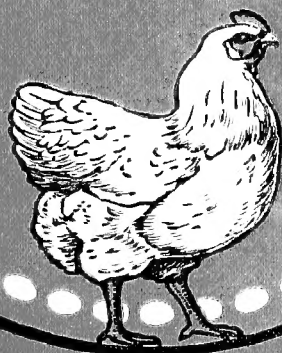
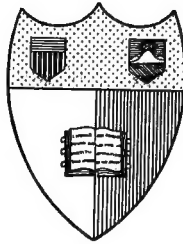


The
HEN
AT WORK



By
ERNEST COBB



New York
State College of Agriculture
At Cornell University
Ithaca, N. Y.

Library

Cornell University Library
SF 487.C65

The hen at work, a brief manual of home



3 1924 003 129 263

mann



Cornell University Library

The original of this book is in
the Cornell University Library.

There are no known copyright restrictions in
the United States on the use of the text.



METHOD OF HOLDING A FOWL

The Hen at Work

A Brief Manual of Home Poultry
Culture

By

Ernest Cobb

Author of "Garden Steps"

With 35 Illustrations

G. P. Putnam's Sons
New York and London
The Knickerbocker Press

1919

COPYRIGHT, 1919
BY
G. P. PUTNAM'S SONS

The Knickerbocker Press, New York

A WORD FROM UNCLE SAM

In every household, no matter how economical the housewife, there is a certain amount of table scraps and kitchen waste which has feeding value but which, if not fed, finds its way into the garbage pail.

Poultry is the only class of domestic animals which is suitable for converting this waste material, right where it is produced in the city, into wholesome and nutritious food in the form of eggs and poultry meat.

Each hen in her pullet year should produce ten dozen eggs. The average size of the back-yard flock should be at least ten hens. Thus each flock would produce in a year 100 dozen of eggs which, at the conservative value of 25 cents a dozen would be worth \$25.00.

By keeping a back-yard poultry flock the family would not only help in reducing the cost of living

but would have eggs of a quality and freshness which are often difficult to obtain.

Remember that eggs produced by the back-yard flock cost very little, as the fowls are fed largely upon waste materials.

United States Government Bulletin.

CONTENTS

CHAPTER	PAGE
I.—POULTRY AND THE MEAT PROBLEM	1
II.—CHOOSING THE BREED	7
III.—COMPARISONS OF FOUR LEADING BREEDS	25
IV.—POULTRY TYPES	32
V.—STARTING A FLOCK	46
VI.—COOPS FOR CHICKENS	56
VII.—HOUSES FOR HENS	69
VIII.—AN IDEAL HOUSE	82
IX.—FURNITURE	96
X.—HATCHING UNDER HENS	109
XI.—HATCHING WITH INCUBATORS	123
XII.—RAISING CHICKENS WITH HENS	153
XIII.—RAISING INCUBATOR CHICKS	164
XIV.—METHODS WITH GROWING STOCK	176
XV.—METHODS WITH LAYING HENS	184

CHAPTER	PAGE
XVI.—BREEDING FOR EGGS	198
XVII.—POULTRY DISEASES	206
XVIII.—PARASITES	223
XIX.—DUCKS	228

ILLUSTRATIONS

	PAGE
METHOD OF HOLDING A FOWL	<i>Frontispiece</i>
WHITE WYANDOTTES	16
WHITE LEGHORNS	18
ROCK AND LEGHORN COCKEREL	20
SILKIES	22
A BALANCED HOME FLOCK	50
BRAHMAS	54
RUN AND COOP FOR RAISING CHICKS	60
A CHEAP, DESIRABLE HEN HOUSE	86
FRUIT BOXES TURNED TO GOOD USE	100
DRY MASH HOPPERS	102
DRINKING FOUNTAINS	108
TURKEYS RAISED WITH CHICKENS	156
FEED TROUGHS	160
DOMESTICATED WILD DUCK WITH YOUNG	230
DOMESTIC DUCKS	232

ILLUSTRATIONS IN THE TEXT

	PAGE
COOP FOR SITTING HENS	58
FLOOR OF PAPER COOP	62
SIDE OF PAPER COOP	63
BACK OF PAPER COOP	64
A PAPER COOP	66
ROOF TYPES	73
FRAME PARTS FOR HEN HOUSE	84
FRAME SET UP	85
AN IDEAL HOUSE	88
PARTS OF DRY MASH HOPPER	102
WATER PAN AND SHELF	107
OVARY AND OVIDUCT	130
EGG SHOWING AIR SPACES	136
YOLK AND GERM	141
FERTILE EGG AT SIXTH DAY	143
DEAD GERM	144
BOX FOR SHELL AND GRIT	159
LARGE HOVER SHOWING STOVE	168

The Hen at Work

The Hen at Work

CHAPTER I

POULTRY AND THE MEAT PROBLEM

DURING the world war the world's meat supply has been seriously taxed. The prices in all countries show only too clearly how serious this shortage has become. Had the various governments not taken a direct control of such purchases, and restricted competition between nations in securing a supply of meat, these prices would have been far greater than they are to-day.

Ten years ago roast pork could be purchased in many parts of the country at about twelve cents a pound. Good beef to roast could be bought for twelve or thirteen cents. Other meats could be had for proportionate prices. Since then the supply has dwindled until to-day the cost of even

the poorer cuts is well beyond the means of any but the rich.

The situation as to meat will improve very slowly under peace conditions. With the return of millions of able men, labor will be plenty, and wages must inevitably drop. At the same time, purchasing restrictions will probably be to a large extent removed. European nations must replenish herds and flocks at any cost. It takes at least three years to produce a respectable beef animal. The meat supply will be a long time in returning to its normal level; meanwhile prices will be very high, and money in the average family will be far less plenty than to-day.

With grain the situation is very different. England, France, Italy, and other countries at war in Europe, have greatly increased their agricultural possibilities. They have installed farm machinery of the latest type. England, for example, has now under cultivation more land than ever in her history. In other countries enormous crops of grain are raised. South America and Australia have millions of bushels waiting for ships, and those ships are plunging into the sea from hundreds of yards. Thousands of these vessels will soon be

Poultry and the Meat Problem 3

free to carry essentials between the more distant ports, and the fleets of the Teuton allies will be added once more to the carrying trade.

This can mean one thing only—cheap grain before very long.

In the face of a situation where meat is high and likely to remain so, while cheap grain is an early probability, there is a solution to the meat problem which appears at once and clearly: Poultry will supply us almost at once with an abundance of meat, and also of eggs, which in some respects are more valuable than meat itself. Fat, juicy broilers are ready for the table within ten weeks of the day the chick is born. In two months more the soft roasters follow the broilers, and the pullets of some breeds are beginning to lay.

Fortunately the common feeling that we cannot have gardens, nor keep hens, unless we have just this or that equipment, has passed away. We know now that we can do these things, and if we wish to stand as patriots we must do them. With a building ten feet square we can house all the poultry a family needs, and on a very few square yards of ground enough chickens can be raised each year to keep the flock up to full quota.

“But,” you say, “so many people go in for keeping hens and make a fizzle of it. Only a few people really succeed.”

That is partly true and that is why this book is offered. *The Hen at Work* is written straight at the patriot who wants to help maintain his family and do his bit to relieve the meat and egg shortage, by keeping a few hens.

There are a few simple rules which must be followed carefully in gaining success with hens. These are outlined and fully explained. There are many details which the poultry keeper will wish to know about as necessity arises. These are arranged so they may be found and mastered at a minute's notice.

During fifteen years the author has been engaged at regular work which took him away from home daily. His profession has led him into several States, but, except when in a foreign land, he has never been without a flock of hens, and therefore never without fresh eggs, and fat-roasting chickens, at a cost easily within his means.

Once, when spending a spring and summer in cramped quarters, a hundred chickens were

Poultry and the Meat Problem 5

brooded in the bay window of the dining room, making lots of fun, and causing no trouble, till they were large enough to go into outdoor coops. All this has proved a source of interest, health, good food, and decided financial profit.

The present book is an outgrowth of these years of experience under all possible conditions, combined with a careful study of poultry culture as it has progressed from year to year. Step by step from one phase of poultry life to another, the program is laid out along the simplest and most practical lines. No effort has been made to include all details on any subject, as there are special books on special subjects, where any enthusiastic poultry keeper may delve according to his interests. The particular need which this book seeks to fill is that of a definite, simple manual of general home poultry culture, put into language easily understood by all.

Until normal conditions return, it is the plain duty of all who have even a small back yard to do their share in producing meat, the most needed of all foods. When it is realized that by doing this we also bless ourselves with a stock of fresh eggs and poultry, largely supplied from table scraps,

otherwise wasted, the full value of such an effort can readily be seen.

Entirely apart from the war and its consequences, a flock of chickens in the yard will help solve a food problem that was steadily getting more complex several years before the war began. The price of fresh eggs was rapidly putting them beyond the reach of the common people. The cost of poultry was likewise prohibitive under normal circumstances, and would have remained so in the absence of any definite change. The time to make this change is now, and the means lie in the power of the millions who have back yards now lying idle. Buy a few hens, learn their nature and their needs, add your quota to the visible meat supply, add a delicious and valuable food to the family menu, and you will never again be willing to return to a condition where your poultry and eggs are of doubtful quality and difficult to obtain.

CHAPTER II

CHOOSING THE BREED

FIRST consider your circumstances.

I once had a large flock of White Leghorns in a lovely New England town. I kept them under cover the year round.

My next neighbor, an old sea captain, had a flock of Rhode Island Reds, which had the run of a large yard, guarded by fish nets six feet high.

He got along very well with his quiet red hens, had a fair crop of eggs, and lived in peace.

As he saw me carrying my pail of white eggs into the house each day, he became restless. He examined the egg record of the Leghorns. He started a record of his Reds. Then he asked the address of the breeder who sold me the chicks; and the next thing we knew, he announced the arrival of a hundred Leghorn chicks by express.

The Captain put them in a brooder he had rigged

up, "better'n any brooder they sell in the stores," and his troubles began. He told his chicks just how to enjoy the benefits of his "better brooder," and repeated the information so you could hear him across the corn, but the chicks failed to grasp the idea.

The chickens "acted queer," they drooped, and died in twos and threes. He was a proud old man, who had bossed the decks for fifty years without help; but when half the chicks were gone, he asked my advice.

So, with many compliments for his better brooder, I offered to loan him one of my store brooders. He accepted, and we saved the remnant of the flock.

Soon the little sprites were scampering all about his yard, much to his delight. The feathers grew, the combs appeared, and the Captain was getting his egg pail ready, when new troubles descended.

He found a group of them very busy one morning in his lettuce bed, that lay near the hen yard.

What he said to them could be heard across an acre of corn. Fortunately the season was young, so the corn had no ears. He spent a hot half hour in capturing those birds and putting them back in

bounds. Then he stopped all holes where they might have crawled through.

The next morning they were out again. This time the chase was longer. The following day brought them out once more. Now he resorted to a fish net on a long pole. Stealing up behind the pullets he would clap the net over them, and then, clawing out a bunch of wing feathers, he would throw them over the fence, with a stern command to go and lay some eggs.

As they grew more, they flew more. Pulling wing feathers did no good, and raising the nets did no better. He declared they could fly to a crow's nest with their feet alone.

Saddest of all, they learned to elude the hand net. At this, the old whaler lost what little temper he had left. Taking an old rake handle, he advanced upon the unsuspecting fowl, and, with a skill developed by many a long whaling cruise, transfixing the guilty bird with his wooden harpoon.

At this his neighbors decided that the limit was reached. He was advised regarding his hens. He took the advice, sold his Leghorns to a peddler, and returned to his Rhode Island Reds and peace. But he always held me to blame for leading him

into temptation. The moral of this episode is, of course: Consider your circumstances before choosing your breed.

IMPORTANT BREEDS

In looking over the poultry yards scattered about the country, we find that four breeds of poultry predominate: three of these are American breeds, Plymouth Rock, the Rhode Island Red, and the Wyandottes. The other is the Leghorn, a bird of a different class.

As these breeds are so important to the amateur poultry keeper, we had better discuss them before going on to other varieties of fowl.

ROCKS, REDS, AND WYANDOTTES

Plymouth Rock.—The Plymouth Rock, an American breed, has had a long test under various conditions in all parts of the country, and has, in some locations, no serious rival as an all-purpose fowl. The Barred, Buff, and White Rocks all claim attention.

Although there are fanciers here and there who claim good points for the White and Buff Rocks, the general popularity of the Barred Rock is so

much greater that there is every reason to give it first choice in this breed.

The Single-Comb Barred Plymouth Rock has so long been bred among the conditions of the American farmyard that its adaptation is now complete. It is a generous producer of handsome brown eggs, is hardy, and makes plump, heavy poultry, when dressed. A full-grown cock should weigh from eight to ten pounds, and the hen about two pounds less.

These fowl are tame, and as they are heavy and fly little, a five-foot fence will usually keep them safe at home. They are good winter layers, and if given comfortable quarters will earn many dollars during the months when the snow is deep on the ground, and eggs are high.

Special care must be taken in feeding Plymouth Rocks not to give too much, nor too rich food, as they put on fat rapidly, and frequently die suddenly without apparent reason, when they are fed beyond the danger point.

They are excellent mothers, sitting quietly and persistently, and taking good care, in a clumsy way, of the chickens when hatched.

A trait of the Barred Rock which especially

recommends it to the amateur, who means to keep a small flock only, and to breed from his own eggs, is the certainty with which it comes true to type. The chickens from a flock of well-marked, high grade Barred Rocks will usually show the same good points. No one appreciates this more than the experienced poultry raiser, for the old saying, "Like father, like son," is unfortunately by no means always true in the hen yard. In fact, the children from many strains very often fail to do their parents credit.

Rhode Island Red.—The Rhode Island Red is a type of the American class which is rapidly making a reputation and becoming more popular each year, through sheer merit. The southern part of New England claims the honor of launching this bird, and the Red is seen there to-day at its best. The following note from Mr. F. W. C. Almy, known throughout the poultry world for his Reds, is of special interest:

LITTLE COMPTON, R. I.

June 7, 1918

DEAR MR. COBB:

I know nothing personally of the origin of the Reds, but it is almost universally conceded that they started in this town.

A Capt. Macomber was first to bring the Yellow Malay fowl home from India. He and a Mr. William Trip used these yellow fowl to cross—some say on Buff Cochins, some say on Brown Leghorns and Red Games. I believe they were crossed on all three, or even more breeds, as eggs and males were constantly exchanged, back and forth between neighbors, time and time again.

I am sure there was Leghorn blood in the earlier Reds, as they were quite small and wild. There was also Cochin, as a big proportion used to come with feathered legs. Red Games came in also, as they were frequently partly black and partly red when I first knew them.

They were named, I believe, by Mr. Isaac Wilbur, and have been bred about here almost to the exclusion of all other breeds, as they were hardy, early maturing, fine layers with very little care.

The present-day Reds very faintly resemble those I first knew, being much larger and redder, still better layers, and 1000 per cent. better lookers.

Sincerely,

(Signed) F. W. C. ALMY.

The chief points of merit displayed by these birds are hardiness, ability to do well without expert attention, quiet disposition, early maturity, and great laying powers. They also dress well and make good market poultry, though not quite so heavy as the Rocks.

During the cold winters and wet springs of the northern States these fowls seem to keep free from ills, and even if neglected, as so many home flocks are neglected, they often cheerfully go about their business, and lay brown eggs of good size and shape. They are not easily disturbed by children or unusual sights and sounds.

As hatchers and brooders, these hens are easily champions of the world. I have one at this moment that will not budge from her nest to eat or drink. There is no sign that she has left it during five days. When I lift her off, she sits motionless on the ground and soon steals back again. This is bad for the hen and also bad for the eggs, as they should have a chance to cool and air each day.

It is not easy for the amateur to breed these birds. They represent a mixture of different breeds, and their traits are by no means settled, as are those of the Barred Rock. Experts themselves do not depend so much on their knowledge of points and mating qualities as they do on a large number of chicks from which to choose. From the most carefully selected birds chicks of all varieties of color are likely to appear, so it is not

easy for one with a small flock to get enough high-grade birds to keep his flock up to standard.

However, the average chicks from good Red hens, though they may not be standard in color and points, will prove good utility fowl. A rose or pea comb, and a poor color, seem to hurt the fowl very little for general purposes, so long as the shape is good and the vitality is high.

Wyandottes.—The Wyandottes are found in seven varieties: White, Silver, Silver-Penciled, Buff, Golden, and Black, with a recent addition, the Columbian. Outside the yards of specialists, the White Wyandotte is the only variety commonly found.

The Wyandotte is an American breed, and has certain qualities which recommend it to all, but especially to those who intend to give poultry serious study and care. The frame is compact, full-grown cocks weighing about eight pounds. It puts on flesh rapidly, and is desirable for market at any time after eight or ten weeks, either for broiling or roasting. It is reasonably hardy, and of quiet nature, hatching and brooding well.

The Wyandottes, however, seem to suffer from lack of expert care. In laying contests, where the

pens are given every comfort and care, Wyandottes frequently show surprising results, defeating other breeds which have had great reputations for egg production. Under the conditions of the ordinary home yard, however, they often fall back rapidly.

I once had a flock of White Wyandottes that I kept in a room in the barn. It was an excellent poultry house in every way except one—the sun shone in for only part of the day. Although they came from a flock which had a reputation for egg production they did poorly, and brought unsatisfactory results. A flock of Reds, later on, under exactly the same conditions, in the same room, enjoyed life and made a high egg record. Of course the particular strain of each breed counts, but Reds in general seem more hardy.

The eggs of the breed are not considered so attractive in shape as those of other American breeds. Instead of an oval, they form a rather straight wedge-shape on the narrow end, and seem smaller than they really are. They are not so large as those of the Rocks or Reds.

On the whole, unless they have conditions to suit their taste, they will not be likely to give such



WHITE WYANDOTTES

good returns in small poultry yards as Rocks or Reds.

LEGHORNS

There is much to be said in favor of the Leghorn, as the most desirable fowl for a small flock, taken the year through. The Leghorn is very different in many respects from the breeds just described. It is in the Mediterranean class, originating in that vicinity, and has several varieties, the White Leghorns and Brown Leghorns being the only ones found generally in utility flocks.

The White Leghorn has gradually been developed into a truly remarkable bird, and is rapidly being adopted by poultry men in all parts of the country. In California it has done especially well, and millions of this variety are now raised there. As it has the same traits as the Brown Leghorn, let us consider the White Leghorn as typical and the best exponent of the breed.

The hardiness and rapid growth of the chickens is astonishing. It is not unusual to raise ninety mature fowl from a hundred day-old chicks, shipped fifty to a hundred miles by express. The

common troubles of digestion and temperature, which carry off so many chickens of other breeds, pass lightly over this midget.

The White Leghorn chick of the best strains will have a full battery of feathers and be attacking June bugs in single combat before a Rock or Red would get out of the downy stage. He eats heartily and digests his food well, because from early dawn to almost night he loves to run, and scratch, and fight.

Once it was thought that the Leghorn could not succeed in the northern States, but this is not true of the White Leghorns as now developed.

One of the most successful breeders of this strain has his place in Lawrence, Mass., where the winter temperature is often twenty below zero. While it is true that the egg yield during severe cold drops more than that of the Rocks or Reds, the birds themselves suffer no ill effects, and are eager to make up for it when the temperature rises.

There are two periods when the White Leghorn becomes of special value to its keeper: in the fall, during October and November, when eggs are always very high, and the heavy breeds are just thinking about contributions to the egg basket,



WHITE LEGHORNS

and in the warm months, after the spring tide of eggs is ebbing.

Nothing except stupidity and neglect will stop the White Leghorn from laying about the end of its fifth month, and nothing except the best conditions and expert care will induce the American breeds to lay until along into the seventh month. So if a flock of hens begins to lay early in October when eggs are very high, instead of late in November, they may well receive our blessing.

Late in the spring, when the warm days come and lilacs bloom, Mrs. Rock and Mrs. Red decide to give up laying eggs, and attend strictly to the duties of raising a family. For one who has regular customers, as most people have, this is small pleasure to any but the hen. The time has come now when incubators and brooders could take her place very well, though she won't admit it. But the Leghorn never heard of union hours. She seldom sits, and when she does, is easily induced to return to regular duty. Egg prices are now mounting again, and once more the Leghorn proves her worth by laying through the summer, till molting time begins in the fall.

White Leghorns can get a good living and pro-

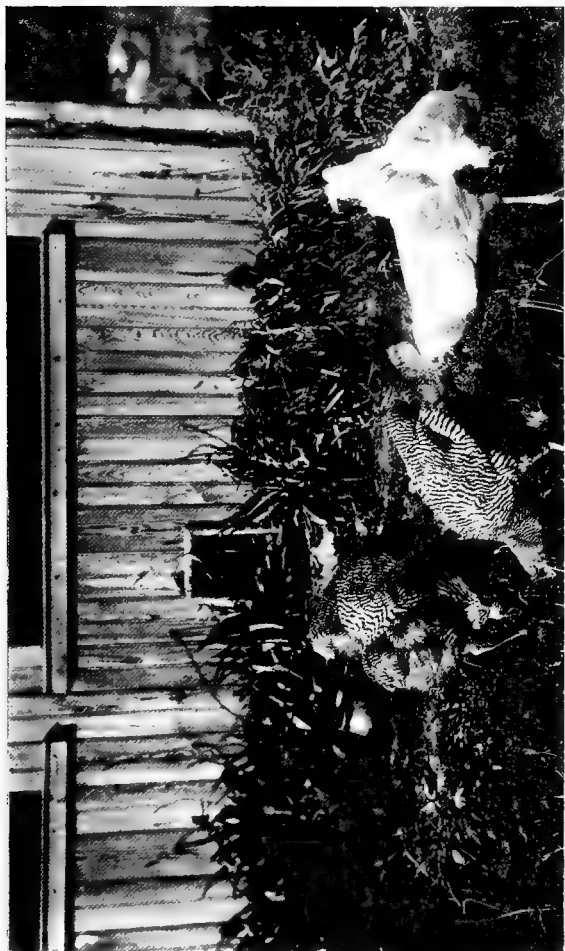
duce a full quota of eggs from about three fourths the food required by the American breed. A flock of thirty Leghorns will do well on the food called for by two dozen Plymouth Rocks. When food is high, this is important.

The Leghorn breed lays white eggs, and the best strains of White Leghorns lay beautiful specimens which will average twenty-four ounces to the dozen, about the average of the American breeds.

In the northern States there has been a prejudice against white eggs. The Boston market to-day places a discount on white eggs, while the people in New York will pay a premium for them. Years ago the hens in the north all laid brown eggs, being the heavy breeds, while almost all those around the New York market were of the Leghorn type. Of course the people knew that white eggs in the Boston market were shipped from a distance, and the New York City people had reason to suspect that brown eggs were not laid nearby.

This custom, like all other customs, had a real cause, and was not based on a mere whim; but conditions have greatly changed, and the age or condition of eggs can no longer be told by their color.

Some people pretend that they can detect a



ROCK AND LEGHORN COCKEREL

difference in taste between white and brown eggs. To such people one might offer the following incident.

Mrs. Phineas Barnes lived for many years in the Warren homestead in Waltham, Mass., whence six stalwart Warren boys went forth to fight in the Revolution. One day, as she was clearing away the morning meal, a gentleman appeared at the side door. "Madam," he said, "can you sell me some fresh eggs?" It happened that the hens in that neighborhood were mostly Leghorns, and she brought out a dozen white eggs. He eyed them and shook his head.

"My wife is an invalid, and she has a dainty appetite. White eggs offend her taste. She cannot eat them. Have you no brown ones?"

Mrs. Barnes shook her head. Then she thought a moment. No one about there had brown eggs, and she knew something of dainty appetites.

Pouring some coffee into a bowl, she dipped an egg and wiped it dry. It was a perfect brown.

"How would that do?" she asked, presenting it for inspection.

"Perfectly, perfectly, madam. May I have a dozen like that?"

The Hen at Work

So Wendell Phillips, for it turned out to be the great orator, took a dozen brown eggs home to his invalid wife, and after that, during his stay nearby, he went personally to secure the brown eggs his wife found so well suited to her delicate taste.

To-day high prices are paid for Leghorn eggs, where one can prove their quality. I have obtained fancy prices near Boston during the past ten years.

As a fowl for the table, the Leghorn is not much to boast of, but here, also, breeding has done much during late years. The modern high-grade White Leghorn is very little like the birds our grandsires used to chase out of the cabbage patch. The breast is highly developed, and, if well fed, the dressed fowl not only makes a good appearance, but provides a far more substantial meal than one might suppose. Cocks from good breeds will weigh six or seven pounds, and hens about two pounds less. We must bear in mind that one dozen eggs in the fall, at sixty cents a dozen, will pay for two pounds difference in weight between these and heavier fowl.

Another point to consider is the tendency of this breed to do their best the first season. It hardly



SILKIES

pays to keep a flock through the second winter in the northern States, unless you want the hens to breed from, and with this particular hen, it is far wiser to buy day-old chicks and brood them, for all except those who enjoy developing and improving their flocks through personal selection. This will be taken up more fully under the chapter on "Raising Chicks."

The nervous, flighty tendency of Leghorns must always be kept in mind. Although it frequently happens that they will remain quietly in a yard that suits them, with a fence only six feet high, they may fly over a fence ten feet high, if they think they like it better outside. If they take the notion, over they go, with not so much as by your leave, and it is no fun catching them. If there is a large place to wander over, say half an acre, they seldom cause much bother. A six-foot fence will probably keep them in, but with a smaller space available the best plan is to keep them under cover entirely.

