CIHM
Microfiche
Series
(Monographs)

ICMH
Collection de
microfiches
(monographies)

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming are checked below.

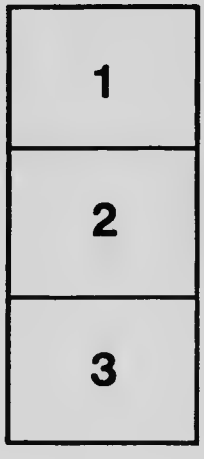
- ☐ Coloured covers / Couverture de couleur
- ☐ Covers damaged / Couverture endommagée
- ☐ Covers restored and/or laminated / Couverture restaurée et/ou pelliculée
- ☐ Cover title missing / Le titre de couverture manque
- ☐ Coloured maps / Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black) / Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations / Planches et/ou illustrations en couleur
- ☑ Bound with other material / Relié avec d'autres documents
- ☐ Only edition available / Seule édition disponible
- ☑ Tight binding may cause shadows or distortion along interior margin / La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure.
- ☐ Blank leaves added during restorations may appear within the text. Whenever possible, these have been omitted from filming / Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- ☐ Additional comments / Commentaires supplémentaires:

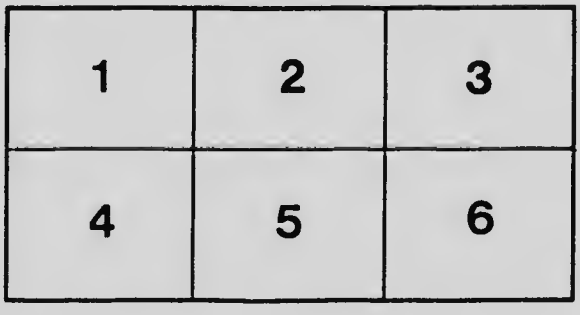
L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured pages / Pages de couleur
- ☐ Pages damaged / Pages endommagées
- ☐ Pages restored and/or laminated / Pages restaurées et/ou pelliculées
- ☑ Pages discoloured, stained or foxed / Pages décolorées, tachetées ou piquées
- ☐ Pages detached / Pages détachées
- ☑ Showthrough / Transparence
- ☐ Quality of print varies / Qualité inégale de l'impression
- ☐ Includes supplementary material / Comprend du matériel supplémentaire
- ☐ Pages wholly or partially obscured by errata slips, tissues, etc., have been refilmed to ensure the best possible image / Les pages totalement ou partiellement obscurcies par un feuillet d'errata, une pelure, etc., ont été filmées à nouveau de façon à obtenir la meilleure image possible.
- ☐ Opposing pages with varying colouration or discolourations are filmed twice to ensure the best possible image / Les pages s'opposant ayant des colorations variables ou des décolorations sont filmées deux fois afin d'obtenir la meilleure image possible.

This item is filmed at the reduction ratio checked below / Ce document est filmé au taux de réduction indiqué ci-dessous.

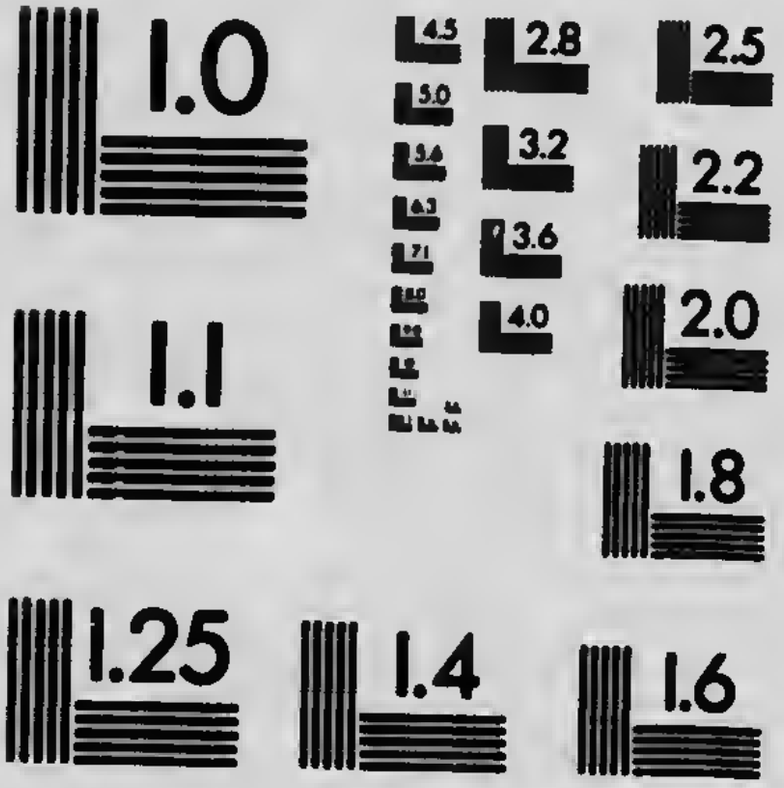
10x	12x	14x	16x	18x	20x	22x	24x	26x	28x	30x	32x
						✓					





MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



APPLIED IMAGE Inc
1653 East Main Street
Rochester, New York 14609 USA
(716) 482 - 0300 - Phone
(716) 288 - 5989 - Fax

BULLETIN 189.] [M , 19

Ontario Department of Agriculture

ONTARIO AGRICULTURAL COLLEGE.

Farm Poultry with the Results of Some Experiments in Poultry Houses and Fattening Chickens

By W. R. Graham, Professor of Poultry Husbandry.

This bulletin is intended to give information to farmers and others on general matters pertaining to the keeping of poultry.

It also contains the results of a few experiments which have been conducted at this institution on various matters pertaining to poultry.

CONSTRUCTION OF POULTRY HOUSES

We find poultry thriving and yielding good returns in so many different styles of houses, that it is very difficult to lay down any hard and fast rules. The tendency at the present time is towards cheaper houses, with better ventilation. The hot-house style of housing poultry during the winter has not been satisfactory, many houses being damp, and the air in them anything but agreeable. Disease has been quite common; and results in many cases have been disappointing.

Every poultry house should be light; at least one-third of the south side should be of glass, or otherwise opened to the sun. It should face the south-east or south. The sun's rays are very beneficial to fowls, especially during the winter months.

College Poultry Houses.

For a number of years we have been trying various styles of house. The first houses constructed were well built, tight and warm. They were fitted with stoves or hot water pipes, so that the fowls could be kept at a comfortable temperature. This plan was not satisfactory;

mainly for the reasons that it was difficult to keep the fowls in good health, and furthermore the eggs were low in hatching power. The cost of heating was also considerable, in fact the entire equipment was too expensive to be successful as a business.

It was noticed yearly that the surplus stock held in the cheap houses was much healthier than those fowls kept in the warm houses. During the past eight years we have been trying to evolve a house that could be cheaply constructed, that would keep the fowls in good health, and at the same time get a fair egg yield from the fowls so housed.

Seven years ago, four houses, representing different styles of popular poultry houses, were constructed. These houses were stocked with birds representing, as nearly as possible, the same strains of the breed.

No. 4. No. 3. No. 2. No. 1.

Fig. 1. Different Styles of Poultry Houses Suitable for an Ordinary Farm.

The breeds used were White Wyandottes and Buff Orpingtons, the one a rose combed breed, the other a single combed breed.

The houses are of equal size as regards floor space. Each house is 24 feet long and 12 feet wide. The house is divided by a wire and board partition, making two pens each 12 feet square. The pens will accommodate from 20 to 25 birds each, or about 50 to the houses. Fig 1 shows fairly well the appearance as regards windows, etc., of the house. The roosting quarters of each house are very similar in construction. A dropping-board is used which is constructed of matched dressed lumber. The board is placed at the back of the building, and is about three feet above the floor level. The dropping-board is three feet wide. The roosts are made of dressed 3 x 3 scantling, and are placed six inches above the dropping-board. A curtain is arranged to be let down during cold nights, as in No. 1 and No. 2 houses. There is no curtain used in No. 3 or No. 4 houses.

House No. 1 is made of matched boards which are dressed on one side. The front and ends of the house are single-ply. The back is sheeted

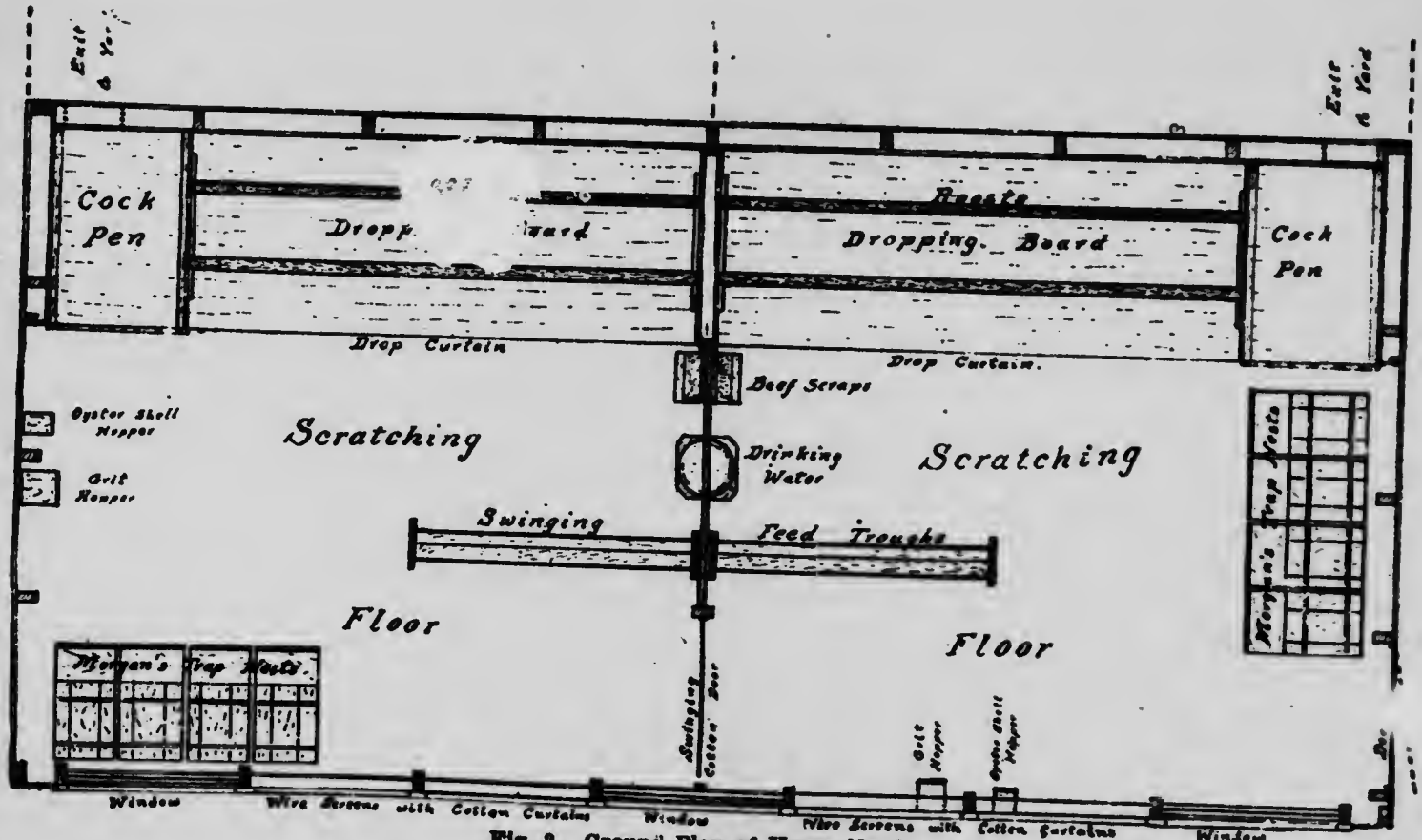


Fig. 2. Ground Plan of House No. 2.

The general arrangement in the other Houses is much the same

on the inside, building paper being used under the boards so as to make the wall tight or free from draughts. The windows in this house slide back and forth, so that the ventilation can be adjusted to the weather conditions. The roosting quarters in this house have curtains which can be dropped on very cold nights.

Trap-nests are used in all the houses, and are on the ground level. These take up some floor space that might be used for exercising the fowls were we using other styles of nests.

The second house is what is known as the "Maine State" house. This house is practically open to the weather on the front or south side. There are canvas curtains which can be dropped as a protection against

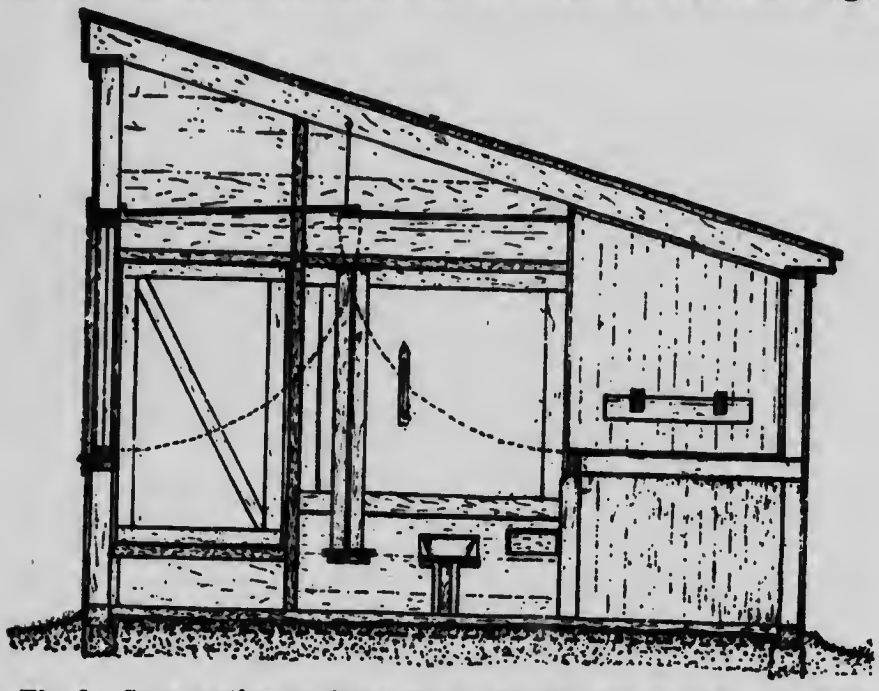


Fig. 3. Cross section of House No. 2, showing the curtains in position for the day, etc.

wind and snow on stormy days. On other days these canvas curtains are to be rolled up, and the fowls allowed to exercise in the fresh air. The ends of the house are single-ply matched lumber; the back wall of the house is matched lumber lined with paper, and is sheeted again on the inside. This is done in order to make a warm roosting coop, which is protected at night in front by canvas curtains.

The third house is the warmest house of the four and is built of matched lumber and lined with paper. There is a dead air space between the inside and outside walls. The building is made as tight as possible, the windows, doors, etc., all being made to fit tightly.

Many houses built on this plan are moist inside. To do away with

the moisture we have a straw loft. The straw is placed on boards, which are from four to six inches apart. These boards are placed on a level with the roof or ceiling. The straw absorbs the moisture and keeps the house dry.

The fourth house is one of the extremely airy ones, being made of boards that are dressed on one side and the cracks battened; about half of the front is open to the weather, but may be closed on stormy days by large doors. There is not any special protection for the roost, the chickens roosting in this house in exactly the same temperature as they worked in during the day. This house, needless to mention, is much cheaper than the other styles.

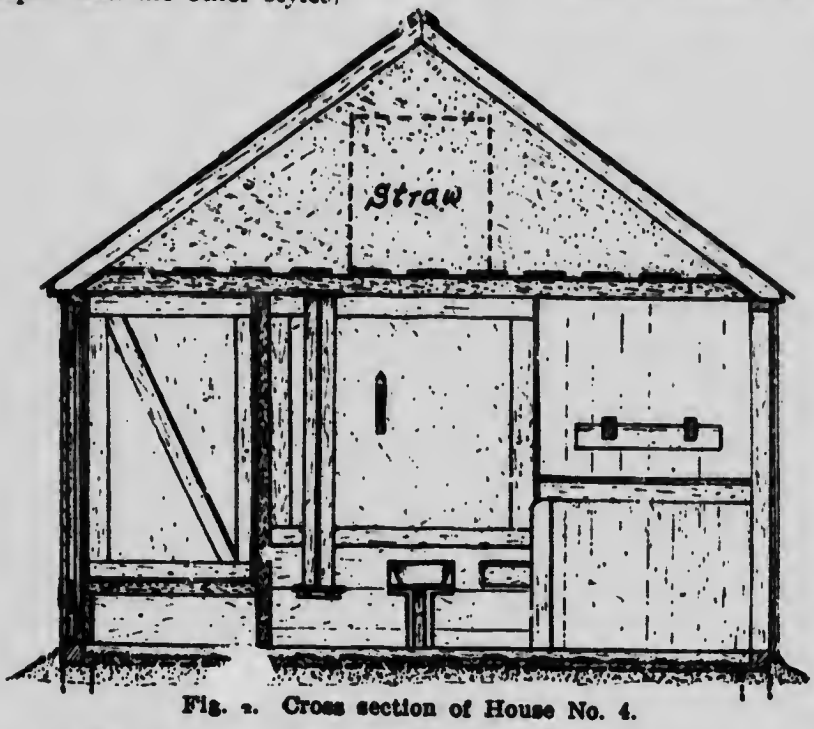


Fig. 2. Cross section of House No. 4.

