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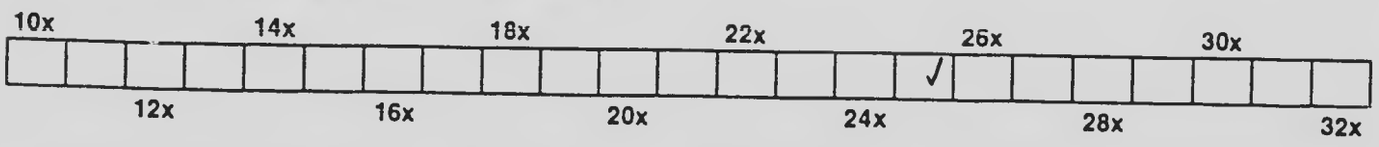
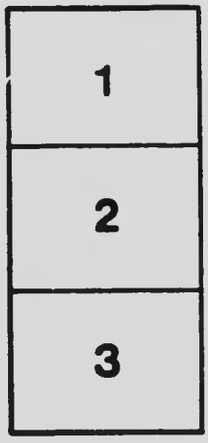
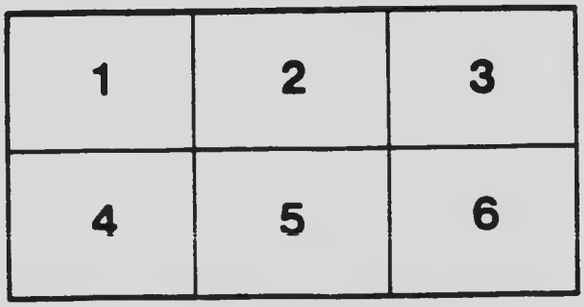






DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
BRANCH OF THE COMMISSIONER OF AGRICULTURE AND DAIRYING
POULTRY DIVISION

JAS. W. ROBERTSON
Commissioner of Agriculture and Dairying

F. C. HARE
Chief of Poultry Division

PROFITABLE POULTRY FARMING

(REVISED EDITION)

BULLETIN No. 6

NEW SERIES

PUBLISHED BY DIRECTION OF THE HON. SYDNEY A. FISHER, MINISTER OF AGRICULTURE
OTTAWA, ONT.

March, 1903.

OTTAWA, March 1st, 1903.

TO THE HONOURABLE
THE MINISTER OF AGRICULTURE.

SIR,—I beg to transmit herewith a Revised Edition of the Bulletin '*Profitable Poultry Farming*,' by Mr. F. C. Hare, Chief of the Poultry Division, and to recommend that it be printed for distribution.

I have the honour to be,
Sir,
Your obedient servant,

JAS. W. ROBERTSON,
Commissioner of Agriculture and Dairying.

CONTENTS.

Poultry House Construction

Profitable Trade Branches.

The Flock of Poultry.

Feeds and Feeding.

The Hatching and Rearing of Chickens.

The Fattening and Marketing of Chickens.

The Diseases and Parasites of Poultry.

PREFACE.

On farms throughout Canada there are nondescript fowls that are a small source of income. They receive little care. In the spring of the year they produce eggs that are sold at a low price. Their chickens are marketed with difficulty.

'Profitable Poultry Farming' is written to show how increased profit can be realized from utility-bred, well-cared for farm poultry. Poultry farming on a farm can be developed in Canada with much profit. The fowls should receive the attention afforded the larger stock; they should be as well housed; from 200 to 1,000 chickens should be reared annually.

There is a great demand in Canada for fatted chickens and fresh table eggs. The market requirements show a pronounced advancement within the last few years; the consumption of chickens and eggs has increased; the prices paid by the trade have improved.

A most striking development has been the crate fatted chicken trade—a business introduced in 1898 by the Commissioner of Agriculture and Dairying. In that year crate-fatted chickens were first forwarded to Great Britain. The reports received stated that the chickens arrived in fine condition; pleased the trade well in every respect, and were sold at good prices. Canadian fatted chickens have been received favourably in Great Britain. The value of the poultry shipped to Great Britain has increased from $18,992 in 1896 to $238,047 in 1902. The latter sum represents only 2 per cent of the value of the poultry imported into the United Kingdom from other countries.

This Department of Agriculture was asked by one dealer in Manchester to supply the names of Canadian exporting firms who could ship him 3,000 cases of chickens (36,000 chickens) a week. There is an almost unlimited market in Great Britain for Canadian fatted chickens.

When home consumers realized the improved quality of fatted chickens, a home demand was created. This demand has increased rapidly. There is every indication of a substantial yearly increase in the home consumption of fatted chickens.

An important trade is the new-laid egg trade. This is most profitable during the winter months. December 1st, 1902, this Department was offered for strictly new-laid eggs 40 cents a dozen until the end of last month.

Poultry farming on a farm will be found a profitable branch of agriculture. The business should be managed by those who have direct control of the farm. Poultry farming can also be conducted in connection with any of the minor branches of agriculture. There will be a greater profit realized from the business when the utility type of breeding fowl is kept; when the pullets are fed for winter egg-production; when the cockerels are specially fatted for market.

F. C. HARE,
Chief of Poultry Division.

DEPARTMENT OF AGRICULTURE,
OTTAWA, March 1st, 1903.

PROFITABLE POULTRY FARMING

(Revised Edition)

BY F. C. HARE.

POULTRY HOUSE CONSTRUCTION.

I LOCATION OF THE HOUSE

1. **Concerning the Location in General.**—The poultry house should be a separate house and somewhat apart from the main farm buildings. It should be situated where the sun can shine on it all day; it should face the south; it should be convenient of access during the winter. If the breeding fowls are to be kept in confined yards, the yards should extend 75 feet in front of the house.

2. **Site.**—A well-drained site is essential for the house and yards; dampness and filth around the poultry house are the causes of the most of the poultry diseases.

3. **Shade in Summer.**—Shade is required during the summer months. Poultry at liberty can secure this around the farm buildings. Trees are most satisfactory for shade purposes; the poultry house should be located 20 or 25 feet north of the trees.

4. **Movable Houses.**—Movable houses are poultry houses that can be drawn by a horse to any portion of the farm. A small, easily-constructed movable house, capable of housing 15 hens is described in another paragraph (76) of this bulletin. By adopting movable houses the poultry can be housed in the fields from May until October; they will secure animal and vegetable food from the new ground; they will render the soil more fertile.

II. PLANS OF POULTRY HOUSES.

5. **General Requirements.**—The poultry house should provide a well-lighted and well-ventilated pen for the fowls to exercise in, and a warm roosting pen. This necessitates that the roosting quarters (1) should be in a warm pen which is separate from the exercising pen, or (2) arranged so that the fowls can be closed in at night. There are two plans of houses: (1) the double house, (2) the single house.

6. **Double House.**—The double house is built 16 feet wide and contains separate exercising and roosting pens. Each 8 feet in length of the double house will house 20 hens producing market eggs, or a breeding pen of a male and 10 females. For example, a double house 16 feet wide and 16 feet long will house 40 laying hens or two breeding pens; a double house 24 feet long will house 60 laying hens or three breeding pens.

Advantages of the Double House.—The floor of the exercising pen is well-lighted by windows in the roof; these windows are storm proof when closed; they can be raised for ventilation. When the doors of the roosting pens are closed at night, the fowls are comfortable on the roost.

7. Single House. The single house is built 12 feet wide and the fowls have one pen to exercise and roost in. During the cold weather the roosting quarters are closed in by a burlap-covered frame at night. Each 10 feet in length of the single house will house 20 hens producing market eggs or one breeding pen. A single house 12 feet wide and 30 feet long will accommodate 60 laying hens or three breeding pens.

III GENERAL CONSTRUCTION OF POULTRY HOUSES.

8. Foundation. In medium size poultry houses the sills of the frame may serve as foundation. Long poultry houses should be built on cedar posts or on a stone or concrete foundation.

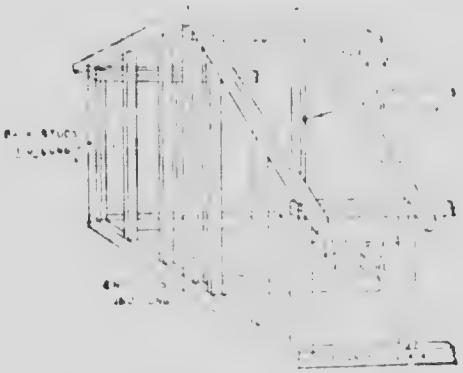


FIG. 1.—The frame of the poultry house.

9. Frame. The sill (Fig. 1) of the house should be cedar. For medium size houses 4 by 4 inches, for long houses 4 by 6 inches with the 4 inch face horizontal. The studs and the plate are each 2 by 4 inches.