This type is easily startled by strange sights or sounds. A new hat or Sunday suit will cause a lively time in a flock of a hundred hens. In large plants visitors are restricted, because

of the bad effect they have on the feathered boarders.

Taken all in all, the Leghorn, where eggs are wanted, is without question the best producer for the average poultry yard, and is rapidly spreading in a popularity that is in every way deserved.

CHAPTER III

COMPARISONS OF FOUR LEADING BREEDS

A STUDY of the records kept at the important egg-laying contests held each year gives us some very helpful and interesting facts about the four leading breeds in America.

Out of a thousand birds entered at the annual laying contest we may expect to find the following: 490 Leghorns, 149 Plymouth Rocks, 147 Wyandottes, 130 Rhode Island Reds, with the remaining 84 made up of Anconas, Buckeyes, Buttercups, Campines, Dorkings, Faverolles, Hamburgs, Houdans, Langshams, Minorcas, Oregons, Orpingtons, Sussex, and one or two local and less well-known varieties.

This shows more than three times as many Leghorns as any other breed. The American breeds are very evenly divided among Rocks, Reds, and Wyandottes. These four breeds comprise more

than nine tenths of the whole exhibit, making it clear that the wise poultry keeper would maintain a fair number of one of these breeds until he has assured himself by experience that some other breed suits him better.

Weight and Value of Eggs.—The weight of all eggs produced by the four principal breeds and their average value per dozen, was made the subject of careful calculation. The Rocks lead in weight of eggs per dozen, with an average weight in ounces of 26.4, while the Wyandottes hold last place with 23.5. The Reds and Leghorns come between them.

The highest average value, however, for eggs per dozen came to the Wyandottes, because they laid the most eggs during the months of high prices. The average value of all four breeds varied less than one cent, making this a matter of comparatively small importance.

It is interesting to note that the month of August gave the highest gross receipts for eggs. The price is then rising and the rate of production fairly high, so the income is the largest of the year.

Whether this would be true of the ordinary flock or not would depend on the comfort of the fowls.

The pens at laying contests are airy, and the birds are free from lice and mites. In stuffy, cramped quarters where fowls suffer more or less from insect pests, the spring record might be encouraging, but that in August would be low.

Weight and Value of Birds.—It is customary at laying contests to weigh contesting fowl frequently during the year, and the facts learned are of value. The Rocks are the heaviest, followed in order by the Reds, Wyandottes, and Leghorns. All birds gain steadily in weight until March first, when they are nearly a year old. After March first they lose slightly in weight during the warm months.

The difference in value for the meat of the Rocks, the heaviest, and the Leghorns, the lightest, has averaged about fifty cents. Remember, however, that feed for the Leghorns costs about fifty cents a year less for each bird.

Monthly Egg Production.—It is of great importance to know, if we can, the months when certain breeds will produce their heaviest egg yield, for if we decide to handle more than one breed, as many people do, we must arrange the flocks, if possible, to keep the egg supply steady. It is always most profitable to supply a few customers

steadily throughout the year, at retail prices. To do this, a fairly regular supply must be maintained. Otherwise we shall have to lose good customers during dry times, and sell at low figures when the flood comes.

A careful study of the monthly egg production of each breed shows that Plymouth Rocks gave the highest production in March, but took a lower position every other month. The Wyandottes, as a breed, exceeded all others in average production during December, January, September, and October. The Reds enjoyed a similar distinction in February, lost out by one egg in January and March, and shared honors with the Leghorns in April. During November, May, June, July, and August, the Leghorns outlaid all their competitors.

As the Leghorns are laying their best while the American breeds are resting, a combination made with them and an American breed would balance things.

In considering these figures we must remember that they concern a thousand picked birds under expert care. The conditions, however, are easily duplicated in any back yard where sun and air are abundant.

More than One Breed.—The general conclusion must be that to maintain a fairly even supply of eggs through the year, more than one breed is necessary. While it is unwise to scatter our attention, it is good judgment to plan for two breeds.

There is an increasing tendency for poultry keepers to do this, and to select the Leghorns in combination with some American breed. The American bird keeps the eggs coming during cold months and the Leghorns have their turn in the warm weather, while the heavier birds take a summer vacation.

The personal element in selecting between the three American breeds is, perhaps, as important as the breed itself, for they have merits that are very nearly equal. If one bird suits your fancy more than another, it would be wise to give that preference due consideration. It is easy to make one flock do better than another merely by the interest taken, as hens respond quickly to personal attention.

Cost of Feed.—The weight of a fowl seems to be an accurate indication of what she will eat. This is certainly true of the four breeds here described. The heavy Rocks eat the most, and the others

follow down the scale according to weight—Reds, Wyandottes, and Leghorns. It costs at normal prices for grain, fifteen and a half cents for each dozen eggs produced by the Plymouth Rocks, and only twelve and a half cents for a dozen Leghorn eggs. It is safe to estimate that the heavier a type of fowl is found to be, the more feed she will need, to produce a dozen eggs.

The cost for feeding a single hen per year, where all food is bought, runs from one and one half to two dollars, according to breed. This figure, of course, is averaged on normal prices for grain.

Hens which are laying heavily also consume much more feed. In a late test, a pen of ten Leghorns which laid 2021 eggs, cost \$20.09 for feed. A neighboring pen of the same breed laid five hundred eggs less, 1501, and cost \$15.75 for feed. The first pen turned in \$41.74 above cost of feed, and the second brought only \$26.69 above cost of feed. This shows clearly that laying hens are hearty eaters and pay well for their board.

Broodiness.—As the use of incubators and artificial brooders grows, the broody hen becomes more and more of a problem. It is worth while to note the results of careful surveys regarding the broody

habits of the four important breeds. In all tests the average number of days lost through broodiness amounts to fifty or sixty days. At the Danvers, Mass., contest during the year, 1917, not a Leghorn went broody, while the heavier breeds lost from fifty-five to sixty days. The report of the Storrs, Conn., contest, where one hundred pens are kept, is, of special interest on this point:

The average Leghorn lost four days out of the year as against nearly forty days for the average Red, and twenty-seven days for the average Rock or Wyandotte. The combined loss amounted to 18,650 days. This means, we might say, 688.5 dozens of eggs. It would thus appear that broodiness is a rather expensive pastime in which the average American hen is prone to indulge.

CHAPTER IV

POULTRY TYPES

WITHOUT attempting to include every type and variety of fowl, we may give a general view of the different breeds which find favor, here and there, among poultry men, which will prove of interest and value.

The American Poultry Association includes in its official list those birds which the Association think worthy of recognition as pure bred poultry. It publishes a book, *The American Standard of Perfection*, in which these breeds are carefully described. A scale of points is given by which the fowls may be rated and compared.

AMERICAN CLASS

The important birds in the American class,—the Rocks, Reds, and Wyandottes, have already

been described. Besides these are the Javas, black, mottled, and white, and the American Dominiques.

The Java fowls are seldom seen now. They resembled in shape, size, and general traits the Plymouth Rocks, but by no means compared with them as all-round fowl.

The American Dominiques have rose combs, a trim, neat shape, and gray hawk-colored plumage, and are about the size of the Wyandotte. They are the oldest American breed, and it was from a cross of these that the valued Plymouth Rock originated.

ASIATIC CLASS

In the Asiatic class we find the large, solid, quiet birds, the Brahmas, the Cochins, and the Langshams.

Brahmas.—The Brahmas, light and dark, are the most important of the Asiatic class to the American poultry keeper. The Light Brahmas have been steadily improving in size, shape, and laying qualities, and many growers recommend them highly as a breed to keep in combination with Leghorns. While they do not quite compete with

the leading American strains as egg producers, they do lay a generous number of large, attractive brown eggs.

The special importance, however, of the Light Brahma is its quality as a meat producer. As now bred, the cocks will weigh over twelve pounds, and the hens frequently ten pounds. They are the largest of all the breeds, are hardy, very quiet, put on flesh easily and rapidly, and have little tendency to wander. A four-foot fence will restrain them.

For making heavy broilers at eight or ten weeks of age, no other fowl can beat them. They are not again in shape for table fowl till well matured, as they begin to develop the bony structure more rapidly than the flesh at about the tenth week. In the late fall, however, when the holidays approach, these birds bring fancy prices and big totals. The sight of one well browned, on a blue platter, will easily explain the reason why.

Dark Brahmās weigh about a pound less than the Light Brahmās, and are shaped somewhat like Cochins, probably originating in a cross between Light Brahmās and Cochins. Although not frequently seen in small flocks, the Dark Brahmās are grown by many who cater to the fancy market

trade, and make especially plump capons. It seems to be generally conceded that the Light Brahma, for general purposes, is the better fowl.

Cochins.—It may be that you have seen, in sea-port towns, yellow hens with long necks, who stalked about as if they walked on stilts. These were probably yellow Shanghais. The old garden at the House of Seven Gables must have contained some of these. Years of breeding have shortened the necks and reduced the legs, and they are now called by a new name, Buff Cochins. They now have no more neck than seems necessary, and their legs are just long enough to reach from the body to the ground.

The bodies of Cochins are blocky, and weigh about the same as Dark Brahmas, covered with soft fluffy plumage of a creamy golden hue. Their plump form and yellow skin make them valuable birds for market, and their gentle, almost lazy disposition enables them to put on flesh easily. They seem to have small ambition for supplying the egg basket; and it may generally be taken for granted that a large, quiet bird will lay comparatively few eggs.

After their introduction into this country the Buff Cochins were used very widely for crossing with native stock, and have left their mark very definitely upon American poultry yards.

There are also Partridge Cochins, Black Cochins, and White Cochins. They vary only from the Buff Cochins in color, having about the same size, shape, and habits. The Partridge Cochin, as one might guess, has plumage resembling somewhat the partridge. This is true, however, only of the hen, as the cock has a back not unlike the Brown Leghorn, with black breast and body feathers.

A lively interest has been taken in these birds at poultry shows of late years, and very large prices have been paid for setting eggs, but this interest seems as yet to be largely confined to breeders of show birds. The ordinary citizen demands egg-producing qualities first of all, in any fowl that is to win wide popularity.

Langshams.—The Langshams in both black and white were introduced, as many breeds have been, by way of England. Much was promised for them twenty-five years ago, but few are seen to-day. They have good plumage, are sightly, and make good market fowl, weighing a pound or so less

than the other Asiatic fowls, and having their quiet habits.

MEDITERRANEAN CLASS

Besides the Leghorns, of which we have spoken, there are, in the Mediterranean class, the Black and White Minorcas, Andalusians, Anconas, and Whitefaced Black Spanish.

Minorcas.—The Minorcas resemble in many ways the Leghorns, but have longer, deeper, heavier bodies. The weight of a full-grown male should be about eight pounds, and the hen six and a half pounds. They are not bred extensively in this country, though well thought of by many practical people. Their eggs are of unusual size, and those laid by mature hens, after the first birthday, are so large as to create interest wherever seen.

Whitefaced Black Spanish.—If you ever see the Whitefaced Black Spanish you will not forget them. No Spanish grandee ever took his place in the world with more distinction. They look, in general, like the rest of the class, but their white face, black, silky-glossed plumage, and a boat-shaped body set well up on long slender legs, give

them a unique appearance. They are about the size of the Minorcas, and lay large white eggs.

Andalusians.—The Andalusians are in most respects, the same as the Leghorn, except that they are blue in color. They are handsome, and could doubtless be bred to a good service, but are not as yet receiving much attention.

The Ancona is much like the Leghorn, mottled in black and white.

POLISH CLASS

Eight varieties comprise the Polish class, and the poultry show which fails to have two or three types of this variety is seldom found. No one claims that they compare in value with the American breeds or the Leghorns, but their quaint hoods, their moustaches and beards, and general sprightly appearance attract the interest and attention of many fanciers. There are the White Crested Black, Golden, Silver, White, Bearded Golden, Bearded Silver, Bearded White, and Buff Laced. They are about the size of Leghorns. The number of eggs produced by this breed is fairly large, but they are rather small and not welcomed by housewives at regular rates.

HAMBURG CLASS

It would not be easy for the inexpert to tell the Hamburg from the Mediterranean breeds. They are small, pert, lively, and very trig in their dress. Although they lay like champions, the eggs, like those of the Polish fowl, are too small to offer in regular trade, and there is no good reason for keeping them, if anything more than good looks is desired.

There are six varieties recognized among the Hamburgs, the Golden Spangled, Silver Spangled, Golden Penciled, Silver Penciled, White, and Black. In the same class there are Red Caps and Campines.

The Red Caps are slightly larger than the ordinary Hamburgs, having large rose combs. The Campines have single combs.

FRENCH BREEDS

The French breeds include Houdans, Creve-cœurs, and La Flèche. Of these the Houdan, shown in the picture, is most frequently seen in this country, and no great attention has been paid to improving the breed here.

They have good qualities, however, and in their native land, where eggs are sold at so much each, and poultry almost by the ounce, they give their breeders great satisfaction.

I never see a Houdan without remembering one which taught me a lesson in French thrift and skill. My better seven eighths went forth one day to market in France to procure a dinner, and returned with the plumpest, roundest fowl you ever saw. The little tuft of feathers on the head proved it a Houdan. At once I decided that when I "got home" I should raise some of these butter balls.

It was plucked, but the carcass was apparently not disturbed in any way, and it was my duty to prepare it for the pot. Taking a knife I opened a slit to remove the entrails, and suddenly sought the open window to escape the vilest odor that ever saluted my nose. That specimen had been stuffed with brown paper, and nothing else remained within, yet there had been no cut made in the skin.

Upon examination, we found a greenish shade about the head, but until the fowl was cut, there was not the slightest evidence to show that it was not a choice morsel.

With averted face, I carried it down to the Concierge, and asked her if she thought her cat would touch it. She beamed, and accepted on behalf of the cat without hesitation, but from the odor and the merry song that rose from her kitchen window I judged that the cat was not to be served first, and felt that I had learned another lesson in home economics, *à la* Paris.

The French breeds vary in one or two essentials from most poultry. They have all white meat, a great recommendation to some people I have carved for, and have five toes on each foot. The Crevecœurs and La Flèche have black plumage and are rather larger than the Houdans. Although they are excellent fowl, they have found little favor in this country.

ENGLISH BREEDS

The English breeds, Dorkings and Orpingtons, are fowl which have, at different times and places, threatened to get a firm foothold in America and displace our native poultry. Almost my earliest recollection of hens is a long oration from a neighbor over the back fence on the merits of his White

Dorkings. As he smoked long, black cigars, I felt sure he must know all about it, and was greatly surprised when he cleaned them all out the next year in favor of Barred Rocks.

"They warn't hardy, bub," he replied when I asked why; I didn't know just what "hardy" meant at that time, but I have learned since what it means in the poultry yard, and have paid well for the lessons.

It is said the Queen Victoria insisted on having the eggs of White Dorkings for her breakfast, thus showing a patriotic support for the English breeds.

The Dorkings are found in a variety of colors. The Silver Grays and other colored types are larger than the White Dorkings. This breed has white flesh, like that of the French breed. In many ways they resemble our Rhode Island Reds, being good layers.

Orpingtons, also, were hailed as the new perfection in the chicken world. They have good size, about that of Plymouth Rocks, are quiet, handsome, good layers, and are said to be very hardy. Indeed, one is led to wonder after reading various booklets about them, that they are not found in every yard; but a review of contests, and inspection of poultry

houses, here and there, show that they have as yet failed to find an important place in America.

It is usually true that a fowl, bred to the climates and conditions of a certain country, does its best in that spot. We do not as yet hear that the French and English have thought it worth while to exchange Houdans or Dorkings for Rocks or Rhode Island Reds.

GAMES

Games, Game Bantams, Cornish Indian Games, and some others, are classed under Games. The importance of the Game blood in breeding among the various types of fowl now esteemed has been very great. Wherever it has been used, the Game adds hardiness and courage, with a tendency to rapid growth and early maturity.

The erect, peculiar shape of the Game makes it look the part it has so long played as the warrior among fowls. It ranges in size from rather small birds to the Cornish Indian Game, where the cock will weigh nine pounds.

The common treatment by fanciers, called "dubbing," where the single, erect comb and

wattles are cut away, has helped to give it a fierce and warlike appearance.

Game hens are fair layers and excellent mothers, usually raising their broods with great success. There was a time when the Cornish Indian Game promised to become very popular here, but the wave of enthusiasm passed, probably because its egg yield was well behind that of several breeds already at hand. In the long run, whatever other qualities a fowl may have, if her egg production is deficient, she will surely have to give way, so far as the home poultry yard is concerned, to her more prolific sisters.

BANTAMS

The last class to review is the Bantam division. Here we might find varieties without end, as people have taken lots of fun in crossing them back and forth. Some of these have been bred down so they seem hardly larger than sparrows.

The Seabrights, sleek, pert little birds, are good examples of pure breeding, and are entered in many shows.

The Bantam is hardly worth while in the barn-

yard, and is rather in the way among standard birds, which are very likely to crowd and worry it, but as a pet for children it is well worth while. Bantams are very tame, and can frequently be handled for hours together in apparent enjoyment. A small coop is sufficient for their needs, and the eggs they lay amply repay the little ones for the interest they take in their feathered pets.

CHAPTER V

STARTING A FLOCK

HAVING decided on the breed we intend to handle, and having prepared quarters for the new family, the next step is to form the nucleus of the flock. For those who have never had poultry before, and especially for boys and girls who are starting, it is best to begin with well grown stock.

In getting acquainted with any new business, there are always small mistakes and discoveries to be made that can be overcome and outgrown only through experience, and no occupation seems to be more certain to provide a chance for queer mistakes than poultry raising.

A gentleman in a New Hampshire town became interested in hens and purchased a large flock. In May, they began to die. Their crops filled up, and nothing seemed to help them. He came to me for advice. I inspected his houses. All was

clean, bright, and in good shape for poultry. His feed was right, and fed according to a hen book he studied with care.

Next I looked into his grit boxes. He had only oyster shells.

“Where is the grit?” I asked.

“Why, there it is.”

“Those are only oyster shells,” I replied.

“Yes, but I should think they were sharp enough to grind any food. It says in the book to give them good sharp grit, and that was the sharpest I could find.”

“But, my dear sir, that shell will soften almost as soon as it gets into the crop. It soon goes into the digestive organs, and is absorbed in a solution to make new egg shells. It is of hardly any use in grinding food.”

At that moment his wife brought some grass and threw it on the floor. It was nearly a foot long and some was rather tough.

“I guess I see your trouble,” I said. “That long grass would be dangerous even with the best of grit; with no grit, it becomes deadly.”

“But the book says to feed them grass, and clover, and other green stuff.”

He did not realize that all green food for hens must be tender and brittle.

We got some excellent grit from the grain store, at once, dosed the suffering hens with a little olive oil, and he was a happy man to see them recover quickly, and start for the nests again. He had studied his books with care, but was in a good way to kill his whole flock.

A young man in Maine was anxious to make a start with poultry. He wrote to me for advice. I did the best I could by mail.

"I can't get oyster shells, down here," he wrote, "will clam shells do?"

"Yes, they are satisfactory," I replied.

The hens did not do very well. He had his troubles. I visited him a month or two later, and found he was feeding his clam shells whole. Whether he expected his hens to suck the shells or bite pieces from them I never found out.

These incidents are merely samples of the errors that are almost certain to occur. Where grown fowls are concerned there is frequently time to correct matters, but with chicks it is all over usually before the doctor arrives. So we had better begin with grown birds; and will

be getting poultry-wise when the chicks come along.

Do not buy from peddlers, nor buy poultry from men who go about with wagons and crates. The chance of getting a healthy fowl from those coops is very small. Men who keep large flocks usually inspect their birds, now and then, to pick out all those that seem weak or ailing. They seldom bother with cures, but put them in small coops and sell them to these men who travel about. It is clear that the crates on their wagons must be infested with every disease a fowl is heir to.

After advising people against this for many years, I took a chance one day, and bought some bright looking pullets, that showed no signs of illness. It cost me about fifty of my best birds, some of them splendid specimens from high grade breeds.

Go to a reputable poultry man in your own vicinity if possible, and buy the fowls he recommends. It is not necessary nor advisable to pay fancy prices, but it is wise to pay a fair price and get good birds to start with.

It frequently happens that exhibitors at poultry shows sell their show-pens at the end of exhibitions,

but there is some danger here. Unless they have prize birds, many fanciers dispose of such pens rather than return them to the home flock, for much disease has been brought home in this way. The danger is not great, however, if the hens seem lively, and not too much worn by their experience. We may at least feel assured that they are high-grade stock, or they would have not been exhibited. Never buy chickens from shows unless for some special reason, as their vitality is very low after a night and day performance. Always keep hens brought from shows in quarantine at least ten days, before allowing them to run with other birds.

The quarantine rule is a safe one in any case when adding foreign stock, but as few people with small flocks have extra space, it is usually safe to take birds from the flock of a reputable and experienced dealer without fear of illness.

Spring Hatching.—When the spring arrives, whether we have decided to start with mature fowl or not, the time comes when we shall want to start out with chicks, for certainly half the fun comes in raising the chickens and having the broilers and soft roasters.

There are four ways of starting chickens, each



A BALANCED HOME FLOCK

of which has its own advantage, according to circumstances. We can set the hens and let them care for their own broods, we can have incubators and brood the chickens by artificial heat, we can buy day-old chicks and put them under mechanical brooders, or we can have our eggs hatched in custom incubators. The attempt to buy chicks and get broody hens to care for them is not practicable. We know just what a mechanical brooder will do, but what a bunch of broody hens will do is sometimes more than an oracle could foretell.

Hatching under Hens.—Hatching under hens has many advantages for busy people who must come and go. The mother is always on hand to guard her flock, to keep the chicks warm, and nurse them carefully during the days when a chilly hour might be fatal. It is a great comfort to know that if we are late home, the chicks will be tucked under the feathers safe and warm till morning.

Hatching in Incubators.—If we can be at home at regular hours, hatching by incubation is decidedly worth while. We know just when it will “set” and if we plan to start hatching in March, we do not have to wait till April for lack of broody hens. Every two or three years there is a scram-

ble in the neighborhood to borrow broody hens. When we have started it off, we are reasonably sure that it will not decide to change its mind and scream to get out of the cellar, while a five-dollar setting of eggs goes to ruin.

No lice or mites can attack little chicks hatched in an incubator, and kept in clean quarters. While it is true that hens, properly treated, should be free from lice, the danger of lice on hen-hatched chickens is always greater.

The chicks hatched in an incubator can be started all together, fed together, and, being of the same size, develop more evenly, and make a much better appearance than the assorted chicks from hens. Perhaps we do not realize that the familiar wail, "He's pickin' on me," came from the poultry yard. Where big chickens and little chickens, with or without feathers, run together, some chickens get picked on, and not the big chickens. I have never been able to get the results with my late hatched chickens that the early ones showed. The little brothers always get picked on.

The matter of feeding the little chicks is really of importance. If we have a hundred chicks, hatched together, we can measure the feed, and adjust the

rations intelligently, but with assorted broods it is different. It is not well to keep each brood in a small run, and yet we do not want to keep big chicks on the small chick feed any longer than necessary, while the larger grains are not suited to the small chicks.

Again—the incubator, handled with care, hatches chickens with more uniform vigor. I have just been through a siege with a hen that simply refused to leave her nest. As it is necessary to air the eggs each day for at least fifteen days of the incubation period, I had to haul her off each day, and try to get her to eat and drink. The chicks are now hatched, eleven out of thirteen, and while they seem lively, they are not well feathered, are long, and their heads are small and sharp, all indications of poor development in the shell.

The enormous increase in the sale of small incubators during the past ten years is ample proof that this method of hatching has proved decidedly successful.

Day-Old Chicks.—Another plan for starting a flock is that of buying a number of chicks from a dealer who maintains large breeding pens and large incubators, containing thousands of eggs. For

many who have small flocks in small yards, this is the very best plan of all.

It is not convenient to keep a cock all through the year. He costs money for feed, reduces the table value and keeping qualities of the eggs, and is likely to make himself unpopular with neighbors who do not care to rise before the dawn.

The difference in cost between buying eggs for hatching and buying chicks is very small. If we consider the cost of the incubator, the expense is frequently in favor of the day-old chicks. If we pay one dollar a setting for eggs we are getting them at a low figure. A hatch of sixty per cent. is all we should reasonably expect, though we will frequently get more than that. This would make the cost of chicks finally hatched at least ten or eleven cents each, and I have never paid over fifteen dollars a hundred for standard chicks, getting most of them for twelve.

There is little danger of losing many chicks sent by express. I have had them sent a hundred miles with perfect success and others have found a thousand miles not too much, if railroads make good connections. White Leghorn chicks seem to stand these journeys especially



BRAHMAS

well, while other breeds stand travel if the strain is vigorous.

There is usually no advantage in incubating eggs at home, if the eggs are to be purchased, unless the breed desired is a specialty. Day-old chicks from the standard breeds are all offered by large dealers in almost any quantity.

Custom Hatching.—Another plan made use of by those having small flocks is custom hatching. In many localities men run large incubators for the purpose of hatching eggs for others. The charge is usually small, about three cents an egg, and the work well done.

There has been some fear that disease, especially white diarrhea, spreads from brood to brood in custom incubators, but a reliable man always cleans and disinfects his compartments carefully between each hatching, and there need be little fear of disease in any up-to-date plant.

If you have a flock of birds you wish to develop yourself, and do not feel able to attend to an incubator each day, this custom incubator is just suited to your needs. You send off your eggs and have no further bother till your chicks return.