The following record shows in a concise form the difference in the percentage of egg production in favor of the cold or fresh air house during the five years for the months of December, January, February and March, the first year beginning December, 1904-05, 76 per cent.; 1906, 8 per cent.; 1907, 11.8 per cent.; 1908, 15.6 per cent; 1909, 12.4 per cent.

The house with the cloth front and the one with the movable windows compare favorably with the cold house. There is probably not enough difference in the actual egg production to warrant a statement that either of these houses is very much inferior to the cold house. They are about three degrees warmer than the coldest house and about 15 degrees colder than the warm house.

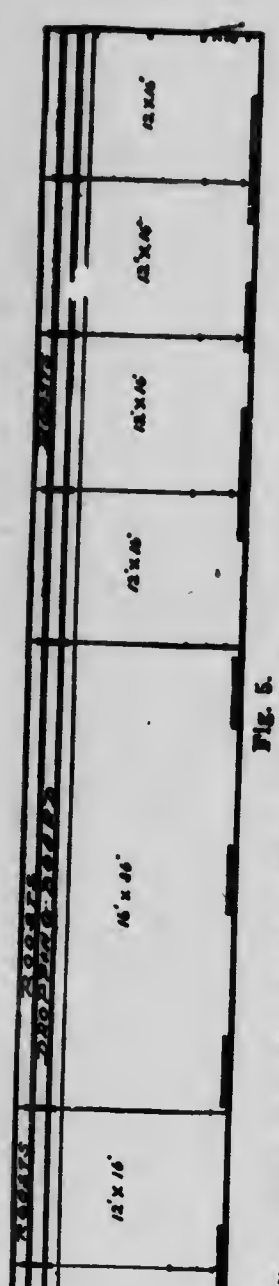


Fig. 5.

These figures must not be taken to mean that hens will lay better in a cold house than in a warm one, but that fresh air is essential to health, and health is a factor in egg production. When one tries to retain the animal heat of the body to maintain the heat of the house, one necessarily allows but little air circulation, hence the air becomes foul or stagnant, which is not healthful.

The above results indicate that the free admission of fresh air is a very essential factor in house construction.

House No. 3 in Fig. 1, which gave the poorest results for each of the five consecutive winters, was operated quite successfully the sixth and seventh winters by introducing more fresh air; that is to say, one-half of the windows were removed until about December 1st, and when these were put in, the openings (about one foot square), where the fowls go out into the yard at the north side were left entirely open. These except during mild days appear to supply sufficient air to keep the birds doing nicely. This statement is made as a means of helping any person who may have a similar house, and who wishes to continue using the same.

Our experience is that all four houses, while fairly satisfactory, especially No. 4, are not all that may be desired, for the reason that they must be adjusted according to weather conditions—that is to say, on bright, sunshiny days, the doors, movable windows, or cloth screens should be opened for nearly all the day, or, again, for but an hour, depending upon the sunshine and temperature.

The slope or shanty roofs on houses Nos. 1 and 2 have not been as satisfactory as the pitched roofs on houses Nos. 3 and 4. The roofs on the latter houses are more durable and the houses themselves much cooler in summer, and furthermore, the straw lofts in these houses are very effectual in preventing dampness in the houses; no frost collects upon the walls or ceilings.

We have tried several houses with curtain fronts, and we are pleased to say they work fairly well, when used in a house as in Figures 5 and 6, which is practically the same style of house as No. 4 in Figure 1, but these require adjusting according to the weather, and if they are not kept brushed, the dust and dirt will gather to such an extent as to pre-

vent free ventilation, so that they will not ventilate very well. Our experience has been that such cloth screens should be of the cheapest of cotton; heavy cotton or duck scarcely ventilates at all. There is yet another objection to these cloth screens, in that the hens, especially the lighter breeds, become notionate about trying to lay or roost upon the screens.

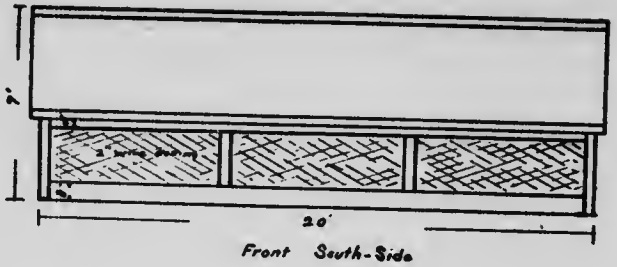
To the person who is breeding the tender varieties or those with large combs, some means must be taken to keep them fairly warm at night or their combs will become badly frosted. The females of such breeds as Leghorns or Minorcas will stand a temperature considerably below zero without frosting their combs.

Fig. 6.

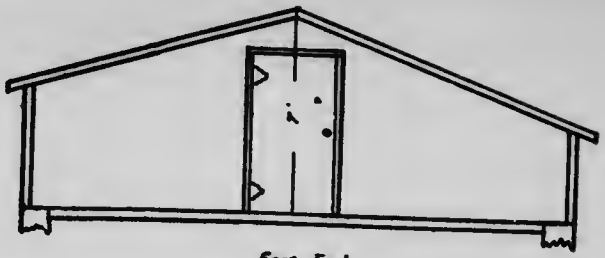
The question naturally arises: can a house be constructed which is nearly self-operating, that will keep the birds in health, and at the same time ensure a fair egg yield.

Open Front House.

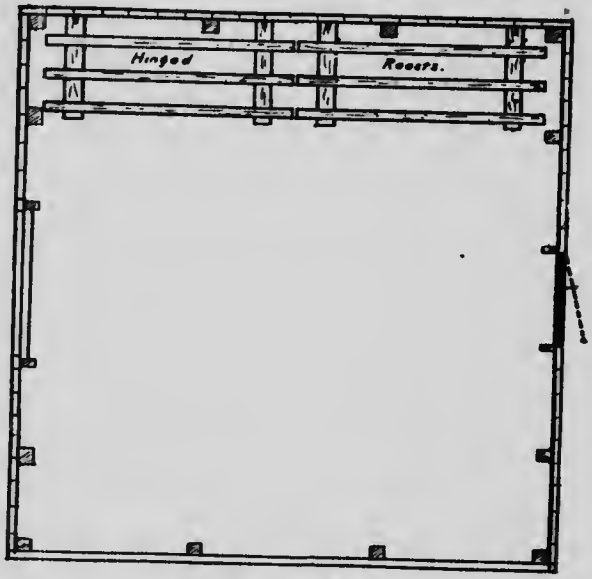
Our experience has been that the fowls thrive best in low-down houses, especially during the winter. We have four houses with the fronts entirely removed, except a two-foot wire netting, which keeps the fowls in, and the sparrows, etc., out. These houses for this climate must be low down, especially in front, to keep out the snow and a portion of the wind. It is the writer's opinion that Fig. 7 will meet the needs of the average farmer, where he wishes to keep seventy-five to one hundred



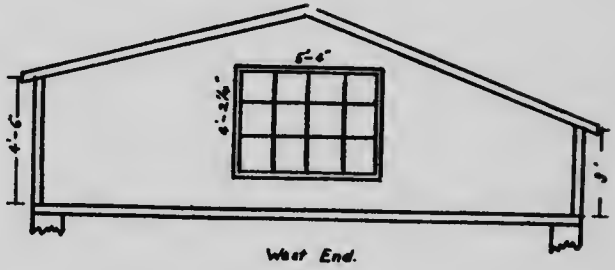
Front South-Side



East End.



Ground Plan.



West End.

Fig. 7. Open Front Poultry House.

hens. The house looks too cold, but the birds do well. They possibly could be made to lay more eggs during the months of January and February with cotton screens properly adjusted to meet the weather conditions; but few farmers would be there at the exact time to do the adjusting, hence we use it entirely open.

The large window in the west, essential for light, should be hinged at the top, so that it may be opened during the summer months, otherwise the house will become too warm in summer.

It will be noticed that no dropping-boards are used in this building. During the winter the manure freezes almost as soon as it is made, hence no odor or bad results, and if cleaned, say, every two months, it will answer very well. We would rather have this condition than dropping-boards, covered one foot deep with manure as we so frequently see them.

Fig. 7. Open Front Poultry House.

Open front poultry house in Fig. 7.

In conclusion we are free to admit that the open-front houses apparently keep the stock in better health, brighter in plumage, and they require less labor than any house we have yet used. It is not perfect, and no doubt could be improved upon for special, painstaking poultrymen, but this class is very limited, and as now used comes most near to meeting the average man's position.

Long, Continuous House.

No doubt some readers will wish for a plan of a long, continuous house, in which a large number of fowls may be housed under one roof, or where a number of different breeds can be kept in the same building.

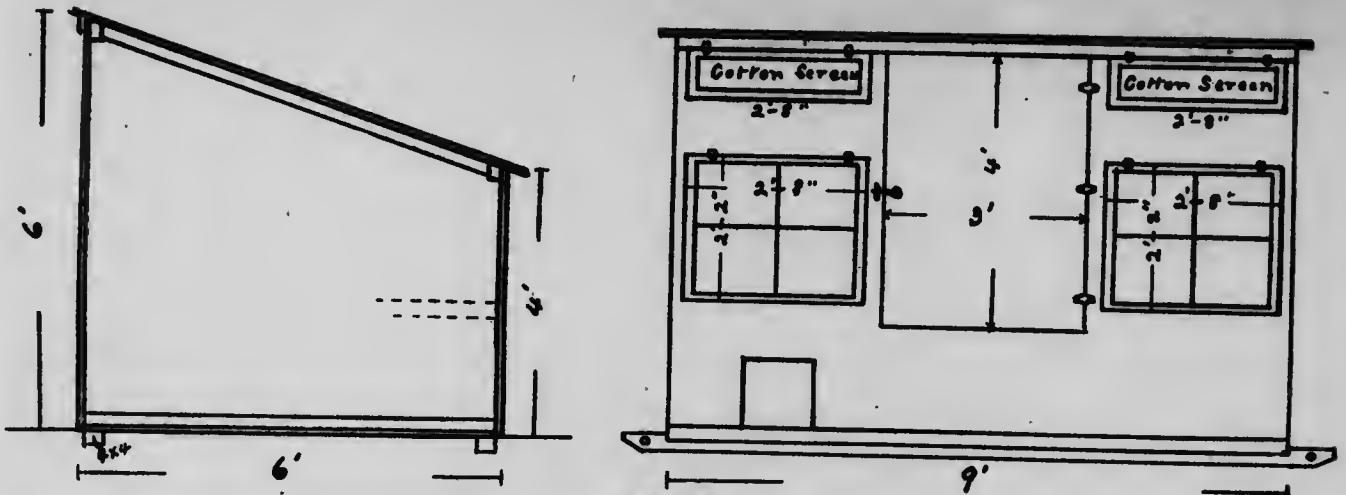

6'
4'
6'
Cotton Screen
2'-8"
Cotton Screen
2'-8"
2'-8"
2'-2"
3'
4'
2'-8"
2'-2"

Fig. 8.

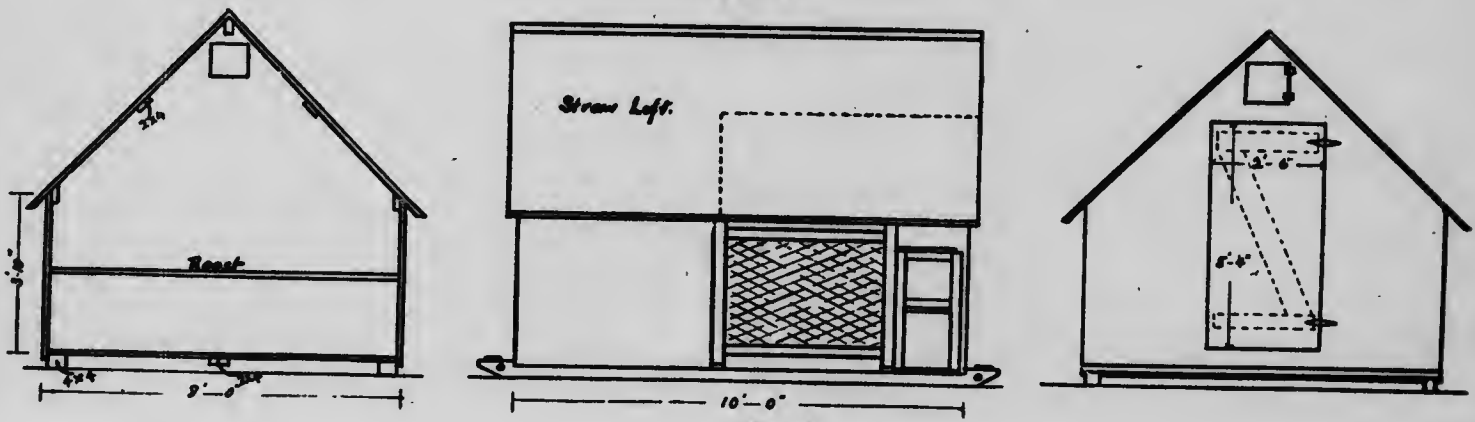

Roost
3'-0"
4'-0"
Straw Loft.
10'-0"
2'-6"
5'-4"

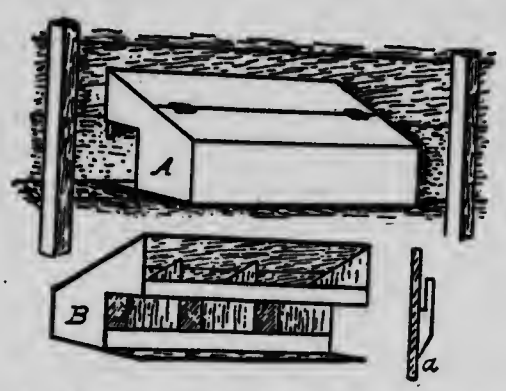
Fig. 9.

Fig. 5 gives the ground plan of this building as now used. The partitions are temporary, made of cloth tacked to wooden frames, and can be moved or adjusted to suit almost any sized flock. This house was originally used for flocks of 50, 75 and 100 laying hens, with the idea of testing large and small flocks. The house was used in this manner for three seasons with slightly better results from the flock of 50.

The plan as now given accommodates 25 fowls in each flock, with the exception of the large pen, in which can be kept 75 fowls of such breeds as Rocks or Orpingtons, or 90 of such as Leghorns. The large pen could, of course, be divided into the smaller pens.

General Rules for Building.

Every hen should be allowed at least four to six square feet of floor space. Each bird of the Plymouth Rock, Wyandotte, and such breeds,



Figs. 12 and 13. Front and Back Views of Nests. (*Poultry Craft.*)

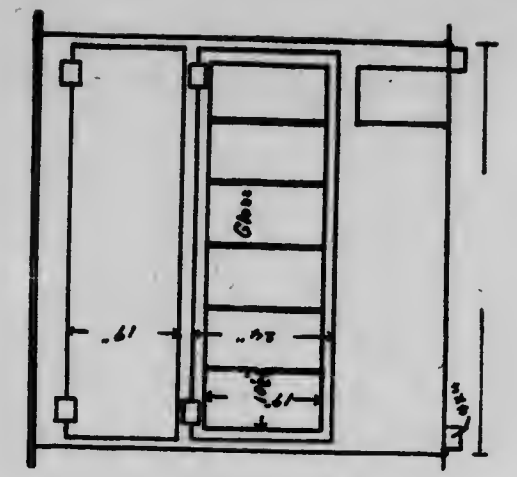
requires about nine inches of perch room; Leghorns, etc., about eight inches; and Brahmas ten inches.

Roosts should be made low, or near the ground. There are several reasons for this. Fowls of the heavier breed cannot fly high, and those of the lighter breeds frequently injure the soles of their feet in jumping from high perches.

When dropping-boards are used, they should be moderately low down, to admit of easy cleaning. Dropping-boards should be made of matched lumber, and should be 20 inches wide for one roost, and three feet for two perches, the first being placed eight to ten inches from the wall.

Most poultrymen prefer roosts two inches by two inches, with edges slightly rounded.

