It must, however, be preceded by a mild aperient, such as part of a Seidlitz powder. If the heat is great, a dose of homeopathic tincture of aconite should be administered every two hours until the fever has been reduced. When the fever is overcome and yet the pains appear to be severe, the aconite should be replaced by belladonna. Externally the treatment is just as important. At first the limbs must be bathed in warm water, and, after having been kept therein for some time, carefully dried, and then be rubbed with arnica lotion, or with turpentine, before encasing them in flannel. In very severe attacks fomenting the limbs with a decoction made

from poppy-heads will be found effective. During rheumatism the food given should be rather stimulating, and it is a good thing to give a little meat in the food. If a cure is attempted, patience and perseverance will be needed, as recovery cannot be at all rapid.

Gout.—If there is a swollen condition of the feet, that must not be confounded with rheumatism. This has been called gout, but it is due to congestion of the bloodvessels of the feet, generally the result of want of exercise. The cure is to be found in soaking the feet in warm water, and keeping the bird off wet ground, together with plenty of exercise.

Bumble-foot.—Some varieties of fowls are very subject to an affection of the feet to which the name of bumble-foot has been given. The affection consists of a swelling on the ball of the foot, which is either in the form of a corn or an abscess. The causes are various. Sharp gravel, a cement or stone floor, will equally induce the trouble. In the former, when the foot is cut with gravel (glass or sharp stones will have the same effect), an abscess generally results. In the latter it is usually a corn. With both there is a considerable amount of pain with the inflammation set up. If the abscess is only a small one, and there is not much pus in it, the best thing will be to apply daily lunar caustic in the usual way. But if the swelling is large, with an evident gathering of pus, an incision will have to be made. After all the matter has been squeezed out—and it must all be out to effect a cure—the place should be bathed with warm water once or twice a day, and two days afterwards be touched with lunar caustic. Should it gather again, the effect of a poultice may be tried. When there is a corn in the foot, then this must be cut out, which can be done quite easily. The hole left after the removal has taken place should be touched also with caustic. In treating birds suffering from any form of bumble-foot, it is most important that they be kept on perfectly clean straw, so as to keep dirt out of the wound, or some more serious development may result. Bandaging is a very wise precaution.

7. Diseases of the Crop and Egg Organs.

Crop-bound.—This is the commonest form of crop trouble, and is generally caused by careless feeding. If green food be withheld for a time, and then given in unlimited quantities, the fowl will eat to repletion, and as the crop cannot deal with this mass of undigested food all at once, it becomes hard, and not only itself cannot pass into the stomach, but effectively bars the way for other food. This same result may be caused by feeding new grain, which, swelling in the crop, becomes a solid mass. Or, on the other hand, crop-bound is often caused by the presence of a twig, or some undigestible substance that has been swallowed by the fowl. The proof of a bound crop is purely external, but is, fortunately, very easily discernible.

Instead of the crop having a firm, close appearance—in fact, not being seen—it hangs down like a bag, and on feeling it we find that there is a lump or ball of food inside. This does not hurt until it grows very large and incommodes the bird, who often eats more than usual, for the reason that the food it is eating is not being digested, but going to increase the mass in the crop. If the trouble is discovered early, cure is comparatively easy. The first step is to pour some salad-oil or melted lard down the throat, and then to work gently the crop contents by the hand. This, if properly and effectively done, will soon cause the food and the fluid to mix, and when the mass has been well broken up, it will in the course of a few hours pass away. The length of time necessary for the operation will vary, and we have known an hour required for the purpose. Warm water may be used instead of the oil or lard, but it is not so rapid nor so effective in its action. When the mass has been got rid of, great care is required in order to prevent a recurrence of it, which would almost certainly result if food was immediately given without stint. After distension like this, the crop is naturally in a somewhat inflamed condition, and very susceptible to any strain on it. The food, therefore, for a few days should be limited in quantity, and be easily assimilated, such as sopped bread or Spratt's meal. Often a permanent distension of the crop results from neglect of this simple precaution. In about a week the bird may be put on to ordinary diet.

When the kneading process is ineffectual, then an operation becomes necessary; but no one need fear it, as it is very simple and does not require great skill. The object is to remove from the crop the mass of impermeable stuff gathered there, for unless that is removed the recovery of the bird is impossible, and it must soon die from absolute starvation. The process is to make an incision lengthwise in the upper part of the crop, about $1\frac{1}{2}$ inches in length. This should be cleanly made through the outer skin with a very sharp knife or lancet. Through the incision the contents of the crop may be removed, using for that purpose a small egg-spoon. Sometimes the mass is so hard that it cannot pass through the aperture, and in that case it must be broken up, which can be accomplished with care and patience. This mass is usually very offensive, and to remove any contaminating matter remaining the organ should be washed out with warm milk-and-water, or any weak non-poisonous disinfectant. It is also desirable to pass the finger, well pared and oiled, into the orifice, so as to be certain that there is no obstruction to the œsophagus, otherwise the whole process may have to be repeated. This done, the incision must be sewn up, and for this a small bent needle should be employed, for by it the skin can be easily gathered together, and white silk or horsehair. The inner skin should be sewn first, and then the outer,

making three stitches in each, and tying separately. The food must be limited in quantity, and as described above. No water must be given until the suture has completely healed up.

Soft-crop.—In some instances when the crop is distended there is no mass of food, and the distension is from a surcharge of water or air in the crop. This cause is difficult to determine, but probably arises from some inability on the part of this organ to perform its functions. It may arise from inflammatory action, causing excessive thirst, or from indigestion. Sometimes soft-crop is found after a bound crop has been cured. When discovered, an attempt should be made to expel the contents by holding the fowl upside down, and pressing the crop with the hands. But if this does not secure the desired effect, it then becomes necessary to puncture the crop. A coarse darning-needle will answer very well for the purpose, and the incision, when made, will not need stitching. A fowl found to be affected should be kept in a pen by itself, where it cannot obtain any food but that supplied to it, and be fed three times a day with a small quantity of toasted bread which has been soaked in Zebril. A little water may be given, but only after each meal, and then be removed from the pen. It is advisable to acidulate the water with a few drops of nitric acid. Homeopathic tincture of *nux vomica* is useful for correcting this derangement.

Inflammation of the Crop.—This is a much more serious complaint, and very speedily terminates in the death of the sufferer. It is usually due to the presence of some irritant poison. The symptoms are difficult breathing, restlessness, depression, attempts to vomit, and convulsions, together with, at times, phosphoric odour from the mouth. Mr. Woodroffe Hill, to whom is due the credit of defining this disease, recommends the following treatment: Mucilaginous or albuminous fluids, such as barley-water, milk, and isinglass, or a thin solution of gum, should be freely administered after first evacuating the crop. Should phosphorus have been taken, magnesia may be given, followed by turpentine mixed in cream. Oil must not be administered. Lead is often a cause of poultry poisoning when paints are about. In this case the crop should be immediately evacuated, and half a teaspoonful of sulphate of magnesia and 5 minims of sulphuric acid, mixed in a wineglassful of water, be administered without delay. In a couple of hours 5 grains of iodide of potassium may be given in a teaspoonful of water. Afterwards feed on mucilaginous liquids. If purging commences, give a teaspoonful of castor-oil, with a grain of opium. Crude or unslaked lime is an irritant poison to fowls, producing inflammation of the throat, crop, gullet, gizzard and intestines. In this case oil should at once be administered, followed by full and frequent doses of mucilaginous or albuminous fluids.