CHAPTER VI

COOPS FOR CHICKENS

So far as we know, old silk hats have not yet been used as chicken coops, but almost every other possibility has been accounted for: boxes, barrels, kegs, tubs, old bureaus, sewer pipe, tin bread-boxes, and fifty-seven other objects may be seen serving as a shelter for chickens. It is possible that many such quick-and-easy coops may at times bring the flock through to a successful maturity, but let us understand at once that there are more failures and disappointments in poultry ventures at this stage than reason gives any excuse for, and many of them are caused by faulty coops.

The easy way most books and poultry papers speak of these coops is delightful. They are probably jokes anyway to the writers, who handle chicks by thousands in brooder houses. "If troubled by rats to any extent," says one, "make

the floor of the coop tight." How do you know, and when do you find out if you are troubled by rats? Well, some morning when you go out and find your chickens half gone, and the rest dead about the coop, with small holes in their necks, or just over their wings, you will know that you are troubled by rats. It will then be time to put a floor in the coop and wait for next year.

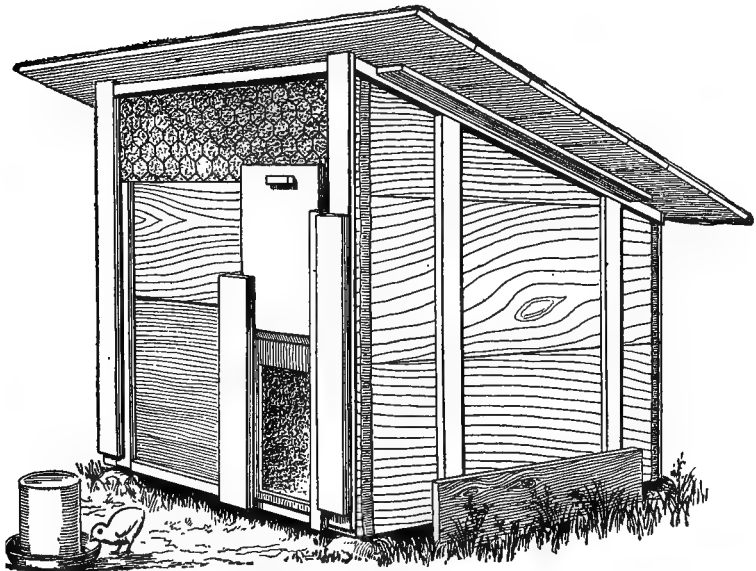
Rats, cats, dogs, hawks, weasels, thunderstorms, and spells of stormy weather must all be faced before the flocks will be large enough to look after themselves.

Unless you are in a position to give chickens adequate well-planned shelter when they are ready, don't start. You will be discouraged, and lose interest in a venture which should be successful, and is of great importance to every one who shares family life.

This does not mean an expensive outfit; far from it. The coop in the picture gives perfect protection from rats, cats, and other enemies. It keeps the chickens dry under all conditions, and gives them ventilation on hot nights. If everything were paid for, it would have cost less than a dollar; but

since the packing box came free, it cost less than fifty cents.

' To make a coop like this is a very simple matter.



A coop for sitting hens and growing chicks that will be safe, tight, and convenient. Made from a packing case that cost fifty cents

For the beginning we need a wooden box about three feet long, by two feet wide, and a foot and a half high. These dimensions may vary somewhat without harm, but a box much smaller does not give space for the hen to move about, in comfort

and safety, with her chicks. If boxes about that size cannot be readily obtained, it is not much work to make such a coop from box boards, although such cases are plenty in most parts of the country.

Remove the cover of the box, nail two strips of scantling which are six inches longer than the box, across the boards of the cover, and piece it out with an extra board, so that when it is replaced on the box it will extend three inches beyond the edges on all sides.

Nail a piece of roofing paper to this cover with strips of lath to hold it firmly in place. Do not fuss about making this lid fit snug around the top of the box. Air space will be needed all around the top for ventilation.

Now take a piece of board about six inches wide, the same length as the box, and saw it obliquely across from end to end. These triangular strips may then be nailed to the long, top sides of the box, supported by wooden cleats on the inside. These provide a slope for the roof.

To strengthen these slanting pieces a strip two inches wide should be nailed across the front, level

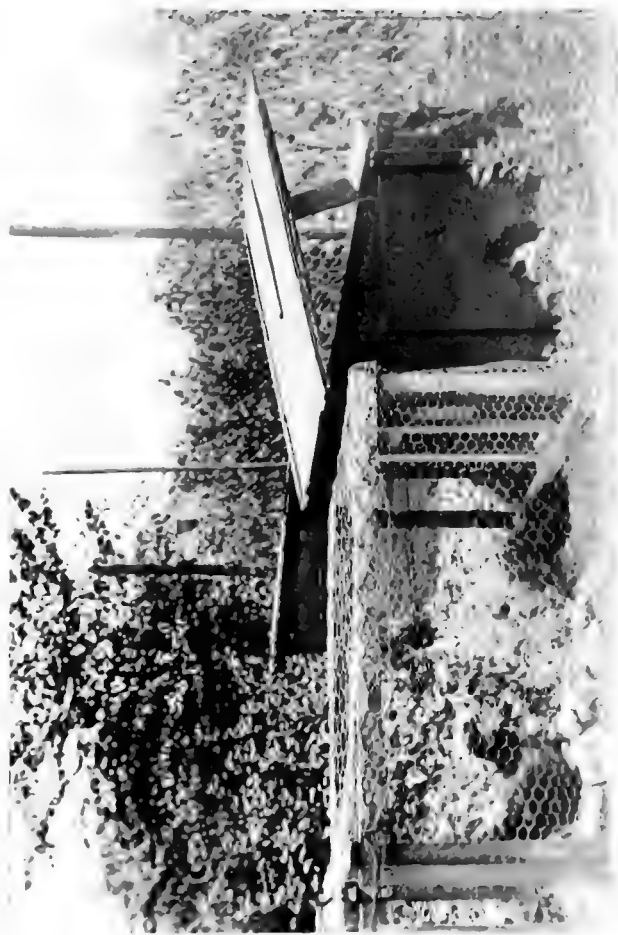
with their highest part. This leaves an opening in front four or five inches wide, which allows free ventilation. The opening should be covered with wire netting having a one-inch mesh.

The door is nine inches high, by seven wide. This gives free passage for all but the big Asiatic birds. With Brahmas one inch more should be allowed for comfort, though it is surprising how small an opening will let hens out. As an experiment just leave a four-inch hole somewhere in the fence and find out for yourself.

Up the sides of the door one-inch strips are nailed, one inch back from the edge, on the outside. Two-inch strips the same length, nailed so they make a groove one inch deep, will hold a board an inch larger all round than the opening so it will slide up and down, and effectually shut out intruders of all kinds.

At the bottom of the coop nail skids, pieces of board five inches wide, so they raise the box three inches from the ground. These also help in pulling the coop about from place to place.

It is of great importance to keep the bottom of the coop above the ground, for wet is dangerous



RUN AND COOP FOR RAISING CHICKS

for chicks. Many serious losses have occurred because this detail was omitted.

A woman had some Barred Rocks that cost her dear, and were valued accordingly. As the coop was on the side of a high, rather steep hill, she did not raise the floor of the coop above the ground. A heavy thunderstorm came, the water poured down the hill, backed up against the side of the coop, and ran in across the floor, drowning every chick.

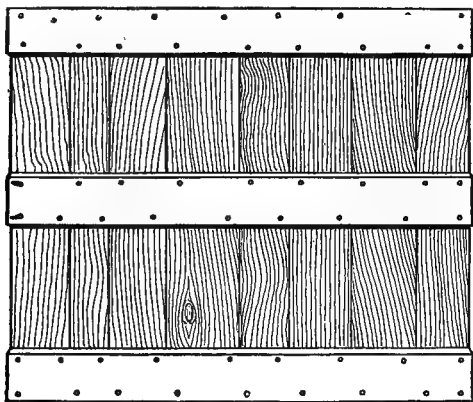
After a heavy storm in May, a census of your town would show many drowned chicks. What is the sense of taking a chance when ten minutes' work will insure against such loss?

The top should be fastened in front with strap hinges, screwed on. It is then easy to raise the lid for cleaning, and replenishing supplies. It will also stay in place during heavy winds and storms.

Ten years' use of this type of coop for small flocks, and small yards shows that it fulfills all needs at very small cost. It is light, easy to move about, protects the chicks from the weather, and prowling enemies, and will offer comfortable quarters for twenty chicks till they are large enough to go into the big house.

A PAPER COOP

Having a flock of fifty chickens a month old to move out into the open, a house was needed that would shelter them all and allow room for a small hover. As time, labor, and expense were impor-



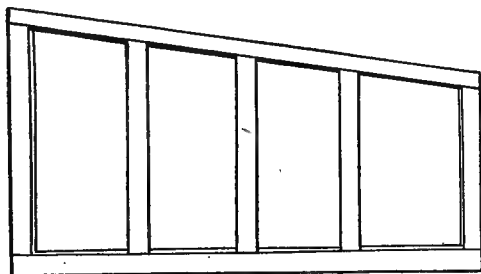
Floor of the paper coop. This is made of light boards securely nailed together

tant items (they always are in poultry yards) wall-board was selected for construction.

The wall-board was merely heavy paper stock, without wooden filling, or stays of any kind, one fourth of an inch thick, and would hold nails well. It cost three cents a square foot.

As this board comes in any desired lengths, and can be cut with a knife or saw very easily, the construction problem was extremely simple.

First the floor is made by nailing box boards together on three cleats, either narrow boards or



Side piece of the paper coop, with strips of scantling nailed on

scantling, making a light but firm platform 5 ft. 10 inches long, by 4 ft. 11 inches wide.

For the sides use two pieces of wall-board, six feet long and four feet wide. Cut it so the top edge will slant from four feet high in front to three feet high in back.

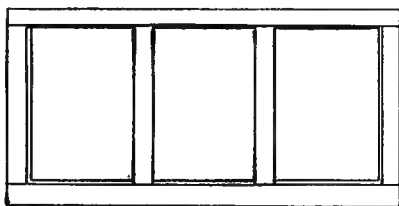
Nail a strip of scantling flush with the upper and inner edge of each side, using roofing nails, with short points and large heads.

Flush with the lower and inner edge of each

side nail a strip of light board, as thick as the scantling, and at least six inches wide.

Five strips of scantling are used as upright stays, nailed on the inside, between the edge pieces, as shown in the illustration.

Remember that these slanting sides are not reversible. Before nailing on the supports, stand



Back piece of the paper coop, reinforced with strips of scantling

them facing each other to make sure which is the inside.

The back wall of the coop is merely a strip of wall-board five feet long by three feet high, edged and strengthened with strips of scantling.

To assemble the coop, lay the bottom on a level surface, nail the back to the floor by driving the nails through the scantling at its lower edge into the edge of the floor boards themselves. Then nail the side pieces on each side. As they are two

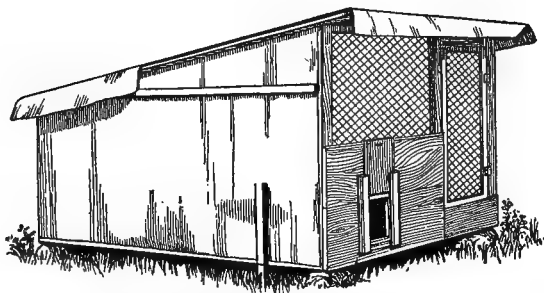
inches longer than the floor they will, if started flush with the front corner of the floor, extend beyond the rear guard board and come flush with the edge of the back, so nails may be driven through the scantling on the edge of the sides, into that on the edge of the back, making a firm joint.

This completes the coop, except for the top and front.

The top is made of two pieces of wall-board two and a half feet wide, edged and braced like the other pieces. The center brace, when the strips are pieced, should be a six-inch board, to give the middle a firm support. These will probably be six feet long, unless an overhang is desired, but new measurements should be taken now, after the sides are up, so the top will have its edges even with the back and sides. It is a simple matter to drive a few nails through the edge pieces of the top into the side trimmings, which will hold it solidly in place.

Roofing paper of any good grade may easily be laid over the top, so it will extend beyond the edge four inches. In the picture this overlap is partly removed, showing the joint between the top and side pieces.

The front is mostly open. Across the top a strip of scantling holds the sides firm. From this to the bottom platform a four-inch board is nailed two feet from the right front side. This forms the doorway. Then three-foot boards, as shown in the picture, are nailed half-way up on the other



A paper coop. This is cheap, easy to build, light, dry, and snug. It may be taken apart at any time, and lasts several years in good condition

side. Through these the little door is cut, as described in the plan for the smaller coop.

The large door is two feet wide, high enough to fill up the space, and swings on strap hinges.

The space to the left of the door is filled with chicken wire with a one-inch mesh.

When the house was built five years ago, some

doubt was felt about the rain-shedding quality of the wall-board, so the side shown here was covered with roofing paper as an experiment.

It proved, however, that the wall-board took ordinary house paint extremely well, and the side not protected by roof paper is in good condition.

Setting up the house is an easy matter. Choose the location, then drive four stakes into the ground in pairs, just far enough apart one way to allow the house to set in between them, and four feet apart the other way.

Nail strips of scantling across from one stake to the other so that the house can be set up on them, about one foot up from the ground. The stakes will stand about one foot in from the front and back of the house, as shown in the picture.

Take care to have the front bar an inch lower than that behind, so that any rain which may blow in will run out again through the front, and not settle in the back of the coop.

Two people can easily carry the house and set it down on the cross-bars between the two stakes. A nail, driven through each stake into the floor of the coop, will hold it in a wind, which might tip such a light dwelling upside down.

This type of house has proved cheap, easy to build, and easy to move about. While it would not last so long as a wooden house, the present model is ample proof that it will last as long as most people care to have it. As a winter house for laying hens it would hardly serve, though it is well suited to shelter a few fowls who are in quarantine, and for roosters being fattened.

The chief value of a coop like this is for growing stock. It gives space enough for a round hoover in the center, and will provide comfortable quarters for fifty chickens till they are large enough to go into winter quarters.

CHAPTER VII

HOUSES FOR HENS

IF chickens are housed in sixty varieties of coops, it is certain that apartments for hens cover a greater variation still. The reason for such a weird array of structures intended to shelter hens is probably because so many poets and newly-weds go in for hens. Such people have vivid imaginations, and surely only a quick and fertile imagination could plan out some of the châteaux dedicated to feathered flocks.

Starting with the great poultry houses having every modern device and equipment, costing as much as a good dwelling, we can pass in review actually hundreds of various buildings. Among the houses built especially for poultry we find the shed-roof, the span-roof, the monitor, and hip-roof; we have the open front, the closed front, the house with scratching shed, the portable house, and

finally the little A-shaped house, so small and cramped that one must either back in or back out, for there is no turning around therein, and even large hens wear off their tail feathers for lack of room.

Beside the buildings purposely constructed, we find unlimited adaptations. Hens are kept in old barns, sheds, cellars, carriage houses, old horse, electric, and steam cars, to say nothing of ancient hacks. If we add piano boxes and back steps we shall just be starting the list.

Although many of these various houses give satisfaction in some localities, and during certain parts of the year, the fact remains that if we expect results from hens we must provide certain essentials. Damp, dark, dirt, and drafts cause discomfort, disease, and disaster in any hen house. This means that houses must be dry and snug, must have plenty of sunlight and fresh air without drafts, and must give the fowls ample room to move about and exercise.

Fortunately all these requisites are to be had for small cost and little labor. Some of the adapted buildings prove excellent if they assure the poultry of sun, dry quarters, and good ventilation.

On a farm near me is a barn twenty-five by thirty feet, which has been used during the past four years. It provides all essentials except ample sunlight. Still, by leaving the doors wide open during all sunny days, when the wind is not too high, the hens get some sunlight through the winter months during several hours of the day.

Over a hundred White Leghorns have been entertained here in one flock with excellent results. In very cold spells they stop laying rather abruptly, as they are somewhat exposed. They start up again promptly, however, when the mercury rises to normal winter standards, and have averaged more than a hundred and sixty eggs a year. It is fair to add that the flock kept in this barn has paid during four years the coöperative bank dues on a four-thousand-dollar farm.

Many more pictures and suggestions for makeshift poultry houses could be given, but such advice would not be helpful in the end. Of many such buildings looked into, only one or two proved really suitable for poultry. Since a building which is suitable costs so little, is so easy to build, and contributes so much to the pleasure and comfort of both fowls and keeper, as well as to the eventual

success of the undertaking, why use a makeshift and run the risk of failure?

Your decision on this matter will tell what kind of a person you are. Unless you provide a building which, when ready for the flock, has sunlight in all parts, has good ventilation, room for comfort and exercise, and freedom from damp and dirt, the chances of success are not great.

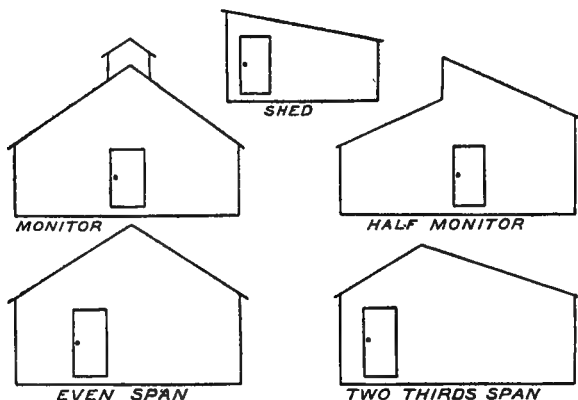
Success with poultry is not a matter of grand ideas, but of strict attention to small details.

ROOF TYPES

There are several roof types used in poultry house construction which are to fill certain needs.

The shed roof is the type experience has proved most useful in small houses. It requires little cost in labor and materials, and makes a high front possible, letting in ample light and air. All water is carried to the rear, making only one eave trough necessary, if such are used, and keeps the front of the house dry and clean. A shed roof is also cool in summer, for the slope of the roof is towards the north, and does not receive the direct rays of the hot sun.

A building having a span roof adds some details not given in the shed. This provides a garret, or upper chamber space, where hay and other roughage may be stored for winter use, and the room below will be more protected from heat and cold.



Roof types

This advantage is more than offset however by the extra cost of construction, and the pests that may harbor in the litter.

The monitor and half monitor roofs are used by some for large plants, where they want wide floors. They are not suited for smaller plants and prove none too good for large ones, making a peak into which the warm air rises rapidly in winter.

The A-shaped roof has been advocated as an economical way of covering a small floor space. It serves as roof and sides also, but this is so cramped and so difficult to ventilate well without admitting too much weather that few practical poultry men make use of it.

MATERIALS

Probably the best material for use in the construction of hen houses is wood and roofing paper.

Hollow tile is very satisfactory, but is expensive, and adds nothing that wood does not provide. When the argument is made that the hollow tile retards heat and cold better than wood, remember that the roof will not be of tile, and the front should be mostly open. The side walls and back make up about two fifths of the total exposed area of an ordinary poultry house, so that argument is not very important. Besides this, it is great fun tinkering round in the hen house, driving nails here and there to put up nests and roosts and feed boxes. I never have found any enjoyment in driving nails through hollow tile.

Cement blocks are good for construction also,

but have all the expense of tile and are not convenient to handle.

Brick and stone are costly, and are likely to be damp and cold. They are not equal to wood.

Cement is not suited for building houses for poultry. Concrete and solid masonry draw moisture during damp weather, just as a wick does oil.

There is no question that wood is the best and cheapest material under ordinary conditions.

The lumber for poultry houses need not be new, but the sills and timbers should be firm and strong, for they will be depended on to stand the strain of time and weather.

In buying lumber, southern pine boards of second quality milled with tongue and groove make very satisfactory material, at a comparatively low price. Spruce and pine are good, and easier to work with than the southern pine, but in many places they are more expensive. Any lumber that is available in your locality will probably give adequate service.

LOCATION

Yard or no Yard.—The first question to settle is where the house shall go, and before this is

cleared up we must make up our minds whether we want a yard or not.

There was a time when everyone who kept hens thought a yard was necessary, but this idea is rapidly passing away, for most excellent reasons. Unless you can provide a double yard, so hens can change from one to the other, or can give the birds room to wander over a large piece of well-drained ground, it is much better to have no yard at all.

That type of yard where the hens gather in drowsy groups studying the insect problem; where the flies gather in summer, and the mud in winter; where rain stays for hours after a shower, and then leaves a hard, fowl-smelling surface in the hot sun, cannot be ended too soon. It spreads disease and disgust among the hens, and those who care for them. But there are still thousands in daily use, as your new tan shoes will find to their cost, if you go about looking for poultry items of interest.

The Double Yard.—There are, here and there, especially in poultry books, double yards, which give great satisfaction, especially to editors and authors. The plan is to let the hens run on one side of a divided yard while you are digging up and

planting the other side to some green plant that grows quickly, such as rye, or rape. When this is well sprouted you allow the poultry to run in and feed on that, while you cultivate the other half.

Of course you won't be planting anything here in winter, and nothing will grow much in many States, except in the spring and early summer; but if you love work and don't care what you work at, the double yard is all right. Your egg yield, however, if you keep the birds in a comfortable house, and throw them fresh greens, will be just as great, if not greater, and you can have the yard for a garden.

The Large Yard.—A large yard, such as part of an orchard, or shady place so large that the fowls do not kill off all vegetation, offers some advantages. The hens can wander about and get a good deal of their food in the summer from insects, weeds, and fallen fruit. They eat many insects and grubs, and fertilize the earth, thus helping distinctly towards better crops.

Practical men, however, who have let their hens run thus, and then tried them confined to the house, say that the egg yield is actually better when the

hens do not wander. When confined, the hen must eat what and when her owner wishes; when she runs about she often eats what and when she wishes. The regulated diet proves the best.

Besides this, there is a growing opinion that ground where poultry runs becomes infected far more easily than has been supposed, and even large yards expose fowls to this danger. The house is always under our control. We may clean it when we will and remove every scrap of litter, which can hardly be done in a yard.

It seems reasonable, then, to consider the location of the house without placing too much importance on yard space, and to plan the building so the flock will be comfortable, if kept confined.

Off the Ground.—The matter of location is determined to a certain degree also by the floor of the house. If the floor is on the ground, the home must at any cost be on a dry, well-drained location. If the floor is off the ground you need not worry so much about drainage, and if you want to be up to date, and make a real profit, you will build your floor off the ground.

When your hen-house floor is a foot or more off

the ground you *know* it is dry, and safe from rats. When it is on the ground you *hope* it is.

Hope gilds the uncertain stream we venture o'er,
But knowledge guides us safe from shore to shore.

A week ago I saw a chicken coop where fourteen Barred Rock chickens, three months old, were captured by rats in a single night. The coop stands flat on the ground. There might have been a rat family right beneath it, while we viewed the scene, and probably was eating fourteen dollars' worth of chickens. Fourteen dollars buys a good hen house, well equipped. If the coop had been above the ground, the cats could have followed the rats. Now the rats keep house in high style right next the base of supplies.

If you think it is easier and cheaper to put the house on the ground, read the following instructions from one of the latest professional books: "Excavate the soil inside the house to a depth of at least eight inches. Place a layer of crushed stone, cinders, or coarse gravel eight inches thick over the bottom, tamping thoroughly and leaving it level. Over this place a rough coat of concrete about three inches thick. Put one thickness of tarred building

paper over the rough coat, lapping and cementing the seams, and nailing it down. One inch of finish coat should be laid over the paper."

All this, mind you, must be aided by a carefully planned drainage system to carry off water from all sides of the house. As a fact, with all this care, such houses are not dry, and open fronts have been used to overcome the damp.

Have you lived in a house where the cellar was dry at all seasons? Few house cellars keep dry, though all houses are built with a careful plan to drain the water away.

When the snow and ice pile up on the north side of this house, in the late winter and early spring, it is going to be damp and you can't help it.

Does it not sound more simple to put in posts, lay your sills on them, and nail a good tight floor to the sill? A hen house built with the floor well above the ground will be dry in all seasons, and no rain, snow, or slush can soak in. It will be free from rats, as they will have no place to harbor beneath it, and the cats will keep them on the move, as rats seldom linger far from a safe retreat.

The floor and sills of such a house will not decay, as they would very promptly if near the ground.

An additional point in favor, is the space provided beneath for boxes, nests, wheel-barrows, and tools. A four-foot rise beneath allows a very convenient space for such storage.

If we want a yard, then, we must place the house with respect to a yard the hens can use. But if we plan to keep the laying hens confined in a house above ground, a practice rapidly spreading among the best poultry men, we can choose any convenient location, sheltered as much as possible from north winds and open to the sun.

Do not put the hens too far away from the house. To get the best results they should be visited frequently. They are fond of the house people, and like personal attention. If they are remote, it is hard for women to go to them in snow and wet weather, and it is a temptation for people who have roast-chicken appetites and nocturnal habits. A neat hen house is an honor to the poor and a credit to the wealthy. There is no need to hide it.

CHAPTER VIII

AN IDEAL HOUSE

FORTUNATELY in this business the best is not only the cheapest, but, to a large degree, the cheapest is the best. It seems to be the general agreement that for the small flock a square house with a shed roof and ample window space is the cheapest and best form of dwelling you can choose.

If we wish to enlarge the house we need only enlarge lengthwise, using the first square as a unit. If we have the first house ten feet square, and wish to double the size, we may simply put another house ten feet square next to the first, leaving out the side wall.

If we want to put in a big house, one hundred feet long or more, it is better to make the width sixteen feet, as this width has proved most economical in long houses.