Nests.—Many use only old boxes; but such nests, if near the



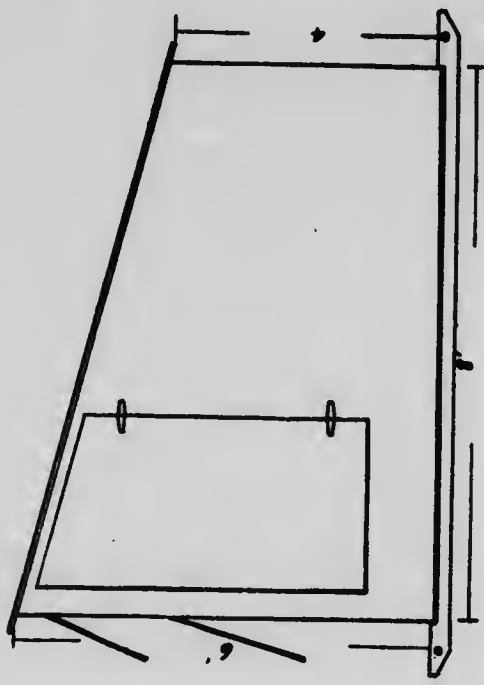
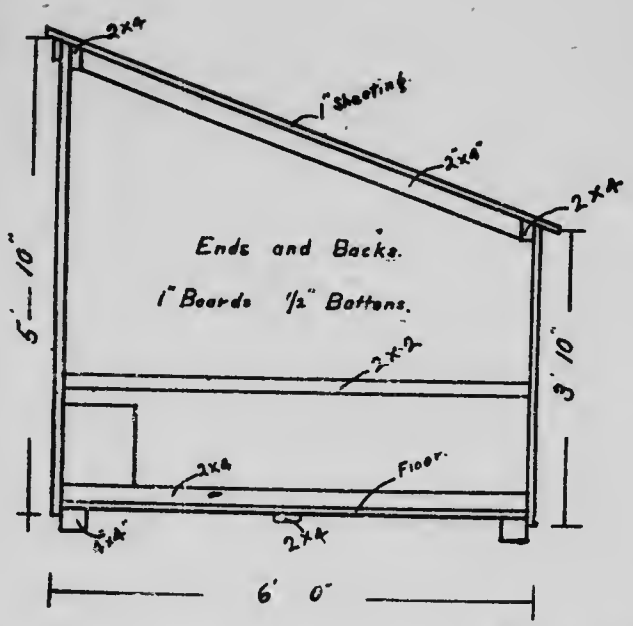


Fig. 10.



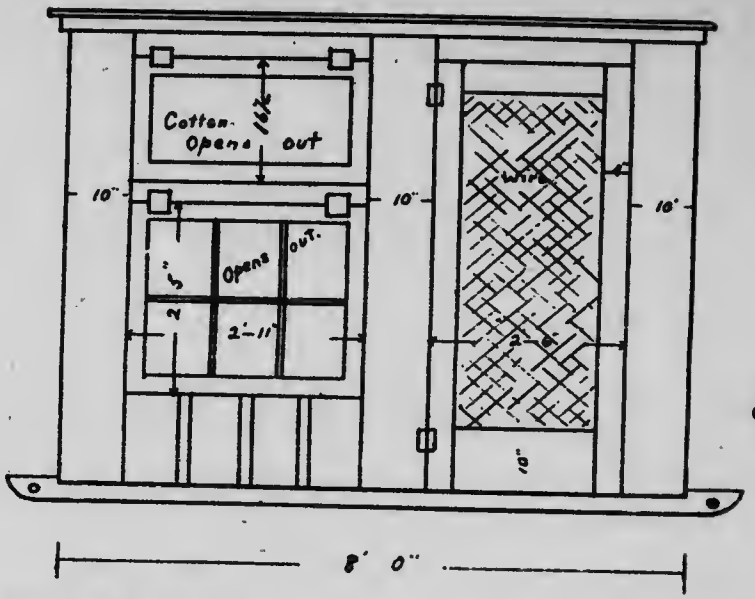


Fig. 11. Bill of Material for Colony House.

2 Pieces 4 in. x 4 in. x 10 ft. Runners.
3 " 2 in. x 4 in. x 7 ft. 10 in., Plates and Cen. Runner.
2 " 2 in. x 4 in. x 5 ft. 10 in., End Sills.
2 " 2 in. x 2 in. x 5 ft. 10 in., Roost Supports.
50 Feet 1 in. Matched Flooring.
50 " 1 in. Roof Boards.
140 Feet 1 in. x 10 in. Outside Boarding: Door, etc.
½ Square Shingles.
1 Sash, 6 lbs., 10 x 12 Glass.
1 Cotton Screen, 2 ft. 11 in. x 16½ in.
1 Door, 2 ft. 6 in. x 5 ft. 6 in.
1 Cotton Screen, fits on doors.
100 Feet Run, ½ in. x 2 in. Battens for ends and sides.

ground, are apt to induce egg-eating. Dark nests prevent this. (Figs. 12 and 13.)

Nests are usually made from 12 to 15 inches square.

Cement floors are the cleanest and the results are very good. Their cost is a serious objection. Ground floors are more in favor than board floors, and cost much less.

In my own experience, the best results are obtained from keeping 20 to 25 birds in a flock. Some succeed with 60 to 75 in a flock; but these are the minority. We have received fair returns from a flock of 100 hens.

Colony Houses.

Many people living in towns and cities wish for plans of houses suitable for housing a dozen fowls each. In some instances they wish these houses so constructed that they can be moved from place to place.

There is also a demand among farmers for a small house for rearing chickens, or for small special breeding pens. The plans given below are all adaptable to these conditions, and have been used here for the purposes mentioned above. The houses are of sufficient size to accommodate 100 chicks to a two-pound weight, or fifty chickens to a four or five-pound weight; but for winter use I would not advise putting in more than a dozen laying hens. See Figs. 8, 9, 10 and 11.

EGG PRODUCTION.

In considering this subject there are several factors worthy of notice—the housing and the range, the breed and the strain, the kind of feed and the method of feeding, the attendant, the cleanliness of the buildings, their surroundings and the weather.

In the foregoing pages we have discussed houses, and no further mention is needed here.

The question of which is the best breed is rather a delicate one, and moreover, my experience is that there is as much in strain as there is in breed. However, it can be safely stated that the heavier breeds such as Plymouth Rocks, Wyandottes, Rhode Island Reds, Orpingtons, etc., usually lay better during the winter—if hatched early—than do Leghorns, Hamburgs, etc., or the lighter breeds. The lighter or smaller breeds, with us, are more easily affected by sudden climatic changes during the winter. Usually their egg production declines considerably during a cold snap. Where one has no particular desire to get eggs in winter and does not care for roasting chickens, they would find the lighter breeds most profitable. Where one wants a general purpose chicken, that is a fair layer during both winter and summer, and at the same time a chicken that will make a fair broiler or roaster, such breeds

as Plymouth Rocks, Wyandottes, etc., will prove the most satisfactory. The light breeds can not be depended upon to hatch and rear their own young, whereas the heavier breeds may be relied upon for this purpose.

We have our best egg production yearly, from April and early May hatched pullets. These will commence laying if well reared between September and December, depending upon the strain or family as to whether or not they are late or early in maturing. March hatched pullets usually lay during August and then go into moult some time in November. These, of course, lay but little before March after moulting. They are, however, useful where one must have a constant supply of eggs, as the old hens decline rapidly during September and October, and the April pullets are then just getting started.

We find that Leghorn pullets or pullets of similar breeds hatched before April 15th, are apt to moult, so that we usually try and hatch these varieties after the middle of April.

Yearling hens lay fairly well, but older than this they are usually unprofitable, except as breeders when they have shown exceptional merit.

EGG PRODUCTION AND COST OF FEEDING.

COLLECTIVE RESULTS FOR 138 PULLETS FROM OCTOBER 1ST, 1909, TO MARCH 1ST, 1910.

Males.	Females.	House No.	Eggs laid.	Cost.	Average Eggs per Hen.	Amount Grain consumed.
2	23 R.I. Reds	6	1131	$15.21	49.1	851 lbs.
2	23 B. Rocks	6	1098	14.81	41.7	826 "
2	23 R.I. Reds.....	5	821	14.74	35.6	820 "
2	23 B. Rocks.....	5	1469	15.70	63.8	880 "
2	23 B. Rocks(weak).	3	694	14.09	30,1	748 "
2	23 B.Rocks(strong)	3	622	16.04	27.0	867 "
12	138		5835	$90.59		4992 "

COLLECTIVE RESULTS, 138 PULLETS, MARCH 1ST, 1910, TO SEPTEMBER 1ST, 1910.

Males.	Females.	House No.	Eggs laid.	Cost.	Average Eggs per Hen.	Amount Grain consumed.
2	23 R.I. Reds	6	2,187	$15.52	95.0	811 lbs.
2	23 B. Rocks.....	6	2,243	14.70	97.5	759 "
2	23 R.I. Reds	5	1,778	12.53	77.3	631 "
2	23 B. Rocks.....	5	2,185	14.41	95.0	746 "
2	23 B. Rocks (weak)	3	1,488	12.47	64.6	626 "
2	23 B. Rocks(strong)	3	2,120	15.24	92.1	788 "
12	138		12,001	$84.87		4361 "

It will be noticed in the above table, that the three pens lowest in egg production during the winter months, were also lowest during the summer months.

COLLECTIVE RESULTS, 138 PULLETS, OCTOBER 1ST, 1909, TO SEPTEMBER 1ST, 1910.

Males.	Females.	House No.	Eggs laid.	Cost.	Average Eggs per Hen.	Amount Grain consumed.
2	23 R.I. Reds	6	3,318	$30.73	144.2	1662 lbs.
2	23 B. Rocks.....	6	3,341	29.51	145.2	1585 "
2	23 R.I. Reds	5	2,599	27.27	113.0	1451 "
2	23 B. Rocks;.....	5	3,654	30.11	154.4	1626 "
2	23 B. Rocks,(weak)	3	2,182	26.56	94.8	1374 "
2	23 B. Rocks (strong)	3	2,742	31.28	119.2	1655 "
12	138		17,836	$175.46		9353 "

Average cost per dozen for winter months: 18.62c., or 19c.
" " " " " summer " 8.48c.
" " " " " eleven " 11.79c., or 12c.
Average cost of feeding each hen per month in winter: 13.12c.
" " " " " " " " " summer: 10.25c.
" " " " " " " " for eleven months: 11.55c., or 12c.
Average number of eggs per hen: 129.2.
Average amount of grain consumed per bird (males included): 62.35 lbs., or 5.66 lbs. per month.

FEEDS AND FEEDING.

A fowl requires grain food, vegetable food, meat food, and grit. These foods should be clean and wholesome, and furthermore a portion of them should be given in some form so as to induce the birds to take exercise, so that the fowls will be healthy. Fowls should be well supplied with water or milk to drink. Many make the serious mistake of not giving sufficient drink or not giving it regularly. The supply should be clean and constant. Dirty water, dirty or slimy drinking dishes, etc., will do more toward making a flock unhealthy and diseased than anything else. Most attendants are inclined to forget to clean the drinking vessels, and to keep them well filled at all times.

GRAINS.

Wheat with the Ontario people is the most popular feed and is one of the best. It is relished by all classes of poultry. The price of wheat, as compared with that of other grains during the past few years, makes

it necessary to mix other grains with it. I doubt very much if it is advisable at any time to feed only one kind of grain constantly, as a variety is better; some birds like one grain while others relish another.

Wheat bran is fed dry in hoppers also in mashes. It has considerable feeding value. It helps materially in adding bulk to the ration, and prevents impaction in the stomach. In other words, it aids the digestive fluids in acting upon the food.

Middlings or shorts is of value in mashes, to all classes, and is one of the good foods to check looseness of the bowels, where an excess of vegetables is given.

Low-grade flour is often a cheap and economical food in mashes for stock birds or for fattening chickens. It also has a tendency to check looseness of the bowels.

Corn is not used so much in Ontario as in the New England States. There it appears to be used quite freely in both summer and winter feeding of fowls. It is used whole, ground, and cracked, the meal being used principally in the mash foods. Cracked corn is used largely for young chicks, and fowls when scattered in the litter. The whole corn is rather large and conspicuous; and when in the litter, does not usually give sufficient exercise. I am of the opinion that corn can be used in portions of Ontario, where it is grown extensively, much more freely than it has been heretofore. Corn is a heating and fattening food, and is, therefore, best adapted for winter use. It is considered by many, when fed in large quantities, to make the hens over fat; yet it is used extensively by many progressive poultrymen with little or no evil effects.

Oats should be a first-class poultry food, but owing to the large percentage of hull, they are not relished by chickens when fed whole, and for this reason are somewhat indigestible. When rolled hull and all they are an ideal food as a dry mash, and are relished by fowls better than any other dry mash we have yet used. Ground oats without the hull are used extensively for fattening chickens.

Barley, either whole or ground, is very good. It has rather too much hull, but otherwise is a satisfactory food. It is considered by many to be next to wheat in point of value.

Buckwheat is very popular as an egg producer in districts where it is extensively grown. Some difficulty is at times experienced when first feeding it to fowls in getting them to eat it, but this is usually overcome in a day or so, if other feeds are withheld. Boiling the buckwheat will sometimes start the birds to eat it. After they once get accustomed to its appearance, it is much relished by them. Ground buckwheat is an excellent food to use in a fattening ration. It is somewhat like corn in its fattening properties and, therefore, it is better for winter than for summer use.

Method of Feeding the Winter Laying Stock at the O. A. C.

We try to simplify our methods and use only the common foods, and at the present time are using as whole grains, wheat, corn and buckwheat. These grains are fed in equal parts both morning and evening. The morning feed is fed the previous evening after the hens have gone to roost, by sowing it on the litter, and then turning the litter over; the straw is now on top and the grain below, and when the hens get up in the morning, they start to dig out the grain, and are kept busy all forenoon. At noon we feed mangels, cabbage or clover hay. The night feed consists of the whole grain fed in troughs, and what the birds do not eat is taken up. Rolled oats are kept constantly before the hens in hoppers. Buttermilk only is given as drink.

Method of Feeding the Summer Laying Stock at the O. A. C.

At the present time our plan of feeding is to scatter whole grain in the litter both morning and evening. The grains used are wheat, barley, oats, and occasionally buckwheat and corn. Green food is supplied in the form of grass, etc., in the runs. Sour milk is given as drink.

Dry Feeding.

The tendency at the present time is to feed dry grain, and to use no wet mash foods. It has been claimed by some writers that mash foods, while tending to force growth, and possibly egg production, do not tend to produce good eggs for hatching purposes; that is to say, the mash is more or less of a forcing food. In the production of eggs, the number produced is probably as large if not larger where mashes are used, but the hatching power of the eggs in some instances is not as high. During the past two or three years we have not fed any wet mashes to our breeding birds, and have fed in place some sprouted grain, but mostly rolled oats in hoppers. As far as we can see at the present time the sprouting does not improve the feeding qualities of grain very much, with the one exception of oats. The palatability of oats is increased considerably. We have made the oats equally palatable by having them rolled or flattened, that is the hull and all.

Feeding When Wet Mashes are Used.

The general method of feeding is to give a mash of mixed ground grains moistened with water or milk, in the morning; a little whole grain scattered in the straw covering the floor, at noon; and all the whole grain they will eat at night. This latter meal is usually fed in the straw. Some poultry men adopt the plan of not feeding the mash until evening,

we have been practising this plan for some time, and we like it very well. The objection to the former plan is that the hen is likely to become gorged with food early in the morning, and thus take to the roost for the rest of the day, which is usually followed by hens becoming too fat, and the egg record becoming small; but, notwithstanding, many successful poultrymen use this method to advantage. The objection to feeding the mash at night is that it becomes quickly digested, and the bird has not sufficient food to last it during the long winter night; but this objection can be overcome by giving a little whole grain after the mash at night.