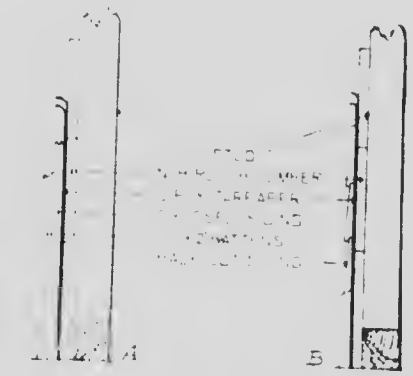


FIG. 2.—Methods of building a draught proof wall.

10. Wall.—A satisfactory draught-proof wall can be made by nailing *outside* the studding of the building (1) one thickness of rough inch lumber; (2) on the outside of the rough lumber two thicknesses of heavy building paper, well lapped; (3) one thickness of ½ inch dressed lumber (not over 8 inches wide) laid vertically over the building paper and with the joints covered with 2 by 2 inch battens (Fig. 2, A); or (3) the building paper can be covered horizontally with bevel siding (Fig. 2, B).

11. Roof.—The roof boards should be placed close together and covered with heavy roofing paper and shingles.

12. Windows.—The windows should not be large in size. Some poultry houses contain a large window area, and as a consequence are too warm during the day-time, and in severe weather very cold at night. One window is sufficient for every 8 or 10 feet of length of a house 10 or 12 feet wide. The lower edge of the window should not be over 18 inches from the ground, so that as much sunshine as possible will fall on the floor of the house. Hinged or sliding windows are advisable as they can be opened for ventilation or for removing the litter.

13. Floor.—The level of the earth floor of the poultry house should be 6 inches above the outside ground in order to insure a dry floor. A wooden floor is not satisfactory. An earth floor is made as follows: 3 inches of coal ashes or coarse gravel are placed on the earth inside the house, and over the ashes 3 inches of light, dry sand.

IV. THE DOUBLE HOUSE.

The double plan of poultry house is 16 feet wide and is divided by cross partitions into separate pens 8 feet running length.

14. Sill.—The sills should be placed in position with the front edge of the centre row 6 feet from the outside of the back row.

15. Studding.—The front studs should be cut 4 feet 6 inches long (Fig. 3); the centre studs 8 feet long, and the back studs 6 feet long. The back studs should be 2 feet 6 inches apart; the centre studs 8 feet apart at first, and a space 2 feet 4 inches wide left at the centre for the door; the front studs 8 feet apart at first, and a space 2 feet 10 inches wide left at the centre for the window. The end studs should be 2 feet 6 inches apart and a space allowed at each end of the house for a door. The doors open into the exercising pen near the centre of the house.

16. Rafters.—When the three rows of studs and plates are nailed in position, the rafters should be cut. The rafters should be 2 feet 6 inches apart except between exercising pens Nos. 1 and 2, 3 and 4, 5 and 6, &c., where the roof windows are placed and where the rafters require to be 2 feet 9 inches apart.

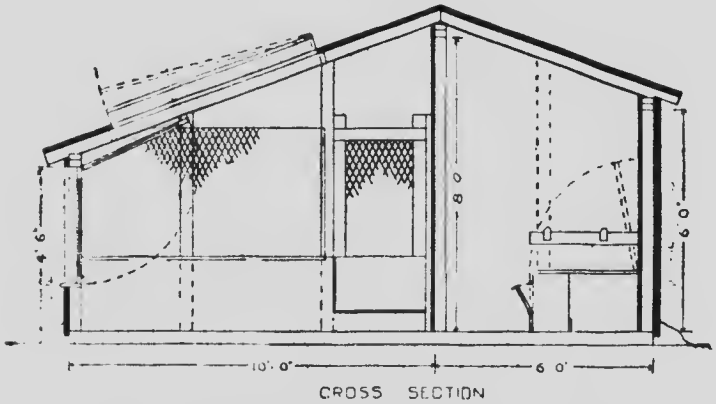
17. Walls.—The four walls of the house should consist of the studding covered on the *outside* with two thicknesses of siding and having two ply of heavy building or tar-paper between.

To add to the comfort of the fowls in the roosting pens of the double house during the winter months, a layer of building paper should be laid vertically over the studding on the inside of the roosting pens, and the paper covered with $\frac{7}{8}$ inch dressed lumber. This will insure an air-tight hollow wall around the roosting quarters.

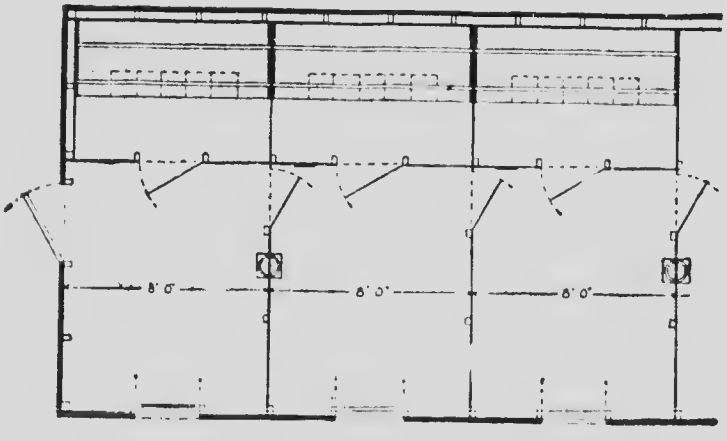
18. Long Partition.—The wooden partition running the length of the house and separating the exercising and roosting pens should contain doors 2 feet 6 inches wide opening into each roosting pen. There should also be a 12 by 14 inch pane of glass in the partition (at the side of each door and about 5 feet from the floor) to give light to the roosting pen when the door is closed. A chicken opening 10 inches square is also required near the bottom of the partition between each exercising and roosting pen: this opening should be closed when necessary by a sliding board 12 inches square.

19. Windows.—The window in the front of the exercising pen should be 3 feet 2 inches long and 2 feet 10 inches wide (six lights 10 by 16 inch); it should be hinged to the plate and open inwards.

For the *roof* window it is necessary to use a 3 by 6 feet hot-bed sash. With 1½ inch boards a frame should be made 4 inches high and of the exact outside dimensions of the sash. When the roofing boards are laid, an opening corresponding to the inside dimensions of the frame should be sawed out in the centre of the roof of the scratching pen, and above where the rafters are 2 feet 9 inches apart. The frame can then be nailed in position on the roof.



CROSS SECTION



PLAN.

FIG. 3 The double house.

To Prevent Leakage of the Roof Window.—Before the roof is shingled the four sides of the frame should be covered with pieces of galvanized iron extending on the roof. The front edge of the frame should be covered first, and the pieces of galvanized iron nailed along the sides of the frame should have an inch lap (like shingles).

Above the sides and the upper end and under the front of the *sash* there should be nailed four long angular pieces of galvanized iron (3 inches wide) to prevent leakage between the sash and the frame.

To Raise the Roof Window.—A piece of $\frac{1}{8}$ inch by $\frac{1}{2}$ inch iron 24 inches long should have a handle formed at one end; $\frac{1}{4}$ inch from the other end a $\frac{3}{16}$ inch hole should be drilled and a large screw eye opened and inserted. Several holes are also required in the iron for fastening the window closed or at different heights. They should be drilled in the iron of sufficient size to go over a 3 inch wire nail with the head removed. The finished iron should be attached by the screw eye to the bottom of the sash. The 3 inch wire nail over which the iron is placed is driven into the edge of the roof board.

20. **Cross Partitions.**—A board and wire partition extending 5 feet 6 inches in height should be between each scratching pen. Boards should be used for 2 feet above the ground; the rest of the partition is preferably 2 inch mesh wire netting. There should be a door 2 feet 6 inches wide in each scratching pen partition near the centre of the house; it should be hinged with screen door spring hinges and open inwards when entering the pen.

The partitions between the roosting pens of the double house should be tight boarded to prevent draughts through the house and to add to the warmth of the fowls.

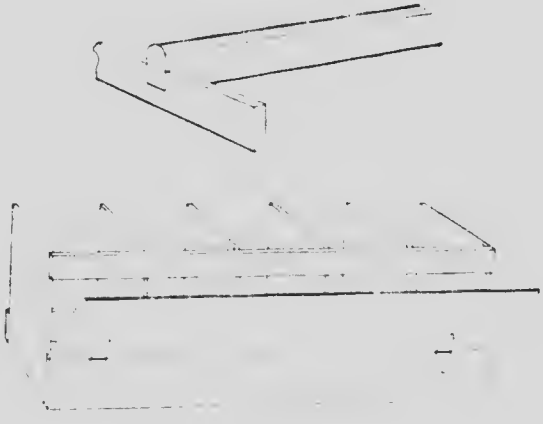


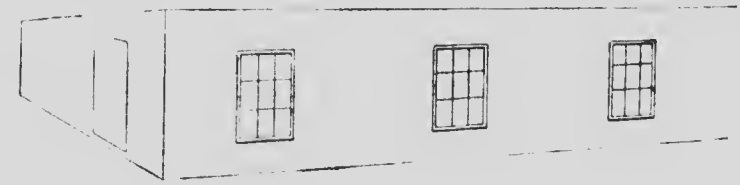
FIG. 4. The nests and roost of the double house.