Soft Eggs.—One of the earliest forms of derangement

of the egg organs is indicated by the laying of soft eggs. Sometimes, however, this is merely due to want of shell-forming materials, chiefly with fowls in confinement. When birds are kept in small runs and commence to lay these soft eggs, the first thing is to see whether they have sufficient calcareous materials. But if this is found to be the case, then we must look in other directions, and it will generally be discovered that over or improper feeding is the cause. The egg organs have been unduly stimulated, so that they are unable to retain the egg until coated with the shell. After the steps already indicated have been taken, if unsuccessful, laying must be checked by the withholding of food having the slightest stimulating tendency, and by the giving of an aperient. For the latter there is nothing better than a pill composed of 1 grain of calomel and $\frac{1}{2}$ grain of tartar emetic. A little iron may be given in the water as a tonic, and the food should consist of boiled rice and potatoes. We have known, however, soft-shelled eggs caused by the hen being frightened, and to prevent this the nests should always be in as quiet a place as possible. Heavy breeds are most liable to be troubled in this way. At times it is found that the presence of some irritant in the egg passages causes this trouble, and when that is so the simplest way is to try a dose of castor-oil. The difficulty is that this affection is by no means easy to discover.

Egg-bound.—Another form is when the hen is unable to lay her egg, which blocks up the oviduct. This may be caused by a contraction of the passage, or by abnormal size of the egg. The noticeable symptoms are a frequent visiting of the nest without any result, and a depression of the tail and wings, the poor bird showing evident signs of distress. If the egg is very large, the first step is to soften the vent with pure salad-oil, and, if this treatment fails, to inject an ounce of the same oil an hour afterwards. In making the injection care must be taken not to break the egg, as that would probably be fatal to the hen. In more obstinate cases good will result from the use of warm treacle, in which some chopped groundsel has been mixed. This should be given in doses of a tablespoonful at a time, at intervals of an hour, until the necessary relief has been effected. Small doses of castor-oil may be substituted, but this is not so good. In very obstinate cases the holding of the vent over a jug of boiling water, in which ten drops of iodine to a quart of water is added, so as to well steam the organ, usually gives relief. When the egg produced is of the regular size, it betokens contraction of the passage, which is more serious, as that indicates inflammation. This is dealt with in the next paragraph.

Inflammation of the Oviduct.—This affection may be due to causes already mentioned, but is also caused by the passage of a broken egg. In other instances it is due to serofulous deposits. The indications are, general feverishness with restlessness, and the shape of

the eggs voided. Mr. Tegetmeier says that the locality of the inflammation may be discovered by the state of the egg. "When the inflammation is very severe, the yolks may be expelled as they are received from the ovary, without any white or membrane; at other times the white may be expelled with the yolks, or the eggs may be imperfectly or irregularly enclosed in membrane. If the lower part of the oviduct is unduly excited, the egg is expelled before the shell has been secreted, and a soft-skinned egg results. If the inflammation extends to the middle portion, the membrane is either misshapen or incomplete, and if the whole tube is inflamed the yolks are dropped without any covering whatever." The bird affected with this disease suffers greatly. There is a continual straining, and if the vent is examined it will be found to be very high in temperature. The wings are usually dropped and the feathers ruffled. Death soon follows. Treatment depends upon the cause. Should there be any remnants of broken shell in the oviduct, the first step is to remove it. Inflammation may be reduced by the aperient mentioned under the head of soft eggs, and homeopathic tincture of aconite is useful to follow.

Prolapsus.—This is commonly known as "down behind," and is generally due to overfeeding or to excessive laying, either of which will cause muscular relaxation and debility. All stimulating food should be stopped, and the system braced by tonics. The bowel, which protrudes from the vent, should be returned thereto, and when that has been done, an astringent, such as a tablespoonful of zinc dissolved in a pint of water, of which two tablespoonfuls should be employed at a time, a weak solution of alum, or vinegar and water, must be injected. This complaint is very apt to return, especially during the laying season.

8. Parasites.

Information with regard to the various forms of minute life which live upon our larger animals is always very welcome indeed, and there can be no doubt that much more injury is caused to fowls by the presence of parasites than is usually supposed. These pests swarm in many poultry-houses, even when their presence is unsuspected, and they only make their appearance when the birds are roosting during the night. The result is seen in various directions—sometimes birds failing to thrive when they apparently should do so, and in other cases different diseases being induced. In the March, 1896, issue of the *Journal of the Board of Agriculture* appeared a valuable article dealing with "The Parasites of Poultry," by Mr. F. V. Theobald, M.A., and which has been since extended and issued in book-form.* Much of the article dealt with fleas, lice, and mites, and the following suggestions for the prevention and treatment of these pests

will be found valuable: "Infestation is always worst in dirty and neglected runs and roosts, and such are a standing danger to more cleanly neighbours. Cleanliness and freedom will always put these pests under a disadvantage—not only cleanliness of the nests, walls, and floor, but also of the ceilings and perches. To suppress these pests, the houses should be cleaned down at least twice a year with a wash made of lime, sulphur, and soft-soap, the ceilings, walls, and nests having a good coating. The wash should be fairly liquid, so as to run into every crack and crevice. Early spring and autumn are the times for these applications. The perches are best treated with boiling water and soft-soap, or with an emulsion of kerosene or creosote. This latter insecticide is most beneficial, especially in regard to mites.

"Special attention should be paid to the nests; they should be frequently cleansed and changed to keep off fleas and other parasites. Neither nest-boxes nor perches should be fixed; relays of each should be at hand, so that they can be changed to ensure complete disinfection. The nest-boxes should be now and then cleaned out, and dressed with hot lime and sulphur, or with a solution of corrosive sublimate. Either dusting the prepared nests with Persian insect powder or putting a little sawdust or sand soaked in naphthaline at the bottom will keep off these depredators. Wood-shavings or wood-wool in the nests instead of straw is most beneficial. No lice or fleas will live in it, owing to the aromatic odour given off from the wood. Care, of course, must be taken that the remedies employed do not affect the eggs in the nest.

"Schneider's suggestion of fumigating the roost with sulphuret of carbon, put in small phials in the corners of the houses, etc., where they cannot be upset, is very successful so far as killing the pests goes, but this method is not quite safe to recommend. Regarding the infestation of the birds themselves, white precipitate seldom fails. The heads and necks of young chicks should be early dressed very sparingly, and repeated when necessary. White precipitate is a strong irritant poison, and needs the greatest care in its use, especially in young chicks. It is best obtained as an ointment from the chemists. Hens selected for sitting should have a small quantity of this ointment rubbed in under the vent, head, and sides, and then be well dusted with insect powder. Sitting hens are greatly tortured by parasites, and their young are often lost by neglect of these simple precautions. The skin should be first moistened with soft-soap and water prior to dusting the birds with insect powder (pyrethrum). Some breeders prefer flowers of sulphur. Dust-baths are the natural remedy for lice and mites, and fowls should never be kept without them. Sand mixed with a small quantity of creosote will generally keep the birds free from vermin. Finely-divided gypsum mixed with a small quantity of paraffin or carbolic is still

* "The Parasitic Diseases of Poultry," by F. V. Theobald, M.A., F.E.S. London: Gurney and Jackson.

more successful for these dust-baths, quickly getting rid of any lingering pests that the birds cannot reach."

Gapes.—At one time gapes was a great scourge in poultry-yards, the worms which are the cause lodging in the throats of the chickens, and destroying thousands every year. Ground which has been used for poultry for a long time is often affected, and in that case they must be removed elsewhere. Now, however, the disease has been studied, and can be overcome. But it will return unless fresh ground is provided, or chemically treated with lime to kill the germs. Several preparations have been introduced which effect a cure. These are Chamberlin and Smith's Kalyde, Freemans' Gape Powder, and Spratt's Patent Gape Remedy. The two former are volatile powders, and are administered by blowing into the air, so that as the chicks breathe the worms lose their hold and are coughed up. An excellent preventive of gapes is by anointing the heads of young birds with a preparation made as follows: Mercurial ointment, 1 ounce; pure lard, 1 ounce; flowers of sulphur, $\frac{1}{2}$ ounce; crude petroleum, $\frac{1}{2}$ ounce. This is mixed and applied.