Changes may be made from the square house to

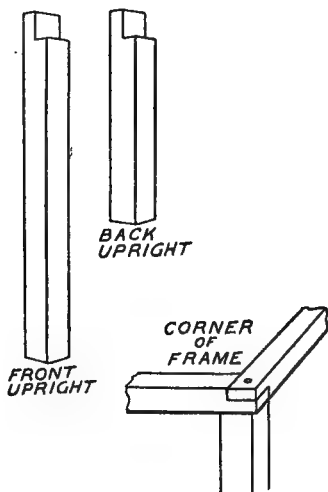
one slightly oblong if we have lumber that cuts better that way. Instead of a house ten feet square we might have one twelve by eight, or ten by eight. It would not be wise to make one fourteen by six. Such a house invites drafts, and does not combine ventilation and shelter well. The nearer to the square we get, the better the house will be for hen purposes.

Suppose, now, that we decide that we will be guided by experience, and build a simple, sunny house, and start out in a small, safe way.

Size of House.—The size of the house depends on the number of laying hens you wish to keep. As it is about as easy to care for twenty-five as for a dozen, and easier to make use of the table-scrap in a flock of twenty-five, the wise plan would be to build for that number. There is always a sale at retail prices almost at your door for the eggs such a flock would lay, and the cash return, is not to be sneezed at.

Four square feet to each bird is the least which should be allowed for health and comfort. A flock of twenty-five would call for a house ten feet square. But, as a little more room will give a little better result, let us decide to make our house ten feet deep by twelve feet long.

Foundation.—Eight stout posts are needed to set the sills on, one at each corner and a pair in the middle. These may be of cedar, of four-by-four lumber, of two pieces of two-by-four lumber nailed together, or of brick. For the amateur, bricks are

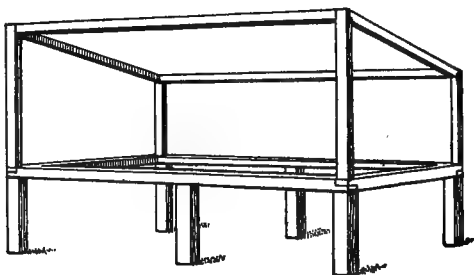


not easy to handle. Cedar is the best, six inches in diameter, as it will last a life-time. Sawn lumber should be painted with tar to protect it from decay.

Posts may be set firmly in holes two feet deep, or in concrete about one foot deep and two feet

across. Either way is satisfactory. Set the posts so the house will face about south, or slightly south-east. If the house stands four feet up, room will be given for storing tools beneath it.

The Frame.—When the posts are set, lay the sills across them. These are pieces of two-by-



Frame of house set up on posts, ready for side boards and roof

four lumber, two, twelve feet long and two ten feet long. By cutting them, four inches back from the end, half-way through each piece, and sawing out a section four inches long by one inch deep, we can match the ends so the sills will lie even all around. A five-inch spike, driven through the corners into the posts, will hold all firmly in place.

At the two front corners uprights of two-by-four stock, six feet high, should be erected, so that

they stand exactly flush with the edges of the sills. For a building this size it is satisfactory to nail these in place by driving four- or five-inch nails through their lower edges, obliquely into the floor. After the cross pieces are in place, there will be no more strain at this point. These uprights should be cut four inches down from the top, on the front side, for the front top piece, and the rear for the back top piece, and a piece four inches long by two wide should be cut out.

Two uprights at the rear, five feet high, will allow for sufficient roof pitch, and room for roosts. These uprights should have their narrow two-inch edges facing the front and back.

Now two pieces of two-by-four should be placed at the top of the front pair and the back pair of uprights, each being twelve feet long, the length of the sills. Then the long cross pieces may be seated flush with the front and rear of the uprights, so the wall-boards will fit tight all around. When the cross pieces are set in place a nail will hold them snug against the uprights.

The ten-foot top cross pieces going from front to back need no cuts made for them. A small block nailed to the upright, four inches from the top, will



A CHEAP, DESIRABLE HEN HOUSE

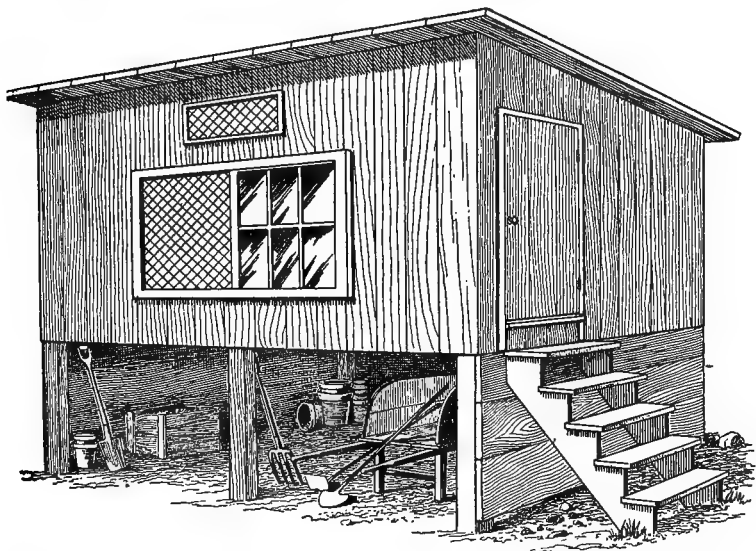
support the weight, and nails driven obliquely into the upright make the joint solid. While driving these nails, have a heavy weight held to the post to avoid wrenching the joints already made.

Now another long cross piece, twelve feet, should go half-way between the front and back cross pieces, to support the roof boards in the middle. This should be of two-by-four stock, and may be fastened in place by four- or five-inch nails, driven through the end top pieces into the middle roof support. A small block beneath each end will give added strength.

Twenty inches up from the front sill, a two-by-four piece twelve feet long should be nailed. Drive the nails through the front uprights, and make the ends flush with them. This serves as window sill. There must be another piece above the window space to hold the upper part of the front wall. Just where this will go depends on the size of the window.

Windows and Ventilation.—It frequently happens that there are storm windows about the place, or other window frames in good condition that we can use, and save the expense of new windows. If these are at hand the size of the open-

ing should be made according to the size of the window. If, for instance, the window is three feet



An ideal house for a small flock. The pitch of the roof and the window space are greater in the specifications than they appear in the picture. There is no harm in giving most of the front to window space

In winter the window may remain closed, and the door be opened in good weather for extra light and air. In stormy weather the small window provides air enough. In summer the door should always remain open, with a wire door inside to keep the flock at home

high, we would put the upper window stringer sixteen inches from the roof.

You can't have too much window space in the

front of this house. Two ordinary frames like those used for storm windows, would serve well. No extra time or work need be taken putting these in. A six-inch board may be nailed from the front roof stringer to the sill, outside, in the middle of the front, and the windows may be screwed in place from the outside.

These windows need not be moved or opened during the winter months, in Northern States, but should be taken off the first of April or May, when wire netting, nailed on the inside, will take their place.

If windows are to be bought, we can choose from the illustration the type we prefer. A window that swings on hinges will serve well in this type of house. It is usually better to have them swing inward than outward, as they are less liable to damage. On the whole, windows on hinges are better than those screwed in place, as they can be opened on warm sunny days all through the year. If they open inward, wire netting should be nailed on the outside.

Double glass in such sash will give a slight advantage in keeping the temperature a little more even as night comes on, but there is nothing to show that this is important.

Ventilation in hen houses has been discussed widely, and at present open fronts and muslin windows, instead of glass, are advised. This advice, however, is based on conditions in houses built on the ground. The problem is very different where the floor is entirely off the ground.

I have never yet entered a house in winter, where muslin had replaced all glass, in which the hens seemed to enjoy life. They are cold, cheerless, and dull. There is little temptation to kick around and burrow in the litter, and, though ventilation is assured, the rays of the sun, the chief blessing of hen-kind, and Nature's great purifier, are shut out.

Where the floor is off the ground and the front is well glassed, the rays of the sun on cold winter days penetrate to all corners of the house, and fall warm and soft upon the floor. As this does not touch the ground, there is no way in which these warm rays can draw up moisture. The house stays dry, and, during many hours of the day, will be warm and cosy. The fowls will be active and happy.

The matter of variation of temperature is largely theoretical. Many declare that the drop from this warm room at midday to the cold surroundings at

night, will be harmful to the fowls, but there is little experience to support such a theory. The comfort and pleasure fowls get in a sunny, warm house during the day is clear to any one who knows hens. It is a distinct factor in the winter egg total.

In setting these windows, no special care need be taken to make them tight around the edges. A crack here and there will admit no more air than is needed. A crack in the back of the house is a serious defect, but the front may admit air without harm.

Fresh air is as necessary for hens as it is for us, though with twenty-five hens in a house ten-by-twelve, kept clean, we may shut the doors and windows cold nights and blustery days without fear of harm. It is wise, however, to plan in some definite way for ventilation which shall be constant, and this may be done by leaving small windows, as shown in the illustration, above the regular windows, and cover them with muslin. These are merely square or oblong openings, framed about with scantling. Such windows provide adequate ventilation during those days and nights when storms and heavy weather make it necessary to close doors and windows, but when it

would be too damp to leave the flock without a constant change of air. Such days come often in February and March in most States.

During good weather the door may be left open, and the door of wire netting, which will be used through the summer in place of the wooden door, will keep the hens at home.

The Roof.—The roof of a house ten feet deep is, very easy to construct. The boards should be cut eleven feet, or possibly two or three inches less, but should provide a generous overhang in front, to protect window spaces in storms. These boards should be nailed securely in place with strong nails. Cut-iron nails are the best, as they wedge into the wood and stay put. Galvanized nails will not serve well, as they are likely to work loose. A nail which works loose means a hole in the roof paper before long. After that is put on there is no way to drive them in again.

Lay the boards flush with the edge of the rear roof stringer and allow an overhang seven eighths of an inch on each side, to cover the sawed edges of the side boards.

If tempted to plan an overhang for the rear, remember that this side must be absolutely tight.

It is by no means easy to fit a joint up under an overhanging roof that will be wind tight, but it is very easy to lap the roof paper down over a flush corner, so no air can leak through. This rear roof corner is just where the hens are going to roost, and every precaution should be taken to shelter them.

The Door.—The doorway should be about twenty-six inches wide and five feet high, placed on the east end of the house. Two pieces of stock, two inches square, or strong pieces of board, would do as uprights for door frames. They are nailed flush with the outside edges of the sill and roof piece. The door itself can easily be made of three or four pieces of matched board, five feet long, nailed securely on cleats. It swings on strong strap hinges.

Side Walls and Rear.—The easiest way to plan the side wall and rear is to nail the boards vertically. These should be of sound stock, tongued and grooved, and should fit snug up under the lap of the roof edges. A double back wall, with dead air space, is often planned in the Northern States, and a double roof is sometimes used in hot climates.

Floor.—If you can afford it, put in a double

floor, in regions where winters are cold, with roofing paper between each layer. One twelve-foot piece of two-by-four stock will serve as a center brace for the floor. Support it in the middle by a stout post.

If the double floor seems rather costly, a single floor, with thick litter will give good service. It must be of clear stock, and carefully tongued and grooved, as any crack or knot hole will let wind in and litter out.

Waterproof Covering.—The cheapest and most practical covering to keep wind and wet away from our egg factory is good roofing paper, which comes down on all sides to the lower edge. Do not use cheap covering like tarred felt for this purpose, as that will last but a year or two. A good quality covering of standard manufacture will cost little more and will last a long time.

In laying roof paper, as in many other jobs in life, we must begin at the bottom and work up. First carry a strip round the back from the door to the front edge on the west side, the lower edge even with the lower edge of the wall. The next, strip will lie flat on the lower part of the roof, lapping over on both sides and rear, enough to

overlap the first strip at least four inches. The upper strips are easily laid on in the same way. Full directions for handling and fastening the various covers always come with the rolls of paper.

CHAPTER IX

FURNITURE

THE furniture for this dwelling is simple, inexpensive, and easy to install. It includes roosts, dropping boards, nests, dust box, mash and grit boxes, feed trough, and a place for water basins.

Dropping Boards.—The matter of dropping boards in a house where the flock is confined has lately been questioned in some parts of the country. The accepted custom has been to provide board platforms beneath roosting hens, to catch the droppings at night. These may then be cleared away frequently, removing that much waste matter from the house. Experiments have been made with roosts set up on horses, so they never touch the walls, and allow the droppings to fall directly into the scratching litter, where they stay, even for months.

No bad results were noticed from this practice,

and, when the climate is dry, such a plan might work very well. Although unpleasant at first, the droppings would soon be dry, and ground to dust under the feet of active hens. It must be remembered that during the year droppings gather in large quantities in all houses, and are not harmful or offensive unless they get damp. Those voided at night, added to these, would probably make no great difference.

Careful hen men, however, have declined this suggestion, and it is not because of fogey notions or hide-bound ideas. The poultry raiser to-day is a spry fellow; he must be, or he wouldn't stay in the business long. A flock of hens will soon finish the acid test of their pastor, and prove the answer.

In favor of the roost across horses, without dropping boards, is the labor saved in cleaning, and the protection against lice. These roosts touch the walls at no point, may be removed entirely from the house for a thorough cleaning, and will not be contaminated quickly when put back into the house.

The dropping boards however are important for several reasons:

In all locations where the air is moist at times, as it is in the Far West and all the Eastern States, it is really important to clear out as much manure as possible, which is always offensive in damp weather.

The droppings themselves, when kept pure, or mixed with crude potash or rock phosphate, are highly valuable as dressing in the garden, and are easier to handle well in this state than when scratched into the litter. The dropping boards come up close beneath the hens and make their sleep more comfortable, shutting off most of the moving air on cold nights.

Eggs which are laid at night, and many are laid from the roosts, seldom break, and are seldom touched by the hens on the dropping boards. If they fall to the litter below they are almost sure to break, where the hens will find and eat them in the morning. Here is the starting point of the egg-eater. Nothing gets on the nerves more than the habit of egg-eating. Hens always eat broken eggs, and if they get the taste, soon begin to break them for themselves. The dropping boards are important for this reason alone.

Dropping boards give an extra space for fowls

to wander over, and, if they are covered with sifted hard-coal ashes, they give a valuable addition to the daily bill of fare.

The weight of the argument is greatly in favor of dropping boards. Put them high enough from the floor so you can get underneath for fowls and eggs when you need to. Three feet is enough. The simplest way to support them is to nail a piece of board, about three feet long to the ends of the house, starting close to the back. In the center, a post of two-by-four, three feet and ten inches high, may be stood, three feet from the back wall. Then strips of scantling can be nailed, one at the top, and one three feet from the floor, reaching horizontally to the back wall, one supporting the middle of the dropping boards, and the other the roosts.

Upon these supports the dropping boards, three feet wide, may be nailed. Shove them close to the back of the house, so they fit snug. They must be tongued and grooved, or be planed to fit without a crack.

Roosts.—The roosts go about ten inches above the dropping boards. They may be two-by-four, two-by-two, or even of scantling, unless it is frail.

Pieces of scantling, nailed to the end walls, ten inches above the dropping boards, will support them. Two roosts, twelve feet long, give ample room for twenty-five hens. The first one goes ten inches from the wall, and the second ten inches from the first. Nail them lightly in place, so it will be easy to take them out. See to it that the edges of the roost are rounded and smooth. When a hen sits down, her claws contract, and they can't let go, even if they would like to, when sharp edges hurt. Pleasant dreams never hurt the egg record.

Some people nail the roosts on a frame, hinged at the back, and raise the whole frame in the morning, fastening it to the roof with a button or hook during the day. This is said to keep hens more active, and make it easier to clean the boards. It is one more thing to remember, however, morning and night, and there is no proof that hens do not get benefit from a brief nap during the day, away from the crowd. Every one who has to scratch for a living is entitled to what rest he can get. If hens are not properly handled they will loaf anyway. It is the plan of feeding, not the furniture, that counts.



FRUIT BOXES TURNED TO GOOD USE

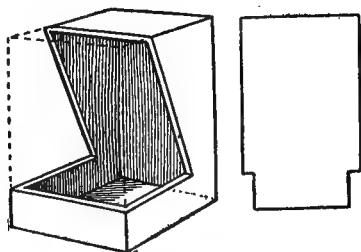
Nests.—Orange, lemon, or egg boxes make excellent nests. They cost nothing, and come already divided, just the right size for the hens. All we have to do is to nail a strip of the cover three or four inches wide across the lower part of the open front, to keep the hay in place. Do not nail these to the wall. Make a shelf at the end away from the door, about the height of the dropping boards, and put the nests on that. Three boxes are enough for twenty-five hens.

The nesting material may be of hay, straw, fine excelsior, or fine shavings. Soft hay is probably the best, though fine straw and excelsior give good results. Be sure to keep the nesting material fresh and clean.

Dust Box.—A box about a foot deep, large enough for two hens to kick around in, must be provided, for a dust box. It should be set up on legs at least a foot high, so litter from the floor will not be thrown in.

The bath may be of dry earth or sifted ashes. Sifted hard-coal ashes can be had in most places, and seem to give the hens more satisfaction than most types of earth. Fill the box half full, and renew every three or four months.

Mash Boxes.—A box for dry mash should be provided, no matter what the general plan of feeding may be. There are many good metal boxes, some with grated fronts, like that in the picture. Of the two shown, the wooden box has proved the better. It has a deep trough, from



*The soap box cut down for a dry mash hopper,
and cover of front, cut so it will fit
down into the tray*

which hens can throw nothing with their bills, and no new food can be touched until all before the fowls is eaten. There are always greedy hens, good fighters, who crowd in when the box is opened, and, if the box allows it, pick here and there for pieces of beef scrap and morsels they like best. Then they leave the common victuals to their weaker sisters.

To make a mash box like that in the illustration,



DRY MASH HOPPERS

a tight wooden box is needed. The one photographed is a soap box, twenty-two inches long, by sixteen wide, and is one foot deep. Any box of dimensions about the same will do. First cut a hole in one end with a key-hole saw, about six by eight inches. The mash will be poured in here. By nailing strips one inch wide about the edges of the piece cut out, we can turn it into a good cover, if pieces of board are scarce. Fasten it in place by small hinges, or pieces of leather.

Next remove the cover of the box. Now saw a triangle out of each side. To support the side pieces while sawing, and to strengthen them while in use later, nail a light strip to the side so it will run from the front upper corner, down to a point seven inches from the bottom, and four inches from the back. Then another strip should be nailed along a line slanting from the lowest point of the first strip to the front edge, five inches from the bottom. Cut along these strips, taking a triangle from each side, as shown in the illustration.

The cover may now be used again, with a slight change. In order to nail it along the slanting front edges, and allow four inches of it to slide down below the sides of the bottom tray, the

lower edges must be cut just enough, four inches up, to let it fit snugly against the sides of the lower tray. Before it is fastened in place, nail a strip one inch square across the front, five inches from the bottom, to hold the ends of the slats. The lower edge of the front should come about two and a half inches from the bottom of the tray. This leaves space for the mash to feed down to the hens by its own weight, as fast as it is cleaned up, but no more can come down until that in the tray is well cleaned up.

A lip, or strip of wood two and a half inches wide, is to be nailed across the top of the front edge of the tray. This keeps the mash from being spilled out.

Slats, as shown in the picture, should be nailed across from the lip to the strip on the front. These are two and a half inches apart, and keep the hens from scattering the mash about with a side swing of the head, which they will always do if they can. A piece of thin board, just wide enough to cover the open space at the top of the tray, should be provided to slide under these slats, and keep the fowls away from the mash during the morning.

The mash box should hang well up from the floor, away from flying bits of litter. A foot or eighteen inches will be high enough. Bore small holes in the back at the top. Nail heads will pass through these and hold the box firmly in place.

A low perch should be fixed in front of it, level with the lower edge, and about six inches away.

Grit and Shell Boxes.—Grit and shells should always be where fowls of all ages can get them, and their absence from the laying house will be fatal. If we add dry cracked bone in the laying house, and charcoal, under certain conditions, we shall add to our success with the flock.

I spent ten years trying various hoppers for feeding these condiments to fowls, and have come down to a very simple plan. The bone is thrown into the tray of the dry-mash box. There it mixes with the dry mash more or less, but is soon eaten, when more may be thrown in. The grit and shells are mixed in the box described below. As there is much gravel on the floor of the house, and sifted coal ashes are always present, these hens eat little grit. Where grit on the floor is absent, a separate grit box will be necessary. If charcoal is served, that can be put into the same kind of box.

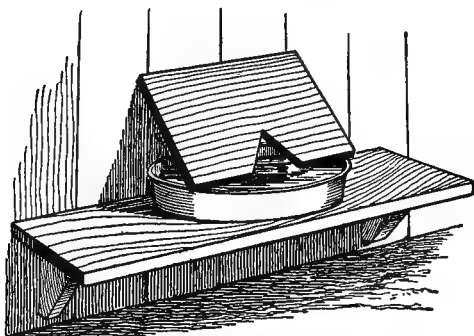
The hopper illustrated is simply a box six inches square, cut down. The cut is made in the middle, and leaves a tray three inches deep, with a hopper three inches wide by six inches deep. Holes bored in the back, near the top, serve to hang it up out of the litter.

The type of hopper where several slots feed down grit, shells, and bone into small trays, side by side, has proved unsatisfactory. Hens will not eat shells or grit when the material is dusty or stale, and before long the shells in such a tray get mixed with other matter. If you want to dump it to clean out dust, you may have one slot nearly full, while the next is nearly empty.

The various materials are, of course, all mixed together when the hopper is dumped. Beware of all fancy patent dishes for serving hens. Fowls are disciples of the simple life, and simple things appeal most to their taste. They will eat more shell and grit from a lot freshly placed in the little wooden box, than out of any patent device ever invented, and they can never eat too much grit or shell.

Water Basins.—While chickens are developing through the summer months, the water fountains

described later, of the syphon type, prove the best. They are easily moved about; they keep the water in and the chickens out. But when the flock has grown, and is in winter quarters, this type of fountain gives place to an open basin.



*A shelf for water pan, and board to protect the water.
This keeps dust out of the water, and prevents
hens from stepping in their drink*

Perhaps the most satisfactory kind is an agate-lined pan, bought at the ten-cent store. It holds about a gallon, and is used frequently as a milk pan.

In cold winter weather the ice forms slowly on such a pan, and may freeze thick without doing any harm. A heavy freeze splits and ruins the syphon fountain, but the agate pan slopes at just

The Hen at Work

the right angle to avoid injury, and a little warm water will clear all in a moment. This agate pan is also easy to keep clean. A few strokes of a cloth or mop, daily, keep it fresh and sweet.

Put a shelf about two feet from the floor in a convenient spot, wide enough to hold the pan. Set the pan in place. Then fasten another board with a V cut in it so it slants down and covers the pan. The slant keeps hens from roosting and sitting about on the board, and the V enables the hens to put their heads in to drink.



DRINKING FOUNTAINS

CHAPTER X

HATCHING UNDER HENS

BEFORE we can start to hatch with hens, the nests must be ready, the eggs must be ready, and the hens must be ready.

The Nest.—As spring approaches make up your mind where you can best put Biddy away in seclusion for three weeks. Quiet and freedom from disturbance are essential; those being secured, we may set hens in many places with entire success.

Perhaps the most satisfactory plan is to set her in a small coop like that in the picture on page 58. This ensures quiet, seclusion, fresh air, and a chance to exercise a little each day. A nest in a small house like that shown on page 66 with or without a run is also desirable. Other places where nests may be put with success are: a vacant room, with floor covered with paper and chaff, down cellar, if not too musty, under back steps, in

the barn loft, in a barrel, or in any sheltered spot where she can be by herself.

It is not wise to have two hens sitting where they can visit together, and laying hens must be kept strictly away. Sitting hens have hasty tempers, and a first-class fight will turn a sitting of eggs into second-class omelette. A hen often decides to swap nests without asking the owner of her new choice, and this leads to trouble. If laying hens are in the same apartment, they are always glad to lay just one more in the batch, for good luck, and we are likely to find five or six extra eggs in our sitting that we don't want there at all. Keep all sitting hens strictly in solitary confinement.

In this business attention to small details spells success in the long run, and the nest must be carefully prepared. Get a shallow box at least a foot square. It may be larger, even up to two feet square, any size to hold a hen comfortably on thirteen eggs without crowding. It should not be over five inches high. A deeper box may easily be cut down to about four inches. If two sides only are cut down, leaving two sides several inches high, the result will be satisfactory.

In the bottom of the box put fresh, damp earth, placed so that it makes a layer about one inch thick in the center, and slopes up to about three inches on the sides, making a saucer-shaped hollow, to keep the eggs from rolling away. It is true that eggs will hatch if placed on dry hay, but the results will not be so good. In the natural state a hen will hide her nest on the ground, which, in the spring, is always cool and moist. This moisture plays an important part in incubation.

Over the earth arrange some soft hay, fine straw, or soft excelsior, so that it forms a neat hollow, broad enough to hold the eggs lying loosely, side by side. Now sprinkle the hay liberally with lice powder to keep the mother comfortable, and the chick as free as possible from vermin. Powdered tobacco is good for this; and the powder sold by standard houses is satisfactory.

The box may now be placed in the corner of the coop. Leave no spaces between the box and the wall. Fill them up with earth or hay, so the chicks cannot get caught there when hatched. Pile earth or ashes beside the box, to make a slope from the floor to the top of the nest. Some of the chicks

may run out before the hen is ready to leave her nest, and they will be unable to return to shelter unless a sloping bank is provided, but will die in a short time right under the beak of their poor mother, who can do nothing but cluck and watch them perish.