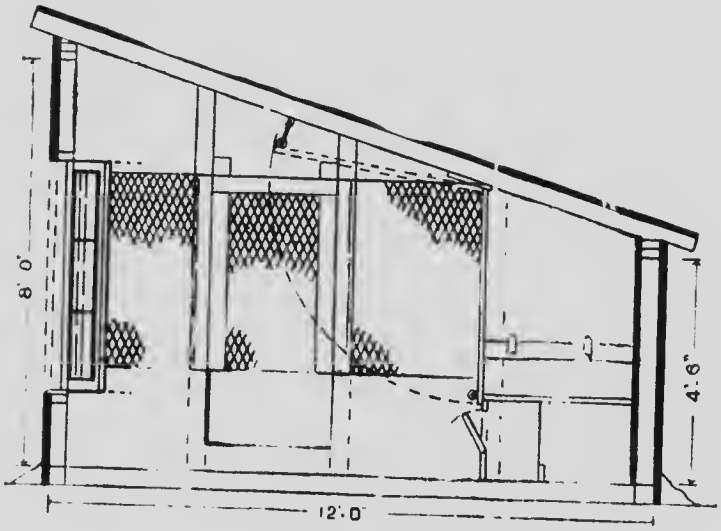
21. **Roosting Quarters.** The drop board, roosts and nests should be placed at the back of the roosting pen.

The *drop-board* should be about 8 feet long and for one roost 2 feet 6 inches wide, or for two roosts 3 feet wide; it should be hinged to the rear wall of the roosting pen 20 inches above the floor.

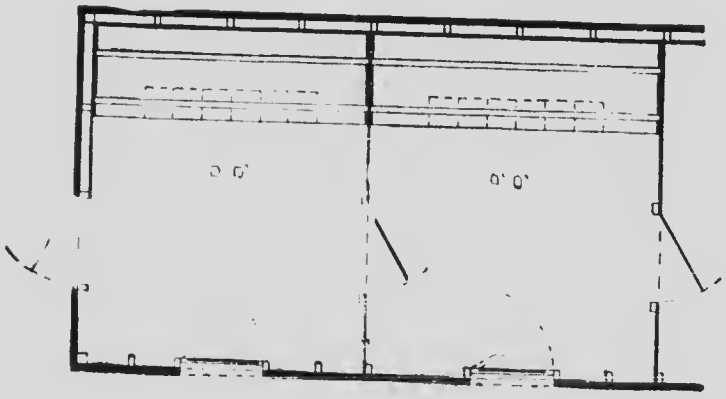
The *roost* should be a 2 by 4 inch scantling with the corners rounded off on the 2 inch side on which the fowls roost; the roost should be placed 10 inches above the

drop-board ; it should not be nailed to the side walls. When it is necessary to use more than one roost, the roosts should be on the same level. The roost nearest the rear wall should be 10 inches from the wall ; the roosts should be 16 inches apart.





CROSS SECTION.



PLAN

FIG. 5.—The single house.

The *nests* should be placed on the ground under the front edge of the drop-board; they should face the rear wall of the roosting pen; they should be made without a floor and not fastened to the house. Five nests should be constructed together and placed in each pen. There should be a door 10 inches wide in the front of the nests from which to collect the eggs. The inside dimensions of the nest are 11 inches wide, 12 inches deep and 19 inches high.

V. THE SINGLE HOUSE.

The single plan of poultry house is 12 feet wide, and divided by cross partitions into pens 10 feet running length.

22. **Studding.**—The front studs should be cut 8 feet long and the back studs 4 feet 6 inches long. When the sill is in position the front studs should be set up 10 feet apart, and a space of 2 feet 10 inches left at the centre for the window. The back and end studs should be 2 feet 6 inches apart. There should be a door in each end of the house. The door should be near the front wall.

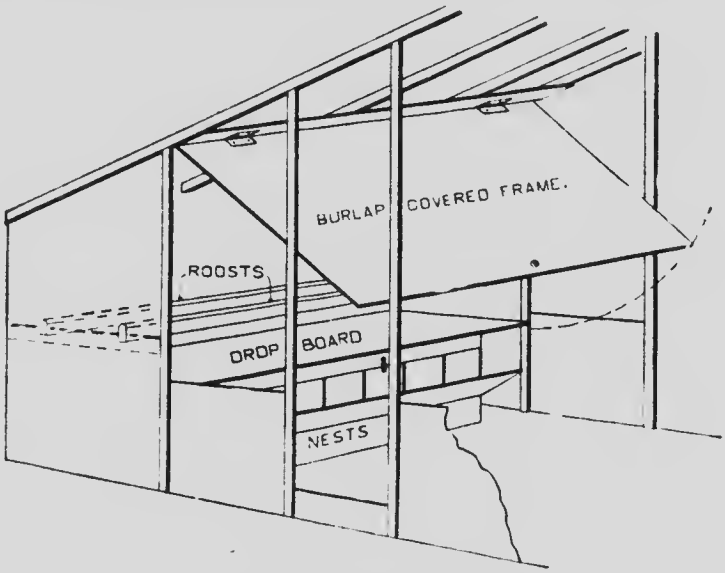


FIG. 6.—The warm roosting pen.

23. **Rafters.**—The rafters are about 14 feet long and should be spaced 2 feet 6 inches apart.

24. **Walls.**—The four walls of the house should consist of the studding covered on the outside with two thicknesses of siding and having two ply of heavy building or tar paper between.

25. **Windows.**—The window in the front wall of each pen measures 4 feet 6 inches long by 2 feet 10 inches wide (nine lights 10 by 16 inch); it should be hinged at the side, open inwards, and with the lower edge 18 inches above the sill.

26. **Cross Partitions.**—A wire and board partition 5 feet 5 inches high should be between each pen. Boards should be used for 3 feet from the rear wall and 2 feet above the ground; the rest of the partition should be 2 inch mesh wire netting. There should be a door 2 feet 6 inches wide in the partition near the front wall of the house; it should be hinged with screen door spring hinges and open inwards.

The drop-board, roosts and nests should be at the back of the pen. They are of like dimensions to the roosting quarters and nests of the double house, with the exception that the drop-board and roosts are about 10 feet long.

27. **Warm Roosting Pen.**—The burlap curtain which can be lowered in front of the fowls at night, should be tacked to a light wood frame and hinged to the roof of the house directly above the front edge of the drop board (Fig. 6). This burlap-covered frame should extend across the pen and should fall an inch or so below the drop-board. When not required in front of the fowls, the frame should be hooked to the roof of the house. This frame when lowered together with the board sides of the roosting quarters form the warm roosting pen: the fowls will generate sufficient heat to keep themselves comfortable during a cold night.

VI. GENERAL INSIDE FITTINGS OF POULTRY HOUSES.

There is also required for each pen of fowls in either the double or single house (1) a water fountain placed on a shelf about 5 inches above the ground; (2) two small boxes for grit and shell material nailed on the wall where the fowls can reach them; and (3) a trough for feeding the mashes in.

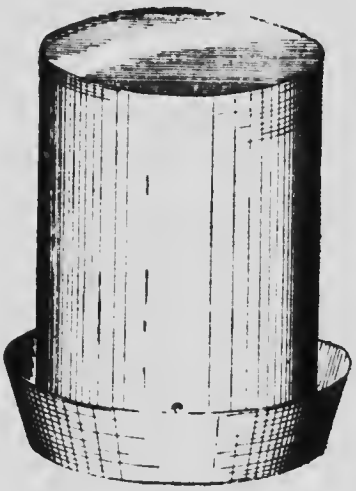


Fig. 7. The water fountain.