VALUE OF HOSPITAL.

It is an excellent plan in all extensive poultry-yards to have a room or building prepared where sick birds can be kept, not only for their own sakes, but in order to prevent spread of the disease should it prove to be infectious. Serious results are often prevented in this way. Isolation frequently means a great saving of time and money. Such remedies as have been named should be at hand, or a stock of those prepared by firms who give attention to poultry diseases, such as Spratt's Patent, London; Chamberlin and Smith, Norwich; Freemans, Birmingham, etc., will often save many pounds if applied at once.

EGG-EATING.

The cause of egg-eating is sometimes difficult to determine, but usually it is simply a bad habit. A blown egg should be filled with a strong mixture of mustard and cayenne-pepper, closing up the ends with gummed paper. Leave this in the nest, and if the hen tries to eat it she will obtain a dose she does not like, which may prove a deterrent. Sometimes the habit is due to want of shell-forming materials, a supply of which will stop the trouble. Placing the nests above ground and in a quiet place will generally prevent egg-eating.

FEATHER-EATING.

Feather-eating is one of the most annoying things that trouble the poultry-keeper, and is both difficult to account for and difficult to cure. It arises no doubt from the want of something which the hens require, and which they are able to find for themselves in a natural state, for fowls with a wide range never show it. The want may be lime, or flesh food, such as

worms and grubs, or the habit may be encouraged by the presence of insects in the feathers, which latter is best prevented by a dust-bath. Those hens which are usually the culprits had better be removed at once, as the habit will scarcely be broken off if kept with the cock. Pluck the stumps of the feathers out of the cock, and wash the bare places well; then rub on vaseline or olive-oil, mixed with a tenth part of carbolic acid. Give the birds plenty of exercise by burying the corn and letting them work for it, and also hang a piece of meat or a cabbage by a string just where they can touch it, and so that it will swing about. Some bone-meal should also be given in the soft food.

Mr. Theobald says that feather-eating, which is known as specially troublesome when birds are kept in confinement, is due to a minute parasitic mite (*Sarcoptes levis*) on the roots of the feathers, and this observation confirms experience in many directions. Mr. Theobald, however, makes light of the fact that it is sometimes due to want of something better to do. Whilst doubtless a great majority of feather-eaters are so induced by parasites, many poultry-keepers can bear out the statement that the example of one feather-eater in a lot of birds will do more for the development of this troublesome habit than anything else, and also that certain breeds are more given to it than others. Upon this point, however, it is needless to enlarge.

Mr. Theobald says: "There are two kinds of feather-eating, viz., 'self-feather-eating' and the eating of other birds' feathers. The former is entirely due to the mites living upon and irritating the roots of the quills, and so far as is known the latter is caused by the same *acarus*. The form on the fowls makes its appearance about April, and is most prevalent in spring and summer. The mites can be easily found amongst the white powdery matter at the base of the quill. The minute young are transmitted during copulation. The fowls pluck out the feathers to destroy the irritation caused by the mites at their base.

"*Prevention and Remedies.*—As the disease is contagious, isolation of the affected bird is the first step, especially if it be a cock. The mites readily yield to treatment with oil of cloves rubbed into the infected area. One part of creosote to thirty of lard or vaseline is still more successful."

MOULTING.

The moulting of birds is an operation which usually takes place every year, and is casting one set of feathers and replacing them by entirely new ones. There is a constant change of and growth in the feathers all the year round, but only during the moulting season is there anything like regularity in the process. Moulting makes a considerable demand upon the system. Chickens hatched during the first four or five months of the year obtain their adult plumage about September,

or October, but this cannot be called a moult, and the first one takes place about the following September. Every year this becomes later and more protracted. Hence the plan we have advocated for laying fowls, namely, killing off birds before their first or second moult, when they are still good for table purposes, and before they have to be kept without any profit.

The time during which birds are moulting is a somewhat critical period, its nature depending very much upon the stamina and constitution of the breed. There is a considerable amount of difference in the way which the various breeds come through the moult. Some of the hardier varieties pass through it both rapidly and easily, whilst others find it most protracted and difficult. The usual period of moulting for a strong bird in its first or second year is six to eight weeks, in which time the old feathers are completely cast, and new ones take their place; but it is no uncommon thing to find weak or old birds taking three months, with the result that winter arrives before they get through it, and they do not recommence laying until the following spring, so that several months are lost, and just when the produce is most valuable. All that is necessary for healthy birds is to give warm food once a day, mixing a little aromatic compound in it, with a little grain, as buckwheat and hempseed, in the middle of the day. In the drinking water put a little sulphate of iron and sulphuric acid, say two pieces of the former, the size of nuts, and ten drops of the latter to a gallon of water, and, of course, this must be renewed every day, as fresh water is most important.

SEPARATING THE SEXES.

Whilst it is true that the majority of breeders of exhibition stock separate the sexes in their chickens at an early age, farmers and cottagers are very neglectful indeed of this matter, and as a consequence trouble and loss are natural results. Some time ago we were told by a large poultry-breeder, whose primary object is egg-production, that if he could be sure which were cockerels, he would wring their necks so soon as hatched. The reason is that as soon as the sexual characteristics become apparent the cockerels begin to fight each other and bully their sisters, checking their own growth and arousing instincts which are better dormant for a considerable time. It appears to us that such methods are needless, for there are two ways in which the trouble can be avoided. First, by dividing the sexes so soon as they can be distinguished. On a farm this is not at all difficult, though it may involve two houses instead of one. These should be some distance apart, and into one the cockerels can be placed, for they will live in unison if there are no members of the fair sex to quarrel about, and they will grow much more rapidly than would otherwise be the case. As a rule, however, chickens and adults are permitted to wander and roost all together, and it is surprising how

little the initial principles are acted upon. We cannot too often reiterate that the same rules should be applied to poultry as to larger stock. No one would think of allowing bull and heifer calves to run in the same field after a given age, but some people never seem to realize that separation is as essential for poultry. The second way of avoiding the difficulty referred to is by caponizing all cockerels not to be kept for stock purposes, when they are nine or ten weeks old. Then all can be allowed to run together without the slightest fear. Here again we are only following an example set forth in larger stock. It is desirable where a large number of chickens are being bred to get rid of the males as soon as possible, because there is no advantage in keeping them. To this end they should be separated from the pullets, and when large enough fattened off for killing. It must be kept in mind that the cockerels will not grow nearly as rapidly as if they are permitted to run with their sisters.

KEEPING MALE BIRDS.

The question is often asked as to whether it is necessary to keep a male bird at other periods than the breeding season. It may be explained that the male has no part in egg production, as these are formed in the ovary, and the process will begin at the right time independently of any external influence. It is a doubtful point, however, whether the commencement of laying is not accelerated if the hens are mated, but upon this no evidence is actually possible. When fowls are kept simply for egg production, it is not necessary to keep any male birds. The only advantage found practically is that hens are sometimes quarrelsome when only with their own sex, but a cock-bird keeps them in order, and prevents trouble arising in this way.

SELLING OLD HENS.

"It is easy enough to sell young chickens, but what about the old hens?" is a problem often presented for solution. At first it may seem to be a difficulty, but this is not the case in reality. At certain seasons of the year there is a good demand for these hens, and at fair prices, principally for use by Jews. Wherever is found a Hebrew colony, there a trade can be done in this direction; but it must be borne in mind that the birds have to be killed by the Kosher butchers, and must not be sent forward dead, as is the case with fowls for Gentile consumption. In London there is a regular market. Various salesmen make a speciality of the trade, and they are on the outlook for suitable birds.