Eggs for Hatching.—The eggs for hatching will be selected from hens you have set apart for breeding, according to the plan outlined in the chapter on breeding pens, or they will be purchased from poultry men who specialize on breeding stock. Do not buy eggs from flocks confined in houses, nor from people who are inexperienced in breeding, unless for some special reason. Reliable dealers usually sell utility eggs at reasonable rates. For the home flock costly eggs from fancy matings are not necessary and will usually prove a useless expense.

When eggs are shipped for hatching, the germs, which will later develop into chicks, are usually displaced by the shaking the eggs receive. If these eggs are started at once the germs will, in many cases, develop in the wrong position, and the hatch will be poor. Such eggs should be laid on their side in a cool, airy spot for about a day,

to allow the germs to swing back into place before incubation begins.

In selecting eggs for hatching choose eggs as near the standard of your breed as possible. Leg-horn eggs should be cream white. Tinted ones should be discarded. Those of the Rocks and Reds should be a rich brown, and light shades should be thrown out. The shell should be smooth, and free from rings or warts or rough places. Any thick spots, or rings, make it hard for the chick to break out when he is ready for the great adventure.

There is good evidence to show that hens which have done little or nothing in the winter often lay the largest, handsomest eggs during the hatching season. As chicks from such hens will probably lay few eggs themselves, be on your guard. Eggs much over standard size, from twenty-four to twenty-six ounces a dozen, as given in the chapter "Comparisons of Four Leading Breeds," are not safe, however promising they may look.

Every now and then a claim is made that the shape of eggs will control to some extent the number of pullets in the hatch. Round eggs have been recommended most earnestly as producing a

high average of pullets. No such results should be expected, however. If you set round eggs you are likely to get hens that lay round eggs, and the total results will probably be poor. Choose the egg that is recognized as standard in size, color, and shape for the breed you handle.

In the early spring months, when many wish to get started with incubation, the nests must be visited frequently. During February and March the temperature will be low, and an hour or two in freezing weather may kill the germ in the egg.

Even on mild days the eggs should be gathered at least twice daily, not only to keep them from freezing, but to get them as clean as possible. Dirty eggs should not be used. Washing hurts the egg for hatching, as it damages the pores through which oxygen passes in to the embryo chick.

Those having small flocks can seldom provide enough eggs in one day for hatching, as only part of the total lay are satisfactory. Until the eggs can be used, they should be put in a cool, airy place. A well-ventilated cellar, or pantry, where the temperature runs between fifty and seventy degrees will be suitable. Below fifty the germ

may die. Above seventy it will incubate. They should lie upon their sides, and should be turned half over every two days, to keep the germ from rising with the yolk to the top, and adhering to the membrane.

Eggs for hatching may be kept two weeks, if necessary, but the fresher they are when started, the stronger the germ is likely to be, and the better conditions it will have for development.

Collect frequently, select at once, smooth, clean, standard-sized eggs, store in a cool, airy spot, turn half over every two days, and place under the hen within two weeks.

Broody Hens.—One cluck does not make a broody hen, but clucks surely show which way the feathers blow. If you have a flock of Reds or Rocks, or any heavy breed, along in the spring you will find a hen that takes a long time in laying her egg, and makes a double racket when she leaves the nest. Later she refuses to leave at all, and now is the time to get the sitting nest ready.

But do not hurry in taking such a hen from the flock. If she is removed before the sitting fever is well advanced, and put in a strange place, she is likely to give up the idea and mess things. Wait

till she peeps out at you when you are serving supper, and stays right where she is. So long as she shows hunger, and comes off at evening feed, she is probably too restless to sit quietly.

It is not wise to use Leghorns, or other light breeds, for incubation. They frequently sit on the nest and behave for all the world as if they never would quit, but if given a rest and a sitting of eggs they suddenly make up their minds they would rather lay after all. Once in a while a Leghorn will make a very good mother, especially if she can steal her nest, but they are not to be trusted in general.

Another matter of importance is the body of the hen. The light breeds have little flesh and almost no fat. Both are needed in a good mother. A hen that goes on to the hatch in poor flesh will not have sufficient body heat to keep the temperature at a proper point. The strain of a long period of sitting will also tell on a thin bird, and she is likely to grow restless. For these reasons choose a fat, heavy hen for the sitter.

When we feel sure that the hen has settled down to real business it is time to let her start house-keeping. It is by no means as easy as it seems to

get a fowl to start incubation in the right way, especially in the early season, when cool nights seem to quench their desire to sit. There are several don'ts at this point.

Don't take her to the new nest early in the day. There is a tradition among the race most intimate with chickens that they should never be moved by broad daylight.

Do not attempt to set her directly on the eggs; such an introduction is too abrupt.

Do not try to confine her in a nest where there is just room for the eggs; you will wish you hadn't.

Don't keep running to see if she is covering the eggs, nor let the children visit her; she doesn't like company at such a time.

The best plan is to place the nest in the darkest corner of the house, or coop, where she is to stay, and scatter a little corn in a trail from the door to the nest. Then about sundown, remove madam to the new quarters, put her near the door, and leave her strictly alone.

I use the coop and run as shown in the picture. The eggs are placed in the back of the coop. Then a little corn is dropped near the entrance, both without and within the coop, and a dish of fresh

The Hen at Work

water placed at hand. Then the quietest hen is selected, treated for lice, and, at evening, dropped into the run.

At first she frequently runs about, and tries to escape; then she grows more quiet and stops to look around her. Seeing corn, her favorite food, and fresh water, she remembers that she is hungry. Gradually the hen works her way to the door of the coop. There is more corn just inside. She looks suspiciously about, but no one is watching. Cautiously she slips through the opening and follows the trail of corn.

In another moment, by the fading light, a neat nest with thirteen eggs appears to her enraptured gaze. All is quiet; she is well fed and watered. Here is just the chance she has been looking for, and if the hen has a spark of real motherhood she will nestle down with a contented cluck, and start off on her three weeks' vacation.

If the hen is still ramping around the run next day she probably is not ready to sit, but it may be that she needs a little longer to get used to her surroundings. Another day will settle the matter, and if the second morning dawns on eggs uncovered she must be returned to the flock.

It frequently happens that a hen will behave in this way at first, especially in early season, and will later quiet down and make a good hatch. If she fouls the nest and kicks the eggs about, however, a band should be put on her leg to mark her as a bad performer. She might behave better at another time, but other hens should be used first if they are at hand.

After the hen has settled down she seldom leaves the nest for forty-eight hours. Then she will want to eat, drink, and exercise a little, while the eggs are airing. There is no need of putting in food until the second day after she starts. Throw a handful of whole corn in the run. If she does not leave the nest lift her gently off the eggs and place her in the run. Inspect the eggs to see if they are whole and clean, and if foul, clean away the dirt.

Whole corn is the most satisfactory food for a sitting hen. It quickly fills the crop, digests well, and provides heat and fat, much needed at this time. At the end of the hatch there is no stale food lying about for the chicks to eat, as there would be if she had broken grain or mash. Such musty food would be dangerous to the babies.

Besides the corn, supply fresh water, grit, and oyster shell. Scatter sifted hard-coal ashes an inch deep over the floor of the coop.

As the hatch proceeds, the nest should be inspected every two or three days, and, if the hen has not been off to eat her corn, she should be placed in the run and kept off for twenty minutes. This airs the eggs, which would spoil if kept covered all the time.

If the sitter should quit in the middle of the hatch, and decline to return, it is often possible to change her for another hen if you have one. Careful experiments show that during the middle of the period the eggs may stand for fifteen hours in temperature as low as fifty degrees without fatal results. Place the eggs in a warm corner of the kitchen or near a radiator, at about eighty to ninety degrees, till the new hen is ready. A large jug of hot water, not over 120 degrees, placed in a covered box with the eggs will keep them going very well for many hours.

Visitors in general should be kept away from the sitting hen, but a daily visit by the one in charge will be necessary. It is well to lift and handle, and talk to a broody mother of the heavier breeds,

now and then, unless she resents it, as she will grow more friendly, and her chicks will be easier to handle. Scary hens have wild chicks, and wild chicks are hard to develop in the right way.

The date when the eggs were covered should be set down, and after the eighteenth day the sitting hen should not be disturbed in any way. The chicks will frequently begin to appear about the twentieth day, and hatching may continue during two days more. Hens differ in this respect as they do in many others. Some will leave the nest on the twenty-first day, but most mothers will wait a day or so to give every egg a fair chance, and leave with her brood about the twenty-second or -third day.

There are varying opinions regarding the wisdom of helping chicks out of the shell when they seem unable to break forth themselves, but the principle is well understood; any chick which is strong enough to be valuable is strong enough to break his shell. There are exceptions to every rule, and now and then a chick might be liberated from a tough shell that would be worth while. At the same time the hen usually resents interference, and the harm

done by meddling is likely to be fully as great as the advantage to the brood. It is a safe plan to leave it to Biddy, and discard unhatched eggs.

CHAPTER XI

HATCHING WITH INCUBATORS

THE selection of a machine for hatching will offer no great problem, especially where others in the same town already own incubators of various types. There is no need to pay high prices unless you wish to hatch a large number of eggs at a time. Usually five or six dollars will buy a machine giving excellent results, and for ten dollars I have bought an incubator and brooder which hatched and brooded the chickens from one hundred eggs with perfect success.

In winter issues of poultry magazines, various incubators are advertised and explained. Look them over, make up your mind about how many eggs you want to handle, and about what you want to spend. Unlike many ventures of modern times, there are few extras to pay for. When the incubator and brooder are bought, the oil for

heating is the only added expense, as the thermometer, thermostat, egg-tester, and other accessories are usually included with the machine.

At this point visit neighbors who have machines like those which interest you. Get their ideas and experiences and look over their machines. If possible buy your incubator from a local dealer, rather than from a distant factory. It will cost no more, and you will have someone nearby to help you get it started, and supply broken or missing parts.

Second-hand incubators may frequently be purchased at a low price. If they are of standard, well-known makes, and not over two years old, such a purchase might be wise, but the development in incubator construction during the past ten years has been so rapid that it is well worth while to have machines that are up to date. Ten per cent added to the hatch will make up for several dollars in first cost, and a new machine would probably give that advantage over a second-hand one of an older type.

Order your machine by January first, and set it up as soon as it arrives, giving it a thorough test. Every year many beginners order incubators and

leave them in the cases until a week or so before they wish to begin hatching, only to find that some part is hurt or lacking. It is rather late then to write letters and get needed parts in time to start promptly.

Although an incubator is, after all, a very simple instrument to handle, when we understand it, the first experiments should not be carried out hastily. If you get yours set up along in January, test each part and run it a few days at the required heat. You can then leave it till hatching time with the assurance that everything will be ready and in order. If you put this off till the season opens you may join those who make a mess of the first trial through haste and lack of preparation.

Location of the Incubator.—The successful operation of the incubator will depend to a certain extent upon its location. It is clear that in a room which has a temperature of seventy degrees at noon and forty degrees at night the problem of keeping the heat within the hatching chamber at the same point all the time will be difficult.

In general we can figure that, however good the construction may be, the temperature in the egg chamber will fall one degree if the outside tem-

perature falls ten degrees, and a drop of thirty degrees in the room would be a serious matter.

For this reason the cellar is usually chosen for such a location, unless it is poorly ventilated and musty. A room where the heat is shut off, and where the sun does not shine directly in, will also give good results, unless the temperature varies twenty degrees or more, or the room is very cold. A room like a schoolroom, where the heat is maintained to a certain extent all the time, would serve. The sun should never shine directly on the machine while hatching is in progress.

Fresh air is necessary in the chamber for incubation, but in no case must a draft play on the incubator. A muslin curtain, tacked over the window will admit air without much draft, but even then care must be taken to protect the machine from currents of air.

For the majority of those using a small incubator the cellar will be convenient and available. It should be thoroughly cleaned from all débris and decaying matter, and arranged for ventilation, so that it smells sweet and clean.

Preparing for the Eggs.—It would be of no value to attempt detailed instructions in a book

like this for running an incubator. Manufacturers send instructions for assembling and handling their machines which are compiled after a long series of experiments with that particular machine, and each detail is covered with minute care. In running the machine follow the printed instructions that deal with that particular incubator, and you probably will have no difficulty.

There are, however, general rules that apply to all incubators which should be followed. The inside of the machine and egg compartments must be thoroughly cleansed before each hatch. Hot water and soap, with a coal tar disinfectant, may be used as a wash, or the washing may be with soapsuds, and a spray used afterward. Many who run large incubators spray the egg chambers during the hatch while the eggs are out cooling.

Level the machine with care before the eggs are put in place. Hot air and hot water tend to rise to the upper corner, and if there is a slope the eggs near the top will be much warmer than those at the bottom. If the egg tray is exactly level all the eggs will have the same degree of heat.

Fill, trim, and regulate the lamp in the morning.

Then if it draws up, or is not adjusted properly, the trouble can be remedied. At night no one will be about to observe such defects.

Keep a clear, bright flame. The saving of oil from a low flame will be so small that the total value will not equal that of a chick. When the flame is kept high and clear the thermostat will take care of the surplus heat, but if the flame is low and the temperature in the egg chamber falls, the thermostat can do nothing to help matters.

Toward the end of the hatch, as the body heat of the chicks increases, if the temperature stays at a high point, the flame may be reduced a little, but it should never be lowered so as to give the slightest odor, and should give constantly a bright, clear flame. Needless to say that only the very best oil should be used, and the wick and burner must be kept in perfect condition.

After the location is secured, the machine set up, and all made ready, the lamp should be lighted and a careful test made for at least three days, making any necessary adjustments and getting command of a steady flow of heat before starting the eggs.

In hatching with incubators the eggs to be

used are selected and cared for according to the directions given for hatching under hens. They must be collected frequently, selected carefully, with a view to color, smooth, perfect shells, and standard size, all dirty eggs being discarded. While waiting for the incubator they must be stored in a cool airy place with a temperature running from fifty to seventy degrees, and turned over half-way every two days or oftener.

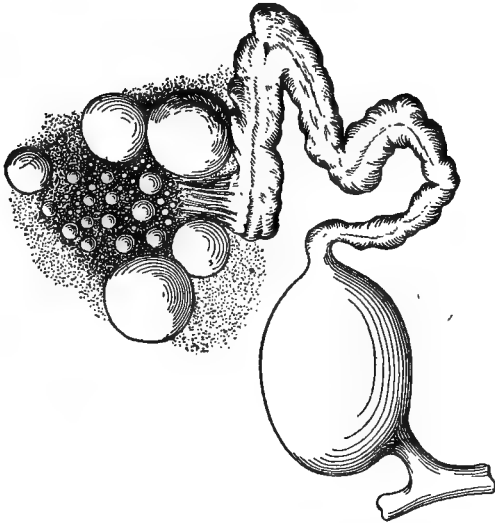
Inside Facts on Eggs.—It will be a great help in handling eggs during incubation if we know something about the development of the germ within the egg.

Most of us have probably seen the little cluster of yellow balls gathered close to the backbone in the center of the fowl's body cavity. These range in size from that of a pinhead to an inch or more in diameter. They may be seen in the illustration.

These yellow globes are the yolks of what will be eggs. They are clear yellow yolk, except for one little spot, a germ, on the surface of the egg, or ovum, as it is frequently called at this stage.

Leading from this group of egg yolks is the oviduct, a very elastic tube, through which the egg passes, adding the white or albumen, and the

shell. In its finished stage it passes out at the lower end a complete egg. The illustration shows



Ovary and oviduct. The eggs gather and develop in the ovary. One by one they enter the oviduct, forming their shell and complete size as they descend. The progress through the oviduct takes about twenty-four hours

the egg, soon to be laid, near the lower end of the oviduct.

The male germs are found in the upper part of the tube, and almost as soon as the yolk enters they attach themselves to the germinal spot on its

surface. If they are absent or inactive, the egg will be sterile, and will not hatch. The germinal spot will remain unchanged, and be almost invisible in the yolk of the complete egg.

The growth of the germ begins almost as soon as the meeting takes place, and continues as long as the egg is in the body of the hen, or in a temperature of about one hundred and three degrees. It does not stop entirely when the egg is laid unless the weather is cold, but continues developing. In hot weather this germ dies, after growing for some days, and the egg is spoiled. This is why sterile eggs, where no rooster is kept, stay in good condition much longer than those with the living germ.

As the yolk progresses downward, the albumen, or white, gradually gathers about the yolk, and the membrane forms around the albumen. This membrane is found in two layers, and at the large end of the egg a little space is left for air, between these layers. As the liquid in the egg evaporates, this cavity becomes larger, and an expert can easily tell the condition of an egg from the size of this air space.

About half-way down the oviduct there is a series of glands, and from these a fluid runs out to

cover the membrane and form the shell. This fluid is white, and is chiefly carbonate of lime.

In the natural state a fowl will pick up enough material to form this fluid for a few eggs in the spring, but when eggs are expected at all seasons, special supplies must be provided—oyster or clam shells, which were themselves formed of just such a fluid. In the digestive tracts of the hen the shell returns to a liquid state, and hardens again after it has formed around the egg.

The egg remains in the lower part of the oviduct about twelve hours, while the shell is becoming solid. It is then expelled by muscular contractions, narrow end first, and the process begins again at the upper end of the oviduct, if the hen is in active laying condition.

The normal time consumed in finishing the egg is about twenty-four hours. This is frequently extended to a longer period. On the other hand a hen may lay one egg early in the morning and another before going to roost, if she is prolific, and the eggs happen to come along at just the right time.

General Principles of Incubation.—The problem of incubation is to place the egg under such

conditions that it will hatch and bring forth a strong, active chicken; and the simple, inexpensive incubators of the present day prove how well the problem has been solved.

A careful record shows that the hen has a temperature, after the hatch is well started, running at 104° and 105° . The heat of the eggs beneath her is not so high, starting at about 98° , at the end of the first day, and rising to 103° at the end of the hatch. Long experience has shown that the temperature of the incubator should be held about one degree lower than that of the sitting hen.

If we stand the thermometer on a level with the eggs, so that it does not touch them, and keep the temperature at 101 , 102 , 103° , the result will be satisfactory, and we shall be well pleased with the hatch if other conditions are good.

If anything happens and the thermometer drops to 50° for a short time, we may get fair results after all; but a temperature which frequently dropped below 101° would probably prove fatal.

A temperature one degree higher, 102 , 103 , 104 , would do no harm, but the vitality of the chicks

might be impaired. A temperature of 103, 104, 105° is too high and will do great harm. The heat may rise for a short time, however, to 110° and not kill strong germs.

White eggs and brown eggs need the same degree of heat. The eggs of fowls, other than hens, require varying periods for incubation, and as all lend themselves to the artificial mothers as well as the hen's egg, a list is given for guidance in handling the hatch.

Variety	Days
Pigeon.....	17
Hen.....	21
Pheasant.....	24
Duck.....	28
Peafowl.....	28
Guinea Hen.....	28
Turkey.....	28
Goose.....	30
Muscovy Duck.....	35
Swan.....	35

Of course there will be variations from these figures according to the average heat in the hatching chamber, and the season of the year, as well as the condition of the eggs, when entered. In look-

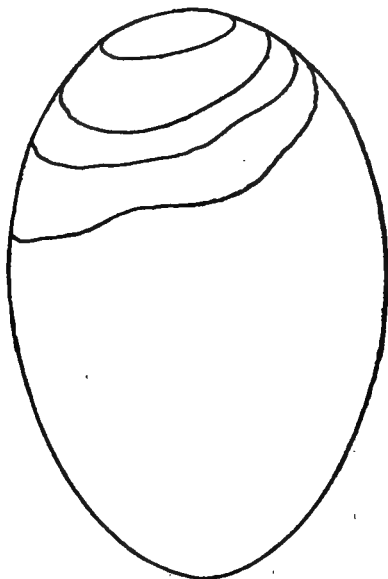
ing after the incubation try to get the chicks out on time. This means steady heat. Trained men say that a chick hatched the twentieth day is worth two born on the twenty-second.

Moisture in Incubation.—The amount of moisture in the air during incubation has an important effect in the result, and a generous amount is needed for a successful hatch. The average fresh egg contains almost seventy per cent water, and a large part of this is necessary to the growth of the chick. If the air about the eggs is too dry, this water evaporates through the shell so fast that the embryo suffers.

There are no easy methods of determining the exact amount of humidity in the egg chamber, but fortunately there is no necessity for exact calculations on this point. The operator need not worry so long as he uses a cellar, or a room not too dry, and runs the machine according to the maker's regulations. Reports of experiment stations tend to prove that the instruments usually sold to show relative humidity about the egg tray, are not accurate, not valuable, and really not needed.

The nose can usually tell at once whether the

air is sweet and fresh about an incubator, and the operator can usually tell by the "feel" whether



The fresh egg has a small air space as shown at the top. The second line shows the larger air space after one week of evaporation, the third line after two weeks, and the lower line shows the air space the chick will have at hatching time

the atmosphere is damp or dry. It should have a distinct feeling of dampness.

If the air seems too dry, there are several devices for supplying sufficient moisture.

Some incubators are supplied with shallow trays. These trays are to be filled with sand, which is kept moist. In this case we have but to follow operating instructions. Remember that these machines are sold to be used with the sand. If the sand tray is left out the incubator will not do its best.

Moisture may be supplied in the room about the incubator by sprinkling the floor each morning. If the air is very dry it should be sprinkled again at noon.

Sprinkling the eggs themselves is another method that proves satisfactory. They may be sprinkled with water at about one hundred degrees, or that seems warm, not hot, to the hand. This may easily be done by a small whisk brush, dipped into a pan of warm water, and shaken over the eggs. Experienced incubator men follow this practice, as it moistens the membranes and makes it easier for the chick to get out of the shell. They begin sprinkling about the twelfth day, and stop about the nineteenth day, before the shells open.

Cooling Eggs.—There has been an almost universal belief that it was necessary to cool eggs frequently during incubation in order to assure a good

hatch. This idea originated, no doubt, from the fact that the hen leaves her nest almost daily to feed and dust, during the first eighteen days. Hens average from twenty minutes to a half-hour away from the nest, even during the cold spring months.

Careful tests have lately been made to see if this cooling process helped in incubation.

At Storrs, Connecticut, about four thousand White Leghorn eggs were incubated. Every care was taken to see that the eggs cooled daily should be, half and half, from the same hens, laid under the same conditions, as those which were not cooled. Half of the eggs were cooled on the third day, and after that were cooled night and morning till the eighteenth day. The cooling periods were five minutes long on the third day, and increased one minute each day to twenty minutes on the eighteenth. The other half, nearly two thousand eggs, were not cooled at all, but were left in the incubator, run at about $102-103^{\circ}$, except for the brief periods necessary for testing and examination.

The result was interesting. Sixty-seven per cent. of the fertile eggs hatched in the incubators

that were cooled; seventy per cent. of the fertile eggs hatched in those where they were not cooled.

The question still remained as to whether the chicks from the cooled hatches would be stronger or not. Five hundred chickens were selected for a test. Half had been cooled and half had not been cooled. At the end of four weeks twenty chickens which came from the cooled eggs had died, and fourteen had died coming from eggs that were not cooled.

This experiment shows that cooling itself is not a vital factor in incubation, and the small difference is in favor of eggs not cooled. After an equally careful experiment the Station in West Virginia reports that: "In using incubators that were well ventilated, the chicks appeared stronger at the age of three weeks, when the eggs were not cooled."

The difference between the hen and the incubator is that beneath the hen the eggs can get little or no air. Eggs closed in a box and kept at 102 degrees for three weeks will not hatch. The germs will die. The situation beneath the hen is much the same, and the eggs get no real ventilation except when the hen is off the nest.

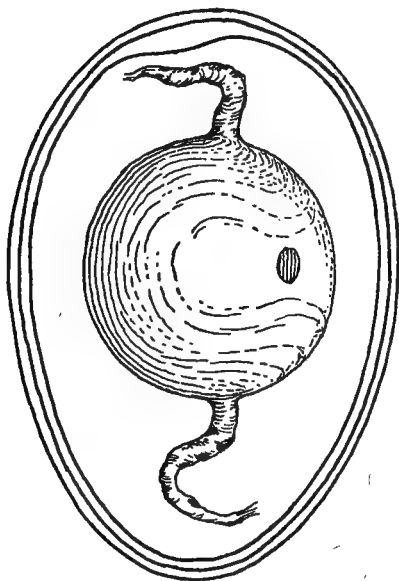
Taking it for granted that your incubator is well

ventilated, it may be assumed that the air thus supplied, and the brief period of airing when the eggs are sprinkled, will bring results which are fully equal to those gained by the process of cooling the eggs each day.

If the eggs are cooled, remember that the life developing within grows more sensitive to low temperature as the incubation goes forward after the twelfth day. Great care should be taken during the last few days to keep the eggs from a chill, as a temperature of fifty degrees, which they would stand very well for several hours, about the tenth day, would be fatal during the last week of the hatch.

Turning the Eggs.—Some interesting experiments have been made to discover what effect will be made on incubation by turning the eggs. In one of the first tests three machines were used with twenty-five eggs in each. In one machine the eggs were turned five times daily; in another twice daily, and in the third they were left unturned. In the first machine, fifty-eight per cent. hatched; in the second forty-five per cent. hatched; in the third only fifteen per cent. of the unturned eggs produced live chicks.