Some poultrymen feed their fowls but twice a day, morning and evening, and get very good results; but I favor feeding three times a day. Our plan is somewhat as follows:—

Early in the morning the fowls are given half a handful each of whole grain. This is buried in the litter on the floor. Thus the fowls get exercise (a very necessary thing) in searching for it and at the same time keep themselves warm. At noon about two handsful of grain are given to a dozen hens in the litter; they are also given all the roots they will eat, either pulped or whole, as fowl relish mangels, sugar beets and turnips. Cabbage also—a very good green food—is sometimes given. About four o'clock in the afternoon they are fed a mash composed of equal parts of bran, shorts, oat-chop and corn meal (during cold weather); and to this is added about 10 per cent. of animal meal, if we have not cut green bone or cooked meat. These foods are thoroughly mixed together in the dry state, after which is added steeped clover, which has been prepared by getting a bucket of clover leaves, or cut clover hay, and scalding it with boiling water. This is done early in the morning, and the bucket is kept covered with a thick sack throughout the day. This will be quite warm at night, if it has been kept in a warm place. There is usually sufficient liquid to moisten the meal that has been mixed. Our aim is to have about one-third of the ration, in bulk, of clover. After the mash a small amount of whole grain is fed in the straw. There is—and should be—a plentiful supply of good, *pure water within easy reach at all times.*

To those who keep but a dozen or so fowls, or to those who wish to economize in the feed bills, by using table refuse such as bread, meat, vegetables, etc., the wet mash system is commendable, in that these cheap by-products, if clean, and cooked, make excellent mashes, when dried off with shorts and bran or other chop. This kind of mash usually gives excellent egg yields, and the labor entailed is not a serious consideration, under the above conditions, but it is, at times, where birds are kept in large numbers.

Animal Foods for Fowls.

The most expensive foods given to fowls are the animal foods. These are used as a substitute for the worms and insects that form a portion of the natural summer food of fowls upon free range. Flocks

confined to small runs require to be fed more or less animal foods during the winter, and during very long dry spells in the summer; even where the range is unlimited it frequently pays to feed a little animal food.

Animal foods usually assist very materially in the production of eggs in winter. By some people these foods are considered as a forcing food, that is to say, they will induce heavy laying, which in some instances may be followed by serious sickness, or possibly the injury may be only very slight; in fact unnoticeable, except that the eggs from birds so fed may be of very low hatching power.

It is generally believed, and I think rightly so, that good egg yields cannot annually be secured without the use of such foods as green cut bone, beef scrap, or cooked refuse meat, etc. Many believe that the larger the amount of these foods fed the greater will be the egg production. There is good ground for doubting this statement, in that these foods are expensive, and the extra eggs may cost more than they are worth, moreover, herein is where serious injury may be done to the hen's digestive and reproductive organs.

Milk is available on many farms, and it is claimed that as an egg producer, this food is equal in value to any of the meat foods. Our experience has been that sour milk for fowls has a slightly greater value than sweet milk, and is certainly much more easily obtained.

Last year we planned an experiment with the idea of studying what effect various animal foods would have upon the egg production, and the hatching power of the eggs.

The plan of the experiment is for five years, with a different breed for each year. The males used in the different pens were brothers. Buff Orpingtons were used for this trial. The grain and green food were the same for each pen, and all were housed in the same building. There were twenty-five females and two males in each pen. The pen given green cut bone were fed about three quarters of a pound daily. Several trials were made to determine the hatching qualities of the eggs during January, March and April.

The following are the results for seven months, from October 1, 1909, to April 30, 1910:

Pen No.	Animal Food Used.	Whole Grain. Lbs.	Dry Mash. Lbs.	Animal Food. Lbs.	Total Cost.	Total Eggs Laid.	Cost per Dozen Eggs.	Percentage of Eggs hatched.
1	Buttermilk.	720	233	1453	$18.16	2040	10·68c	55.0
2	10% dry mash is B. Scrap	840	327	84	19.85	1670	14·28c	50.5
3	B. S. in hopper.....	900	216	141½	22.21	1664	15·84c	33.0
4	No animal food.....	900	224	....	17.99	1496	12·00c	59.5
6	Green cut bone	900	196	127½	21.37	1654	15·48c	40.5

(1) The above table must not be taken as a final conclusive result. It is simply what happened with one breed for one season. It is, of course, an indication of what may be the results in years to follow, and as such it is valuable.

(2) From the results in pens 3 and 6 it would appear that the feeding of very large quantities of meat foods is not to be commended.

(3) Sour milk, where it can be secured at 20 c. to 25c. per hundred pounds is an economical food.

(4) Where eggs for hatching purposes, only, are the object in view, all forcing foods are probably best left out of the ration.

Green Foods.

When fowls have free range, they eat a considerable amount of grass, or other green foods. It would appear, therefore, to be desirable that where birds are confined either in small runs during the summer, or in houses when the ground is covered with snow in winter, that some effort should be made to supply this food.

Many foods are available, such as waste cabbage, mangels, turnips, rape, clover hay, or clover leaves, and green food grown especially for the purpose.

Early in the fall we use cabbage or rape; or at times where the runs have been sown to fall rye or wheat, the fowls are allowed to feed upon these. Where rape is extensively fed it frequently will cause the whites of the eggs to have a greenish cast, which renders them unmarketable. This food is relished by the fowls, but must be fed carefully. Cabbage at times will flavor the eggs slightly, and if frozen may cause serious digestive troubles. Both rape and cabbage make good green foods, but good judgment must be exercised in their use.

Mangels are a very succulent food and are relished by the birds during the winter. They can be fed either pulped or whole. When they are fed whole, we usually stick them on a projecting nail, at a convenient height, upon the wall of the pen. When these are fed freely they frequently scour the fowls. For this reason during some seasons we are obliged to feed them not more than twice a week.

Turnips may flavor the eggs. They are not as palatable as mangels, in fact some birds will not eat them at all, but at the same time they have considerable food value.

Clover leaves, either steamed or dry, are relished very much, and upon the whole are the most reliable winter green food. One hundred hens will eat from a peck to a bushel of clover leaves daily. This food upon the farms is cheap and easily procured, and should be fed more than it is.

The growing of green food is becoming quite popular with many, but we have never received sufficient results to warrant our growing it extensively, except for little chicks.

The ordinary plan is to soak the grain—most people use oats—twenty-four hours previous to sowing. The ordinary greenhouse flat is useful for this purpose. Any box from 3 to 4 inches deep will answer. It is necessary that the bottom of the box should have sufficient holes to give good drainage. Place a little damp earth over the bottom of the box, and then put in about ½-inch of soaked grain, and cover this with about 1 inch of sand. Keep the box in a warm place, and keep the earth moist. In a few days the grain will begin to germinate. Most feeders allow the grain to grow two or three inches before feeding.

INCUBATION.

This is a very interesting topic. Here we are dealing with the renewal of the flock. This has been to the large grower a difficult problem, and to most farmers and small growers comparatively easy. (It is apparently easy for the farmer to hatch and rear 100 or more chicks, and very difficult to get hens to lay during the winter. The large grower can usually get a fair egg production during the winter, if he can get the chicks out and well grown.) There are so many factors that may influence the hatch and the vitality of the chicks, that it is at times an impossibility to say why one fails and another succeeds.

The first essential to successful incubation is good hatchable eggs. The hatching power of eggs is apparently influenced by the parent stock, not only in the present generation, but possibly for generations back. Granting this, we must then use only the strongest and best birds as breeders, and if a rigid culling is followed annually, it is our belief that gradually, but surely, the problem will become less difficult. Then, again, the methods of housing and feeding are factors. Birds kept in ill-ventilated, damp houses, or under any unsanitary conditions, are lowered in vitality or vigor, which of necessity must be more or less imparted to the germ of the egg. It has been shown under the discussion of foods that the hatch is influenced by the feeds.

The farmer's flock is usually strong and rugged; it has plenty of exercise in the fresh air, and, moreover, is seldom kept in such numbers that the ground about the buildings becomes seriously contaminated. There are, of course, some exceptions to the above statement. Fowls upon the farm are very seldom excessively fed upon meat, or what may be termed forcing foods. Then, again, the unlimited range and the great variety of foods available make the conditions upon the farm excellent for the production of good hatchable eggs. If more attention was paid to the selection of the males, the results would be improved. The selling of the largest, and earliest maturing males, and the breeding of the late hatched, immature, ill-nourished males is not conducive to progress, to say the least.

The difficulties of the large growers are mainly due to bad housing, yarding, and feeding. Many houses are poorly ventilated, and the yards are small, and the fowls are on them constantly, and are, therefore, in an unsanitary condition; and, furthermore, the lack of a variety of foods and exercise, and the use of animal foods, are also more or less injurious. All these conditions are largely under our control, and many of the failures in the past appear to be directly due to a too intensified condition. It has been many people's idea to see how many hundreds could be kept on the least acreage of land.

Natural and Artificial Incubation.

Whether it will pay to buy incubators and brooders depends largely on one's circumstances. Where chicks are wanted in considerable numbers earlier than April 15th, an incubator becomes practically a necessity, as it is seldom that hens become broody in numbers until after the 1st of April. Again, where one wishes to hatch more than 150 chicks, an incubator is in many cases cheaper and better than the natural methods. It is also a necessity where one is breeding from the non-setting varieties.

There are numerous illustrations of chicks being raised in large numbers by the natural method in the States of Rhode Island and Massachusetts, particularly in the former State. Where this method is followed, the chicks are hatched largely during the months of May and June; and where from 500 to 1,500 laying hens are kept, there is little difficulty in getting a sufficient number of broody hens. Those who are keeping large numbers of hens appear to be well satisfied with the natural method; but there can be no doubt that the number of incubators in use is increasing from year to year.

The average hatch is probably one chicken from every two eggs set. This, of course, varies with the different seasons, also with the percentage of fertile eggs, and the strength of the germ. We have found during the months of February and March, when the ground is covered with snow and the fowls are closely housed, that the percentage of fertile eggs is small, and that the germs are very weak. Under such conditions we have very poor hatches and chicks that are very hard to rear. Much better eggs are obtained in December and early January, or when the fowls get out into the fresh air and are able to pick some grass. Thus it will be seen that, as a general rule, as the percentage of fertile eggs increases, the tality of the germ increases, the percentage hatched is larger and the mortality among the young chicks smaller. For example, we would expect to get a much larger percentage hatch of the fertile eggs from eggs that were 90 per cent. fertile than from those that were 60 per cent. fertile; and, moreover, we would figure on raising a much larger percentage of chicks from the former eggs than from the latter, owing to the chicks being stronger and having greater vitality.

Setting the Hen.—It is generally agreed that, in order to secure a good hatch, the hen must be placed where other hens are not likely to

disturb her; for, as a rule, we seldom get good hatches where other hens lay in the nest with the sitter. Some farmers do not set a hen until one becomes broody on a nest where no others lay, which often necessitates late chicks. The difficulty can be overcome by making a new nest for the broody hen. Get a box about twelve inches square and six inches deep; put some earth, or an overturned sod, in the bottom, taking care to have the corners very full so that no eggs can roll out from the hen and get chilled; next put on about two inches of straw or chaff; and then put a few earthen eggs to the nest. Place the nest in some pen where nothing can disturb the , and put her on after dark. Feed and water must be within easy reach and a dust bath should also be convenient. If the hen is sitting quiet the next day, you will be safe in putting the eggs under her. In our experience we get 90 per cent. of the hens to sit by following this method.

It should be remembered that the hen will be in better condition if dusted with insect powder when set, and also a few days before the hatch comes off. This will usually keep the lice in check, especially if some tansy or mint leaves are used in making the nest.

Artificial Incubation.

During recent years many incubator experiments have been conducted here as well as at other colleges, and some progress has been made. It is our purpose at this time, not so much to go into the details of these, but to give, if possible, the best methods we know, that can be used by the average person.

Selecting an Incubator.—There are many makes of incubators on the market, that do fairly good work; they are not perfect, nor have they the hatching power of a normal hen, but then they are always ready to hatch eggs in any day of the year, and by their use eggs can be incubated in large numbers. They do not get balky, and cease hatching as some hens do—that is, unless the operator fails to do his part. Commercially they are a necessity. To the prospective buyer I would suggest the purchasing of a well built machine, one that is double cased, and that is easily cleaned, and whose fixtures, such as the lamps, etc., are convenient. I do not know which is the best incubator made.

Recent scientific investigations indicate that it is probable, in some instances, that disease organisms, found in dirty incubators, cause serious harm. Our plan—no matter what the type of machine—is to thoroughly wash the entire interior of every machine before putting in the eggs for hatching. We use a ten per cent. solution of a tarry compound, such as Creoline or Zenoleum. This helps to clean the machine, and if applied hot, so much the better. We have obtained best results by using water or moisture during the entire hatch. I have seen good hatches from incubators where no moisture was used. We use a pan beneath the egg-tray, nearly the full size of the machine, and keep this pan covered with water, or wet sand, not more than one inch in depth.

Many incubator thermometers are not reliable, and it is, therefore, advisable each season to have the thermometers tested; any druggist will have a registered thermometer, and can do the testing if the owner does not wish to do so.

The hatch is made or lost usually during the first week of incubation. Keep the temperature well up to 103 deg., with the thermometer lying on the eggs, and maintain as even a temperature as possible.

Do not set dirty, washed, small or extra large eggs. The shell is porous and disease germs that may be on dirty eggs might infect a number of eggs. Do not turn eggs when your hands are dirty, or immediately after handling lamps or kerosene.

The room in which the machine is operated should be clean and well ventilated. If possible select a room that varies but little in temperature; in such a room it is easier to keep the hatching chamber of the machine at an even temperature. Where there is a strong odor of lamp fumes, or where there are decaying vegetables, or where moulds grow upon bits of boards or upon the walls, an incubator will not usually do good work. The lamp burns brighter, the eggs hatch better, and the chicks have more vitality when the air in the incubator room is pure.

General Symptoms of What is Commonly Called White Diarrhoea in Young Chicks.

When chicks are about twenty-four to ninety-six hours old they resemble each other very much in appearance, with the exception that we have noticed that hen-hatched and chickens hatched in moist incubators were longer in the down, or looked larger and fluffier. The trouble generally begins about the fifth day. Some of the chicks will have a thin white discharge from the vent, the chick is not active, it has a sleepy look; also the head appears to settle back towards the body; one thinks the chick was cold or in great pain. Some of the chicks get in the warmest spot under the hover, others have intense thirst. The white discharge from the vent is not always present. The chicks may die in large numbers between the fifth and tenth days, or there may be a gradual dropping off each day until they are six weeks of age. The disease kills some quickly, others linger for a week or more. A few chicks appear to recover, but seldom, if ever, make good birds. They are small, unthrifty and are good subjects for roup or any other epidemic.

To the ordinary observer a post-mortem examination may reveal any or all of the following conditions: The lungs will usually show small white spots in them. These are generally quite hard and cheesy. These spots are not always present, but from our examinations I would judge they are in fifty per cent. of the cases. Some lungs have no white spots, but are red sometimes, fleshy. These in our experience are not very common unless the chickens are chilled. The yolk is often hard and cheesy. It varies greatly—some yolks are of a gelatinous nature or almost

like the white of the eggs; others are hard and cheesy and very yellow in color, sometimes these are greatly inflamed; other yolks appear like a custard that has curdled, and they usually have a very offensive odor. The ceaca, or blind intestine, is frequently filled with a cheesy substance.

The white spots in the chicks' lungs are generally considered to be due to the growth of a common mould. This may be in the eggs, or more frequently comes from moldy feed or litter. It is much more troublesome in damp, dull weather, when the chicks are most inclined to stay under or near the hover.

REARING CHICKENS.

Experience and observation has led me to believe that chickens, in order to do their best, require to be grown on fairly good land, probably a clay loam or a sandy-loam being the best. I have never been successful nor yet have I seen good flocks of chickens grown on very light sand. Chickens require dry ground at times, yet, at the same time, a rather moist location near by renders a good foraging ground.

Young chickens require plenty of ground to range over; some convenient shade, such as fruit trees, or growing corn or artichokes; tender green food and insects. Many growers of large numbers of chickens on limited areas crowd the birds far too much, the result being a large proportion of unthrifty chicks. These last mentioned chickens have been very much in evidence on nearly all the large, intensive poultry plants that I have visited. The chicks frequently outgrow these conditions to such an extent that they are very difficult to pick out when mature, but are readily seen when about one-half grown. Many growers appear to believe that as long as a chicken is alive it is a good one, but this is folly. I believe by breeding from such stock the vitality will gradually decrease until we shall reach a point where eggs are practically unhatchable.

Chickens when taken from the nest or incubator should be placed on ground upon which no other chickens have ranged that season. The range or run for a chick during the first four weeks of its life need not be large, but it should be fresh.

Many make the mistake of putting late hatched chickens on old tough sod, the green grass (if there is any) being so tough that the chicks cannot break it, and often the grass too thick to admit of a chick catching an insect before it is out of reach. I much prefer a cultivated piece of ground. A little tender lettuce, or rape, or even weeds for green food are preferable to summer sod, or grass. But after the middle of May the cultivated land gives better results than grass land.

A corn field well cultivated appears to be nearly an ideal place for raising late hatched chicks.