When the stock of poultry is properly managed, every year half the laying hens should be got rid of, their place to be taken later on by the young pullets. The best time to get rid of them is about June or the early part of July, when they will have given their spring quota of eggs, and before the market is seriously affected either by the influx of game or supplies of foreign

chickens. If the business is systematized, the older birds have not fallen into the moult at the time named, and thus having only passed through one of these annual castings of the plumage, they do not make by any means bad eating if fed up or crammed for a fortnight or three weeks. Unless they are killed then, it is more than likely that they will have to be kept three months longer, when the prices will be considerably lower, and all the food consumed meanwhile is practically to no purpose. This may reduce the stock of layers, but the loss of a few eggs will be more than compensated by the gain on the hens as compared with keeping them longer. If they can be sold to fatteners this will offer the best outlet, or they may be caged and fed on ground oats, fine barley-meal, or even oatmeal, mixed with sour skim-milk, for at least a fortnight. Of course we do not mean to say that these older specimens will sell for as much as chickens, but they will probably realize a shilling more than would be the case a couple of months later, and that is an important difference. The temptation is to keep them as long as they will lay, but it should be resisted. Once the plan here suggested is adopted, it will be very easy to follow it out annually, and avoid the keeping of birds until they are three or four years old—a mistake so often made in farm poultry. Further, the killing off of birds in June or July liberates the ground for chickens, and if the pullets have been bred sufficiently early they will begin laying in autumn or early winter, when eggs are commencing to jump up in price.

POULTRY MANURE.

The value of poultry droppings as a manure upon the land has been acknowledged for many years. Analysis has proved it to contain many of the elements in which the best guano most excels. It can be guaranteed pure, which is not always the case with artificial fertilizers, and even considering the amount of water it contains when in a fresh state, about half or two-thirds of what is given for the other would be deemed a high price for it. Many instances could be given where a farmer has found that his poultry would have been almost worth their keep if they had not been productive in other ways. In addition to those droppings which fall upon the fields when the fowls are upon them, there is a large quantity made by the fowls in their houses, which, if it

has to be used, must be preserved until the proper season. This can be done in various ways, either by drying and keeping in barrels under cover, or, what we may think to be the better plan, by putting a thick layer of fine soil upon a hard bed of earth, brick, or cement, and then layer by layer of droppings and soil, always making the latter uppermost. By this means the value of the manure will be completely preserved, all unpleasant odour prevented, and the soil will gradually absorb much of the nature of the dung, until the whole will be a mass of the most valuable manure, ready for use at any time.

FEATHERS.

Except on large farms, or where fattening is being carried on, and the birds are killed upon the spot, the feathers obtained will not be an important item. But they should be sorted, and if well kept, will always command a fair price. It is wonderful how great a quantity will accumulate if they are carefully gathered. Every item should be regarded, every detail attended to in order to obtain complete success.

ACCOUNTS.

It is desirable to strongly urge that complete accounts of their operations be kept by all poultry-keepers, not merely for the satisfaction of knowing whether there has been a profit or loss—though that is very desirable—but also as an inducement to economy. There are several poultry account-books sold which may be used, or a plain ruled book can be made to serve the purpose. At the beginning of the year all birds and appliances should be valued and recorded. Next, all items of receipt and expenditure should be set down regularly and methodically; then the number of eggs laid, and how they are disposed of—whether consumed, sold, used for sitting, or for the chickens; and, finally, a hatching record, showing the dates and number of eggs set, how many hatched, and the number reared. At the year end there will have to be another valuation, and the debit side will show the valuation at the beginning of the year, and expenditure, whilst the credit side will give receipts, allowance for eggs and chickens consumed, and a final valuation. The balance between one side and the other will determine the profit or the loss, whichever has resulted.

CHAPTER XX.

CONCLUSION.

POULTRY CLASSES—OBJECT OF SHOWS—SECTIONS—TABLE-POULTRY SHOWS—VILLAGE POULTRY SOCIETIES.



CONSIDERABLE discussion has taken place from time to time as to poultry classes at agricultural shows, and it has been advocated that only a few dead poultry classes should be given, with one or two other breeds which are best suited for market fowls. It may be well to consider the entire question, and to show the lines upon which agricultural and other societies, who have a desire to encourage poultry-keeping, should arrange their classification. It is needless to devote any lengthy space to the remarks in question, for the writers evidently look at the matter from merely one standpoint, and even then fail to see the fuller necessities of the case. But it may be said that in their advocacy of table-poultry alone they are dealing with the lesser, and neglecting the greater, part of the poultry industry. Market poultry ought to be encouraged in every possible way, and whatever is done in that direction has our warmest support; but from the return of imports into the United Kingdom it will be found that the imports from abroad of eggs are about seven times in value those of poultry and game. And it is probable that in Irish supplies the proportion will be even greater in favour of eggs, as chickens do not bulk nearly so largely at present. These facts conclusively show the greater importance of the egg trade, and that in all our efforts to improve the industry, production of eggs ought to be regarded as of chiefest concern. To make, therefore, as has been suggested, the poultry section of our agricultural shows purely in the interests of table fowls, ignoring eggs altogether, would be foolishness indeed—fishing for sprats when there are mackerel in our net. Not for one moment do we advocate neglecting the table poultry trade, which we hope to see enormously developed and improved.

OBJECT OF SHOWS.

The object of every society which attempts to encourage poultry-keeping ought to be clearly defined, and on understandable lines. To-day it is folly advocating cross-bred stock of any kind as the best. It is

true that often we find the best milkers and the best layers amongst cross-bred cows and birds, but their qualities are derived from pure-bred parents, and without these latter we should never have so great a result. It is an essential, therefore, that we adhere to pure-bred stock, using them in the way which seems best to us. That pure-breeds are better than mongrels no one who knows anything of the subject will for a moment deny, and it ought to be the object of every person of influence and of all societies to develop these as much as possible. To do so in the most effective manner it is necessary to know what breeds are really useful, and in what direction their qualities may be looked for. If this is done a poultry show may assume a highly educative influence, and do much to prevent serious mistakes in the selecting of breeds by those who have not studied the question. Although it is not usually so assumed, there is as much variety, nay, a much greater than can be found in horses or cattle, and the breeds of fowls have as great a divergence in point of qualities as is to be found in any other section of our domesticated animals.

SECTIONS TO BE PROVIDED.

Leaving on one side altogether the purely ornamental varieties of fowls, a show should be divided into five sections, and if this division can be indicated in the catalogue it will be of great service to visitors. These have been named before (Chapter IV.), but may be repeated:

1. Generally Useful Breeds—*i.e.*, varieties not characterized by any special quality, but of average value all round, fair layers and table fowl, sitters and mothers. As a rule, upon this class we depend for winter layers, and they are without exception very hardy.
2. Non-sitting Breeds—*i.e.*, those in which the maternal instinct has been suspended. They are the heaviest layers, but are, as a rule, hardy and excellent foragers.
3. Table Breeds—*i.e.*, varieties in which the table qualities have been largely developed. Some

of these are very hardy, whilst others are delicate, and require to be kept under favourable conditions. They are, as a rule, only moderate layers.

4. Waterfowl and Turkeys.

5. Dressed Poultry.

Of course, where such a section was desired, another could be added for ornamental breeds, and this would make a complete series, but in purely agricultural shows this is undesirable, except it be to secure a better attendance of the public, for many of the ornamental breeds are very popular. Such a consideration as this is important, for shows must pay their way in one direction or the other, unless there are funds available which make them independent of expenditure.