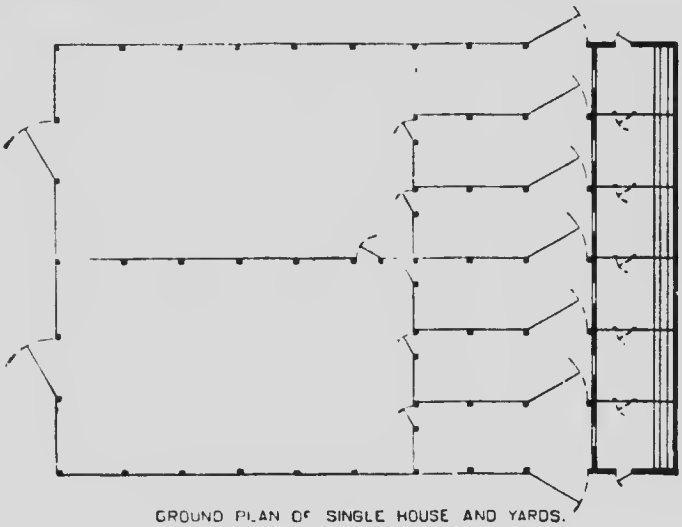
28. **Water Fountain.**—The water fountain (Fig. 7) should be made of galvanized iron. The dimensions are: upper can, 6 inches in diameter by 8 inches deep; lower can, 9 inches in diameter at the top, 7 inches at the bottom and $2\frac{1}{2}$ inches deep. In the upper can there should be a $\frac{1}{2}$ inch hole punched out, with its centre $1\frac{3}{4}$ inches from the open end. These dimensions should be followed when new fountains are made. Fountains can be formed from spare cans of any size.

To Fill the Fountain. Fill the upper can with water first: place the shallow can on top of it and invert the fountain quickly. The water will fill the shallow can on a level with the $\frac{1}{2}$ inch hole. The water in the lower can will remain at this level until the upper can is empty.

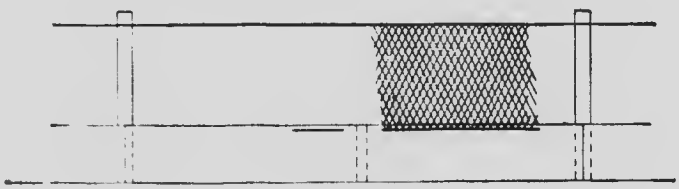
Fig. 8. The feed trough.

29. **Feed Trough.** An efficient feed trough is made from three $\frac{7}{8}$ inch dressed boards 6 inches wide and 6 feet long; they should be nailed together as shown in Fig. 8.

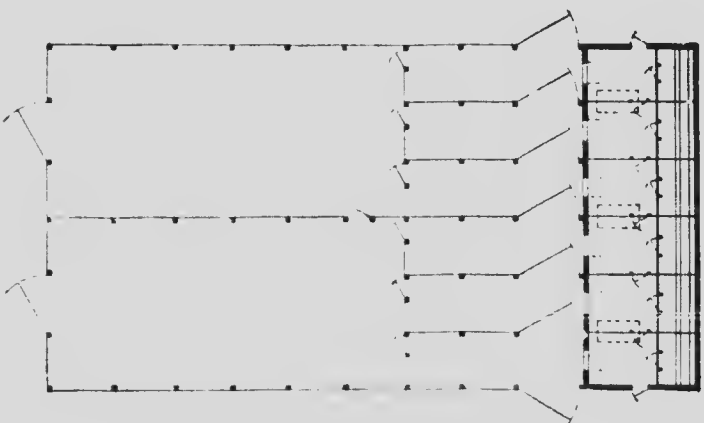
30. Dust Box.—When the earth floor of the house is not suitable for the fowls to dust in, shallow boxes should be filled with *dry* dust, sifted coal ashes or light sand and placed under the front windows. The fowls enjoy dusting themselves; dust baths will assist in suppressing the vermin.



GROUND PLAN OF SINGLE HOUSE AND YARDS.



ELEVATION OF FENCE.



GROUND PLAN OF DOUBLE HOUSE AND YARDS.

FIG. 9.—The arrangement of the house and yards.

VII. THE YARDS AND FENCES.

31 Yards. The fowls should have outdoor exercise during the warmer months of the year. If they cannot be allowed their liberty, they should have access to a large grass yard. If the house contains a number of pens of fowls, it will be found most economical to arrange the yards side by side in front of it. The yards should be the same width as the inside pens of the house (8 feet wide for the double house and 10 feet for the single house) and 25 feet long. Then for every three pens of the house, there should be another yard 50 feet long and either 24 or 30 feet wide (Fig. 9). The fowls of the three pens should have access to the large yard at different times of the day or on different days.

When a number of yards are arranged side by side in front of the house, there should be large gates in the fences near the house, so that a horse and wagon can drive through the yards. Smaller gates are also required opening into the large yards and through which a wheelbarrow can pass.

32. Fences. -A permanent fence for Plymouth Rocks, Wyandottes or the heavy breeds of poultry is constructed as follows: 8 feet cedar posts are placed 2 feet 6 inches in the ground and 12 feet apart; $\frac{7}{8}$ inch siding is nailed along the posts for 2 feet above the ground, and above the siding 2 inch mesh wire netting 42 inches wide. If woven wire fencing is used in place of the wire netting, the posts can be 16 feet apart instead of 12 feet.

Movable Wire Fence.—When it is necessary to confine a pen of 10 selected hens during the breeding season, or a flock of growing chickens, a movable wire fence is satisfactory. The wire fencing can be bought from 3 to 6 feet wide. It can be held in place by driving sharp stakes into the ground and nailing the fencing to them. A movable lath fence can be bought for confining chickens. The laths are 4 feet long and fastened together with wire. The movable fence can be taken down in the fall, and stored until again required. The flock of selected breeding hens can be comfortably housed in the movable house (76).

VIII THE IMPROVEMENT OF FARM POULTRY HOUSES.

33. Inside Improvements. - To make the farmer's poultry house bright and cheerful for the hens to exercise in, the inside of the house should be covered with heavy building paper and limewashed[1]. The paper will prevent draughts blowing on the chickens; the limewashing will brighten the pen and will also suppress the vermin. If the house has a wooden floor, the earth and chaff should be removed from it, and light dry sand distributed around. When the floor of the house is earth, the earth should be spaded and levelled. Then 2 or 3 inches of coal ashes should be placed on the floor and well packed, and above the ashes light sand (13). This will insure a dry floor, and the ashes are a hindrance to the entry of rats. Clover chaff or short straw should be scattered 3 inches deep over the floor, and removed as soon as damp.

Roosting Quarters.—The construction of roosting quarters is given in paragraph 21. The quarters are simply made; the nests and roosts are removable so that vermin can be destroyed; the quarters can be built of a size suitable for any poultry house.

Warm Roosting Pen. - The fowls require a moderately warm place to roost in at night, and a bright, cool, well ventilated exercising pen (5). Unless the roosting quarters are comfortable, a large amount of food is required to sustain the vital heat of the hen's body. In this case the production of eggs is lowered. The warm roosting pen (27) can be built in the house; or the roosting pen can be made box shape, 5 or 6 feet square and 5 feet high, with a burlap-covered frame or curtain that can be lowered on one side. The essential point is to have a small roosting pen that will be partially heated by the fowls when the curtain is lowered at night. The droppings should be removed every few days and the drop board sprinkled with sand. Wood ashes should not be used for this purpose.

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[1] The limewash should be applied hot and fairly liquid, so as to enter every crevice in the fencing. Its quality will be improved by adding to every gallon of the wash $\frac{1}{4}$ lb. of soft soap previously dissolved in boiling water, also a small quantity of salt.

34. Ventilation.—Poultry to thrive well in confinement should be supplied with an abundance of fresh air. It is not meant by this, that the hen house doors and windows should be thrown open in inclement weather, but that they should be opened whenever the outside weather is moderate. The flushing in of fresh air during the warmer parts of the day will prevent or overcome the dampness that is common to a number of poultry houses. When the inclosed roosting pen is used at night, the chickens do not require to remain in the cool atmosphere throughout the night, but are warm and comfortable on the roost.

PROFITABLE TRADE BRANCHES.

IX. THE EGG TRADES.

35. Fresh Eggs.—Eggs to be palatable should be eaten in a strictly fresh condition; therefore they should reach the consumer without unnecessary delay. This requires (1) that the eggs be collected regularly every day and stored in a cool room (temp. 40° to 50° F.) until a sufficient number are on hand to deliver to a dealer; (2) that the dealer forward the eggs to the merchant at least once a week; and (3) that the merchant should protect the eggs from deterioration while in his possession.

Some farmers are so situated that they can establish a city trade in fresh eggs throughout the year. Strictly fresh eggs shipped from the farm to the city merchant weekly, are usually bought at a premium of several cents a dozen.

For all farmers a most profitable branch of the business is the trade in fresh winter eggs. Every winter there is a great demand for new-laid eggs; the supply of new-laid eggs is limited, and high prices per dozen are paid. Exporting firms buy great quantities of eggs during the spring and summer months.