A glance at the picture below will show the germinal disk at the top of the yolk. As the egg



The yolk and germ in a good position. If left several days the germ will rise till it may lie next the shell and adhere. The two membranes within the shell are also shown

remains on one side, the yolk slowly rises to the top, until the disk is close to the shell. There it soon becomes attached to the membrane, and the

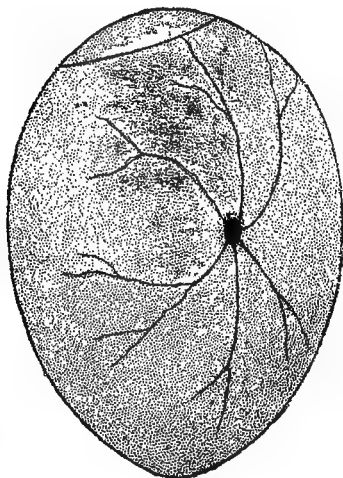
embryo either dies or becomes so weakened that it fails to break the shell.

Other much more extended and more careful experiments have been made which show that turning the eggs has a vital effect on the number hatched. If we turn them five times during the twenty-four hours, five or six per cent. more chickens may be expected than if we turn only twice. It is, however, no small task to turn eggs five times, at intervals of about five hours, during day and night, and as the return is a small number of chicks, which are probably not the strongest in the lot, most of us will be content with turning twice each day, unless the eggs are of unusual value or interest.

Testing.—At about the sixth day it is time to test each egg to see if it has a growing embryo within. There are several devices for testing eggs. When many are to be examined a box is arranged to hold a lamp or electric light. The eggs are then placed against a hole in the box. If the room is dark the light from within the box will penetrate the egg-shell and show much of what is going on.

Where there are not many eggs to be handled a very simple and practical tester is provided by

most dealers and incubator houses in the form of a heavy pasteboard tube, with one end adjusted to cover the eye, while the other will be filled by the egg, when held close up by the operator.



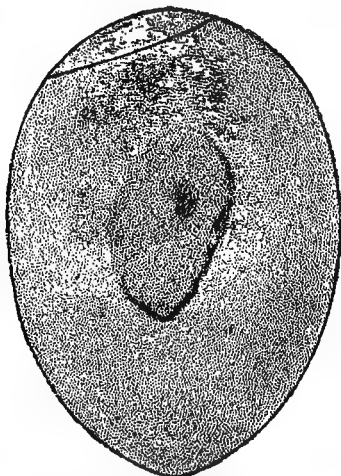
A fertile egg about the sixth day shows a central spot and lines, much like a daddy-long-legs

Velvet or plush, pasted close about the edges of each opening, will make it easy to adjust the egg at once so light will not sift in through small fissures about the shell, or the eye.

This little instrument will serve to handle a hundred eggs very comfortably. It can be used

most successfully in daylight by holding the eggs up to the sun, and will do well also with electric light, or a large lamp.

The egg with a growing embryo will show red



*A dead germ about the sixth day usually looks like this.
It may take other positions, and often is seen in
a red ring against the shell*

lines radiating from a dark spot. This closely resembles a large spider with red legs. The yolk will be seen as a dark cloud about the germ, the size of a natural egg yolk. If this living germ does not appear at once, turn the egg slowly, and a better view may be obtained.

All eggs showing this dark germ at about the center of the yolk, with the red lines running out like spiders' legs, are probably fertile and doing well. They should be laid back in the tray.

An infertile egg will show no dark spot at all, but will be clear, except for the cloudy shadow of the yolk, which will appear in a strong light. These infertile eggs are not spoiled by staying six days in an incubator, and may be used in cooking, or may be kept cold, and boiled hard to feed the chicks when they are born.

Eggs which show a dark spot without radiating lines floating about in a cloudy patch are those in which the germ began to develop and died. Many germs lack vitality to continue their development, and die after a few days. Sudden chills, or overheating also cause early death.

A bright red circle or half-circle, or dark spot, seen against the shell, shows a dead germ, probably killed by improper turning.

All eggs showing the dead floating germs, the red rings, or the spots on the shell, should be discarded, as they are unfit for use.

There will be other eggs which seem to fit into none of these descriptions. They do not show the

living germ clearly, neither do they show dead germs or rings. If incubation has been very rapid this may indicate an advanced stage of growth, and an exceptionally strong chick. It is a good plan to number such eggs, note their condition in a book, and keep track of them when the hatch comes off. Then we can have a better idea of what such eggs are likely to do another time.

Second Testing.—In most works on poultry we are recommended to test the eggs again the fourteenth day. This is to note the growth of the air space in the big end, and also to detect any germs that have died since first testing. The amateur, however, would probably have his trouble for his pains in going through the eggs again. It is now by no means easy to judge the condition within the shell, and only an expert can make much use of the information.

The number of eggs that would be detected in this second testing is small always, and where incubator space is not needed for other eggs, there is little advantage gained. Unless the beginner is interested in this particular work he will be as well off to give a careful test the sixth day and let it go at that.

The Growth of the Embryo.—The growth of the chicken within the egg is remarkably rapid. At the end of the second day many important structures, especially those about the head, are visible to expert eyes.

In three days a new membrane forms inside the shell membranes. This new membrane serves as lungs to the growing chick. It has many hairlike sacks, which absorb the liquid contents of the egg, and turn them into blood. Contained in these tiny vessels, the blood is exposed to oxygen that enters through the pores in the shell. It is then returned to the center of life, and circulation is established.

By the sixth day the elements of the chief parts are formed, and assume such size that the growing embryo may readily be seen through the shell when the egg is held to a strong light.

By the ninth day the head is clearly visible, the beak and claws are formed, and the feathers appear. Four days later the hard, bony structures develop, and the chick is equipped with all important organs.

Up to the fourteenth day the chick has been lying across the egg. Then it turns, so that the

body is lengthwise, with its beak right against the inner membrane of the shell, near the large end. If the eggs are not properly turned while hatching, the chick will have difficulty in making this change, and if its head is not at the right point, it will be unable to free itself from prison. Fully developed, it will die in the shell, because the beak cannot strike fairly against its inner surface.

Rapidly the embryo grows during the last week, until it fills all the space within the shell except the air cell, which is just above the chicken's head. On the last day the walls of the abdomen close about that part of the yolk not already absorbed, and the chick is ready for its earthly adventures.

Hatching.—Nothing in poultry life is more interesting than the last hours of the chick within the shell, and his entrance into the new world.

About the fourteenth day, the embryo turns about in the egg so its head is near the air sack. Thus it grows until it is ready to leave the shell, usually about the twenty-first day. Then it thrusts out its beak, tears away the inner shell membrane, and begins to breathe the air contained in the space at the big end of the egg.

Now for the first time its lungs fill with air.

Circulation through the tiny sacks of the temporary membrane ceases, and pulmonary circulation begins, the blood going into the lungs to be purified, and into the heart to be pumped through the little body.

But this new supply of air will soon be exhausted.

Mother Nature whispers in the ear of the chick. Drawing back his head he strikes as hard as he can on the inside of the shell. Blow after blow he deals with his beak on the same spot.

It becomes clear now why hatching eggs must be smooth and free from thick spots. If there is a ridge or thick spot at this point, he strikes and strikes in vain. His little beak cannot break through. At last the air is exhausted; his blows become weaker; his head droops, and he dies even before he has really lived, a victim of careless egg selection.

If the shell is smooth and even, before long the beak goes through, and Chicken Little is rewarded with a long breath of fresh air.

Having rested a moment, and refreshed himself, the chick picks out a new spot near the first hole. If the egg is smooth he can make one hole after another, round the egg, about one-third down from

the big end. Then, when the holes are well drilled, he gathers himself together, gives a big push, and is out.

Summary of Incubation.—In carrying the eggs through the incubation period, observe the following directions:

Use eggs carefully selected, not over two weeks old.

Set up incubator according to manufacturer's directions, test it carefully at least three days. Also get a druggist to test your thermometer by his standard instrument.

Be sure that there is proper ventilation in the egg chamber and in the room outside.

Plan for some supply of moisture in the air if possible; if not, sprinkle eggs, starting about the tenth day.

Place eggs in the machine at about 101 degrees, and keep it so during the first week.

Turn the eggs half over at least twice a day for nineteen days. This is best done by arranging them side by side, with space enough left at the edge of the tray so that the last egg may turn half over before striking the guard. It will be seen that if we turn the egg completely around, the yolk

will be in the same position as it was before. By passing the hands over the tops of the eggs we may roll them together into the new positions, and may roll them back again at evening with equal ease. Large machines have special arrangements for turning.

See that the lamp is filled and regulated every morning. Take no chances toward the end of the hatch even if little oil is burned out. It may last forty-eight hours and it may not.

Watch the thermometer, to make sure that it is not touching the eggs, and keeps its position at about the level of the eggs throughout the hatch.

Cool the eggs if you feel that you wish to do so, but remember that the best opinion to-day considers that this will not increase the hatch.

Test the eggs about the sixth day. Remove all infertile eggs, and those where the germs have died.

After this, during the second week, the temperature will rise, and a smaller flame may be required. Regulate the thermostat, and keep the thermometer at about 102 degrees.

The third week the body heat of the chicks will be still greater. Watch the thermometer and keep the temperature the third week at 103 degrees.

After the eighteenth day let the eggs alone as far as possible. Keep the incubator door closed, and hold the heat constant till the hatch is over.

Helping chicks out of the shell seldom pays. Those that are worth while hatching will take care of themselves.

CHAPTER XII

RAISING CHICKENS WITH HENS

WHEN the chicks are hatched beneath the mother-hen there is always a temptation to find out how many there are, and to meddle with the old lady. At this point, however, she can be trusted to care for her little ones in the best way herself. One thing that may safely be done, however, is to clear away pieces of shell about the nests, and all droppings and other litter.

Remember that the chick absorbs the egg yolk before he comes out, and this provides him amply during the first forty-eight hours. He does not need food, and he ought not to have it.

It frequently happens, however, that a few chicks run out around the mother before she is ready to leave the nest with the others, and it is a good plan to sprinkle some chick grit, some charcoal, and some cracked dry bone in chick size, on

the floor about the nest. The chickens can scratch around and pick up what they please of these hard morsels, which will do them no harm and much good.

Drinking Fountains.—Clear water must, of course, be provided at all times. The pictures show some useful fountains for watering chickens. Never place water in an open dish for chickens to drink. They are sure to fall into the dish now and then, often are drowned, and always scratch dirt into the water. The syphon fountains of crockery are especially good for little chicks. They are easy to clean, heavy enough to keep upright, and provide water on all sides, if the chickens decide to take a drink together, which they frequently do.

Syphon fountains made of galvanized iron are also good. Two types are shown in the picture. One allows the chickens to drink all around the edge. The other exposes the water at one point only. While the flock is small the chicks will find the water more easily from fountains where the water runs all around the edge.

Later, after they are six weeks old, the large fountain is very satisfactory, as it holds a gallon,

and exposes only a little water, keeping it fresh and clean for a long time.

When the mother finally decides to lead the brood away from the nest, take the nest and unhatched eggs away, as it will be better for her to cover her chicks in a corner of the coop on fresh sand, ashes, or dirt. Insect life grows in the hatching nest, and the quicker we can get it out of the way the better.

The First Meal.—The first feed for the chicks after they have had their grit is an important matter. Among various feeds, one has found favor with so many experts, has given satisfaction over so wide a field, to such a vast number of chicks, as well as their owners, is right at hand in so many localities, and requires so little care to keep ready for the infant fowl, that it is recommended first, and before all others. This food is rolled oats.

In the literature of poultrydom we find many receipts for preparing the first meal for baby chicks, and many of these doubtless prove satisfactory. Rolled oats, however, is the best diet for the small flock, for several reasons:

Rolled oats do not vary. "Chick feed," as it is known in the trade, may be one thing in Oregon,

another in Ohio, and still different in Maine. The standard chick feeds of the last few years have varied so that a poor chicken would get cross-eyed trying to pick out the grains his grandma had when she was young. In all States and all seasons rolled oats are just rolled oats, and nothing else. They have the same food value, and you know what you are getting.

Rolled oats are suited to young chickens. Testimony, from a wide field of experience, shows continued success with rolled oats as a food for baby chicks. The steam-rolling process seems to prepare them in exactly the right way to suit the chicks' digestion. They are easy to see and pick up. The observer can readily tell when the chick has had enough. Chicks relish them greatly, being attracted both by sight and taste.

Rolled oats are inexpensive, usually costing only a little more than chick feed, when purchased in bulk, and there are few spots in the country where they are not for sale.

Where there is one fundamental food so distinctly worth while there is no use wasting space discussing other foods. Make the beginning, then, with rolled oats. If you feel able to mix a hard-



TURKEYS RAISED WITH CHICKENS

boiled egg with them, so much the better. Infertile eggs taken from the incubator are good for this purpose. A hard-boiled egg, ground or crushed, shell and all, should be mixed with a cup of rolled oats.

Sprinkle a tablespoon of this over a shallow pan, and place it where the chicks can reach it. Biddy will lead them aright. She should be fed, meanwhile, with a handful of whole corn each morning and night, so she will not wish to eat too much chick feed.

It is customary to advise removing the pans after five minutes, and also to advise getting up with the sun to feed the babies before they get hungry. Busy people have a good deal on hand to be done, and while these rules may be proper for owners of large flocks, they are not suited, and fortunately not necessary, in all cases.

If you can arrange it, leave the pan five or ten minutes, and then remove it, with what food is left. If not convenient to visit the chicks so often, simply feed just about what they will eat up clean. This is easy to adjust after one or two meals.

While young they should be fed about five times a day. The food for the early meal may be

sprinkled about the run after the chickens are abed. Plain rolled oats are suitable for this feeding. Then we can sleep on in peace without a thought of hungry chickens yelling for breakfast.

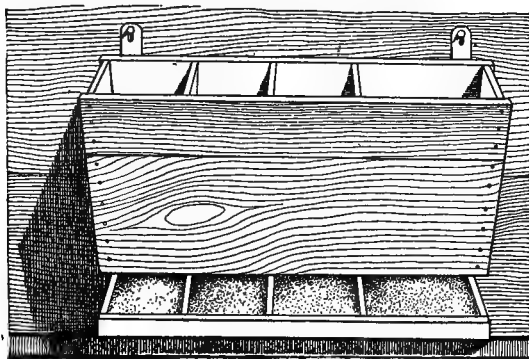
Enlarging the Diet.—After the first day it will help to keep the chickens active if we sprinkle fine chick feed about in the run. Finely cracked corn and wheat, with pinhead oatmeal will do well, or any high-grade commercial chick feed, as we are not depending on this for a ration so much as for exercise. A handful twice a day for the first week and double that the second, will give them something to dig for, assuming ten or a dozen chickens in the flock.

A hopper should be hung on the inner wall of the coop, where the chickens can find it easily, in which fine charcoal, grit, and cracked bone are always ready. Oyster shell may be added, but this is not important for young stock. They will eat little from the hopper at first, but will soon be making frequent visits. Sifted coal ashes should be sprinkled over the floor of the coop. They are good to eat, make the floor sweet, and keep lice down as nothing else of the kind will do.

Worms for young chickens are of doubtful value.

Raising Chickens with Hens 159

It certainly is not wise to feed many, or to let them run on land where many worms are present. Worms are heavy diet, and there is some proof that they may cause gapes, a disease of the throat, that weakens and often kills young stock.



Box for grit, bone, charcoal, and shell, hanging on the inside of a chicken coop, where chicks can help themselves

Chickens which run loose, out of the coop, and round about, while the mother is confined, are always in danger. Cats, dogs, and other enemies are sure to get them, if they can, and if they run out in a larger yard, the other hens and chickens will pester them. They also get food not intended for them. A wire run eight feet by four feet, eighteen inches high, will hold them comfortably for a

month, when they can safely leave mother and run with the rest.

The second week we can add bits of bread, boiled potato, and dry mash to their diet, while we double their ration of scratch grain. The dry mash should be three parts bran, one part corn meal, and one part good beef scraps. Feed a cupful of this for a flock of ten chickens in a little hopper, or long tray, during the afternoon. A tray made of three laths, nailed together, serves well for this.

Do not stop feeding rolled oats during this time. The other feed will form the addition needed to fill their crops as the chickens grow, but the rolled oats should form the basis of diet for three weeks. Feathers sprout evenly and quickly on a flock fed with rolled oats, and this is a result greatly to be desired.

Green Stuff.—During the first week, chickens pay little attention to green stuff, and need little of it, but after that they crave it and should have it. Tender grass, cut short, is good. Tough grass, cut long, is deadly. Clover, cut short, lettuce, beet greens, and other tender leaves, are excellent. They want these greens fresh. There is no fear



FEED TROUGHS

Raising Chickens with Hens 161

of giving them too much, as they seldom overeat of this material. From now on, throughout life, summer and winter, some green stuff or succulent vegetable should be fed daily. It is of vital importance. When hens run about, in summer, they pick up enough for themselves, but when confined, and during winter months, such food must be provided.

The third week, then, the ten chicks will be having rolled oats, what they will eat clean in a few minutes, three or four times a day, a cup of dry mash in the afternoon, charcoal, grit, cracked bone, and green food.

After the third week the chick feed can give way to regular scratch grain—cracked corn, wheat, and cut oats. Whole oats are not relished, nor are they good food for chicks. If the rolled oats are continued another week, with cracked corn and wheat, the ration will be excellent. The dry mash, also, may now well give way to wet mash in the evening. Mix three parts of bran (pure, coarse, wheat bran), two parts corn meal, one part beef scraps. Wet this till it is thoroughly moistened, but not sloppy, and feed liberally, about an hour before they go to bed. The tray may be left before

them till they are all asleep. In this way we make sure that every one gets a full crop. It frequently happens that larger ones will push the others away at first, but if there is plenty of mash and plenty of time they will soon fill up and give every one a chance. No mash should be left in the run for them to get next morning.

Chickens by Themselves.—After the fifth week it is safe to remove the mother and put her back into the laying house. If she stays longer with the chicks she will get fat and lazy. We are assuming now that the hens are confined to the laying house, and that the young stock has a separate place to run. The best plan is to arrange a yard, fifty feet square, or even larger, if possible, surrounded by a five- or six-foot wire fence. Inside this the various hatching coops and runs may stay in perfect safety from cats, dogs, and itinerant skunks.

If this fenced-in yard is not possible, we can get good results by putting our runs on level grass lands, and moving them to a new bit of sod every two or three days. This is almost always possible even in a small yard, and strong pullets may be raised in an eight-by-four run, as many as twelve in

Raising Chickens with Hens 163

a run, until it is time to put them in the laying house. The coop should be cleaned out at least twice a week, and dry earth or coal ashes sprinkled on the floor.

CHAPTER XIII

RAISING INCUBATOR CHICKS

ALTHOUGH it is not always desirable to use incubators for home poultry purposes, neither does it pay to fuss with setting hens, when you can possibly find time to give incubator chicks a fair start. If home incubation is not feasible we can depend upon "day-old" chicks from reliable poultry men. The methods used are the same whether you raise chicks hatched in your own incubator, or buy them from others.

In buying day-old chicks you know just when you are going to have your chicks, and how many you are going to have. You start the flock off together, give it the necessary care when young, wean it from the brooder in four or five weeks, watch it a little after that at nightfall, and you have no more bother with heat or cold, chick feed, and general nursery business. With setting hens

we might have to fiddle around half the summer, building up the flock.

Do not try to start day-old chicks unless you are ready to give them exactly the protection they need. Rapidly as this business has grown, it would have grown far more rapidly had it not been for hundreds of beginners, or lack-wits, who tried to offer the chicks something just as good. Poultry that is well grown will stand a good deal of neglect without fatal results, but little chicks droop and die quickly if their quarters are not what they need. It so happens that it is an easy matter, with modern machines, to supply them with just the right conditions at little cost.

There are nearly as many hovers on the market as there are incubators, and many of them are excellent. For the large flock of chickens, a hundred or more, the coal-heated hover with the large metal drum, is so simple, successful, and easy to manage that it is hard to see how one can fail to succeed with it.

It may be set up in any small house, large enough to hold it, and give room enough to move about, where drafts will not blow across the hover.

The Hen at Work

With a hover of this type the warmest zone is around the edge of the drum, where there is fresh air, and no chance to crowd. Full directions will come with each machine as to regulation and temperature. About ninety-five degrees is usually correct for the high point.

The great advantage lies in the fact that the chick is free to choose for himself just how warm he wants to be. On cold nights he will snuggle under the curtain and stick just his head outside to get fresh air. If the night gets warmer he will push out a little; and with a decided rise in the temperature he will move an inch or two away from the rim, and the flock will lie on the litter in a big circle all about the hover, like camels about a desert caravan.

If the brooder house is on the ground, be sure to nail chicken wire, two feet wide with one-inch mesh, to the bottom of the house, all round, and bury it slanting out, a foot or so under ground. This will keep rats from digging under.

It may very well be that you do not plan to raise more than a hundred chickens, nor to spend ten or fifteen dollars for a large hover. For such people a smaller hover is made in just the same

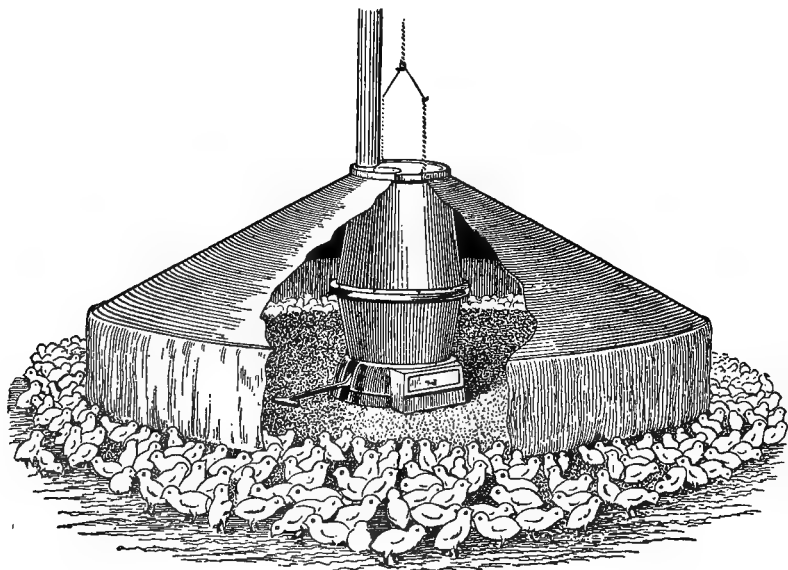
style, heated by a kerosene lamp, and costing four or five dollars.

A brief consideration will make it plain that this type of hover is far easier to handle than one where a box or chamber is heated to shelter the chicks. In such a hover the temperature must be exactly right, for the chick has no chance to regulate matters for himself. The matter of ventilation is also important. With this large drum the chick simply cannot be stifled, or stunted by poor ventilation, because he has all the air in the room about him to breathe, not that in a small enclosed closet. Another point in its favor is that the heat radiates from above. A chick wants heat on his back, not on his feet. We often see chickens standing in the snow, with their backs up under the warm feathers of a watchful hen, in perfect comfort.

Handling the Large Hover.—For raising a flock with the large, coal hover, we need a brooder house carefully built to avoid drafts, with a window high up for ventilation. This may be built on the ground, with protection from rats, or even better, up a foot or so, with a solid floor. The size of the house will be judged according to the size of the hover, which will come with full instructions.

A corner of a barn, or carriage house will do, if we know the rats can't get the chicks.

Scatter litter, from the floor of the haymow if



Large hover, showing stove within. Chicks can suit themselves as to heat. The warmest spot is right about the curtain. As chicks grow the curtain is raised more and more. It should start about an inch from the litter

possible, or soft, short-cut hay, on the floor all about and beneath the hover, at least an inch deep. Be sure that this litter is moist, not dry. Water

it with a watering pot till it sends up no dust when scratched about. It should not be wet, of course, but must be moistened enough each day to keep it from being dusty. It is an interesting fact that grown poultry enjoy dry litter to scratch in and thrive in it, while little chicks will suffer from dried feet and leg-weakness if they stay long on dry litter. The nearer we can approximate their litter to the earth they would naturally scratch in, the stronger they will be.

Fence Them In.—At first little chicks may not know just where to go for warmth, and will tend to crowd into corners, so it is best to place a fence, made from chicken wire, a foot wide, in a ring about the brooder, a foot or so from the curtain. Their water fountain and feed pan can go inside for a day or so. The third day they will be used to the new house, and can then wander about at will, returning when they get chilly.

The feed for incubator chicks is just the same as that for hen-hatched chicks, and the grit, shells, charcoal, and cracked bone are fed in the same way. A light tapping on the pan will bring them scampering to their egg and rolled oats, and the chick feed, scattered about in the slightly

moistened litter, will keep them busy between times.

Clean away the litter just beneath the edge of the hover every two or three days, to keep it fresh.

As the chickens grow, a yard must be provided for them outside the brooder house. When first letting them out, open the door at evening, so they will not forget the way back into the house.

The hover curtain is gradually raised as they develop, and on warm days, after they are three weeks old, the fire may be kept low, as a gentle warmth over their backs is all they require.

Danger comes to the flock when they are five or six weeks old, about the time when the hover fire is put out, if cool evenings arrive. At such times they will crowd into corners and smother two or three in the jam. Curved pieces of chicken wire, two feet high, nailed into the corners, will reduce the fatalities; but it is bad business to have them crowding together so, even if death does not result. The better plan is to light a small fire in the brooder stove. This will get them about in a social circle, and start them off safely for the short summer night.

Nursing the Sick.—In every flock of chickens there will usually be cases of illness. A chick, which seems fairly normal in size and shape, will stand off by himself, and seem very much out of sorts. Men with large flocks waste no time with these, but watch them a day or so, and then, if they still suffer, put an end to the case by a capital operation.

Although the profit in nursing the weak member is a great question, it may be a brief indisposition that a few hours by the kitchen stove will cure. A warm box, with a jug of water at about 120 degrees in the center, will give it what heat is needed, and a little bread and milk may set it right.