It is unnecessary to give in detail a list of classes recommended, as these can be obtained from Chapter IV., or from the catalogue of such shows as those of the Royal Agricultural Society and the Smithfield Table-Poultry Society.

TABLE-POULTRY SHOWS.

One factor which has had great influence in the development of the poultry industry is seen in the exhibitions of table-poultry held in connection with the Smithfield, Dairy, and Birmingham Shows. For several years this has been a feature of the two last-named exhibitions, and the respective councils deserve every credit for their enterprise in that direction. In 1894 a Table-Poultry Show was instituted at the Agricultural Hall, at the annual show of the Smithfield Club, and it has proved a very great success, both in point of numbers and quality of exhibits. The foreign sections have shown our breeders and fatters what is being done abroad, and offered an example which cannot fail to have an influence. In fact, that has been seen already, for the later displays are remarkably in advance of the earlier. The Royal Agricultural Society has also included special classes for table-poultry in its annual exhibition, but in this case the birds have been shown alive first, then killed, and finally adjudicated upon when dead. The Royal, however, is a breeders' show, and from that fact and the time of year when it is held does not attempt what can be so much better accomplished at the winter exhibitions. The one is, however, the counterpart of the other, and in looking at the question we must regard them as a whole, and not individually. It is to be hoped that ere long we shall see at all fat stock shows classes given for table-poultry.

It is not necessary to give in detail a specimen list of classes for table-poultry, as these can be obtained in another way, but so far as the rules and regulations are concerned a few points may be referred to, namely, that the birds should be under twelve months old; that they must be in possession of the exhibitor a

month before the day of the show; that the specimens be sent killed and plucked, except upon the head and neck, but not drawn or scalded; that the breastbone should not be broken, or the head, comb, or feet cut off or scalded; and that the judges be instructed to regard quality of flesh and smallness of bone and offal as of primary importance.

Wherever dead poultry are exhibited the utmost care should be taken to keep everything about the place as sweet and clean as possible, as it is desirable to lay them out in such a manner as they will be displayed to the best advantage. Benches are better when built in two tiers with a slight slope, so as to show the birds lying thereon. These benches, or tables, should be covered with linen cloths, and there ought to be cloths so that the exhibits may be covered if the show is prolonged more than one day. We do not approve of the plan of taking the winning birds away from the others, because everything should be measured by comparison, and it is desirable by those little things which need scarcely be mentioned to make the show as attractive as possible. An increased interest can be obtained if demonstrations are given during the show in shaping and dressing poultry.

In respect to the judging of table-poultry, there are one or two points which require to be considered. At the outset, it would seem that the best persons to judge table-poultry would necessarily be poulterers, but there are exceptions to this rule; we think that, on the whole, poulterers are not the most suitable judges. For one thing, few of them have any actual knowledge as to the different breeds of poultry, which knowledge is an essential when birds of different varieties are on exhibition. The poulterer who may be able to pick out a first-class fowl, if he were unable to determine whether it was of the breed as provided by the schedule, would not be properly qualified for his duties. We think, therefore, that this matter must be taken into consideration, and whilst the most perfect judge would be a poulterer who has given study to poultry as live stock as well as dead, failing him, we should prefer a poultry-breeder who knows something about table-fowls. Quality ought always to be preferred to mere size.

VILLAGE POULTRY SOCIETIES.

One of the most important developments in connection with the poultry industry is to adopt some method of organization by which small producers can be brought into touch with retailers and consumers in the great centres of population, and by combination save intermediary expenses and profits, and obtain the lowest railway rates. The best way to do this is to form a local society on a co-operative basis. The following draft of rules may be adopted with such modifications as are required by local conditions:

Suggested Rules for Village Societies.

1. *Title.*—That the name of this society be “The Poultry Society.”
2. *Objects.*—That the first object of the society shall be to encourage the keeping, and stimulate the proper management, of poultry for profit.
3. That the society shall also assist its members by disseminating information with regard to poultry matters, aiding them in the purchase of suitable stock, obtaining food and appliances on the best terms, and, either by co-operation or any other suitable method, secure the best returns for produce offered for sale.
4. *Membership.*—All persons are eligible for membership who reside in the parishes of .
5. The subscription to the society shall not be less than 1d. per month for each person, payable at each monthly meeting.
6. New members shall be proposed at one meeting and elected at the next. Voting to be by show of hands or ballot.
7. All members shall have equal privileges and rights. A member whose subscription is three months in arrear shall be erased from the roll.
8. Any member found guilty of unfair practice, or being objectionable to the majority of members, shall have his or her name erased if a two-thirds majority resolve upon this course at one meeting and it be confirmed at the next meeting.
9. *Meetings.*—Meetings shall be held monthly at . Special meetings, of which seven days' notice must be given to every member, shall be called at the requisition of any five members.
10. An annual meeting shall be held in the month of , at which the accounts, properly audited, shall be submitted, and officers for the ensuing year elected.
11. *Management.*—The control of the society and its operations shall be vested in a president, vice-presidents (who may be honorary), a general committee of , a secretary, a treasurer, and two auditors, all of whom hold office for one year, and may be re-elected.
12. That the secretary shall keep the minutes, roll of members, and undertake the general correspondence; and the treasurer shall hold, and be responsible for, all moneys received and paid.
13. That a sales committee be elected, who shall be

paid such commission, in addition to actual expenses, as may be agreed upon.

14. That statements of work done and of accounts be given quarterly, or when required by resolution of members in meeting assembled.

15. *Purchases and Sales.*—That all moneys for birds or goods purchased be paid on delivery of the same, and payments be made on account of sales every week. Invoices and sale returns to be open to the inspection of all members concerned.

16. *Winding-up.*—That the society can only be wound up by the vote of a two-thirds majority of members, who shall decide as to the disposal of any property owned by it.

It will be seen from the above that such a society can have wide-reaching influence in the securing of new stock for its members, purchasing food and appliances, and securing a good market for both eggs and poultry, thus minimizing cost to producers, and securing a larger return for what they have to sell. Consumers and retailers would soon find it advantageous to deal with societies rather than individuals, because the supply would be more regular, and transit expenses be greatly reduced by reason of the larger quantities dealt with. Railway companies would be ready to grant favourable rates to societies of this kind where traffic was likely to be regular. Boxes for eggs and poultry should be owned by the society, and bear its name. Moreover, it is certain that we shall see ere long many more fattening establishments in different parts of the country; surplus fowls could be collected and sold to them at regular periods, and this would enable better prices to be realized, avoiding the present wasteful method of buying through markets. Several of these establishments have already been commenced, but the immediate difficulty is securing a regular supply of suitable fowls.

Of course, the success of an organization depends entirely on its management. A most necessary factor will be loyalty to the society in order to keep up its character. Nothing doubtful should be sent in, and in order to avoid complications every egg should be tested for freshness, and sold in accordance with the result. Further, eggs should be graded to size, as is done abroad, and true business principles should be made the basis of operations. Deception or sharp practice, either on the part of individual members or a society, would speedily bring disaster.