Chickens hatched in an incubator can be reared either with hens or

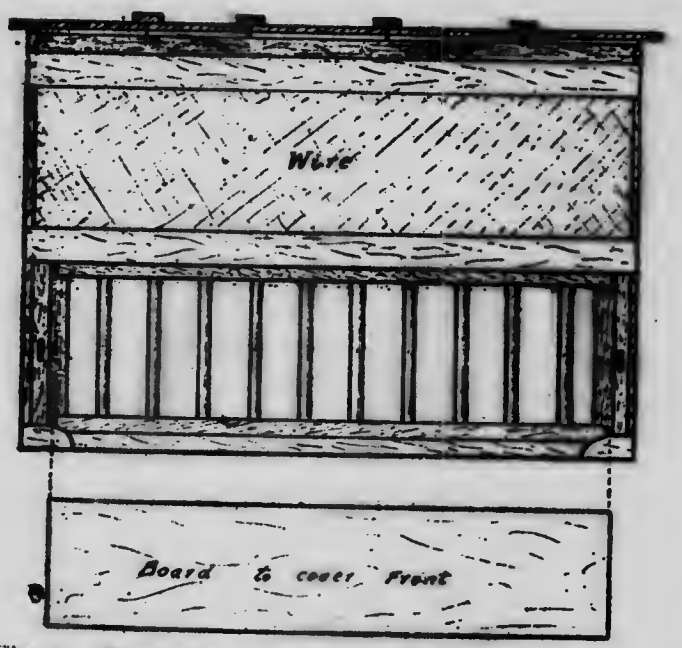


Fig. 14. Front of a convenient coop for hens and chicks.

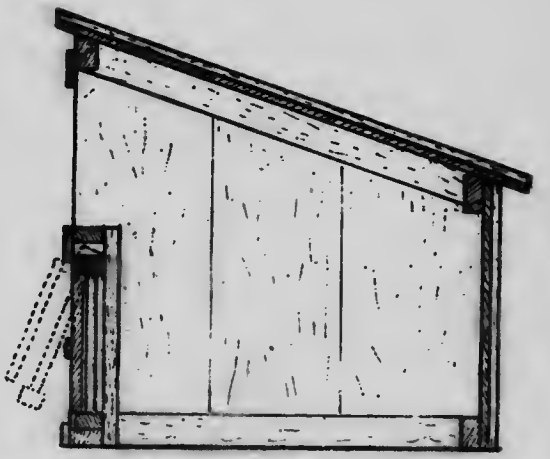


Fig. 15. Cross section.

This coop can be closed at night so as to keep out all animals that might destroy the chicks. The wire front is necessary to supply an abundance of air.

The movable front is a great convenience when the hen is running at large during the day.

The coop is two feet high in front, fifteen inches high at the back, and is two wide by three in length. The wire portion is one foot in width.

with a brooder. Some people are able to make good hatches with their incubators; but they are unable to rear the chickens in brooders. In this case I would advise the use of broody hens for mothers; and the same would apply to those who have an incubator, but do not care to invest in a brooder.

The best plan I know of to get the broody hens to take the chicks, is to give the hen two or three eggs out of the incubator on the 18th or 19th day and allow her to hatch them. When your incubator hatch is over take a dozen or fifteen chickens and put them under the hen after dark. Even if they happen to differ in color from those she has hatched, she will mother them all the same. If you give them to her in the day time she may not do so. Never neglect to give the hen a thorough dusting before giving her any eggs. If there is one thing more than another that requires careful attention in rearing young chickens, it is to keep

Fig. 16. Coop A.—Each side of roof 24 in. by 30 in.; bottom 2 ft. 4 in.

them free from lice. If lice get upon them, from the hen or elsewhere, a large proportion of them will be almost sure to die.

There are many good brooders upon the market which are well described in the manufacturers' catalogues; hence a description here is unnecessary. Personally, I am in favor of a three-compartment brooder, as it admits of keeping the chicks in near the heat when young, and on stormy days. The brooder lamp should always be arranged so as to give little chance of fire.

If the brooder can be placed in a small portable house, it is a good plan, as the brooder is thus protected from stormy cold winds in the early spring; also from the heat later on. The house protects the chicks from rain, and serves as a roosting coop after they become too large to stay in the brooder.

Chicks should not be fed until they are at least 36 hours old. It is a serious mistake to feed them earlier. Too early feeding is the cause of indigestion and bowel trouble in many cases. We try to keep the temperature of the brooder between 90 and 95 degrees at the chick level

throughout the first week. After the first week the temperature is gradually lowered, generally speaking, about one degree a day. When the chicks are put into the brooder, it is well to remember that every 15 chicks will raise the temperature of the brooder one degree. Be careful not to get your brooder too hot, nor yet so cool as to chill the chicks. This is very important, especially during the first ten days.

The floor should be covered with clover chaff before the chicks are put into the brooder. Lukewarm water should also be put into the brooder for drink before the chickens are taken from the machine. I have had best success in starting young chicks on hard-boiled eggs, finely chopped, shell included, and bread-crumbs—about four parts by weight

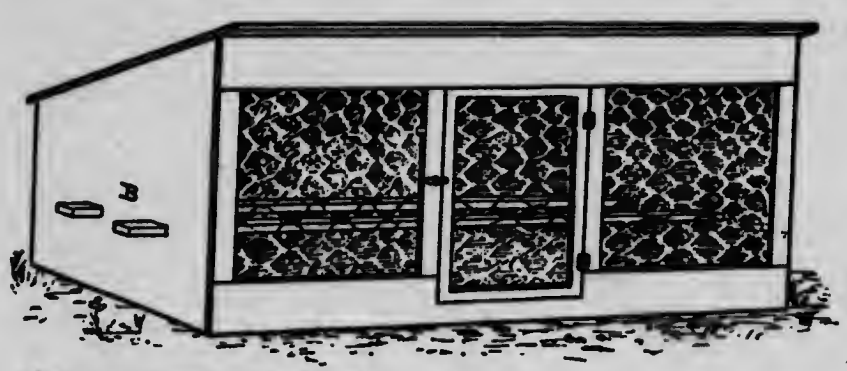


Fig. 17. Coop B.—Length, 6 ft.; width, 2 ft. 6 in.; height in front, 2 ft. 4 in.; height at back, 18 in.

of bread to one of eggs. This is fed dry. After the first two days we begin to give an occasional feed of seed chick-food, which is made as follows:—

Cracked wheat	30	parts.
Granulated oat meal	30	"
Small cracked corn	30	"
Grit (chicken size)	10	"

This can be used for the first feed and continued through the first eight to ten weeks with good results. We aim to feed the chicks five times a day. Generally after the first few days, there are three feeds a day of this chick-food, one of bread and milk (the bread being squeezed dry and crumbled), and one of whole wheat, or a mash made of equal parts of bran, shorts and corn meal, to which has been added ten per cent. of animal meal or blood meal. If we can secure fresh liver and get it boiled, this is generally given twice a week, and the animal meal is then omitted from the mash. If the chicks cannot get out to run about, the seed chick-food may be scattered in the chaff, and the little chicks will work away most of the day for it. This gives them exercise, which is a

necessity in rearing chicks. If there is no *green food* to reach, it *must be supplied*. Lettuce is excellent. Sprouted grains are very good, as is also root sprout, cabbage, rape, etc.

When the chicks get to be about eight weeks of age, we usually feed three times a day—the mash food in the morning and whole wheat and cracked corn at noon and night. If we are anxious to force the chicks, we give two feeds of mash and increase the animal meal a little.

Chicks hatched at a season of the year when they can range out of doors need not be fed as often or as carefully as described above. Dur-

Fig. 18. Growing Chickens in the Cornfield.

ing the winter season where chicks are reared indoors too liberal feeding often causes leg weakness, etc.

We have used during the season of 1909 the hopper plan of feeding chicks during the spring and summer months with good success. We have tried placing a hopper or trough of chick feed, made of grains as previously described (seed chick-feed), in a coop along with the hen and chicks, and keeping the supply constant in or near the coop, from the day the chicks were put out until well grown, with most satisfactory results. Where chickens have a good range about the fields of the average

farm I know of no better plan of feeding chicks. The hoppers may be made of any size or shape so long as the supply of grain is constant and the supply large enough to last for about one week. A hopper which slopes from both sides will feed better than one with a slope to but one side.

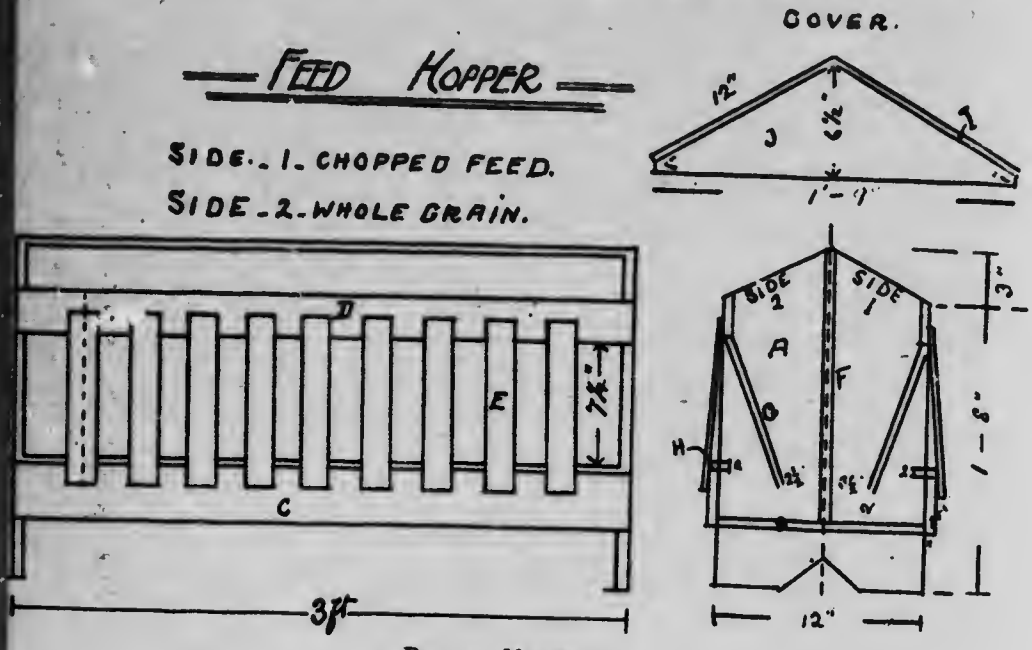
Where the hopper plan is adopted on the farm, the labor problem is very much reduced. This plan can be carried out with chicks in brooders, but for the first ten days or two weeks I prefer feeding the chicks about five times daily, after which time the hoppers are used. Water should be

Fig. 19. This cut shows the method of Brooding, etc.

given daily in a clean dish. We have had chicks with hens do extra well when turned in a large corn field with a hopper of grain constantly near the coop, but no water. These birds were a long distance from a water supply, hence they were tried without water with no bad results. I would prefer giving water if the supply is clean and constant.

The chicks are taken from the out-door brooders at from six to eight weeks of age, according to the weather. A small coop (Fig. 16) is set in front of the brooder, so that the chickens cannot get to the brooder entrance, the result being that they get into the coop A. After a day or two take away your brooder, and the coop can then be moved daily to fresh ground. This will keep the coop clean. When the chicks get too large

for the coop A, which will be in about ten weeks, they are put into coop B (Fig. 17). The same process is gone through with coop B. It is set in front of coop A, so as to obstruct the entrance, and the chicks then go into the coop B, and soon take to the roost. Coop B will roost 20 chicks until full grown. Try to keep your chickens roosting in the open air as long as possible. Never house them in close, stuffy houses. If you do they will be sure to go wrong, become weak, and be of little or no value, either as breeders or egg-producers. Where the indoor brooder is used in a colony house, the brooder is removed from *the house* and the chickens roost in colony house until they are ready to market.



BILL OF MATERIAL.

A. 2 ends ⅞ x 12″ x 1′—8″
B. 1 bottom ⅞ x 12″ x 2′—10½″
C. 2 sides ⅞ x 3½″ x 3′—0″
D. 2 sides ⅞ x 2½″ x 3′—0″
E. 18 pieces ⅞ x 1⅝ x 10″
F. 1 division ½ x 16″ x 2′—10½″
G. 2 " ½ x 9½ x 2′—10½″
H. 2 pieces ¾ x 1″ x 3′—0″
I. 2 " ½ x 12″ x 3′—2″ } Cover.
J. 2 ends ⅞ x 6½″ x 1′—9″ }

Side 1.—Chopped feed.

Side 2.—Whole grain.

There are many advantages in using several small movable colony houses for rearing chickens.

(1) There is no loss of time in teaching the chicks to go from a small coop to a larger one. Movable brooders are used inside the house, and when no more heat is required these are taken out. About this time low, flat perches are put in the house; the chicks soon commence perching, and thus prevent crowding. A hundred chicks can be put

in a house. This house will accommodate fifty chickens of about four or five pounds weight, or until large enough to be fattened or put into laying quarters. Usually some birds are sold as broilers, hence there is not much over-crowding.

(2) The chickens can be reared on a portion of the farm, where a full crop as well as a crop of chickens can be grown. This usually means new land each season for the chickens, which in turn means stronger and better birds reared with less grain. It also may mean the destruction of many injurious insects. We use the corn fields, pasture fields, and orchards, or any similar condition under which a crop of chickens, and an additional crop can be obtained from the land during the same season. Chickens grown on the same land year after year, do not thrive as well as those grown on new ground each year.

(3) Should the chickens at any time become destructive they can be moved. We have raised chickens in tomato fields, and if they develop the habit of destroying the ripe tomatoes, all that is necessary to avoid further trouble is to shut the chickens in at night, and next day draw the house to a new field and open the door. The chickens will come home to the colony house to roost.

(4) Where there has been considerable grain shelled on the field during harvest, the chickens can be easily moved to the field, and there they will gather the grain.

(5) Any vermin that might worry the chickens at night can be easily kept out by shutting the door.

(6) During rainy or bad weather, the chickens have a place for shelter. This is very important early in the spring and late in the fall.

Cost of Rearing.

We were able, during the season of 1909, to keep an exact record of the birds grown in the pasture field, and of those grown in the orchard. The chickens in the pasture field were hatched during the first two weeks in May. Three hundred and forty-five birds were grown to maturity or to a size suitable for fattening. We began to remove the cockerels from the field to the fattening pens on August the 25th. The pullets and cockerels held as breeders were all taken from the field by the 22nd of October. The breeds reared were Orpingtons, Wyandottes, Plymouth Rocks, Leghorns, etc. They consumed 4,304 lbs. of grain; of this about one-third would be dry mash, nearly 300 lbs. chick feed, and the balance wheat, corn and hulled oats in the proportion of two and a half, two and one. There was five per cent. of beef scrap added to the dry mash. The birds were weighed when taken from the field, weighing 3.341 lbs., or one pound of chicken representing 3.2 lbs. of grain. Some of the breeding cockerels weighed over seven pounds, and the Leghorn pullets did not average three pounds in weight. We removed most of the cockerels at about a three and one-half pound weight, or when they would fatten most economically.

The chickens reared in the orchard varied more in age. The first were hatched on the 25th April, and the last on July 6th. Most of the birds were hatched in May. We sold 218 as broilers from this lot during July. The later cockerels were removed to the fattening crates as was done with those grown in the pasture field. Most of the pullets were taken out about the 1st October, and by the 1st November practically all had been removed with the exception of about 100, these were cockerels held as breeders, and the July chicks.

The above illustration shows how it is possible to produce two crops in one season, viz.: apples and chickens. This is one of the best places to grow strong, healthy chickens at a very low cost.

We raised in this field 733 chickens at a cost of 8,649 lbs. of grain. A pound of chicken equalled 3.34 lbs. of grain, or nearly the same as the pasture field chickens.

The figures mean that a farmer can in his fields raise a four-pound cockerel for thirteen or fourteen pounds of grain. This amount of grain at $30.00 per ton, would be worth twenty-one cents. The cockerel would sell in the market for at least forty cents, and if fattened, would be worth sixty cents. The data we have on hand would indicate that it costs about five to seven cents each to hatch the above birds, that is figuring eggs, oil and losses.

Breeding Market Fowls.

When looking over dressed poultry in some of the exporters' shops, I have often thought how easy it would be to improve the appearance of much of the ordinary poultry, and some of that which is specially fattened, if the birds are bred to a proper type. I have spent much time in examining different types of birds, alive and dressed, and in observing the feeding capacity of certain types; but it would take years to arrive at definite conclusions on these points. I am, however, of the opinion that one of the most important things to be sought after is *constitution*. This may have no actual market value, but it certainly has much to do with the bird's ability to grow and put on flesh. What we want is a good feeder, and an economical producer. Generally, a bird with a

Fig. 20. Colony houses used for rearing chicks. Artichokes growing as shade for the chickens.

short, stout, well-curved beak, a broad head (not too long), and a bright, clear eye, has a good constitution. And I have noticed that when a bird has a long, narrow beak, a thin, long comb and head, and an eye somewhat sunken in the head, it is usually lacking in constitution. Such a bird is likely to have a narrow, long body and long legs, upon which it seldom stands straight. There are some exceptions to this rule; yet generally speaking, if a bird has a good head the chances are favorable for a good body; and, if it has a poor head the chances are against it. I have frequently noticed in the rose-comb breeds, such as Wyandottes, that a good-shaped one is seldom found with a long, narrow comb.