Market Requirements.—There is a growing preference on the home markets for brown-shelled eggs. The shells of the eggs should be wiped clean if necessary, and the eggs graded in size. For shipment to the merchant the eggs should be packed into cases holding 12 dozens or 30 dozens each.

36. Egg Preservation.—While no process of preservation will retain the fine flavour of a newly laid egg, so that later it can honestly be sold as such, yet for culinary purposes when the supply of new-laid eggs is limited, preserved eggs meet the demand.

The eggs are placed in the preservative during the spring and summer. None but fresh eggs should be packed[1]; stale or cracked eggs are not only bad in themselves, but they will affect those packed with them. The eggs must be fairly clean as eggs that require washing are poor 'packers.'

Eggs can be preserved in lime-water, or placed in cold storage.

Lime-water Preservation.—The lime-water is prepared by adding one pound of new lime to 4 gallons of water. The mixture should be well stirred and the liquid portion, which is 'saturated lime-water,' poured into a crock or water-tight barrel; the vessel containing the lime-water should be placed in a cool room.

As exposure to the air tends to weaken the preservative, the vessel should be covered with a piece of burlap upon which a paste of lime is spread.

The eggs can be placed in the preservative every day; they should be packed closely in the vessel, but no part of any egg should be above the surface of the liquid. Afterwards the eggs should be examined occasionally and if necessary fresh lime-water added to keep the eggs always covered.

Cold Storage.—Eggs should be held in cold storage at a temperature near 32° F. The air of the room should be dry and pure. Unless the egg cases have projecting

[1] Eggs that are purchased for preservation should be examined with the egg tester (64) and the cloudy or stale eggs removed.

pieces that prevent close stacking, laths should be placed between the cases to allow the necessary circulation of air. The pores of the egg shell should not be coated with any preservative, nor should the eggs be washed. The egg cases and fillers must be thoroughly dry before using. Beyond the fillers no packing of any kind should be used in the cases.

37. **Export Eggs.**—The following information concerning the requirements of the British egg market is from the report of the Dominion Commissioner of Agriculture :—

'The grade of egg which is in good demand in Great Britain is one weighing 15 pounds per great hundred, that is 15 pounds per 10 dozens, which is equal to two ounces per egg or 1½ pounds per dozen. A small quantity imported into Great Britain from France go as high as 17 pounds per great hundred. For every half pound which eggs weigh less than 15 pounds per great hundred the value is lessened by about one cent per dozen.

'Eggs should be graded as to size. A higher value will be obtained for a given quantity of eggs graded into three sizes—large, medium and small,—than if they are sent with the sizes mixed promiscuously. Eggs of a brown shade of colour are preferred.

'The preferred size of egg case for export is a wooden case holding thirty dozen eggs, paper-filled—that is having pasteboard frames with a separate space for each egg. These cases, holding thirty dozen each, measure about 28 inches long, 12¾ inches wide, and 13 inches high, outside dimensions.

'For the safe carriage of the eggs, it is important that they should not be stored in a warehouse, on the cars, or on board the steamship, in proximity to any cargo from which they would acquire a flavour. The carrying of eggs with a cargo of apples has been known to impart to them a flavour which impaired their value.

'They should be carried on the cars and on the steamship at a temperature of from 38° to 42° F. When cases containing eggs are removed from the cold storage chambers they should not be opened at once in an atmosphere where the temperature is warm. They should be left for two days unopened, so that the eggs may become gradually warmed to the temperature of the room where they have been deposited. Otherwise a condensation of moisture from the atmosphere will appear on the shell, and give them the appearance of sweating. This so-called 'sweating' is not an exudation through the shell of the egg, and can be entirely prevented in the manner indicated.'

Eggs that are placed in cold storage from April till July are shipped to Great Britain for the September and October trades. Eggs that go into cold storage in the fall are exported during the winter months. Cold storage eggs are sold in Great Britain as 'Canadian fresh eggs,' and the prices last year ranged from 7s. 6d. to 8s. 6d. per long hundred (120 eggs) during September and October, and from 7s. 9d. to 8s. 6d. per long hundred during November and December.

Pickled eggs should be exported to Great Britain so as to reach there during November and December. The eggs that were sold in November and December last year realized from 7s. 6d. to 8s. 2d. per long hundred.

A report from a Liverpool, England, provision merchant, states :—

'There is undoubtedly a growing inclination among consumers to give a preference to Canadian eggs for winter trade, and the shipments to the United Kingdom may be very largely increased without injury to present prices, provided always in the first place that the quality is maintained up to last year's standard; and secondly (a most important one for Canadian shippers), that the price is not prohibitive.'

X. THE CHICKEN TRADES.

38 **Crate-fatted Chickens.** The business of crate-fattening chickens for market has made substantial progress in Canada during the last few years; it is a business that can be carried on with profit by almost any farmer. The work connected with the fattening of chickens is simple; the chickens gain in live weight from 1½ to 3 pounds

each during the fattening, and they can be sold in Canada or Great Britain for a much higher price than lean chickens.

Reason for Increased Price.—Fatted chickens are sold for an increased price per pound, because they supply weight for weight three times as much edible meat as do lean chickens; all the flesh of the fatted chicken is of a superior quality to that of the lean chicken; by leaving the blood in the chicken's neck, and not drawing the chicken the flesh is rendered more juicy, and rapid decomposition prevented.

Market Requirements.—Fatted chickens when marketed in Canada or Great Britain should conform to the following market requirements:—

Breast.—The shape of the breast should be broad and full, so that when the chicken is dressed the breast will present a plump, meaty appearance. The breast meat is the most palatable part of the chicken. Large framed chickens with prominent breast bones cannot be satisfactorily fatted.

Legs.—The legs of a fowl are largely composed of sinews, of which the meat is inferior, and this of course should form as small a proportion of the weight as is practicable. Feathers on the legs are an objection, also black or dark-coloured shanks and any development of the spur in male chickens.

Flesh.—The colour of the flesh of the chicken should be white, and the flesh should be of fine quality. The colour of the flesh is governed by the nature of the food consumed. To secure a white-coloured flesh, mashes should be fed of which ground oats and skim milk are the main parts; if an excess of whole or ground Indian corn is fed, the chickens will have a yellow flesh. The flesh of an oat-fed chicken is of a superior quality to that of a corn-fed chicken.

Bone and Offal.—Smallness of bone, and minimum quantity of offal are two important requirements. The head and comb should be of small size.

Weight.—The preferred plucked weight for fatted chickens is 4 pounds. Plump chickens of any weight up to 5 pounds each are more readily disposed of than large fatted chickens.

With reference to the dressed weight of chickens a report from a British produce merchant states:—

"The 3 to 5 pound bird is the right thing. I have noticed gigantic chickens, 7 and 8 pounds in weight; these birds approach nearly to the hen turkey in weight. The householders much prefer the Devon Duck (the hen turkey), when the conditions as to weight and size are on a par."

39. Lean Chickens.—The market price received for a lean chicken allows a small profit to the farmer. As from 60 to 80 per cent of the live weight of the lean chicken is offal or waste matter, the lean chicken is generally an unprofitable chicken to purchase even at a low price per pound.

40. Early Chickens.—There is a limited demand in Canada for early chickens for broiling or roasting. This demand is principally in the larger cities and at the summer resorts. The early chickens should be marketed either as broilers or roasters. The broilers should weigh from 1 to 1½ pounds each, and the roasters from 3 to 4 pounds each. High prices are generally paid for early chickens, and at present these trades will return a good income to farmers who supply them.

XI. SELECTION OF A SUITABLE BREED.

41. Pure Bred vs. Scrub Chickens. When pure bred and scrub chickens were reared under similar conditions at the Illustration Poultry Stations conducted by this Department, pure bred chickens of the utility type made a more rapid and economical gain in live weight than did scrub chickens. In the crate fattening of chickens the pure bred chickens made a greater gain in live weight than the scrubs; the cost of feed per

pound of gain in live weight was less with the pure bred chickens. At the age of four months the pure bred chickens were fatted and ready for market, they were of uniform quality and appearance. At no age were the scrub chickens as saleable as the pure breds. For meeting the demands of the higher class local markets, or for exporting to Great Britain, scrub chickens are not satisfactory.

FIG. 16. Barred Plymouth Rocks.

42. Breeds of Poultry.—The standard breeds of poultry are arranged in different classes according to the type or the origin of the fowl. Of these classes, the fowls of the *American* class are the best adapted for poultry farming. This class comprises principally the Plymouth Rock and Wyandotte breeds. They are fowls of a dual purpose character, suitable for egg-production and crate-fattening for market; they lay brown-shelled eggs, and hatch and rear chickens.