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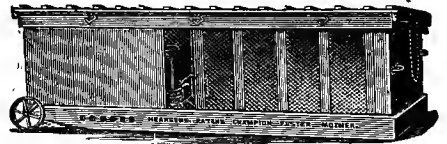
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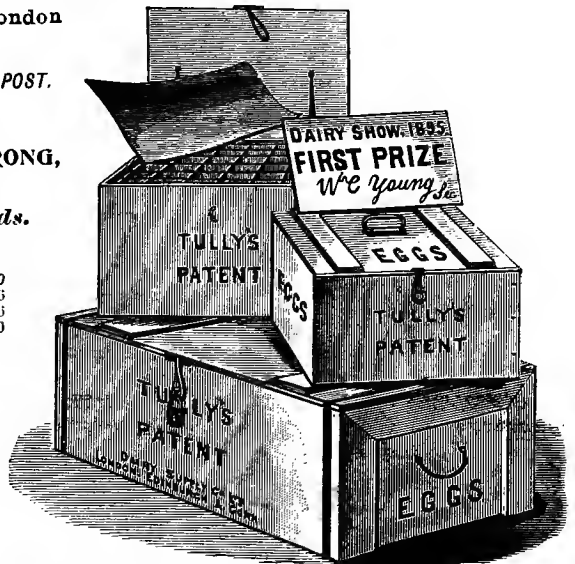
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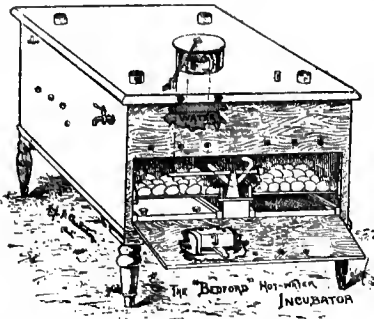
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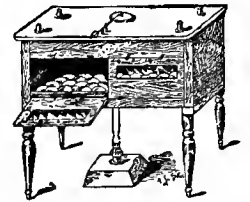
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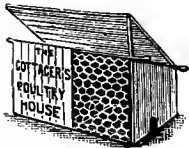
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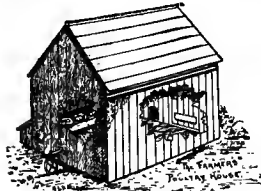
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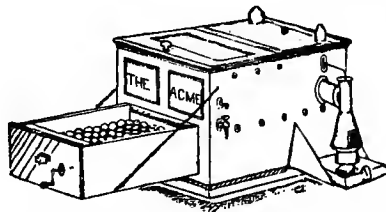
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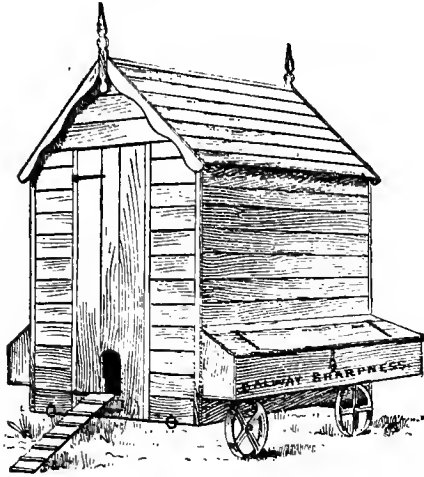
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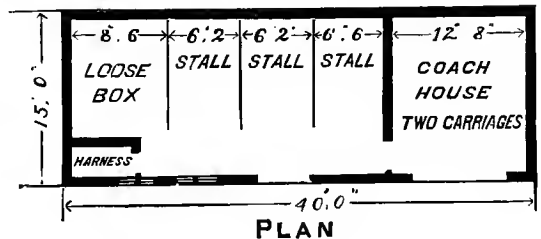
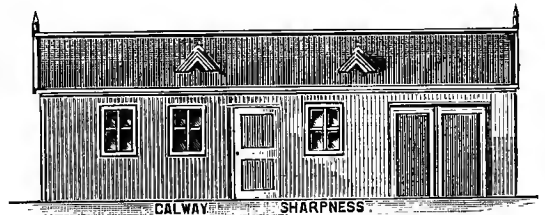
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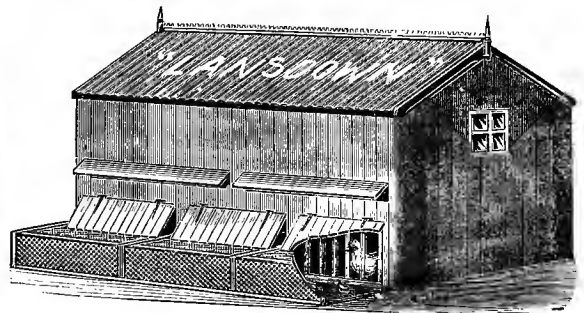
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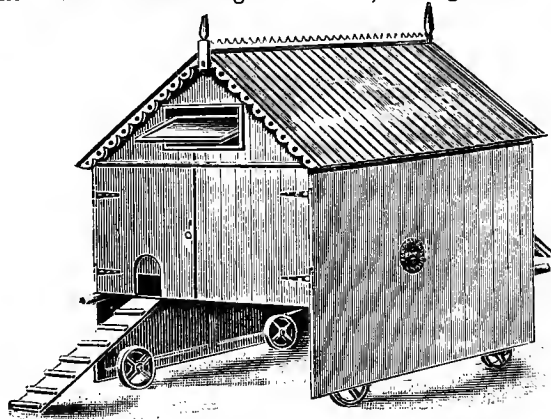


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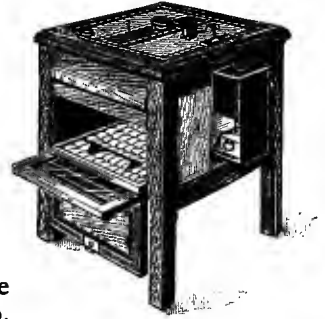
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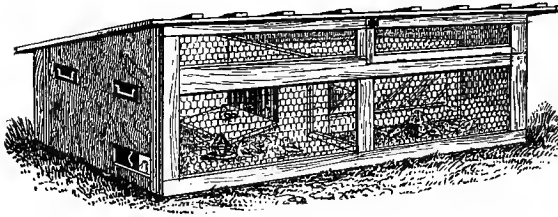
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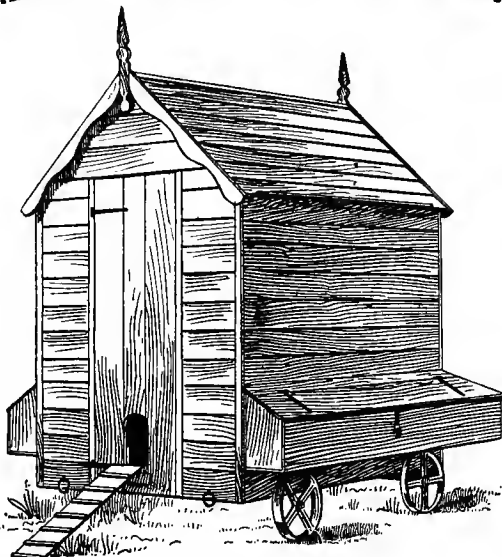
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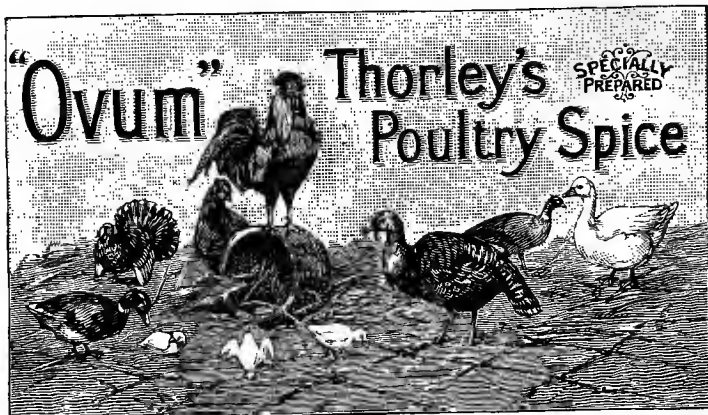
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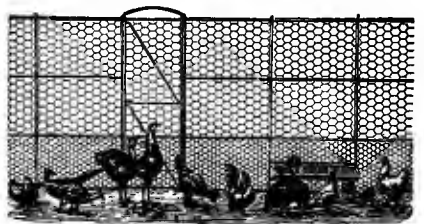
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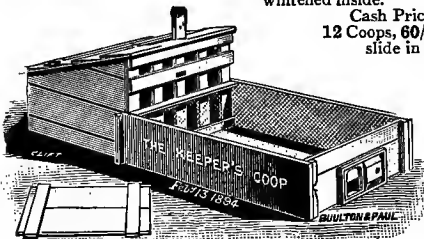
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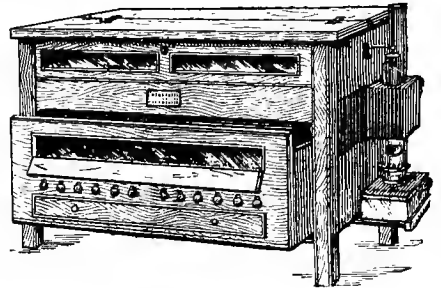
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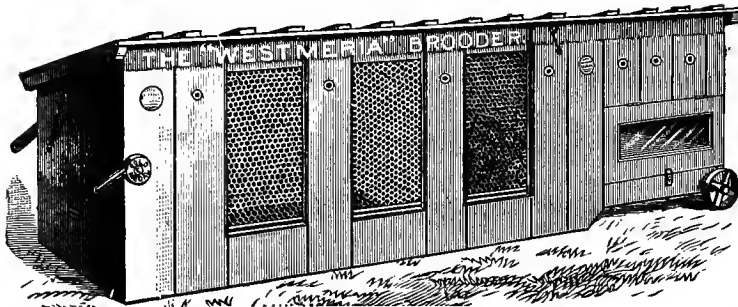
THE "BRITISH" INCUBATOR.