The neck should be moderately short and stout, indicating vigor. The breast is the most important point in a market chicken. It should be

Portable colory houses on edge of pasture-field and woods.

broad, *moderately* deep; and, if broad, it will present a fine appearance and appear well-fleshed. It is quite possible that a broad, deep breast will carry more meat than a moderately deep breast of the same width; yet there is no doubt that the latter will present much the better appearance, and sell more quickly and at a higher price in the market. The breast bone should be well covered with flesh to the very tip.

When considering the length of breast, we must try to have it come well forward (see Figs. 21 and 22), and not be cut off at an angle, as in Fig. 23. The body, in general, should present the appearance of an oblong when the head, neck, and tail are removed.

We frequently see birds that are very fat in front, and cut up behind, as in Fig. 24. Chickens of this class have a very short breast; and, if the breast happens to be deep, as it is in this bird, the chicken will have a very poor appearance when dressed, as it will show a marked lack of width and length of breast, with excessive depth. (Notice that the head is narrow and long, the body is narrow, the eye is bright but slightly sunken, the legs are long and not straight under the body.)

In Fig. 23 observe the very flat breast, the length of back, the long neck and head, the narrow comb, the sunken eye, and the length of legs. The breast comes fairly well back, but not well forward.

In Figs 21 and 22, the bill is short and stout, but not so well curved as it should be. Note the breadth of head, the prominence and brightness of the eye, the short, stout neck, the great width of the breast, the fulness caused by the breast bone extending well forward, the short, stout legs (straight under the body), and the width between the legs. There is an expression about this chicken that indicates health and the essence of vigor.

The back should be broad, to give lung and heart capacity; and the width should extend well back to the tail-head. We do not want the wedge-shaped back, as seen in some fowls that have great width at the shoulders and taper rapidly toward the tail-head.

It is much easier to get good-shaped market pullets than good cockerels. The market demands a five-pound bird when dressed, and farmers have gone into raising big chickens. To that end they are asking for large, overgrown cockerels, of excessive depth, for breeders; and the result is that we get dressed chickens weighing four to five pounds each, that have immense, high breast-bones and very long legs. These are not attractive to the buyers, and they sell at less per pound than plumper birds. For example, if given two birds of the same width of breast, one is one and one-half inches deeper in the breast than the other. The result will be that one bird will look plump and sell readily, while the other will lack in plumpness and be slow in selling. This lack of plumpness can be bred out by using such males as that shown in Fig. 21.

We like to have birds as well built as we can get them, and Fig. 21 is as near the ideal market chicken as we have in the breed which he represents.

Fig. 21.

Fig. 22. Side view of Fig. 21.

Fig. 23.

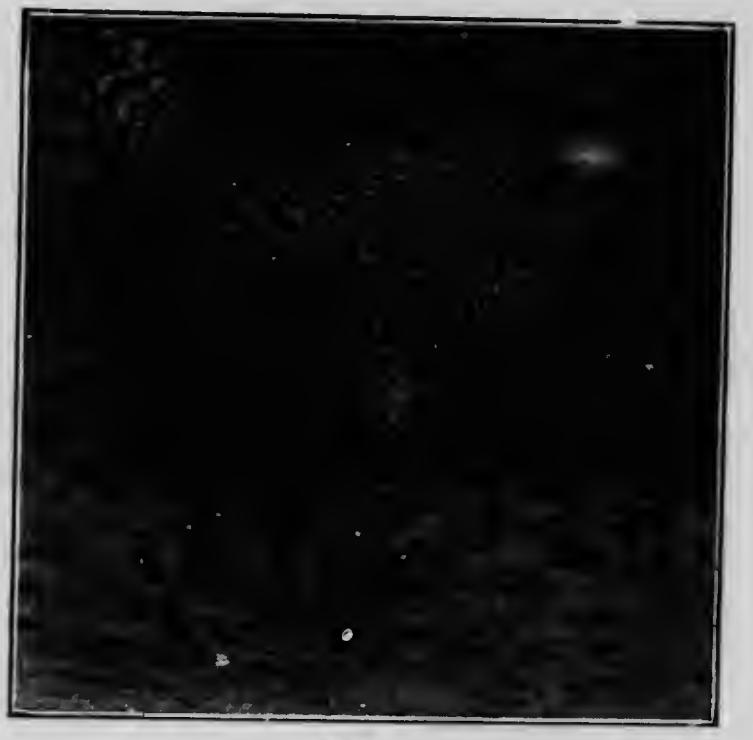


Fig. 24.

Fig. 25.

Fig. 26.

Fig. 27.

The hen as seen in Fig. 25 is of a good market type. (Note the width and fulness of breast.) As a breeder, she is a little fine in bone, and rather too small. She has, however, that blocky appearance which is desirable.

Fig 26 is a photo of a cross-bred chick (sire, Buff Orpington; dam, Houdan). Note the length and fulness of the breast; also good beak and eye

Fig 27 represents the long, narrow sort. (Note the long beak, the narrow head, the sunken eye, the long neck, and long, crooked legs.) When dressed his appearance will not be pleasing.

Fig. 28. Showing the difference in amount of flesh covering the breast bone, due to breeding.

Breeding for Meat Production.

Fig. 28 is a photograph of two fattened chickens, and shows very clearly the great difference in the amount of breast meat upon the two individuals. Many people believe that flesh upon the breast is a matter of feeding and not breeding. These two chickens are equally fat, and both have been equally well reared and fattened. The difference in the amount of breast meat is a matter of breeding and not so much of feeding.

Of course it is a well known fact that if birds are improperly nourished or are sick, their breasts will become bare of meat, but where judicious feeding is practised one will find a great difference in the amount of flesh or meat upon the breasts of various chickens due, of course, entirely to the individuality of the chicken.

Our experience has been that if we select males with long breast bones, that are well covered with flesh or muscle to the tip of the breast

bone, we are able to produce chickens for market purposes that have, on an average, well covered breast bones.

Breeding for Egg Production.

Can the egg yield be increased by breeding from the best producers, or is one just as likely to get as many eggs from any strain, family or breed, provided the birds are strong and vigorous, and hatched at the proper season of the year?

The writer's experience is that there is a difference between families of the same breed or variety as far as egg production is concerned. Some families appear to lay much more readily than others, and a few families that have come under my observation require very careful attention and feeding in order to get a reasonable egg production.

The question naturally arises as to what number of eggs should be expected from a hen. The average over the Province is probably under 100 eggs per hen per year, and many of the good flocks do not average above 120 eggs per hen. Much, of course, depends upon the season of the year in which the eggs are laid. There is an over production of eggs during March, April and May, and an under production during October, November, December, January and February. The writer believes it is within the possibilities of most farmers to produce from 108 to 120 eggs per year from each hen kept, and it is also his opinion that large flocks may be expected to yield 150 eggs per year if well bred, and proper care and attention be given. Many small flocks will probably average much higher, but not in flocks of from 600 to 1,000. A dozen hens might be selected that would lay from 180 to 200 eggs each for one year, but with 500 or 600 similar hens or pullets it would be a very difficult task.

Good, strong, vigorous birds are essential for egg production. The simple fact that a hen has laid 200 or more eggs in her pullet year is not sufficient to warrant her being used as a breeder. The writer has seen a number of 200 egg hens with long narrow heads and sunken eyes, which indicate low vitality, and, moreover, has tested a number of them as breeders, and has yet to see one that was worth while breeding from, judging from the performance and living powers of her offspring.

A hen used for breeding, especially for the production of males to head the breeding pens the next season, should not only be expected to lay a large number of eggs per year, but these eggs should be high in hatching power, and the chicks should live, and, furthermore, they should develop into good sized birds quickly, and the pullets should lay well. Perhaps it might be well to give here the method that is used by us in breeding from selected layers.

The hen is required to be a good winter layer, and to lay at least 150 eggs in her pullet year. The next requirement is that her eggs hatch well—that is, it is expected that over 80 per cent. of the eggs will be fertile, and 90 per cent. of the fertile eggs will hatch. It is then re-

quired that 90 per cent. of the chicks will live to five months of age, and that the cockerels at this age be well developed and weigh—if from general purpose breeds—at least six pounds each, and, finally, that the pullets be good layers. If the pullets lay well during the fall, then I consider holding their brothers as breeders. We try as far as possible to test the males along similar lines, as to producers of plenty of strong vigorous chicks that also live, grow, and lay well. There is probably as much difference between males as there is between females.

The above method entails much work, so much so that it is only practicable to experiment stations, and to a few specialists. I would strongly urge the breeders of pure bred stock to exercise as much care as possible in trying to produce families or strains, that are high in the hatching power of their eggs, and that are equally as high in the living power and growth of the chicks.

There are many who cannot adopt the above method, but to the average grower the best advice we can give is to select a male that has been strong and vigorous from a chick up, one that has matured to normal size quickly, and that has never been unthrifty. Small, fine-boned, quick maturing males have been disastrous where they have been used, possibly not the first season, but shortly afterwards.

The hens bred should be the best you have. Select the hens that are active and look thrifty. Avoid the narrow headed ones, and those that are lazy and awkward.

The following table gives a comparison of two flocks of twenty-three Barred Rock pullets, that were in every way treated alike, except as to the method of breeding. They are the same age, were hatched and reared by the natural method, and have always lived in the same houses and enjoyed the same range.

The one flock, known as the heavier layers, has been bred for some years for early maturity and winter laying.

The other pullets are bred from birds that have been bred mainly with the idea of producing good specimens of the breed, as to shape, color and size.

The bred-to-lay pullets were larger by October 1st, but the others are larger at this writing, February 1st. In other words, the former matured earlier. Their brother's average weight at five months of age was nearly six and one half pounds.

EGG PRODUCTION FOR THREE MONTHS OF PULLETS HATCHED DURING THE LAST WEEK OF APRIL.

	October.	November.	December.	January.	Total.
23 Bred-to-lay pullets ..	101.	337.	296.	179.	913.
23 Common pullets	....	66.	190.	132.	388.

Fig. 29.

Fig. 30.

Fig. 31.

It would be more interesting if given for the entire year, but as we have not the exact comparison of these strains where the age and other matters of importance are exactly the same, we do not deem it wise to use the data; however, this much can be said, that the above record is similar to the others we have had.

Figs. 29 and 30. Type and color of Barred Plymouth Rock, males and females, which for several generations have been bred for heavy winter laying and early maturity.

Fig. 32.

Fig. 33.

Fig. 31. Trap nests as arranged in the pen and two of the bred-to-lay Barred Plymouth Rock hens.

Figs. 32 and 33. Type and color of Barred Plymouth Rocks, which have been selected for generations for color and type. No particular attention was paid to egg production.

The writer believes that by careful breeding for a few years, a family can be secured that will mature early and lay well, which will have fair to good color and type.

FATTENING CHICKENS.

The selling of lean chickens is wasteful, to say the least. Much more interest is being taken in this branch of the industry year by year, and in districts where buyers discriminate in prices between the well finished and thin chickens, the progress has been very pleasing. There are many buyers who now pay a premium for good chickens. The demand for home consumption has increased to such an extent that the supply falls far short, and more than one wholesale dealer in our large cities is fattening the thin chickens sent to market. Some of the dealers have plans for buildings, which they purpose erecting this year, where they can fatten thousands of birds weekly. They know that the farmer or grower can do this work better and more cheaply, but if he will persist in sending lean chickens to market, and the consuming public demands fat chickens, some one must supply the demand. Some dealers have been trying the proposition in what might be termed a small way during the past two or three years. The business has, as I understand, been profitable, even where the milk was brought in by express, and a high rental paid for the building used. Surely if the dealer can buy all the raw materials from the farmer or grower, and make a profit, the producer should do as well or better.

T[illegible] is ordinarily from three cents to seven cents per pound difference in the price paid for well fleshed or fattened birds, to that paid for birds just off the range or fields. This means a difference of from fifteen to thirty-five cents on a five pound chicken, depending upon the quality. Not only does the feeder make upon the gain made while the chicken is being fattened, but the original weight is increased in value by the improvement in quality. There is always a market for goods of prime quality, and the poor quality goes at begging prices, when the supply is great.

It is not difficult to produce good chickens. Like other lines of live stock, the scrub sort are not desirable. Good thrifty cockerels, either pure-bred, crosses or grades of such breeds as Rocks, Orpingtons, Wyandottes, Rhode Island Reds, Game, Dorking, etc., make economical gains. It is usually not very profitable to feed Leghorns, Minorcas, or birds of similar character. These breeds make medium broilers, but rather poor roasters. The birds usually make the greatest gain when about three to four months of age, or at a weight of three and one-half to four pounds. Should the market demand a chicken of more than five and one-half pounds in weight, then it will be required to allow the birds to range longer, and the gain (in our experience) will be hardly as profitable, unless the price paid is higher, at least one cent per pound.

The average birds make the most economical gains during the first two weeks of feeding. It seldom pays to feed much longer than three weeks or twenty-four days, after this period the added gain is not sufficient.

Chickens can be taught to eat by lamp-light, and where one's time during daylight is otherwise occupied, this feature is very convenient. After November 1st, or even earlier, we feed but few chickens during daylight. They are generally fed twice each day, and not more each time than they will consume quickly.

Construction of Fattening Crates.

Fattening crates are usually made 7 ft. 6 in. long, 18 to 20 in. high, and 18 in. wide. The crate is divided into three compartments, each holding from four to five birds, according to the size of the chicken. The crate is made of slats, except the ends and partitions between the compartments, which are solid wood—those on the top, bottom and back running lengthwise of the coop, while those on the front run up and

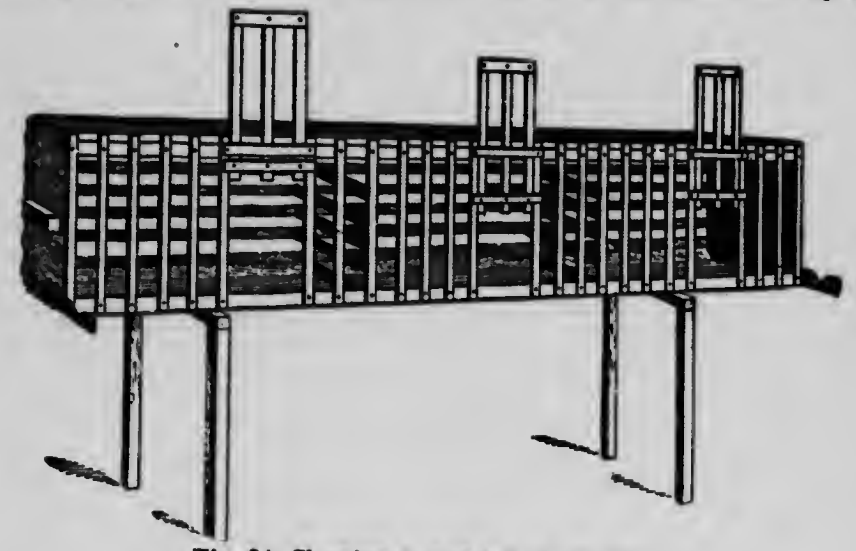


Fig. 34. Showing a single crate or coop.

down. The slats are usually 1½ inches wide and ⅝ inch thick. Those in front are placed 2 inches apart to allow the chickens to put their heads through for feeding. The slats on the bottom are placed about ¾ inch apart, so as to admit of the droppings passing through to the ground. Care should be taken not to have the first bottom slat at the back fit too closely against the back. An opening between the first slat and the back prevents the droppings from collecting and decomposing. The slats on the top and back are usually two inches apart.

There is a small V-shaped trough arranged in front of the coop for feeding and watering the chickens. This trough is from two to three inches deep and is generally made of ¾-inch lumber.

Very fair coops may be made from old packing boxes, by taking off the front and bottom, and substituting slats in their places (see Fig. 34).

During warm weather these crates may be placed out of doors. They need to be protected from the rain, which is easily accomplished by placing a few boards over them. In cold weather the crates should be placed in a house or shed where they are protected from raw, cold winds. When fattening chickens inside of a building, it is well to darken the building and keep the birds as quiet as possible.

After each lot of birds is killed, we paint the crates with some liquid lice-killer. Coal-oil and carbolic acid is very good. Use one gallon of coal-oil to one pint of crude acid. We have used some of the prepared mixtures with good results. If the birds (bought from different par-

Fig. 35. Cramming machine for the forced feeding of chickens, turkeys, etc.

ties) are very lousy when put up, they should be well dusted with sulphur. The birds should be watered at least twice every day in warm weather. Grit should be given them twice a week.