43. Utility Type of Fowl.—For poultry farming the utility type of breeding fowl should be selected. This type of fowl can be had in the popular breeds, Plymouth Rocks and Wyandottes; or, if preferred, in a medium size fancier's breed. It is possible to buy Plymouth Rocks or Wyandottes that are not satisfactory for poultry farming on account of their great size, heavy bone, length of leg, or narrowness of body. For this reason it is of primary importance that the farmer has a definite conception of the proper type of fowl to select for his flock. The breed of poultry from which utility type breeding fowls are selected is of secondary importance.

Utility type fowls should conform to the following standard:—

Mature Weight.—Cock, 7 to 8½ lbs.; hen, 5½ to 7 lbs.

Shape of Body. Broad, blocky and of medium length.

Breast.—Carried well forward, full and broad, of medium depth. Breast bone long, straight, not deep or pointed at the front.

Legs.—Set well apart, short, stout, white or yellow in colour, without leg or foot-feathering.

Head.—Medium in size. Large combs and wattles are not desirable.

Plumage and Flesh. Close feathered fowls are preferable. The colour of plumage and flesh is not important.

FIG. 11. White Wyandottes.

XII. IMPROVEMENT OF THE FLOCK.

44. Grading up a Flock.—*(1) By Hatching Pure Bred Eggs.* In April or May several sittings of eggs from pure bred utility type fowls should be bought. 25 or 30 chickens should be reared. The cockerels should be fatted in the fall and disposed of, and the pure bred pullets retained for the following year's breeding pen. By this means a farmer can stock his farm with pure bred poultry in two years.

(2) By Introducing Pure Bred Cockerels.—When the flock of poultry is large and has unlimited range, a utility type cockerel should be secured for every 15 hens. The other male birds of the flock should be disposed of; also the hens over two and a-half years old and any fowls not in an active or healthy condition. It is preferable, however, to obtain the eggs for hatching from a breeding pen of a pure bred male and 10 of the best hens of the flock (**46**), rather than from all the layers indiscriminately.

(3) By Buying Pure Bred Chickens. A pure bred utility cockerel and 10 pullets should be bought in the fall and should constitute the next year's breeding pen.

In buying eggs for hatching or pure bred fowls for poultry farming, a preference should be given to flocks of poultry that have been bred for winter laying.

XIII. PROFITS FROM THE FLOCK.

45. Profits from the Chickens. *(1) Cockerels.*—The cockerels should be sold in the early fall. Unless they are housed in the fields and require little attention or extra feed, the most profitable age for marketing is four months. After this age the cost of feed per pound of gain in live weight of the cockerels rapidly increases. When cockerels are kept on the farm until they are six or seven months old the profits are materially reduced.

One lot of 363 Barred Plymouth Rock chickens that were reared to four months of age at the Bondville, Que., Illustration Station last year averaged 5 lbs. 3 ozs. in weight, and the cost of feed per pound gain in live weight was 2.51 cents. A second lot of 364 chickens at the same Station had an average weight of 5 lbs. 4 ozs. at four months of age, and the cost of feed per pound gain in live weight was 2.54 cents.

(2) Pullets.—The winter production of eggs is the most valuable asset of the pullets. Early winter laying demands *hot mash* feeding, which includes in addition to the grain, waste meat or animal food, and vegetable food. The pullets should be comfortable and permanently housed in the fall. Transferring mature pullets to a strange pen destroys egg production.

From the two flocks of Barred Plymouth Rock chickens that were officially tested from birth to early maturity at the Bondville, Que., Illustration Station, eggs were gathered daily after the pullets were four months and one week old.

Pullets from Two Flocks of Barred Plymouth Rock Chickens and Their Eggs.

Pullets more Profitable Egg Producers than Hens.—At the agricultural experiment station at Logan, United States, experiments showed that the profit from young hens or pullets was about *five times greater* than that of the old hens. Not only did the old hens lay considerably fewer eggs, but the eggs were worth less per dozen. This is accounted for by the fact that the pullets laid a larger proportion of their eggs in early winter, when the price was high. The old hens were three to four years old. The results of this experiment have been accomplished with fowls kept in confinement. During the winter months, a period of between three and four months, they were not outside of the building.[1]

[1] Bulletin 74

46. Profits from the Mature Fowls.—When the pullets are forced for winter egg production, there should be in addition another breeding pen of selected fowls from which the chicks are reared. A hen or pullet that commences to lay in the spring will at that time produce stronger germed eggs for hatching than will another female that has had her vitality impaired by winter laying. Eggs for hatching are required from the mature fowls. The winter production of table eggs is a secondary consideration.

Selection of Breeding Specimens.—The farmer should select from the flock of pullets the 10 best winter layers. A regular leg band or a piece of wire should be placed at once on the leg of each of the 10 pullets. The next winter the 10 pullets (which are now yearling hens) should be separated from the laying hens and kept in good health and medium flesh. They are not fed for winter laying. In February or March they are mated with a suitable cockerel, their rations are increased, and they are brought into laying at the time when eggs are required for hatching. Male birds used for breeding purposes should not be allowed with the females except during the breeding season.

Fig. 11.—The results of an experiment. The crate in the old one-shown is under-fed.

FEEDS AND FEEDING.

XIV. FEEDS FOR POULTRY.

47. Food Composition.—Five compounds are found in the foods of poultry, viz., water, protein, fat, carbohydrates and ash.

Water.—All food-stuffs, no matter how dry they may seem, contain a considerable amount of water. In grains and dried meat the water averages 10 per cent of the material, in raw meats 50 per cent, while in some vegetables it amounts to 90 per cent.

Protein.—The protein of food is characterized by containing nitrogen. The terms *nitrogenous matter* and the *albuminoids* are frequently used to designate this group. The function of the protein is to build up and repair the working organs and parts of the body, and to supply material for the production of eggs, feathers, &c. No other food constituent can do this.

Starch and Carbohydrates.—Since the carbohydrates and fat serve nearly the same purpose in the animal economy, they may be grouped together. Experiments have shown that fat is about 2¼ times more effective as a food than are the carbohydrates. Fat in the food may either be stored in the body as fat, or burned to produce heat and energy. Carbohydrates constitute a large part of vegetable foods. In the animal body they are converted into fat or used directly to produce heat and energy.

Ash.—The ash of the food is the source of the mineral matter of the animal body, and as such is of importance. Ordinary feeding stuffs, however, do not contain sufficient lime for shell formation, and an extra supply of this material is required.

48. Animal Food. The term animal food is used to denote a number of highly nitrogenous substances fed to poultry. The most important are waste meat, ground raw bones, dried blood, fresh fish and skim-milk.

To obtain the best results in egg production from confined laying or breeding stock, some form of animal food should be supplied every day. The following table[1] shows the average composition of one pound of eggs and one pound of meat. The analysis of the eggs and sirloin steak represent the eggs and steak as they are purchased. The refuse matter in the case of the eggs would be shell material and for the steak, bone or other inedible matter.

	Refuse.	Water.	Protein.	Fat.	Carbo-	Ash.
Brown shelled eggs	10.9	64.8	11.9	11.9		
White shelled eggs	10.7	65.6	11.8	10.8		
Sirloin steak	12.8	54.0	16.5	16.1		

It is noted that the eggs and meat contain similar proportions of the different nutrients—protein and fat. However, in an equal weight of meat and eggs there is less water in the meat, so that three-quarters of a pound of lean meat equals in nutritive value one pound of eggs. Another fact brought out by the table, is that in both eggs and meat there are no carbohydrates.

A large amount of animal food should be fed fowls during the moulting season; for the reason that the growing feathers require the nitrogenous matter that meat supplies most readily and cheaply.

Waste Meat may consist of meat scraps, beef heads, or livers, and can be fed either raw or boiled; if cooked, the water in which the meats are boiled should be fed in the mash, and the boiled portion of the meat either cut up and fed to the hens, or tied in the pen.

Ground Raw Bones require the use of a special bone cutter for grinding. The bones are finely cut so the fowls can eat them, and form a nutritive food that is relished.

Dried Blood is a most concentrated animal food; it should be fed in the mash in the proportion of one pound of blood to 16 pounds of meal. At the Illustration Chicken Rearing Stations conducted by this Department last year the confined chickens were fed dried blood in their mashes until they were two months old, and made rapid development. If fed in this way to laying hens, it would supply the necessary protein.

Fresh Fish. Inquiries have been received from the Maritime Provinces respecting the feeding value of fresh fish for poultry. For breeding fowls it would be satisfactory, but for pullets that were producing table eggs the tendency would be towards the fish flavour in the eggs.