Of similar design, but plainer in finish.

"I am more than satisfied."—MR. W. OWTON.

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THE ONLY PERFECT FOSTER MOTHER.



For 50 Chicks: 6 ft. 9. in. long, 2 ft. high.

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"I recommend your Brooders everywhere. They beat —'s hollow."—LADY PHILLIMORE.

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The AFTER-BROODER and the DOUBLE-BROODER are made on the same plan, but larger.

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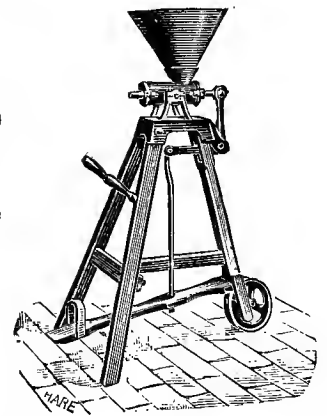
For Fattening Fowls and Turkeys.

THE "WESTMERIA" STORM-PROOF LAMP

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Brighter Light. No Chimney or Globe. 24 hours light for One Penny.

*Movable Fowl House and Runs,
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Poultry Foods

ARE ACKNOWLEDGED BY **ALL** WHO HAVE
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BEST AND MOST ECONOMICAL.

Poultry, Chicken, Turkey, & Duck Foods.

"EXHIBITION" & FATTENING FOODS. MEAT
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HAS THE LARGEST SALE OF ANY GRIT.

6s. 6d. per cwt., Carriage Paid.

Eight Sizes for Poultry, Turkeys, Pigeons, Cagebirds.

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Were Awarded the **ONLY PRIZE MEDAL** given
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SEND FOR COMPLETE LISTS UP TO DATE.

Advice given free on Diseases and Management of Poultry.

"**EMERGENCY GUIDE**" on Diseases, One Stamp.

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FREEMANS' Manufacturing
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TELEGRAMS: "ACTIVITY, BIRMINGHAM."

Foreign and Colonial Orders have prompt attention.

FOR USE IN

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THE ONLY RELIABLE

DISINFECTING POWDER

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"CALVERT'S,"

guaranteed to contain 15 per cent. CALVERT'S
No. 5 Carbolic, the strongest Disinfectant
known.

When *lightly* sprinkled over any offensive matter
it will at once destroy all foul or infectious odour
—hence it is particularly valuable in Stables, Cow-
sheds, and Fowl or Pigeon Houses, to keep them
healthy and free from Insects or Flies. In Kennels
it should be spread lightly under the straw on
which the dogs lie.

WILL NOT CLOG PIPES OR DRAINS.

6d., 1/-, and 1/6 Dredgers; also 7 & 14 lb. Tins (to
re-fill Dredgers) at 2/6 & 4/- each, from Chemists,
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Bulk at Special Rates.

AVOID WORTHLESS IMITATIONS MADE WITH TAR OILS.

"I have for some time used your 15 per cent. Carbolic
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CALVERT'S

CARBOLIC DISINFECTANTS, SOAPS, TOOTH POWDER, OINTMENT, ETC.,

Are the Original and Only Reliable.

They have been awarded **85** Medals and Diplomas for
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Illustrated List Post Free on Application.

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ESTABLISHED 1850.

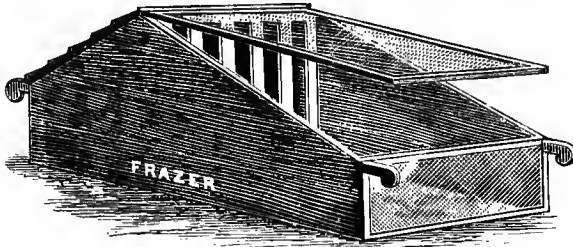
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FRAZER & CO.,

Manufacturers of Poultry Appliances of all Descriptions.

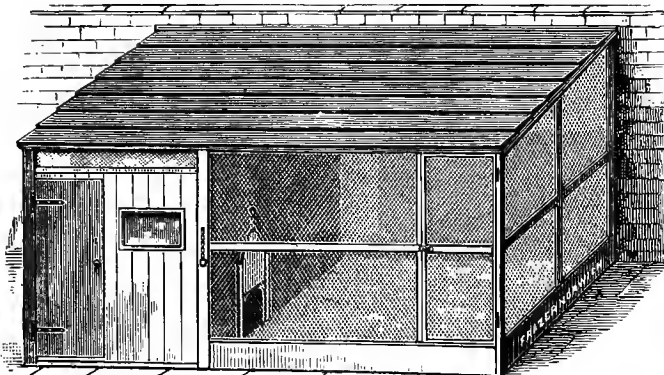
All Goods are sent out in a finished state, properly numbered and marked ready for fixing on arrival, thus avoiding further trouble and expense. Intending purchasers are cautioned against Imitations of our Appliances, advertised at low prices, which are more costly in the end.

No. 78b.—"NORFOLK" COOP AND RUN (VERMIN PROOF).



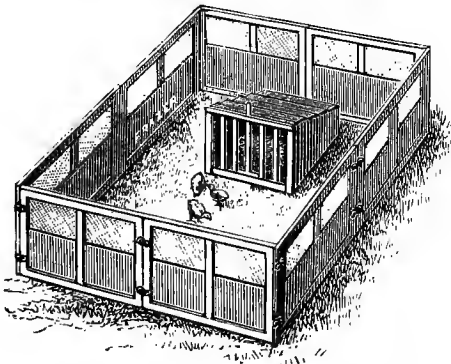
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12 ft. long, 4 ft. 6 in. deep, 5 ft. high in front. Price 90s.