During the first week feed lightly—never quite all the birds will eat. I prefer feeding three times a day during the first week, and twice a day during the succeeding weeks. It seldom pays to feed the birds longer than three to four weeks. Chickens weighing from three to three and one-half pounds each, that are thrifty and of good breeding, appear to be the most profitable for feeding. Large chickens, weighing from five to six pounds, gain less and eat more than the smaller ones.

Should a bird become sick while in the crate, I find that if it is given a teaspoonful of salts and turned out on a grass run it will usually recover.

Cramming Machine.

The crammer consists of a food reservoir, to the bottom of which is attached a small force-pump moved by a lever and treadle which is worked by the foot of the operator.

Communicating with the pump is a nozzle, through which the food passes to the bird.

"A" is the food reservoir, "B" the pump, "E" the pump rod, "O" the lever, which on being depressed at the lettered end causes the pump rod "E," to which it is attached, to move downwards, and to eject the contents of the pump "B" out of the nozzle "K." On relieving the pressure at "O" the lever and the parts connected therewith are drawn up by the spring "C" until the motion is arrested by a stop "M," which serves to determine the quantity of food ejected at each depression of the treadle.

The charge may also be varied by arresting the pressure at any point in the downward thrust of the lever at "O."

The illustration (Fig. 35) shows one method of operation with this crammer, and this plan is now largely followed in some parts of Sussex, England.

Kind of Food Used in Cramming Machine.

Not all kinds of foods can be used in the machine. The food must be in a semi-liquid condition in order to pass through the machine. This necessitates the use of some kind of grain that will stay in suspension in the milk, beef broth, or whatever liquid is used in mixing the grain. Finely ground oats, with the hulls removed, or shorts, answer the purpose well. We use almost entirely the former food. Grains, like corn-chop or barley meal, are not suitable.

The food is mixed to the consistency of ordinary gruel, or until it drips from the end of a stick.

Will it Pay to Buy a Cramming Machine?

For the ordinary person, I think not. First-class chickens may be had by feeding in the crate from the trough only; indeed, I have had equally fleshy birds that have been fed for four weeks from the trough as where we have fed them two weeks from the trough and one week from the machine.

Where one has a special trade for high-class poultry, I am of the opinion that a more uniform product can be secured by using the machine. Machine-fed birds should realize at least one cent more per pound than trough-fed birds in order to pay for the extra labor, etc.

Birds that are fairly well fleshed when put into the crate will do better if put at once on the machine, instead of being crate-fed first.

Crate Feeding vs. Loose Pen Fattening of Chickens.

The term "fattening of chickens" has been in use for some time, but it does not exactly convey the meaning intended by the feeders of chickens. The object is to make the chickens more fleshy, with just sufficient fat to make the chicken cook well. The chickens are not intended to be abnormally fat, yet at the same time they carry considerable fat well intermixed with lean meat.

We have, for a number of years, conducted experiments with chickens in crates and in loose pens. We have tried about six different feeders and the results vary. With some feeders we had equally as good results with birds in crates as with them in loose pens. We have had two feeders in particular who could not feed birds to advantage in loose pens as compared with crates. We have had one feeder who could get slightly better returns in some cases, not all, with birds in pens as compared with crates.

In speaking to the buyers of chickens, the majority of them seem to think that the crate-fed birds are much superior to those fed in loose pens. Personally, I would prefer feeding birds in crates, for the reason that it takes less room, and I believe that I can feed them with less expenditure of labor and get a more even product. There are now many people who can get good results from feeding birds in box stalls, etc. No matter which method is followed, cockerels should be fed for two weeks or more before they are killed and sold.

How to Feed.

We receive a number of inquiries as to how we feed the birds that are being fattened. Most inquirers wish to know the exact amounts fed each day.

It will be noticed that we fed very lightly at the beginning—a very important point—and that the amount was gradually increased until such times as the birds refused to eat all that was given them. No feed was left in front of them longer than ten minutes after it was placed in the trough. Any food left after such time was removed.

Crate N.

Ration:—Equal parts of oat meal, corn meal, and barley meal mixed with sour milk.

	Lbs.	Ozs.
Weight at commencement	53	4
Weight at first week	55	0
Weight at second week	66	4
Weight at third week	70	2

Date.	Morning.		Night.	
	Meal.	Milk.	Meal.	Milk.
	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.
Oct. 17	12	1 8	12	1 10
" 18	14	1 8	12	1 8
" 19	1 0	1 12	1 0	1 12
" 20	1 2	2 2	1 2	2 4
" 21	1 4	2 8	1 4	2 8
" 22	1 6	2 12	1 6	2 12
" 23	14	1 12	1 8	3 0
" 24	1 10	3 0	1 12	3 4
" 25	2 0	4 0	2 0	4 0
" 26	2 5	4 8	2 8	4 8
" 27	2 0	4 0	2 0	4 0
" 28	2 8	4 8	2 12	5 0
" 29	2 8	4 8	2 8	5 8
" 30	1 4	2 8	2 12	5 0
" 31	2 0	3 8	2 0	3 8
Nov. 1	2 4	4 0	2 8	4 8
" 2	2 0	3 8	2 4	4 0
" 3	2 4	4 0	2 4	4 0
" 4	1 12	3 8	1 12	3 8
" 5	1 12	3 8	1 12	3 8
" 6	1 12	3 8	....	.. ..

Rations for Fattening Chickens.

It is difficult to give a ration suitable for fattening chickens and that meets the requirements of every individual. Many of us have to use whatever foods are available, and for that reason we are giving several rations that have worked fairly well with us in a general way. It may be said that the grains in a ration should be ground as finely as possible; and further, some grit should be fed to the chickens at least once a week, and it is also desirable that the food should be mixed to the consistency of a pancake batter, so it will pour, and, moreover, the best results are procured when the food is mixed twelve hours previous to feeding.

The best ration that we have yet used is one composed of two parts of finely ground oats, two parts of finely ground buckwheat, and one of finely ground corn; to this is added sufficient sour milk to make a batter, or ordinarily about two to two and one-half pounds of milk to one pound of grain. We have gotten very good results from a ration composed of equal parts of corn meal, middlings and buckwheat meal. Frequently barley meal can be substituted for the buckwheat, or oat meal for the middlings. It is desirable, if possible, to always use milk, as much better gains are made with it than with any other food. Where milk is not available, blood meal, and beef scrap can be substituted, but

we would not advise more than 15 per cent. of the grain ration to consist of these foods. We would advise soaking the blood meal, or beef scrap, in warm water for twelve hours previous to being mixed with the grain. We have gotten better results in some cases, and equally as good in all cases by feeding any of the above mixtures cool or cold rather than warm—that is to say, there were no better gains made by keeping the food at 70 or 80 degrees than at 30 or 35 degrees.

It is of the utmost importance that the birds be kept with keen appetites, as a little over-feeding on the commencement usually means indifferent gains. One should be careful to have the birds free from lice or other insects, and as far as possible to keep them in a cool, comfortable place, rather secluded, so as not to be disturbed by the visiting public or other chickens. The birds should be dusted with a small amount of sulphur or other insect powder in order to keep the lice in check. If the sulphur is used too freely it produces a scaly appearance on the birds when dressed.

We have each year a surplus of cockerels over and above those required for breeding purposes, and the most of these are fattened and killed; a few are sold to farmers or breeders. We also fatten the cull pullets. In 1908, from September to December, we put in the fattening crates 626 birds. The loss by death among these was two birds. The birds weighed (when brought in from the range, usually with full crops) 2,233 pounds. They were fed from four days to three weeks before killing.

We hoped to have fed them all three weeks, but at times the demand for dressed chickens required us to kill the birds shortly after cooping.

Rations.

The main ration consisted of barley meal, low grade flour, middlings and buttermilk. Some other mixed grains were used and a little shredded wheat. The 626 birds ate 2,057 lbs. of ground grain and 4,000 lbs. of milk.

Many farmers and others market their birds in a thin condition. We can, for the time it takes to feed, clean out the pens, etc., make at least 50 cents per hour over and above the cost of feed. We usually feed these birds by lamp-light at night, so that little valuable time is lost.

Financial Statement of Fattening Chickens.

626 chickens weighing 2,233 lbs. at 8c. per pound, live weight	$178 64
2,057 lbs. of grain at $1.50 per cwt.	30 85
4,000 lbs. buttermilk at 10c. per cwt.	4 00
Total cost	$213 49
624 dressed chickens, bled and plucked, but undrawn, 2,353 lbs. at 12½c. per lb.	294 75
Profit	$81 26

Birds that are starved ready to kill shrink 12 per cent. by bleeding and loss of feathers. We have figured frequently that the average profit per bird in three weeks' feeding was about 15 cents each; the above table shows nearly 13 cents. The profit would have been somewhat higher if all the birds had been fed at least two weeks.

Dressing and Shipping Poultry.

All fowls should be fasted from twenty-four to thirty-six hours before killing. Where this is not done, the food decomposes in the crop and intestines, the result being that the flesh becomes tainted and does not keep well.

There are two methods of killing that are considered proper. One is to kill by bleeding. This method is considered to be the better one in the Eastern States and also in some parts of Canada. The other method is to kill the bird by wringing or pulling the neck. This is done by taking the chicken in the hands, stretching the neck, holding the crown of the head in the palm of the hand, and giving a quick turn backward, and at the same time a steady pull. This method was favored by the exporters of dressed fowls, but is not now, owing to the discoloration where the blood collects in the neck. Where chickens are placed in cold storage this is a serious objection. It is claimed by the exporters that the flesh will keep longer and will not be so dry as where the birds are bled. I prefer the former method.

After the bird is killed, plucking should begin at once. Care should be taken to keep the head downward, to allow the blood to collect in the neck. Where the birds are allowed to become cool before being plucked, it is very hard to avoid tearing the skin; and the plucking is much more tedious. The birds should be plucked clean with the exception of about two inches of feathers adjoining the head.

After the chicken has been plucked it should be placed on a shaping board, as seen in Fig. 36. The weight placed on the top of the chicken is used to give it a compact appearance. This weight may be of iron, as seen in the cut, or a brick may be used in its place. If chickens are hung by the legs after being plucked it spoils their appearance, making them look thin and leggy.

Many good chickens are spoiled by being packed before they are thoroughly cooled. Care should be taken that all the animal heat is out of the body before the fowls are packed. We always cool the birds at least twelve hours before packing them.

The chickens are packed in boxes as seen in Fig. 37. The box is lined with parchment paper; and, if the chickens are to be shipped a long distance, each bird is wrapped in paper. This prevents the chickens from bruising each other, and, at the same time, to a considerable extent, checks decomposition. Do not use ordinary wrapping paper, as it draws dampness, and will cause the chickens to become clammy, which makes them more or less unsaleable.

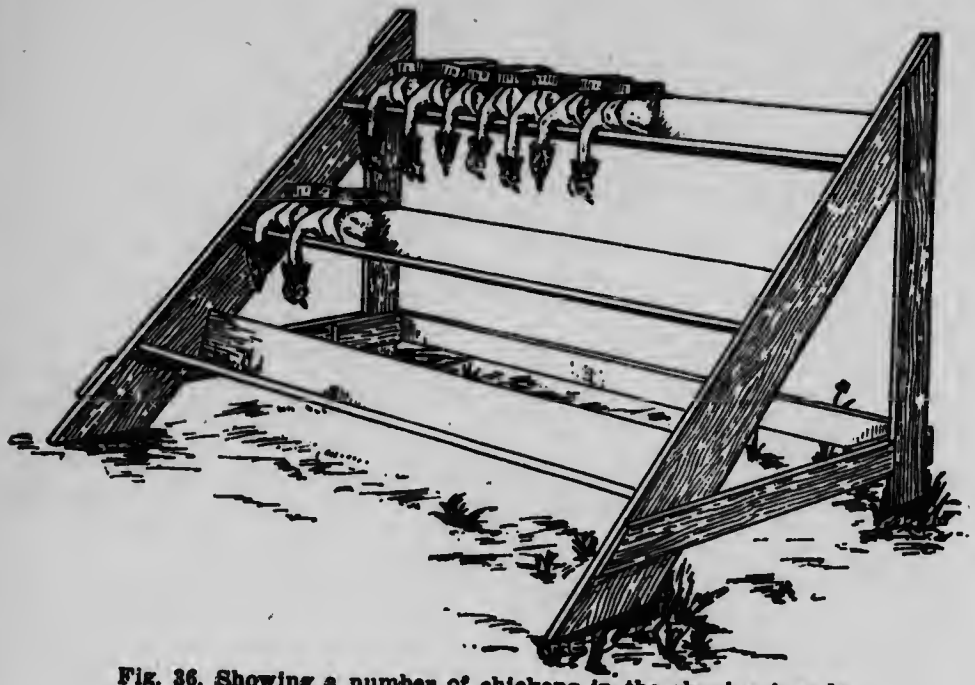


Fig. 36. Showing a number of chickens in the shaping boards.

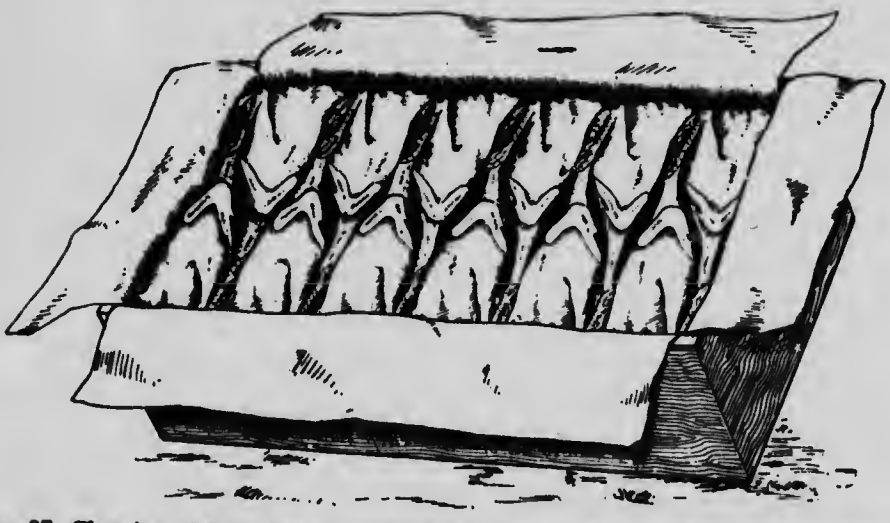


Fig. 37. Showing the top layer of chickens in a shipping case as used for local trade. This is one system of packing dressed poultry. The boxes are usually made 3 feet long, 17 inches wide and 7 inches deep for 24 chickens weighing about 5 pounds each.

There are several other kinds of boxes used for shipping poultry. Nearly every exporter has his own shape of box, and his own method of packing. For shipping locally, we use a box three feet long, twelve inches wide, and twelve inches deep. The chickens are packed similar to those seen in Fig. 37, with the exception that they are three tiers deep. The box will hold thirty-six 4½-pound chickens. The boxes are made strong, so that we can have the dealer return them to be refilled. Do not use cedar in the construction of the boxes, as in some cases it taints the flesh. Basswood or spruce answers well.

EGGS FOR MARKET.

Yearly the egg consumption increases and our exports decrease; in fact we have practically ceased to be an exporting country in this line of farm produce. During the last year in particular the public have taken more interest in the egg supply, and in the kind of eggs that are consumed. The value of an egg as a food is gradually but surely being recognized. Probably no one food is its equal; it is relished by all, old and young. Few people realize how quickly and how easily an egg deteriorates in flavor or as a food.

There appears to be a general idea that the shell of an egg protects the contents against all kinds of germs and weather; that the outside of the shell may be filthy, but that the interior is not in the least affected by the filth on the outside.

There is nothing more disgusting than at the breakfast table to break a bad egg. No more eggs are wanted for days, perhaps for weeks, and consequently egg consumption decreases; or eggs are looked upon as a doubtful source of food. Many bad eggs are due to ignorance on the part of the producers and consumers, and many dealers are as careless in their methods.

The shell of an egg is porous, or is full of very small holes. The egg is designed to hatch a chick. The chick under favorable conditions grows inside the shell and finally bursts it open. The holes in the shell supply the chick with air as it grows, also allows the bad air to escape. Science has proved this, but we have ample illustration in practical work. Eggs that become badly smeared with broken eggs in the nest during incubation usually rot, owing to the breathing holes becoming plugged or blocked by the broken egg content. Greased eggs will not hatch for the same reason; and we might mention several other examples.