One thing—keep the cat out of the hospital. Priscilla brought a big chicken in to nurse. She left the door open. Fluffy wandered in. Fluffy is fond of chicken, and took this one off for a long walk. It never came back.

The broad principle to remember is this: Profit in poultry comes from the best chickens, not the second best. Chickens that are weak or ill are seldom the best. A flock of twenty picked, perfect birds, is more profitable than thirty where ten are second-rate birds. A stern determination to weed

out all birds but the best will prove most profitable in the end of the season.

Moving to the Roost.—There is a general opinion that it is unwise to hasten chickens on to the roost, as this tends to develop crooked breasts, though there is probably no good foundation for such advice. Where we have a good brooder house, there is no trouble on this point, for they are well off and content there till at least three or four months old. At that time low roosts may be installed for their use until ready to move into the laying house.

Small Flocks and Small Hovers.—Many would like to raise day-old chicks in small flocks, and wish to save every cent possible on the outfit. For such there are the small hovers of the same style which brood from fifty to seventy-five chicks with perfect success, if given a proper location. These have the same sheet-iron drum, with the warm zone around the rim, and use oil instead of coal.

In using these small brooders, be sure, absolutely sure, that they are located where they can maintain ninety-five degrees of heat. They probably can not do this in outbuildings during April and

early May, except in southerly States. Thousands of chicks are lost because of cold when their foster parents think they are snug and warm.

In a chicken house or shed room, a hover with an oil wick has a poor chance when the temperature goes down to freezing, as it often does on spring nights. The big hover has lots of surplus heat, and can carry the flock through the various changes that come, but the little one can not, and does not.

In the House.—We always bring our chicks with the small hover right into the house. Why don't you? There is always a room, or part of a room, you can spare. They make no bother at all for three weeks, and, if the litter is moistened, they make no dirt to speak of. In the house they fear no cold nights, no rats, no great danger, even if the lamp goes out. They can run about, away from the hover, sooner than they could outside. They are right at hand where you can watch them, and rescue those that get into trouble, for little chicks with feathers, as well as those without, have various ways of getting into trouble.

Once in a city apartment, we were cramped for space, but determined not to go without our fresh

eggs and broilers. So we finally put a board across the bay window, set a small hover inside, and started off with sixty chickens.

People came in to see them, and soon the landlady heard of it. She was scandalized, and made a call right away to look into matters. She did look in, and the next thing we knew she was buying some chickens herself.

If you do not bring the chicks into the house then be absolutely sure that the chicks not only have plenty of heat, but good ventilation wherever they are put.

It is possible, of course, to raise chicks with the hot-water jug, and "heatless hovers" that are used here and there, but when you compare chicks, crowding into these shelters, breathing stale air over and over again, with a ring of happy babies, getting just the heat they want at any time, and fresh air every minute of the day and night, no question is left about the final result.

The feed with the small hovers is, of course, the same as that used for chicks in large hovers.

Moving Out Doors.—When the chickens are three or four weeks old, they may safely be moved out to the brooding house. This should be large

enough to contain the hover, as the chicks will still need this at night, and on cold, wet days, even in June in the north temperate zone.

Be sure that no strong drafts can blow across the brooder and that there is plenty of litter on the floor at first. Set the hover on a low box so the curtain will be at least two inches from the floor. The chicks do not need much heat now, but must be warm and comfortable, especially at night, or they will crowd and be stunted. When they are two months old and well-feathered, the hover can be removed and no further danger from cold need be feared.

CHAPTER XIV

METHODS WITH GROWING STOCK

AFTER the fifth week, if we have a yard where they can range about, it will be a simple matter to care for the chicks. The wire run is laid aside. If there is an intermediate house like the paper house described in the chapter on that subject, we can lay the coop aside also, but if the flock is no more than twenty or thirty, they can go on well enough in the coops where they were born, for sleeping quarters.

Plenty of fresh water must be kept in a cool, shady spot. In the morning a pint of mixed scratch grain—cracked corn, oats, and wheat, in equal parts, or any high-grade commercial scratch grain—to each dozen chickens, should be scattered round the yard, which should never get hard and smooth. If it does, dig it up with a fork or shovel.

Methods with Growing Stock 177

Any time during the day see that green food is provided.

About noon another pint of scratch grain should be scattered.

At the same time a hopper of dry mash,—two parts wheat bran, one part corn meal, one part red middlings, and one part good beef scraps, should be opened.

The hopper of dry mash, opened about noon, for chickens kept under the conditions of the average household, is important. If the family are out and late in returning, the chickens do not go supperless to bed. If John or Susie should, by any chance, forget to come home from play in time to “feed the chickens,” no great harm is done. They can help themselves from the dry mash box when they get hungry. In fact many growers depend on this dry mash entirely, with the cracked grain.

An evening meal, however, of the same mash, moistened, but not sloppy, with warm water as the days get cool, is a distinct advantage. We can mix in this the table scraps, such as bread, vegetables, and bits of meat. After chickens have had dry mash before them all afternoon they will rush at a trough of wet mash and fill up “fit to bust.”

This means full crops at bedtime, a more rapid development, and eggs earlier in the fall. Feed no more wet mash than they will eat clean. The box of dry mash insures each one of enough food, even if all do not fill quite up on the wet mash.

Stale Bread.—Near many cities, in ordinary times, stale bread can be bought from large bakeries at a low figure. This is a most appetizing and useful food for chickens. After soaking, it may become half of the evening mash. Keep it in a dry place, as it is not a safe food when mouldy.

Cull out the Runts.—When the fowls are young, the runts and chickens that are off shape and size, may easily be seen and picked out. Now is the time to do it. Amateurs frequently leave such chickens a little longer, and a little longer, to see if they won't catch up. They never do catch up, and are an expense only. Later on it is not so easy to pick them out, and many a flock has several dead-heads, who get their food and lodging free, and lay no eggs. These might, and should have been culled out when young, saving trouble and expense.

Separating Roosters.—It is a common custom to separate the sexes as soon as they can be picked out,

keeping the roosters by themselves to fatten. With the small flock in small yards this is not always convenient, as it may call for an extra run and coop, and extra care. With the Leghorn breeds such separation is necessary, as the cockerels bother the pullets and keep thin, running about with the general flock. Young roosters of the heavier breeds, however, especially the Rocks, Reds, and Brahmas, are quiet, and do well in mixed flocks till they are nearly grown.

Fattening Roosters.—The diet given above for young stock is a good one also for roosters as they are developing. When the time comes for a broiler, or roaster, however, those we expect to eat should be put in a small run by themselves, and fed twice a day, morning and afternoon, with as much wet mash as they will eat. The regular mash, with the corn meal proportion doubled, is a good fattening ration. Leave none before them after they are through eating. Grit, cracked bone, and clear water should be where they can help themselves. Three weeks is usually long enough to bring a fowl into condition. After that, if confined, they are likely to go stale and lose rather than gain.

Selling Cockerels.—It frequently happens that a grower will have forty or fifty young cockerels he wishes to sell in the market. He may dress them himself, may ship them alive to commission houses, or may sell them alive to some dealer in town, who comes with his wagon. The last method is the best under most circumstances. If we dress them at home we are in for a tedious, unpleasant task, and will gain little profit by it. If we ship to market alive we have to provide crates, and must stand ready to be disappointed when the check comes. All who deal with commission people must be in the frame of mind Pat was when he declared: "No, I didn't get as much as I expected, but thin I knew I wouldn't."

When we have a man come with his team to the door, we have no trouble or expense for dressing; we have no bother about crates; we know just the weight of our birds and can put them in our own scales if we wish; in the end we shall probably get more profit than by any other method. If there are hens for sale in the fall, Jews will give attractive prices and take them alive from the door.

Dressing Poultry.—Instructions for dressing

poultry usually given do not fit the keeper of a small flock of hens. To put a sharp blade into the mouth, cut the jugular vein, drive the blade on into the brain, so as to cause paralysis, and then pluck the bird dry, calls for a special room, free from drafts, a good deal of skill, and more nerve than most amateurs possess. It is a messy job, and quite unnecessary, unless you wish to ship to market in large numbers. For home use, and for sale in town, a wet-picked chicken is just as good.

Feed nothing for twenty-four hours before dressing. The intestines should be as empty as possible. Provide a solid block of wood. Drive two nails an inch apart into it near the right-hand edge. Get your sacrificial bird and a sharp hatchet. Slip the neck between the nails, draw the neck till the head holds firm and the neck is straight. Then knock off the head with a sharp blow of the hatchet. It is just as well to keep your eyes open while you strike, for it sometimes happens that the sad executioner, upon opening his eyes, sees the bird he has just "killed" starting for the next county, indignant and unhurt.

To make a neat piece of work, provide a keg, or deep box with old bagging, hay, or leaves in the

bottom, and hold the bird upside down in this until thoroughly bled.

Meanwhile a pail of water should be heating on the stove. When it boils, take it from the stove and plunge in the fowl. Push it down with a stick till it is well beneath the water. Count two. Pull it out, turn it over, plunge it, and count two slowly; then hold it up and drain off the hot water.

The feathers should now rub off in handfuls without damage to the skin. Any little creeping friends that might be present are dead, and there is no down to float about and make broom business for two or three days. Do not suppose the feathers are spoiled by this for sofa pillows. If you want to use them, place the soft feathers in a large paper bag, dry them in a warm closet, and they will fluff up very well when put in use.

After the bird is picked, fill the pan with cold water, ice cold if possible, and leave it soaking there for three or four hours. The quicker you can get the animal heat out of the bird the more delicate the flavor will be.

Do not kill a rooster Saturday night for a roaster Sunday noon. To be in fit condition it should be dressed as early as Thursday, and kept in a cool

place. In winter a week is by no means too long to "ripen" a table fowl. Draw it on the day of the feast. It keeps better undrawn.

We might observe here that many chickens make a poor showing on the table because they are not thoroughly cooked. Fried or broiled chicken is almost never done enough. Even small chickens should be roasted at least an hour, and those weighing three pounds and up should start with an hour and a half, and add fifteen minutes for each extra pound. When it is well browned and basted, a pan should be placed over it, unless a double roasting pan is used, to keep it from getting dry.

CHAPTER XV

METHODS WITH LAYING HENS

As the comb reddens, and the pullets round out into form, it is time to move them into the laying house and get them familiar with their permanent abode. This should be done fully two weeks before they are expected to lay.

Litter.—Litter of some sort should be spread thickly on the floor over a layer of coarse, sharp sand. In some locations it is not easy to get good sand. Gravel will do fairly well, but dirt or ashes will not. It is possible to get on without the sand or gravel, if a heavy coat of litter is provided. Coarse hay, chopped straw, cut cornstalks, corn husks, dry weeds and vines from the garden, are all good. Dry leaves are also good, very good to start with in the fall. They soon break up into small pieces, however, and more leaves must be added each week or two.

This litter is the blanket that makes the floor warm, so it must always be thick enough to keep the boards well covered. When bare spots appear here and there, it is time to throw in more litter.

Do Not Frighten Hens.—Do not frighten hens by throwing in fresh litter during the day. Work of this kind should all be done at night, after the hens are on the roost. The night is the best time to move hens from coop to coop, and for making the shifts necessary now and then in the laying house. After a scare, a hen will often lay an egg before it is due, and suffer from the disturbance.

Nests.—Look after the nests and see that the hay or straw is always fresh and clean. In starting off the pullets put a china egg in a couple of nests as a hint. Pullets seldom go into the regular nests at first. It is doubtful if they know just what is to be done with the first eggs, as they drop them about here and there in the litter.

Be sure to leave no flat surfaces, such as the top of dry-mash boxes, to lay on. If such surfaces are present, put up a board slantwise, to keep them from nesting and roosting there. Eggs laid in such places will fall and break. Then egg-eating begins.

Clean the Dropping Boards.—Droppings should not be allowed to gather beneath the hens, so as to become offensive. They should be cleared away twice a week the year round, when weather permits. In cold weather if they freeze they should be cleared away as soon as a warm day comes. While frozen they are not offensive. The cleaner we can keep the dropping boards, the better for all concerned.

If possible, sift dry, hard-coal ashes over the roosts after cleaning them. The hens enjoy them, and will frequently eat a surprising amount of the small particles. They absorb the odors and liquid from the droppings. The fine dust which settles into every crevice is death to lice and mites. On roosts dusted with ashes during the past eight years no sign of breeding lice or mites has ever appeared. While in other houses, near by, where ashes were not used, they became a serious pest in hot weather.

Grit.—All crushed stone is by no means equally valuable for poultry. Some they like and eat freely; other kinds they hardly touch. There is a sort of shell marble in New Jersey that breaks into attractive sizes, and appeals greatly to the hen. It

is shipped ready for use in hundred-pound bags, and will cost about a cent a pound delivered in nearby States. It is well worth an effort to have the best grit.

Shells.—In the case of shells we must also make an effort to get the best. Oyster shell is frequently shipped so full of dust and fine pieces that hens will hardly eat it. There are other shells sold by standard poultry houses that are clean, of good size and shape, and tempting to laying hens. These are usually “re-cleaned shells.”

Even if you have but a dozen hens you can well afford to buy a bag of shells, in order to get the best. Take pains to procure shells of high grade, and, while you pay hardly any more, the results will be well worth while. Soft-shelled eggs are far too common. Hens that eat liberally of shell seldom lay soft-shelled eggs.

Cracked Bone.—The Maine experiment station has made a careful study of cracked bone as a ration for hens. Comparisons were drawn between the results of fresh bone, and that steamed and dried, which can be kept indefinitely. No advantage in favor of fresh bone was found. Dry cracked bone proved a valuable feed for hens. As

fresh bone quickly sours, and is not easy to feed wisely, it is better for the amateur to depend on the dried bone, which can be fed freely from the hopper without danger.

Take care to get the coarse cracked bone, as large as cracked corn. There is a fine, hard, almost polished bone, often sold, which appeals little to poultry and is not much eaten. Rendering plants always have the proper bone. Buy a bag at a time.

Be careful to serve bone in a hopper where the hens can not scatter it about, as they will do so if they can. A pint thrown into the tray of the dry-mash hopper every day or two, as fast as eaten, will be cleaned up without waste.

It is of the greatest importance to keep grit, shell, and bone clean. Put the hoppers up, away from flying litter, and empty the box onto the floor when the contents become dusty.

Green Food.—From the day the pullets go into winter quarters till they start off for market, green food of some sort should be provided. Where there are less than twenty hens the vegetables from the kitchen will go far toward supplying this need. Cabbage, turnip, beet, carrot,

lettuce, and potato are all relished in the raw state, and serve as a ration of green food.

Sprouted oats have been considered excellent feed for laying hens, but the preparation and care in handling them make it a rather difficult way of solving a simple problem. Clover can always be bought at a small cost. This, thrown in dry, or steamed a few minutes, is good food.

Mangel beets, or cow beets of the sugar variety, are a most satisfactory green food. They are greatly relished by the hens, and offer just the balance of fiber and juice required by the fowls. Mangel beets are easy to grow and can usually be bought in the winter at a low price.

Less danger from over-feeding lies in the green food ration than the regular grain ration, but care should be taken to feed only what the fowl will dispose of promptly. A mess of swill in the poultry house is a sign to get ready to buy eggs instead of selling them. Beets may be stuck on a nail each morning, and enough provided to last till noon. Hens should not pick at them all day.

Mash mixtures that have ground alfalfa are advertized to take the place of green food. While it is true that the alfalfa is a good food of this

nature, it hardly takes the place of beets or cabbage. The succulent nature of those vegetables is important. We are paying a high price for green food when we buy alfalfa at the regular price of grain, in the mash, and are likely to get much dust and fine stuff unpalatable to the flock.

Drinking Water.—The agate pans, as described in the chapter on furniture, should be cleaned and filled each morning. In cold weather the water should be warm, and in zero weather, fresh warm water should be added at noon.

Permanganate of Potash.—Now and then a doctrine gets spread abroad in one profession or another which is accepted as gospel, advanced by people who should know better, and becomes almost universal before it is discovered to be false. This is the case in poultry culture with permanganate of potash as a purifier in drinking water. By adding enough of these red potash crystals to color the water a pink or wine color, we are supposed to kill the germs and make it safe for our trusting flock. I have just asked the opinion of a noted authority on bacteria over the telephone as to this matter. His own remarks will be better than anything I could say:

“My dear sir, are you putting that in your own drinking water? No. Then for mercy’s sake spare the poor hens. Permanganate of potash has a very strong color, and looks well, but unless it were strong enough to make a hen very ill it would not kill any microorganism. Let me say that we know as yet of no antiseptic whatever which is safe to use in the alimentary tracts in a form strong enough to kill germs. This whole business is likely to be an excuse for dirt which will cause much more trouble than any potash solution will ever cure. Tell your readers to keep their vessels clean, and to keep them filled with clean, fresh water, and let nostrums alone. The man who would use this stuff is just the man who, in a scourge of influenza, would carry a nutmeg in his pocket.”

Scratch Grain.—Exercise is a prime necessity for laying hens. Like the rest of us they are inclined to get along without it if they can. We must lay our plans to make them work. Grain, scattered in deep litter, is the prescription, and morning is the time.

During late years there has been a tendency to simplify the scratch grain ration. Many grains

used to be fed in a mixture. Now wheat and cracked corn are often used without other grains. The value of oats in scratch feed is still in doubt. Some experts prefer to grind them to mix with the mash. You can safely take your choice on this matter, making your scratch mixture of wheat and corn, or of wheat, corn, and oats, in equal parts by weight.

A pint of this for each twelve hens should be scattered about in the litter first thing in the morning. The same should be given at ten or eleven o'clock, and again at evening, when the mash is served. This evening grain will not be cleaned up, and some will be left for the early birds to scratch for till the boss gets up.

Mash.—Mash also has been much simplified by experts in the last few years. As many as ten ingredients used to make the mixture for the mash; now these ingredients are frequently reduced to four. The same formula as that used for the growing pullets will be satisfactory. This corresponds very closely to that used at egg-laying contests. A hundred pounds, of pure, coarse, bran, fifty pounds of corn meal, fifty pounds of middlings, and from thirty to fifty pounds of

beef scraps, well-mixed, makes an excellent laying mash. If we prefer we can add the ground oats, fifty pounds, and leave them out of the scratch grain.

Beef scrap varies greatly in its protein values, and as protein is what we are after in buying scrap, it is necessary to find out just how much we are getting. Some scrap carries twenty, or twenty-five per cent. protein, along with bits of wood, sacking, and other foreign matter. Other brands run as high as seventy per cent. protein, being composed of clear dry meat. Frequently the price of one is almost as great as the other, in small lots. If we secure scrap having a protein content higher than fifty per cent., we can reduce the quantity in the mash mixture. Thirty-five pounds of scrap showing sixty per cent. protein would be enough to mix with two hundred pounds of bran, meal, and middlings. If in doubt about it, write your State experiment station. They will tell you just where to buy.

Feeding Dry Mash.—The use of dry mash in feeding poultry has greatly increased during the past generation, and it is important. Records show that by the use of dry mash alone good results

may be obtained. It is best fed in hoppers described in the chapter on furniture. For the small flock, however, it should be fed in combination with wet mash. Keep the hopper closed during the morning while the hens are hunting for scratch grain in the litter. After dinner open it, and let them eat what they want in the afternoon. Close it after they are on the roost.

Wet Mash.—The use of wet mash for small flocks not only gives us a good chance to utilize the bits of food left over at meals in an appetizing way, but it adds to the daily menu a dish much relished. It is surprising to see hens, after having had dry mash before them half the day, clean up a large portion of the same mash moistened with water, warm, of course, in winter. Save scraps to feed mixed into the wet mash at night.

Many poultry men, who have been very successful, plan in every way to get the hens off to bed with a crop filled to the limit, but make them work hard during the day. This plan insures the flock against fat, and lazy habits.

Clean away all wet mash when the hens are through. Plan it so none will be left. Hens vary greatly from month to month in the amount

of food eaten. When laying heavily they eat much. When moulting they eat little. The dry mash allows them to satisfy their needs, even if we have to omit the wet mash on certain evenings, and makes things even if the wet mash feeding is not quite enough to fill them up.

Sitting Hens.—As the winter wears on, some hens, if we have a heavy breed, will want to sit. If we wish to have them sit, well and good; but if not, we must take them from the nest at once. If space is limited, a small cage can be fastened to the wall, and Biddy may be put in there with feed and water, for a few days.

We must remember, though, that we not only wish to break up the sitting fever, but also to get her back to laying again. She will get into harness more quickly if we can place her in a small, but comfortable run, with a coop or box, for shelter. Cold will do her no harm, but she should be sheltered from wind and storm. Feed her mostly whole grain, a light but substantial diet, and try her again in the laying house after five or six days.

Sanitation.—In order to keep the house free from disease and insect pests, it should be thoroughly cleaned each year. The best time to clean

is in early fall, before new stock is put in. All the fowls should be removed. Nests, roosts, dropping boards should be taken out, with all other loose furniture. Then the litter should be taken up and the floor scraped.

This litter is of great value as a fertilizer for grass land, rhubarb, asparagus, and other plants that require nitrogen. It may be spread in the fall, or saved under shelter till spring. Its chief value will be lost if it is piled out of doors.

When all loose dust and dirt is removed from the house, it should be washed thoroughly with plenty of water. If a garden hose is possible that will do the work well. If not, a force pump should be used, and water enough to wash out all dust and dirt.

After the wet is well drained away, the whole interior must be sprayed or washed with a strong disinfectant. Zenoleum and carbolineum have both been tested with satisfactory results. There are also other cold-tar preparations which are probably useful. A good formula with lime is given in the chapter on parasites.

Wash, scrape, and disinfect the furniture. When dry, replace in the house, give a liberal dose

of kerosene oil to roosts, nests, and dropping boards, as a final blow to mites and lice; put fresh hay in the nests, new litter on the floor, and all is ready to begin another year.

CHAPTER XVI

BREEDING FOR EGGS

No part of poultry culture is more fascinating than breeding the stock to bring it nearer and nearer our ideals of perfection. This is possible in small plants if certain essentials are provided: Poultry from which we intend to breed should have ample opportunity for exercise while growing, should have ample space for fresh air during the winter months, and should eat a rather less concentrated diet than laying stock. The regular mash, with half the quantity of beef scraps, would make a good diet for the principal feed, and the scratch grain may be of the same mixture.

It is taken for granted that most people who keep small flocks wish to develop egg-laying qualities above all others. If we wish to breed, we must have a definite object toward which we bend our efforts, and as egg-production is by far the most

important detail of poultry breeding, we will devote our attention to that subject in the present chapter.

Trap Nests.—There is probably no detail of poultry breeding so little understood as the trap nest. Most people, and this includes many who deal extensively with poultry, believe that by the use of the trap nest they can find the heavy layers in their flock, select them to breed from, and thus get a steady increase in egg-production. Nothing can be further from the fact.

We must know much more about a hen than her capacity for laying eggs. A hen in the Maine station laid ninety-eight eggs between November 10th and March 1st. This was a very high record. She was mated, and laid steadily through the hatching season, but her eggs failed to hatch. Only one pullet lived to grow up. This pullet laid thirty-nine eggs in the winter, less than one half the number her mother had laid. The next year the mother was mated to another male. Again she was able to produce only one pullet worth keeping. Eleven eggs were laid by this pullet, against the ninety-eight by her mother. The pullet was mated, produced one healthy

daughter, and that daughter made a winter record of eighteen eggs.

This result was not at all unexpected, and is given to show that it is often possible for a hen to lay heavily, while her eggs are no good for hatching, and her children will have no value whatever.

The same station carried on an important test for ten years with a large flock. Breeders were selected by reason of their egg-production, as shown by trap nests. Three quoted sentences show the results: "Not only was there no improvement in average flock production, but actually there was a slight decline in production during the selection.—As a matter of fact daughters of 200-egg hens, with from six to nine years of mass-selected ancestry behind them (on the basis of trap nests), *were no better layers* on the average than birds from the general flock.—There does not exist any critical evidence that the selection of the highest laying birds, on the basis of the trap nest record as breeders, will insure or guarantee any definite, permanent improvement in average flock production."

There is ample evidence of the same kind to show

that the trap nest, while it will always be of value in tests, and in the hands of fanciers, can be of little help to the average poultry man. The trap nest is annoying to many birds, hard to keep in perfect order, and calls for more attention than any busy person can possibly give.

Line Breedings.—The best results in breeding poultry for eggs are gained by knowing the past history of the family, or line, to which the particular hen in question belongs; and by having an equal knowledge regarding the male with which she is bred.

Example.—It is well known that Barred Rocks are strong, heavy layers of fertile eggs. No mixtures show traits so good. If we handle Barred Rocks, then, we must be sure that no one has crossed the breed with another class two or three generations back. If this cross has been made, even if the specimen under consideration seems a perfect Barred Rock, her chicks will surely show various traits. The breed must be pure.

We must also know how the family, to which our breeding male and female belong, have performed. Have the mothers been strong layers? Have their

eggs hatched well? Have the chicks grown into virile cocks and worthy hens?

If the line to which the hen belongs shows a good record of fecundity, strength, and egg production, her chicks will be strong, and good layers, even though she herself may not excel in the number of eggs laid.

If the line to which a hen belongs shows a poor record, she will have chicks which will themselves make a poor record, in spite of the fact that the mother hen may have a high total for egg production.

This is the general law. It is the type, or line, and not the individual that counts, in the long run. The specimen must of course be perfect as to shape, size, color, and health, and must show in itself the characteristics wanted in its children. This is true of both male and female. We should not breed from an imperfect bird, no matter what the ancestry.