Skim-milk, preferably well-soured, or buttermilk, have high feeding values for every class of poultry. In the rearing and fattening of chickens their value cannot be over estimated. In fact, in the crate fattening of chickens no satisfactory substitute has as yet been discovered. Skim-milk or buttermilk should be employed, whenever they can be obtained at a reasonable price, for mixing with the mashes fed to laying hens.

[1] Bulletin 128, U. S. Department of Agriculture.

49. Grains.—The cost of the different cereals in the locality should determine what varieties of grain are to be fed to the fowls. When feeding fowls that are confined or at liberty, animal food should supply the greater part of the protein or nitrogenous portion of the ration. In that case, the grains are required more for maintaining the heat of the fowl's body, and it would not be profitable to purchase expensive grains for this use. Poultry will thrive better on a variety of foodstuffs than they will on a single food of the same nutritive value. It is preferable to feed a number of grains, both ground for the mash and for feeding whole in the litter, rather than to limit the selection to one or two sorts. The palatability of the mash is another consideration; ground buckwheat, ground corn and ground oats are the grains that are most preferred.

In the crate fattening of chickens the most important factor is that the food produces a white, fine grained flesh, so that in fattening chickens the suitable grains are limited in number.

50. Vegetables.—The value of vegetable foods such as clover, mangel-wurtzels, turnips or cabbages is attributed to their succulency and also to their bulky nature. The amount of digestible nutrients in them is comparatively small. The roots may be cut in half and stuck on nails driven in the wall near the ground. The clover is best used as litter. Cut clover often causes crop-impaction.

51. Lime. Laying hens require lime for the formation of egg-shells; it can be fed in the form of egg-shells, broken oyster shells or broken plaster. If the egg-shells that accumulate during the spring and summer are dried in the oven and stored, they can be fed with advantage to the winter layers. Laying hens that are eating their eggs, began picking at the shell to secure the lime. If a flock of egg-eating fowls is given an over abundance of fresh egg-shells, this habit will be discontinued.

52. Grit. All classes of poultry masticate their food by a grinding process in the gizzard. The gizzard is lined with a tough membrane or skin, and will not be injured by a hard or sharp grinding material. In fact, the more hard and insoluble the grit is, the longer it will perform work. Lake shore or river gravel can be utilized, but small sharp broken stones or coarse coal ashes are preferable; broken crockery or granite are also suitable. Sharp grits are manufactured in different sizes for poultry and chickens.

53. Water. Plenty of water is indispensable to the health of poultry, and it should be pure and fresh. The galvanized iron drinking fountain (**28**), placed upon a small shelf where it will not become filled with litter, is a most satisfactory water arrangement.

XV POULTRY FEEDING.

54. Advantages of Good Treatment. A greater amount of food is required by poultry to sustain their vital force in cold weather than in warm weather. Every assistance that is given laying fowls in the winter months, by making them comfortable at night, warming the mashes, or the water, simply reduces the amount of food required for sustenance, and therefore, the cost of egg-production.

55. Winter Feeding. In the morning each fowl should receive a small handful of the smaller grains, such as wheat, buckwheat or barley, well distributed through the litter; this feed of grain will compel exercise. In the middle of the day a warm mash of ground grain and sour skim-milk or water. It is well to mix this mash to a crumbly condition, and allow the fowls what they will consume quickly. If table scraps can be added to the mash, it will be improved. At night each fowl should receive a large handful of whole grain preferably corn, oats or barley, scattered through the floor litter.

Vegetable food (**50**) should be before the fowls at all times. Animal food (**48**) is required daily and except the blood meal, can be fed in unlimited quantities, also grit (**52**) and lime (**51**).

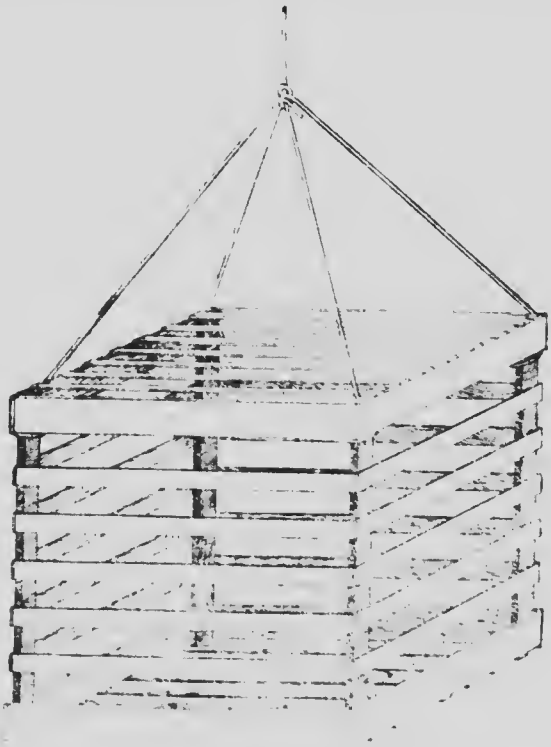
56. Summer Feeding When breeding fowls have unlimited range, the feed can be greatly reduced. The small grains should be scattered through the litter in the morning, and the mash fed in the afternoon. Meat and vegetables are only necessary when the supply of natural food is limited.

Breeding fowls, that are confined in pens during the summer, should be fed whole grain (the smaller grains mentioned above) scattered through the litter, animal food and vegetables. The mash should not be fed. The fowls should be compelled to exercise, and kept in medium flesh.

THE HATCHING AND REARING OF CHICKENS.

XVI. PRELIMINARY WORK.

57 The Time for Hatching Chickens. The most rapid growth is made by chickens that are hatched in the month of May. However, the date of hatching can extend to the middle of June. The date at which the chickens are hatched is not so important as is the consideration that they will mature rapidly after they are hatched.



58 Care Required by Eggs for Hatching

evaporation, and need not be turned. The more fresh the eggs are, the greater is the vitality of the germ, and the more chicks they will hatch; it is not advisable to sit for hatching eggs over ten days old. In selecting the eggs, it is well to avoid extra-long, rough-shelled or sharp-pointed eggs, and to retain for hatching only the well-shaped, smooth-shelled eggs.

59. Removal of Broodiness in Hens. An effective way to overcome broodiness in hens is to place the ambitious sitters in a swinging coop. Fig. 14 shows the construction. The coop is simply a wooden frame 2 feet square and 2 feet high, covered on the top, bottom and four sides with laths 2 inches apart. Four strings from the upper corners of the coop are tied to a central cord fastened to a nail in the roof of the poultry house. The coop should be raised 18 inches from the ground. The excitement of the outside chickens and the swinging of the coop quickly dispel the hatching idea from the hens. The sitters should be fed and watered at the same time as the laying hens, but a liberal vegetable and meat diet will induce early laying.

Fig. 14.—Nests for sitting hens.

XVII HATCHING CHICKENS BY NATURAL MEANS

60. Separate Hatching Pen and Nest Boxes. Natural incubation is a satisfactory method of hatching chickens when several sitters commence hatching at the same time, and in a separate pen from the layers.

The door of the pen for the sitters should be earth, bevelled, and the nest boxes should be made without a wooden floor and placed around the sides of the pen. A packing box about 30 inches long, 16 or 18 inches high and 15 inches wide, can be formed into two nests. A wooden partition is placed in the centre of the box, and either a sliding board or a hinged door is arranged in front so that the sitting hens can be confined to the nests at will. The top of the box should be covered with cotton, and there should be openings in the ends for ventilation.

A few shovelfuls of moist earth should be thrown into each nest box. This earth is pressed into a suitable shape and covered with a little soft straw. Two or three common eggs should be left in each nest.

61. Management of Sitting Hens. The sitting hens should be transferred to the strange nests at night. They should be thoroughly dusted with insect powder or sulphur (102), placed on the nests and closed in. Two nest dishes of wheat, corn, grit (52) and water should be placed in the pen and the hens removed from the nests to feed. They should not be disturbed again till night, but allowed to return to the nests at their pleasure. When the nests are examined at night, all the hens that are quiet and contented can be given eggs.

The best food for sitting hens is whole grain, with corn the most suitable. All the hens sitting in the pen should be fed at the same time, and any that do not leave their nests should be removed. The doors of the nests should be closed except at feeding time. It is necessary to examine the nests while the hens are feeding, and if any eggs are broken the nest should be made clean. It is well to see that each hen returns to her own nest.

Moistening the Earth.—When the hens are incubating in a warm dry atmosphere, it is advisable to moisten the earth around the outside of the nest boxes on the eighteenth day of hatching. This supplied moisture will further soften the membrane inside the shell of the egg, and permit its ready separation by the chick.