Knowing that the shell is porous we can readily understand how minute animal or plant life, or germs, may enter the eggs. Let us take a common case of mouldy or musty eggs. Frequently the paper fillers of egg boxes will become damp due to the boxes being left in a shower of rain or something of the kind. The fillers are only a little damp, and

we think they will do. If no eggs are put in the boxes, and the boxes with fillers are set aside for, say, a week or so, when they are opened they smell musty, and if the fillers are examined we will see slight developments of moulds here and there. Now in cases where eggs are put in such fillers they soon go musty, and when they are left in for some time they become mouldy, not only on the outside of the shell, but on the inside as well. The writer has taken clean eggs on the day they were laid, and put them in dry paper boxes which were slightly mouldy, and set them aside in a dry cellar for a period of a few weeks, and at the end of this time many of the eggs had well developed mould on the inside of the shell.

Many eggs are spoiled by being partially incubated. Most people believe that an egg must be set under a hen, or put in an incubator before it will start to hatch. Eggs will start to hatch at less than 90 deg. of heat. Many eggs are submitted to this or higher temperatures for several hours, if not days, before reaching the consuming public. When the germ inside the egg commences to develop, the edible qualities of the egg are lessened, or the egg goes off flavor. Eggs may be kept at an incubating temperature for a day, when the chicks will start growing, next day the temperature may be so low that the chick is killed, and from that point decomposition begins, possibly slowly, but, nevertheless, the egg is gradually going bad.

There are almost innumerable ways in which eggs may start hatching during the summer, such as forgetting to gather the eggs daily, and leaving some under broody hens over night, leaving them exposed to the sun or in warm rooms, stores, cars, etc., or even in the kitchen cupboards.

No one can guarantee eggs to their customers during warm weather unless the males are removed from the flock. Unfertilized eggs are essential. We may at home take every precaution, but who knows where or how the cook may keep those eggs, even after they have passed from the dealers' hands. The allowing of males to run with the hens all summer costs the Ontario growers a very large sum of money. The writer stood by candlers in a large packing house, and saw over twenty of the thirty dozen eggs in a case that were more or less incubated, most of the eggs being about 48 hours on in incubation. The dealer is thus forced to make prices to meet this shrinkage; at times the public may get "bargain" eggs.

Filthy eggs, or even washed eggs, may be decomposed or rendered useless from the germs in the filth on the eggs. Washed eggs if used immediately are good, but they deteriorate very quickly after washing.

Flavor of Eggs.

Many of us forget that eggs will absorb odors. They will not absorb odors as readily as milk, but, at the same time, care should be taken in keeping the storage room for eggs free of strong odors. For

instance, to put eggs alongside of onions, turnips, or similar strong smelling foods, would mean that the eggs would absorb more or less of these flavors.

Again, the food that a hen consumes very materially affects the flavor of the eggs. This can be very easily demonstrated by feeding mostly scorched grain, or giving large quantities of pulped onions in a mash food. One demonstration will convince anyone that eggs have been scorched, or taste of onions no matter how cooked.

When hens get but little grain food during the summer and are forced to hunt for their living over manure piles, and catch insects, the yolk will become almost red in color. These eggs make the consumer remark that winter eggs taste better than summer eggs. Frequently feeding as above produces a thin watery white, and the egg has not only a bad flavor, but has poor keeping qualities, and, moreover, is little better if as good as a fair pickled or cold storage egg.

Market Terms Used. A new-laid egg means an egg that is under five days of age, or at least not over one week old. It should be clean, and the boxes should be clean.

Fresh eggs are very hard to define. With some they mean eggs from one day to three weeks or even more of age, while with others they mean eggs just out of cold storage.

There are several other market terms, such as pickled, held, etc., which are used mostly by the dealers, and need no explanation here.

Where and How to Keep Eggs.

The nests in which the hens lay should be clean. These usually need cleaning monthly. The best material we have used for nests is shavings.

Eggs should be gathered twice each day, and placed in clean baskets, pails, etc.

The room should be cool, not higher than 60 degrees if possible, and it should be dry. A cool, dry cellar will answer nicely.

The dirties, small, extra large, and found nests of eggs should not be sold. Use them at home. The large ones break in shipping and the smalls and dirties are not wanted on the market. These sell the good eggs at poor prices.

Where one is trying to supply private customers, or a select wholesale trade, it is wise to stamp the eggs with your own initials, or the name of your farm. This is some guarantee to the buyer.

Never Try to Deceive the Dealer.

You may sell bad eggs to the grocers, but the honest people in the district do not get full value for their good eggs.

Some people hold their September and early October eggs, and then ship them later in the year to a dealer as fresh eggs. They, of

course, expect the top price for new laids. Please do not believe you can deceive the dealer. By candling the eggs, which he always does, he can tell fairly closely what your eggs are like as to age, etc.

Candling Eggs.

Eggs are candled very easily. See Fig. 38. A new-laid egg when held between the eye and the light has a clear appearance, the yolk is practically invisible, and the air cell is about the size of a five-cent piece.

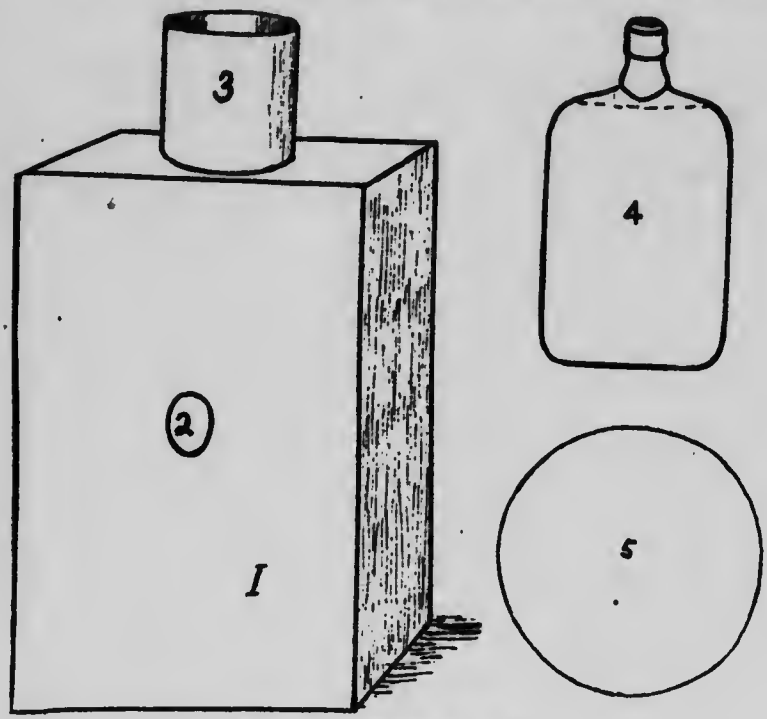


Fig. 38. The egg tester.

1. Egg-testing box.
2. Hole through which light shines and before which egg is held to be tested.
3. Chimney.
4. Bottle of water placed between light and No. 2.
5. Reflector to be placed behind light.

An ordinary lamp or electric light is placed in the box so that the light shines through No. 2. The bottle of water condenses the light, which makes the testing of eggs a comparatively simple matter.

Unless the eggs are put in pickle or held in cold storage, the air cell gradually increases in size, and the yolk becomes visible.

Cold storage and pickled eggs may have small air cells, but the yolks are conspicuous.

Fig. 39 is a photograph of a new-laid egg. It will be noticed that all portions of the egg are similar in appearance. There is a very small air cell at the large end of the egg which does not show in the photo; this air space is not larger than a five-cent piece.

Fig. 39.

Fig. 40.

Fig. 41.

Fig. 42.

Fig. 40 is a photograph of a held egg, or one that is suitable for baking purposes, but not for boiling or packing. Notice that the yolk is conspicuous and the air space is very large. Pickled eggs usually show a conspicuous yolk but a small air space. Eggs that are two weeks

of age usually show the yolk, and have an air space about the size of a twenty-five cent piece.

Figs. 41, 42, 43 and 44 are photographs of what the dealers term "spots," as they show various growths of moulds in the egg. These eggs are not rotten, but when opened smell musty. The mouldy portions are usually easily seen.

Fig. 43.

Fig. 44.

Egg Preservation.

Several methods of preserving eggs were tested in our Poultry Department during the year of 1900. The eggs for this purpose were taken early in June, and were tested in December. Many of the same methods that proved fairly successful in previous years were again tried.

Method No. 1. A solution composed of one part water glass (sodium silicate) and five parts water that had been previously boiled. This was a very strong solution, and unless an egg was absolutely fresh it would not sink in the solution.

The eggs from this solution were of fairly good flavor, and all were well preserved.

Method No. 2. This was similar to No. 1, except that eight parts of water were used instead of five parts. The eggs in this were nearly as good as those in No. 1. This is a good preservative where it is desired to keep summer eggs for winter use.

Method No. 3. This was composed of ten parts of water to one part of water glass. There were no bad eggs in this solution, but the eggs were inferior in flavor and in poaching quality to those kept by methods No. 1 and No. 2.

Method No. 4. This consisted of the same solution as No. 2; but in place of allowing the eggs to remain in the liquid, they were removed after having been in it for a week, except the last lot, which was put into the solution. This lot was left in the solution for the remainder of the season.

(*a*) The eggs, after being in the solution for a week, were removed and placed in an ordinary egg case in the cellar. They were all good when tested, but had evaporated considerably and were lacking in flavor.

(*b*) These are the second lot of eggs to be placed in the liquid. They were handled similarly to those in (*a*), and were of about equal quality.

(*c*) These eggs were allowed to remain in liquid. They were well preserved, all being good.

They were scarcely equal in quality to those from No. 2 method, but were superior to those from No. 3.

Method No. 5. A lime solution made as follows:—

Two pounds of fresh lime were slaked in a pail and a pint of salt was added thereto. After mixing, the contents of the pail were put into a tub containing four gallons of water. This was well stirred and left to settle. Then it was stirred thoroughly the second time and left to settle; after which the clear liquid was poured over the eggs, which had previously been placed in a crock or tub. Only the clear liquid was used.

These eggs were well preserved; but those from the bottom of the tub had a decidedly limey taste, and the yolk in them was somewhat hardened.

BREEDS OF POULTRY.

It is not the purpose of the writer to discuss all breeds of poultry in this bulletin, but simply to mention the general characteristics of some of the popular ones. The present high price of eggs and meat has done much to popularize poultry on the farm, and consequently we are frequently asked as to "What is the best breed of poultry?" It is impossible for one to answer this question satisfactorily, as some breeds are special purpose breeds, others general purpose breeds; and, moreover, there is probably more difference in strains of the same breed than there is between breeds.

We shall endeavor to classify these breeds, not according to the usual classification as adopted in various poultry publications, but more or less on utility lines. It may be taken as a general rule that all breeds that lay brown or tinted shelled eggs will set, hatch and rear their own young and all breeds which lay white shelled eggs, with the exception of

Dorkings are non-sitters and the eggs from these breeds have to be hatched artificially or by hens of other varieties. It will, therefore, be seen that the general purpose breeds lay tinted eggs and are good sitters and mothers.

General Purpose Breeds.

Plymouth Rocks. There are five varieties in this breed—three of which are common—Barred, White and Buff. The Partridges and Columbian are not so common. This breed is undoubtedly the most popular among farmers. The best strains are good winter layers, fair summer layers and make first-class roasters and fair to good broilers. It is one of the hardiest breeds. The standard weights are: Cock birds, 9½ pounds; cockerels, 8 pounds; hens, 7½ pounds; and pullets, 6½ pounds.

Wyandottes. There are several varieties in this breed among which might be mentioned White, Buff, Silver Laced, Golden Laced, Black, Columbian, Partridge and Silver Penciled. The most popular variety from a commercial standpoint is the White. This breed has practically the same characteristics as the Plymouth Rock. but is more blocky in type and usually longer in the feather. They have rose combs, which to some is supposed to be an advantage in cold climates. Wyandottes make good broilers and roasters. They are also good mothers and good layers. The standard weights of these birds are one pound less than those of the Plymouth Rocks.

Rhode Island Reds. There are two varieties of this breed, Single Comb and Rose Comb. As compared with the Plymouth Rocks and Wyandottes they are longer in appearance and not so massive. They were originated by the farmers of the State of Rhode Island and are very popular in that State. They have also grown in popularity in this country to such an extent that they now rival the Plymouth Rocks and the Wyandottes. They are hardy, good winter layers, and fair summer layers. In color they are a rich, bright red, with black tails and more or less black in the wings. During warm weather our experience has been that they are more given to incubating than the two breeds mentioned above. The standard weights of this breed are: Cock birds, 8½ pounds; cockerels, 7½ pounds; hens, 6½ pounds, and pullets, 5 pounds.

Orpingtons. This general purpose breed differs from those previously mentioned in that they have white legs and skin, the other breeds having yellow legs and yellow skin. The common varieties of this breed are: Buff, White, Black, and Jubilee. At the present time, there are probably more Buff Orpingtons bred than any other variety, but the White may outrival the Buff. The Blacks are being bred more by the fanciers than by the farmers, for the reason that their black plumage and dark colored legs are somewhat against them for market purposes.

This breed is among the best winter layers; makes good roasters and broilers, but is probably more given to incubating during warm weather than either the Rocks or the Wyandottes. The standard weights are about one pound per bird above the Plymouth Rocks. For general farm use they might be more profitably bred with less weight for the reason that the largest birds are usually somewhat leggy and rough in appearance when weighing 4 to 5 pounds. When one wants very large roasters, weighing from 7 to 8 pounds each or better, the larger birds, of course, would be better.

Dorkings. This is one of the oldest English breeds and is popular in some districts. They are a large breed, long in the body and short in the legs. By many they are considered to be weak in constitution, although our experience would not bear this out entirely. They lay large white eggs and are good sitters and mothers. They are white fleshed and white legged. Their peculiarity being that they have five toes. This is, at times, a disadvantage, especially where the fowls have to scratch in straw where there is more or less binder twine, which is apt to get around the extra toe, and thereby occasionally fastening both feet together. This is not a very serious objection. Where there is high, dry ground and plenty of range and a person fancies the Dorking color or type, they are worthy of consideration.

Meat Breeds.

Brahmas. The feathered legged breeds are not very extensively bred. The most popular of these is the Brahma. This breed is very hardy, and lays very large brown eggs. They are rather slow to mature and the feathers on the legs are not altogether desirable from a farmer's standpoint, in that they are apt to get wet and freeze readily. Brahmas make the best roasters, but are somewhat slow to mature and the females, in our experience, have not been very good layers, although there are some females that do well. This breed is yellow skinned.

Langshans. Langshans are also of the feathered leg breed, but have white skin. They are longer in the legs than the Brahmas and are not so heavy.

Games. By many the Game would not be considered a chicken suitable to farmers. The exhibition Games, as they are known in the standard, are altogether too long in the legs and head, and too weak in constitution for the ordinary farmer, but the Cornish Games and what is known as the Old English Game are worthy of consideration. The Cornish Game is a very large, tight-feathered, full-breasted chicken, and probably carries more meat on its breast than any other breed. The objection to the Cornish Game is that it is a poor layer. The English Game, sometimes termed "Pit Game" is a hardy bird. They are fair layers and make fair roasters. The most serious objection to this breed

from a farmer's standpoint is that there is a great tendency among the young cockerels to be very pugnacious. This is sometimes carried to such an extent that they kill one another. Other than this, they make a fairly good farm chicken, especially where the mothers are required to protect their young.

Special Purpose White Egg Breeds.

The high price of eggs during the last few years has increased the popularity of this class of chickens very much. Of all breeds in this class the Leghorns are the most popular, and of the Leghorn breed the White variety is bred more extensively than any other. Leghorns probably mature a little earlier, and eat less food than the heavier breeds; they make fair broilers, but are comparatively useless as roasters. They lay a large number of good-sized eggs during the natural laying period. As winter layers they are fair, but in our experience more susceptible to changes in temperature than are the heavier breeds. This much must be said in their favor, that their eggs usually hatch better than those of the heavier breeds, and the chickens are very hardy. Of the other Leghorn varieties the most popular ones are the Brown, Buff and Black, these varieties not being so popular from a market poultryman's standpoint, owing to the color.

Minorcas. There are three varieties of Minorcas. The Rose Comb Black, and the Single Comb Black are more commonly bred than is the White variety. This breed is larger than the Leghorn, and also lays a larger egg. They have very large combs and wattles.

Anconas. This breed might be termed a speckled or mottled Leghorn. They have all the characteristics of the Leghorn, and are black and white in color. This breed is gaining in popularity among the practical poultrymen.

Hamburgs. There are several varieties of this breed. The black is the most popular. They are inclined to lay an undersized egg. We have found the blacks to be good layers, and to lay a fair-sized egg. They have rose combs and are neat and active in appearance.