Thus it becomes clear that we should be unwise to exchange a hen which laid one hundred and twenty-five eggs in a year, descended from a good line, for one of doubtful ancestry that laid two hundred. Experience proves that the first hen, of

good parentage, will hatch stronger and more prolific pullets than the other of higher record, with doubtful ancestry.

Fundamentals of Breeding.—Several definite points about a breeding pair should be known before we can expect a steady improvement in our flock.

Ancestry.—Is the line bred pure by people who know their business? Has the line behind the present pair made a reputation for the characteristics we wish to develop?

Mother Full Grown.—Pullets do not bring the best results. Full-grown mothers in the second year are recommended by all experts. The cock may be in the first year, but should be kept if he shows good results.

Early Layers.—Watch your stock. Weed out every defective while young. If a pullet comes on rapidly, and lays early, band her, and her sisters who do the same thing. Keep your eye on them. You can tell very easily without trap nests, using celluloid rings of different colors, or putting just a touch of paint on the head feathers, whether they lay steadily or not. The first two or three in a large flock may be freaks.

Early to Rise and Late to Bed.—Do these pullets begin work early in the morning? Do they work hard, eat greedily, and go to roost late? These are important signs. They prove the “constitutional vigor” so much spoken of in poultry manuals.

Summer and Fall Production.—Are these selected hens still at it in the summer and early fall, or do they insist on sitting and then start to moult? You are reasonably safe in discarding the early moulters. They seldom have big records or great vigor. There may be a danger to very late moulters in Northern States of weakness from cold. Unless they recover full vigor do not breed from them.

Eggs.—Do your breeders lay eggs true to type, of full size, and free from important defects? Imperfect eggs should not be used.

New Blood.—This is a common remark: “Say, those are good-looking cockerels. I guess I’ll get one of those to build up my flock.”

What do you know about the line behind those cockerels? No one ever built up a strain that way. If your strain is weak, discard it and start again from a line, or strain, noted for its quali-

ties. Then examine your houses, your feed, your methods. Bring them up to date and keep your strain pure. If your line is strong you may safely breed grandchildren and nieces of the same stock. There is no need of getting "new blood" and danger in doing so. Careful tests show that new blood of the best adds little to a line which is itself good.

Follow Hatching Results.—Keep track of matings, and see how results develop. If a mating brings especially good results, hold on to that group. You can use it several years, or until you get a better combination.

Study Types.—Finally get acquainted with your breed, not from books but from flocks. Visit prominent breeders and shows. Learn the points of the breed till you can tell the best birds at a glance. The greenhorn will pick out a smooth, sleek, handsome ne'er-do-well right off. After a while you can tell much about a bird at a single glance.

Don't think you can breed
From a cull or a runt,
And ever succeed
With a flock, for you won't.

CHAPTER XVII

POULTRY DISEASES

PROFESSOR GOWELL, of Maine, once said: "I take mighty little interest in sick hens, or in curing them. If people gave them decent care they wouldn't be sick. I'll show them how to keep their hens well, and if they don't, they can't blame me."

Professor Gowell was one of those men who loved hens, and could almost talk their language. It was under him that the Maine station began the work that has made it famous. In considering this subject, keep his remark in mind.

If a fowl is seriously ill, she will be out of the game so long that her egg product will be low. She is always a danger to the others in the flock, because probably subject to illness again; and she would be of small value as a breeder, passing on her own weakness to her children. If this illness were

infectious, as many poultry diseases are, it is likely to spread to the rest of the flock, unless checked at once.

For these reasons it is wise to get the bird out of the flock and out of the way.

Another reason for getting rid of sick or doubtful fowls is the difficulty found in identifying the disease. Very few men can tell you what is wrong in most cases. The average poultry man of long experience can guess right only once in a while.

Some years ago I had a flock of various breeds; many valuable birds. I did what we all solemnly warn others to avoid—bought strange pullets, and, being very busy away from home, let them mix with the others, as they showed no signs of ill health.

Soon trouble began. An old hen died. Then a cock began to droop. Severe diarrhea, with yellow urates, set in. Combs turned purple, and the future looked dark.

At once I appealed to all I had hope in for help. I sent samples, whole birds, descriptions as requested. All the help I got put together was not worth a postage stamp, so far as a cure was concerned. The replies did, however, serve to lend

a little humor to a sad situation. Some said this, some said that.

To one specialist, an official in my home State, I sent a whole bird for post mortem. Of course I did it up as neatly as possible. It transpired that he had lately married, and the postman thought it wise to deliver this attractive parcel at the house. Had the happy pair realized how dead in earnest I was they would have spoken more kindly, I'm sure.

The note I had from Raymond Pearl, then at Orono, now perhaps our leading poultry biologist, was good. He couldn't make out what ailed my birds, "but," he said, "it is undoubtedly a *very* disease." I could tell by the note that he was training a new typewriter, so I forgave him.

My wife finally came to the rescue. The hens would eat nothing. She watched them, trying first one food and then another. At last she said suddenly: "What about rice, and rice water?" A physician in France had cured our baby of a bad diarrhea almost instantly by mixing boiled rice water with his milk.

She boiled some rice, and put the water and boiled rice before them. They ate and drank freely, perked up, and soon recovered.

The important thing here is boiled rice and rice water to correct a diarrhea in fowls. Sometimes the bowels are loose, though illness does not appear if the diarrhea is promptly checked.

A germ was found in my case which suggested cholera very strongly, and this was probably the disease. The rice could hardly be supposed to cure this, but it did provide just the right help at the right time for those birds that were making a good fight for life.

Chief Causes of Death.—In the last contest at Storrs, Conn., a careful record of deaths was kept, and the causes. More than ten per cent. of the hens died during the year. This is a greater average than should occur in your home yard, but these hens are under a great strain, and many were probably bred from stock noted more for eggs than strength.

Very few of these hens die from troubles that could have been cured. More than half die from ruptures, broken eggs in oviduct, liver trouble, and illness beyond help in most cases. Only a few died from troubles possible to understand correctly till after death.

The experience in most small flocks, kept under

fair conditions, is the same. In twenty years, except for the occasion referred to, our flock has suffered only from enlarged livers, broken eggs, rough handling, and general break-down. At moulting time, and at the high laying point in April, we lose the most.

These records show that it is perfectly safe and proper to eat the afflicted fowl if they are killed before wasting away too far. The flesh of hens troubled with such ills is quite suitable for food. This is another reason for acting promptly.

Watch Fowls at Feeding Time.—Watch any hens that do not run to eat when grain or mash is fed. If they stand apart the next day, something is wrong. Examine the roosts and dropping boards. If watery droppings with yellow edges are found, something is decidedly wrong. Get the affected hens and put them by themselves. It is quite probable they have eaten too much of the wrong thing. An overdose of beets will cause such trouble, or too much sloppy wet mash. Give these fowls scratch grain, grit, charcoal, and fresh water. In most cases they will soon recover. If not, a stew is recommended. Many fowls die from swallowing nails and sharp pieces of iron.

They should be removed from ashes with care. In driving nails about the houses allow none to drop on the litter.

Outside Help.—When difficulties rise in a flock, and the hens do not act as they should, it is a good plan to call in a practical man who has had successful experience, and let him look the place over. He may see at a glance what is wrong, and set matters right. If such help is not at hand, go over the rules you have in this and other volumes. Is everything clean? Is the food clean, the water clean, the house clean? Is there plenty of air without drafts? Is there plenty of litter? Are you sure the flock is not eating too much? This is a very common cause of trouble. It is hard to avoid overfeeding in the home flock. Reduce the rations as advised under that head. Make the hens work right along until afternoon.

When this careful review or inspection is made, the cause of the illness will almost always be found for, if properly kept, hens will seldom suffer from a curable disease. Death does occur from causes stated above, however, which, if beyond the help of experts, are not likely to be overcome by amateurs.

Preventable Diseases.—Poultry science has done much of late in discovering the cause of certain poultry diseases, and finding a way to prevent them, often showing that simple precautions will keep such sickness out of the flock entirely.

Crop Bound.—This condition is caused by clogging and indigestion. The crop is much enlarged and full and the bird eats little. The cause may be heavy feeding, long grass, lack of exercise, or lack of sharp grit. Supply these things and a tablespoon of castor oil. Crops are sometimes opened, but I never saw such an operation in a home poultry plant where the fowl was of value later.

Fowl Cholera.—Fowl cholera is fortunately rare, very rare indeed where flocks are given proper care. It does, however, break out, now and then, in good flocks, where its presence is hard to explain. The germs are terribly virulent, and spread rapidly, so it is quite possible that sparrows and other visitors to hen yards may spread it. This is another good reason for keeping flocks under cover without a yard, in thickly settled places.

Constipation.—You will seldom have reason to treat constipation in grown fowls, but chickens

often have something of that nature. It frequently happens that a chicken lies directly on his own dropping till it hardens and plasters up the vent. Wash the parts with warm soap suds, made with mild soap. When the mass is soft, clip the feathers and remove the gathering. Be sure the vent is clear. If plugged, inject a few drops of sweet oil with a medicine dropper or fountain-pen filler.

Crooked Breast Bone.—The cause of crooked breast bone has not been settled to the agreement of poultry specialists, but it is generally believed that lack of bone development and a general malnutrition is the cause. The notion that early roosting is to blame is not accepted by experienced and thoughtful people, as experiments have shown that it generally follows the lack of bone forming elements, and is frequently associated with catarrh and other debilitating diseases.

A crooked breast bone does not always indicate a serious defect, as many hens thus equipped prove good layers and strong mothers; but a number of cases in the same flock would indicate that careful attention to the diet and care of the growing flock was needed.

Simple Diarrhea.—Many fowls, often strong birds and good layers, have a natural tendency to a mild form of diarrhea or looseness of the bowels. No great harm comes from this, though, if common, it should be checked. The normal dropping in good health is dry enough to keep its shape on the dropping board, and is partly white. This white creamy material is from the kidneys, and is gathered up by the solid matter as it is expelled.

Temporary looseness of the bowels is caused by mash which is too wet. It should be merely wet enough to hold together, but not so wet as to run from the spoon. It is also caused by too much green food. No medicine is called for, but care in feeding, a reduction for a day or two in wet mash, and examination for drafts and possible reasons for catching cold.

Acute Diarrhea.—When a fowl shows a soiled vent, with drabbed stern feathers, and serious disturbance of the digestive organs, get her out of the flock at once. Clean the roosts and dropping boards, every day if possible. See that the hen has sharp grit, mostly hard grains for food, with some boiled rice, and the rice water to drink. Frequently hens will keep on laying, seem in good spirits, and

soon improve. If they stop laying and droop, kill and bury them at once.

After a case has been completed in the hospital ward, scrape out the coop, disinfect it, and dig up the ground. The sunshine will soon kill germs left over.

White Diarrhea.—Among all diseases in poultry there is probably none so deadly and discouraging as white diarrhea; so it is with true gratitude that we learn the great progress now being made in preventing it, and ridding flocks of its presence.

White diarrhea is an infectious disease, caused by a bacillus that has been identified by several biologists of repute. Although found present in poultry of all ages, it seems to cause a serious disturbance only in young chickens. These are largely safe against infection after the first two days, or after the chick has filled his digestive organs with normal rations.

The symptoms of white diarrhea are easy to identify in general, although laboratory tests must be made before the presence of bacillary white diarrhea is certain, as indigestion may produce the same symptoms. Chicks affected become stupid, and stay apart by themselves, usually near

the hover. They eat nothing. Soon a sticky whitish substance is voided, that clings to the feathers about the vent, and gathers in some quantity. The wings droop, the chicken utters shrill peeps of pain, and usually dies within a week.

It is generally agreed to-day that chickens may contract this disease, and recover enough to appear normal, but never expel all the germs. Later, when eggs are laid, they are infected by the same bacilli. The hatching process does not kill them, and when the chick is born, there are the same old germs ready to attack him.

Some States now send men to test hens for breeding in any flock, for a small sum, to see if this germ is present. If so, the hen affected is taken out of the breeding pen. This is a simple and efficient plan, which has rid many large plants of this fatal disease.

If laboratory tests are not possible, another plan has given good results. As the disease is taken during the first two or three days of a chick's life, and it is reasonably sure that infection comes through the egg, we can stop it at its source, or at least check it. Before the hatch is put into the

incubator, wash and disinfect it thoroughly with a good disinfectant. Provide low wire trays that will hold ten or a dozen eggs each, and fit well into the incubator, having a cover for each one. At the eighteenth day put the eggs into these baskets, and, after hatching, keep the chicks in them forty-eight hours. They may then be placed in the brooder, where plenty of loose litter should be provided, to allow all droppings to sift down out of sight. It is suspected that chicks get infection by picking up such droppings.

By this plan we keep chicks from wandering about the incubator and spreading the disease, and fortunately it has proved a great success in large poultry plants.

Chickens raised under hens are kept in small groups by the nature of things, and white diarrhea seldom becomes a menace where such flocks are given good care.

In general there is no cure for the real thing. Strong stock, clean quarters, clean food, and good sanitation will prevent white diarrhea under ordinary circumstances. If, in spite of these precautions, the scourge appears, appeal to your local station, or, if that is impossible, write to the Storrs,

Conn., station, where a great deal of experimental work is now being carried on along this line.

Liver Trouble.—Many of the birds which die in laying flocks go from liver trouble. Medical men say that this is brought on by improper housing and feeding. Where flocks are given the best of care, as at laying contests, there is still death from liver complaint, usually caused by a diet too rich for the fowl in question. It would not be wise, however, to make any change in rations merely because a bird now and then died in this way. The rations in this book, and all modern works on feeding, are rich, and purposely made so. They keep the flock laying at top speed, and it is not surprising if some hens fail to stand the pace.

There are no symptoms with which liver troubles can be detected for sure, even by experts. A post-mortem examination shows at once if the liver has been affected. The post mortem is a bit late, of course, but always interesting.

Poisons.—Salt, nitrate of soda, and copper poisoning may occur among poultry. Salt they may get by various accidents. The nitrate is used as fertilizer, and may be picked up in the garden.

Copper is a part of the common garden sprays, and may get to fowls on sprayed foliage.

I once came home on a hot evening and found some well-grown chickens, in wire runs, very thirsty. I filled their water basins, and later, when watering the garden, I happened to notice one set again and filled their feed trough, where they had lately finished supper, with fresh water. The next morning four or five in the next run were dead, and the rest were lying about in distress, or very weak. Where I had filled the feed trough with water, none were dead and none lying down, though all were gaping and panting. Every drop of water was gone.

I rushed for the water pail and filled pans and trough. They drank like boys at a free soda fountain, and soon improved. By night all except one, who died, were well.

It was a clear case of poison. Many questions brought no light, till my wife said she used the water the ham was boiled in to mix in their mash, as she had seen me save soup and water that meat had been cooked in, for such use. The salt had poisoned them and, had I not noticed their thirst, every one would have been dead by morning.

Chicks rather like salt, but more than a mild flavor of it is harmful. One-twentieth of an ounce of salt will kill a month-old chick.

The best remedy for such poisons is milk—lots of it. Milk counteracts the poison. Mild cases get well right away with proper treatment.

Roup and Catarrh.—Some confusion exists regarding diseases which attack the head and respiratory system of fowls. Roup is the name usually given for any serious cold, or catarrhal disturbance. This is true not only of amateurs, but also among experts. Bad colds, catarrh, diphtheria, canker, pip, and thrush, are often conditions and effects of the same disease, and, if severe, are usually called roup. The germ causing this condition has not yet been discovered, but its contagious nature is well understood. The infection may be carried by birds, by new fowls, by people, and by tools, which have been near ailing poultry.

Colds are not uncommon, especially after sudden shifts in weather, or when quarters are changed. It is thought possible that a cold may develop into catarrh, and then into roup, or diphtheria, without additional infection, if the fowl is not in

good health. The fact is that we are all surrounded with millions of germs which attack at once all diseased and weak tissue. Health and strength keep them from making headway.

Those with coops where the sun can reach all parts and where the floor is always dry, need have little fear of roup. Those keeping hens in cellars or sheds, where the sun can not get in, with a dirt floor, have every reason to fear.

A man in Massachusetts kept hens in a lower part of the barn on a dirt floor. For several years they did well. Then roup got in, and the hens came out, one by one, to untimely graves. No cleaning or waiting has made it safe for fowls again. The germs linger. In sunlight, however, such germs soon die.

If colds and catarrh appear in the flock, be sure there is plenty of green food and fresh air without drafts. Frequently the fowls will go along and lay fairly well, though a complete cure is not likely, bad weather bringing on the same trouble. Take care to clean out both flock and house before putting in new stock the next year.

Soft-Shelled Eggs.—Soft-shelled eggs may be the result of overfeeding with rich diet, combined

with lack of exercise; they may come from a lack of lime, or shell-making material in the food, such as oyster shell and good grit; or they may be the result of rough handling, or fright, which causes the egg to move too fast through the oviduct. If many such eggs are laid, something is wrong with the diet, and proper regulation there will cure the trouble.

Tuberculosis.—Tuberculosis in fowls has long been a serious matter in Europe. It has lately been given much attention in books on poultry diseases in this country. Either it is increasing, or more careful poultry culture is discovering cases formerly prevalent but not identified.

The man with the small flock, kept under the conditions outlined in this book, is reasonably safe from tuberculosis among his fowls. Sunlight and fresh air are the foes of such germs! Here again infection may well be carried by sparrows from yard to yard. Where there is no yard, there is less danger of infection.

CHAPTER XVIII

PARASITES

Internal Parasites.—There are several members of the worm family always glad to set up house-keeping inside our poultry, if they get a chance. Tape worms of different kinds, and gape worms are the most important.

Tape worms develop especially in adult fowl, when they form in segments and starve the birds as they do humans, by taking the nourishment intended for their host. There is little to fear from these pests except where poultry run in yards under conditions not of the best, and in warm climates. Keep your flock working on a clean, dry litter under shelter, and tape worms will be conspicuous by their absence.

Gape Worms.—Gape worms are tiny, thread-like worms which attach themselves to the wind-pipe of fowl. They are found in birds of all ages,

but cause so little discomfort in grown stock that such cases are seldom noticed. In chickens, however, they cause sickness and death, so gapes is known as a disease of chickens.

Chicks with gape worms suffer great irritation in the wind-pipe, while they sneeze, cough, and gape, stretching the neck in an effort to relieve their irritation. At this time they will often cough up the worms and other birds will quickly swallow them, thus getting into the same trouble.

Gape worms are present in yards not frequently changed, and their eggs have been found in earth worms. Whether this proves that earth worms are bad for chickens, as found in scratching about the yard, is a question. With plenty of sharp grit in its gizzard, the active chick could handle many such worms, under clean conditions, and grind them up, eggs and all, in jig time. The real danger is sour soil, and unclean eating trays.

Wire worm-extractors are supplied with full directions for use by poultry houses. Take afflicted chicks out of the flock, and place them in coops, where all droppings can be collected and burned.

Lice.—Salmon, known wherever men read books

on poultry, for his researches in disease, says, "When anything is the matter with a horse the maxim is *examine his feet*, and when anything is found wrong with poultry the maxim should be *look for lice*."

Under this general head let us include the whole family group, including red mites, for there are special lice for every bird, and a dozen varieties for poultry. Some lice live on hens, and must be attacked by treating the hens, others live on the roosts, and in cracks nearby, crawling onto the hens at night, feeding on their blood, and leaving before the fowls do in the morning.

Most lice which live on the bodies of fowls may be destroyed by a very simple method: buy an ounce of mercurial ointment and two ounces of vaseline. In a saucer, or on a piece of glass, work the two ingredients thoroughly together. Take a piece of this salve as large as a small pea and rub it carefully into the skin around the vent of the fowl. It may also be applied to the skin beneath the wings in equal amounts, but experiments prove that application around the vent is sufficient.

The lice get into this ointment before long and are soon destroyed. Careful search frequently

fails to discover a single louse which are thus treated. Two treatments a year are enough to keep the flock free from these pests. This plan has given great satisfaction at laying contests.

Lice and mites which live in the cracks and boards may be destroyed by spray. Five quarts of cream of lime, one quart of kerosene, one pint of zenoleum, well mixed, and added to seven quarts of water, make a mixture that will not only kill the lice and mites present in the cracks, but will tend to fill and cover such cracks, and disinfect the house.

Such a combination is mixed well by turning the nozzle of the force pump back into the pail and driving the stream into the contents. It should be sprayed through a fine nozzle. The clean and bright appearance of the house after such treatment is attractive to the fowl and those who care for it.

It is a safe plan to go on the principle that your hens have lice whether you see any or not, and treat with ointment twice a year, spraying in the summer with the mixture given above.

Ashes.—As stated in other parts of the book, the liberal use of sifted hard-coal ashes in dust boxes and on dropping boards is especially recom-

mended. If we take the ashes from the stove and sift them over the dropping boards and roosts, the light, fine dust gets into every crevice. Dust is death to small insects of this type, and will certainly keep them from breeding, where other conditions are good. Sifted ashes in the chicken yard is especially important.

Scaly Leg.—There is little to fear from scaly leg in a well-kept flock, although the mite which causes it may be found in many yards, and certain hens may carry them without attracting much attention. Such mites bore under the scales of the leg, which soon becomes enlarged and red. In advanced cases the leg is double the normal size, and the fowl becomes lame.

This trouble is only slightly contagious, but it frequently happens that one or two of the flock will be affected and the rest will escape. There is no reason to let it gain a leg hold, as the cure is simple and easy: mix one part of oil of caraway with five parts of white vaseline. Rub this into the leg, after washing with warm water, and repeat each week two or three times. The oil of caraway kills the mites, and the ointment will soothe and heal the afflicted parts.

CHAPTER XIX

DUCKS

IF you have a yard of any size you should raise a few ducks each year along with the chickens. They grow rapidly, being ready to roast at eight weeks, and are a delicious addition to the family menu. It is not advisable on small places to keep ducks over winter for eggs or breeding. Hatching eggs can be purchased for a dollar a dozen or less, usually about fifty cents, and the baby ducks hatch out and grow with very little loss. They should be eaten or sold before they are six months old, as after that they grow tougher and lighter, while they eat more than ever.

Varieties.— There are several varieties of ducks raised in yards and on farms. The Pekin is a large white duck, coming from China, by far the most popular in this country. It is heavy, quiet, and of unexcelled table quality, weighing about five pounds

when ten weeks old. The Aylesbury is an English duck, which resembles very much the Pekin in color and habit, but is not seen much in this country. The Muscovy came from South America, and is of small value compared with the Pekin. The Rouen is much favored in France. In size and type it resembles the Pekin, but it has a gray body color, reddish breast, and greenish back. It is good, but not able to displace the Pekin. Another duck which is increasing on farms and in yards in America is the Indian Runner, usually seen in fawn and white patches, though they also come with a white plumage. These are small, and lay eggs freely, being kept for their eggs rather than meat.

Hatching.—Duck's eggs can be hatched with the ordinary equipment used for chickens. They may be placed in the incubator with the regular hatch, and left a week longer, or they may be placed under the hens, who sit patiently the required four weeks and then seem perfectly satisfied with these children, giving them all the care required. Nine eggs are enough for any ordinary hen. Provide moisture, as explained in the chapter on incubation, as the long period of hatching tends to dry the eggs.

After hatching, if they are with hens, there is nothing to do but provide food and water. With incubators there is little difference in treatment from that of chickens. They need about the same heat, ninety-five degrees at first, but soon the curtain should be raised and the heat reduced. A temperature of eighty-five the second week is enough. Baby ducks are hardier and easier to raise than chickens.

Feed.—If ducklings are in one flock with the chicks they may safely eat the same food, but as they can stand a more hearty diet and will grow faster on it, a separate feeding plan for them will pay well for the slight extra work. The very first feedings should be rolled oats, and scraps of bread, moistened lightly with water. They should be fed about what they will eat in five minutes, five times a day. After the third day, they can handle a mash of three parts bran, one part corn meal, one part middlings, with about one part in ten of beef scrap. At the end of the week, the corn ration may be doubled, and at the end of two weeks it may be increased again, making the corn meal equal to the bran.

When a month old, two parts bran, two parts



DOMESTICATED WILD DUCK WITH YOUNG

corn meal, one part middlings, one part beef scrap, will carry them on till ready to eat.

Green food should be provided from the very first. Tender grass and cut clover may be mixed with their food, about one part in two, and other green food should be near, where they can eat as they wish.

Grit may be given in the food or it may be served separately. Duck growers recommend that a small amount of sharp sand be mixed with the food of baby ducks, and small grit after two weeks. About a heaping teaspoon to a pint of food will be enough. Ducks must always have plenty of sharp grit as they eat heavily. Cracked bone is important for them also, in fact, all the diet of chickens, with special attention to grit, bone, green foods, and water. Water should be served in a large pan or dish. Ducks do not drink easily from founts.

The rations above may not be followed exactly. If the dry mash fed to the chickens is ready, that may be used making it richer in meal and scrap as they get older. Ducks will eat any good food and thrive on it, if they have plenty of grit to grind it, and lots of water to wash it down.

or a paper torch. If powdered resin is sprinkled over the down, and the bird dipped again in the hot water, the resin will melt and stick to the soft feathers, which may then be rubbed off with the hand.

When the body is plucked it should be washed, usually with soap and warm water, to get it perfectly clean. Then it should be rinsed and put to soak several hours in water as cold as possible.

Three or four days should be allowed before the duck is eaten, after dressing as the flesh improves during that time. Ducks, as well as chickens, should be thoroughly roasted. Allow at least two hours for a five-pound duck, and have the oven hot, covering with a pan after the first half hour if the skin is getting brown.