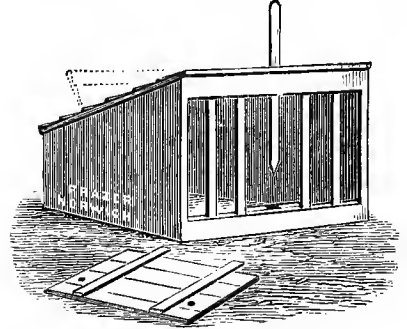
No. 22.—COOP AND ENCLOSURE.



12 ft. square. Price 36s. complete.

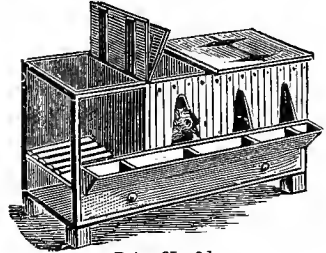
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No. 16.—THE "GAMEKEEPER'S COOP."



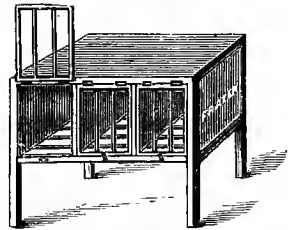
Price 3s. 6d. Shutters, 6d. extra.

No. 75.—FATTENING PEN.



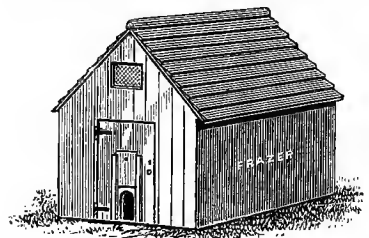
Price 27s. 6d.

No. 37.—PEN FOR BROODY HENS.



Price 15s.

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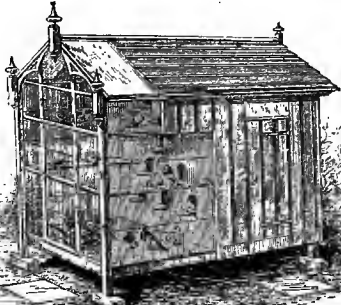
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Full Descriptive Catalogues free on application.

PALACE PLAIN WORKS, NORWICH.

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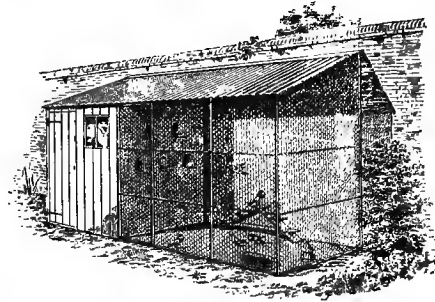
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THE "LUDLOW" PIGEON COTE, No. 148.
8 ft. long, 4 ft. wide, 6 ft. high to eaves.
190s., carriage paid.



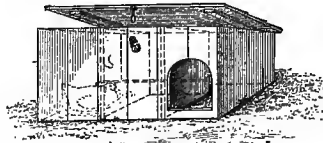
ORNAMENTAL POLE COTE, No. 158,
on Long Pole.
For 5 pairs, 120s.; 7 pairs, 140s.
Plain Cote for 4 pairs, 105s.
Plain Cote, without pole, 70s.



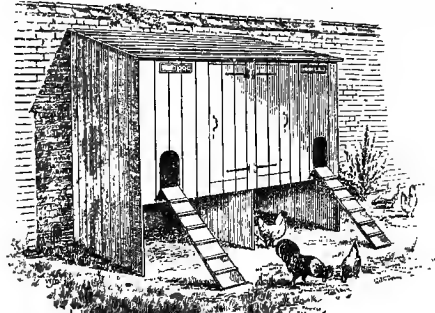
LEAN-TO PIGEON HOUSE, No. 167.
18 ft. long, 4 ft. 6 in. deep, 5 ft. 6 in. high in front,
130s., carriage paid.



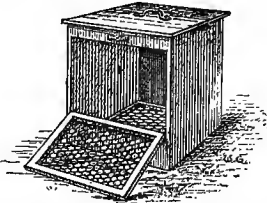
IMPROVED POULTRY HOUSE, No. 91, with sliding
floor.
3 ft. 6 in. by 4 ft. 6 in., 35s.; 4 ft. by 5 ft. 6 in., 47s. 6d.;
4 ft. 6 in. by 6 ft. 6 in., 60s.



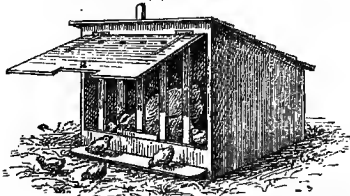
SAFETY LAYING BOX FOR HENS,
No. 120.
With 2 nests, 12s. 6d. each; with 3 nests,
17s. 6d. each.



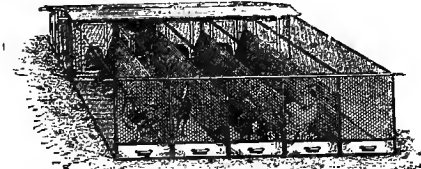
NEW LEAN-TO FOWL HOUSE, No. 88.
Single, 4 ft. by 4 ft., 45s.; 6 ft. by 4 ft., 55s.
Double, 8 ft. by 4 ft., 80s., carriage paid.



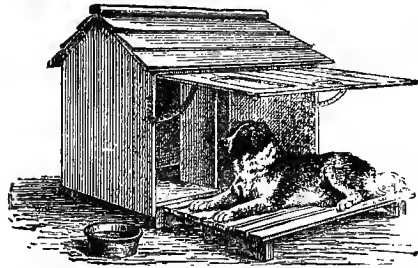
HATCHING OR NEST BOX, No. 118.
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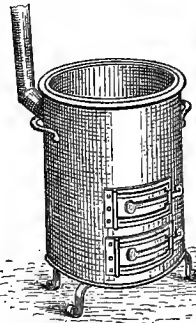
EXTRA STRONG POULTRY OR PHEASANT COOP,
No. 134.
2 ft. square, 7s. 6d. each; 85s. doz.
Cheaper form, without shutter, 5s. each; 57s. 6d. doz.



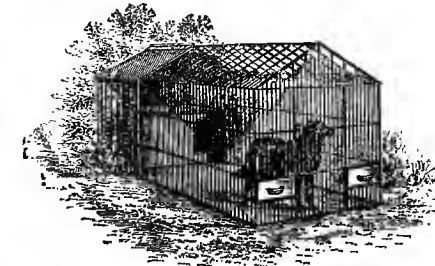
NEW COCKEREL PENS, No. 127.
5 pens, 85s.; 4 pens, 70s.; 3 pens, 55s.; 2 pens, 37s. 6d.
single pen, 20s.



EXTRA STRONG KENNEL.
Complete as illustrated, for terriers, 27s. 6d.; for collies,
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PORTABLE COPPER FOR PREPARING
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Wrought Iron Frames with Galvanized Pans.
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110s.; 5 ft. wide, 12 ft. long, 150s., carriage paid.

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Eggs laid by Fowls suffering from diseased Livers never produce strong, vigorous Chickens.

Improper feeding is the chief cause of Liver disease.

Starchy foods should be balanced by mixing with the

“Zebril” Extract of Meat for Poultry.

This EXTRACT is *not like Greaves* and other Indigestible fibrous residues, but *a soluble Food*, derived solely from Animal Sources.

Try . . .



“ZEBRIL” EXTRACT,

And we assert positively that you will have the best lot of Chickens you have ever seen, and your laying Hens will be kept in capital condition.

It has been strongly recommended by the leading Poultry Experts in the Kingdom.

EDWARD BROWN, ESQ., F.L.S., writing in the *Rural World*, says:

“I have been very careful in testing this preparation, because some forms of animal food are, in my judgment, of greater injury than benefit; but the use of ‘ZEBRIL’ to mix with starchy foods cannot fail to be of benefit.”

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