XVIII. REARING CHICKENS BY NATURAL MEANS.

62. **Management.**—The chicks should be left in the nest for 30 hours after hatching. The hen and chicks should then be removed to a brood coop. In warm weather the brood-coop should be placed on the grass in a sheltered place, and a wooden frame 12 inches high placed around the coop. This frame will prevent the chicks roaming away. When the chicks are a week or two old the frame can be removed. For the first two days the chicks require warmth more than food; the hen should be disturbed as little as possible. The first few meals should consist of stale bread crumbs or rolled oats. As the chicks become older they should receive three times a day a small quantity of a mash made of ground grain and sour skim milk; and cracked wheat, pinhead oatmeal or millet seed scattered in litter twice a day. The small grains will induce the chickens to scratch and take exercise. It is advisable to feed the chickens animal food (48) every day. Waste meat can be cut into small pieces and thrown to them or dried blood can be mixed with their mashes.

In chick feeding the main conditions for success are these: That they are fed regularly four or five times a day; that only a minimum quantity of food is given at each feeding; that no food is allowed to sour; that they are compelled to scratch and exercise for nearly all their food. Chicks require grit (52) at all times. It is advisable to allow the chicks fresh water to drink after they are one week old.

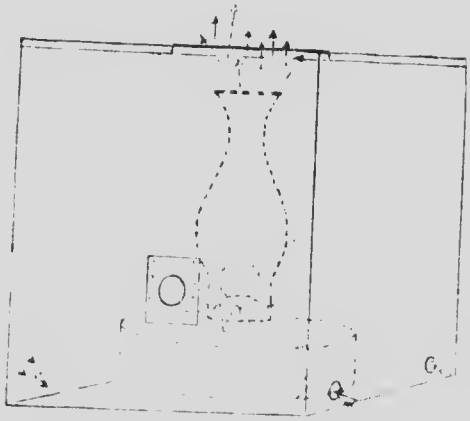


Fig. 10.—A ...

The chicks should be closed in the brood coops at night and given liberty early in the morning. It is necessary to remove the coops to fresh grass frequently; the coops should be cleaned out twice a week, and fresh earth sprinkled over the floors.

63. Brood coops. A serviceable brood coop can be constructed from a packing box of about 2 feet each dimension. The original cover of the box is made into a door, and hinged to one side of the box. This door covers over the front of the coop at night, and can also be partially lowered as a protection during rainy weather. The outside of the coop should be covered with tar paper fastened on with laths; laths 2½ inches apart should be nailed up and down inside the front of the coop.

XIX THE TESTING OF EGGS.

64. A Home-made Egg Tester.—All eggs that are undergoing incubation should be examined twice during the hatching period. Fig. 16 shows how an egg tester can be made that will give good results. One end should be removed from a wooden box of suitable size to place over a lamp. A large opening is made in the other end of the box to allow the fumes of the lamp to escape. This opening can be covered with a piece of tin having a hole punched in it. On the front of the box and on a level with the flame of the lamp, a 3 inch hole is cut. Over this hole a piece of felt or heavy cloth is tacked. A small oval hole is cut in the felt against which the egg is pressed. Several one inch holes are required at the bottom of the box for ventilation.

In order to use the tester, it should be placed over a lamp in a dark room, and each egg pressed against the hole in the felt. The contents of the egg can be readily seen. Incubator eggs should be tested in a warm room, one tray at a time.

65. First Testing. When testing dark shelled eggs on the ninth day, the fertile eggs with live germs in them will have a dark spot (the germ) in the upper part of the egg with veins radiating from it (Fig. 17). These eggs are to be kept in the machine.

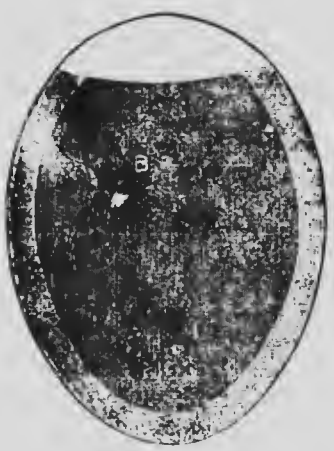


Fig. 17. A fertile egg at the first test (a).

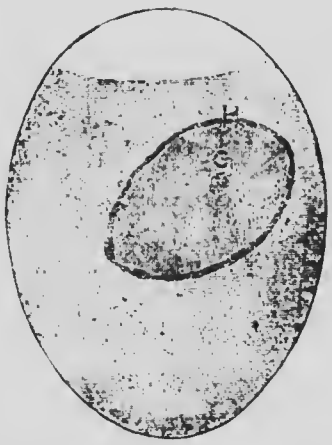


Fig. 18. An imperfectly fertilized egg at the first testing. This egg is discarded.

Eggs that are clear should be removed from the machine. They are infertile and will not hatch; also eggs having a red ring (Fig. 18 B); or eggs with a dark spot without blood vessels (Fig. 18 C); or clouded eggs (Fig. 19).

66. Second Testing. The eggs are again tested on the sixteenth day. At this stage of incubation a live chick darkens all the egg except the air cell (Fig. 20); if the egg is closely watched, a movement of the chick can often be detected.

XX. HATCHING CHICKENS BY ARTIFICIAL MEANS.

67. **Advantages of Artificial Means.**—With a reliable incubator that heats the eggs by means of warm, fresh air forced through the egg chamber, a larger percentage of chickens will be hatched than under hens. One brooder can rear from 50 to 75 chickens as safely as one hen can take care of a dozen. For the hatching and rearing of more than 200 chickens a year, artificial methods will be found necessary and profitable. A suitable plant for hatching and rearing 1,000 chickens—consisting of two 220-egg incubators, 15 movable houses, and 8 brooders—will cost from $150 to $200. This plant can be used for years. The advantages are: the rearing of the chickens is simplified; the loss through disease is decreased; the labour of hatching and rearing 1,000 chickens artificially is no greater than when rearing 200 naturally.

68. **Where to Operate an Incubator.**—The incubator should be placed in a well-ventilated room, preferably one unheated. The chicks developing in the eggs require an abundance of fresh air. A bright airy cellar or a well-ventilated room having an even temperature are the most desirable places; a damp, close cellar will destroy the best hatching eggs. The ventilation should be so arranged that there will be outside air entering the room at all times, but without a direct draught blowing on the machine.

Fig. 29.—A strong specimen egg at the first testing. The egg is fertilized.

Fig. 30.—The appearance of the egg at the second testing.

69. **Operation.** The incubator should be set up and levelled. It is advisable to run the machine for two or three days before the eggs are placed in it, or until the regulation is understood, and the temperature of the egg chamber can be maintained at 103° F.

Turning the Eggs. The eggs should be placed in the machine in the morning. From second till the nineteenth day, they should be removed from the incubator every [illegible] hours and turned. The position of the egg trays should be interchanged at each turning, and the eggs in the middle of the egg chamber removed to the outside, so that [illegible] variation in the temperature of the chamber will be equally distributed among the [illegible]

Temperature. If the thermometer is suspended in the machine on a level with the eggs, the incubator should be operated at a temperature of 103½° till the tenth day, and at 103° from the tenth day until the eggs commence to hatch, and during the hatching [illegible] a temperature of 105° to 106°. At this time it is imperative to [illegible] the machine

door is closed till the hatch is well over, or until the chicks that were first hatched are 24 hours old. It is of the utmost importance that the temperature and humidity of the egg chamber remain constant during the hatching. If the door of the machine is opened, the rapid evaporation cools and dries the air in the egg chamber at once, and many chicks just pipped stick to the shell and do not hatch.

Ventilation. Ventilation is required to supply fresh air to the embryos (chicks developing in the eggs) in the machine, and to remove the carbon dioxide or poisonous gas given off by them. With an incubator that forces warm fresh air through the egg chamber, more fresh air will be forced through the machine when it is operated in a cold room than in a warm room. The quantity of air forced through the machine in a cold room is usually sufficient to remove the carbon dioxide from the egg chamber, and little extra ventilation is required through the ordinary ventilators.

When the incubator is operated in a warm room, the amount of fresh air that is necessary to sustain the temperature of the machine is limited. In fact, the incubator lamp is often removed for several consecutive hours. Under these conditions supplementary ventilation should be supplied, or the vitality of the hatch will be lowered. When the machine is running under warm, dry conditions, if the ventilators are opened there will be too great an evaporation of the eggs. However, the ventilators of the machine should be opened and the undue evaporation of the eggs prevented by increasing the moisture of the outside air artificially.

At the Bondville, Que., Illustration Station last year, the best result in hatching was secured in the month of June. During this hatch the outside air was dry and warm. The incubators were placed in a woodshed having an earth floor. The door of the shed was open all day, and the air of the shed was pure and moist. The machines were given supplementary ventilation; the ventilation was continued until the chicks began to hatch, when the machines were closed.

XXI REARING CHICKENS BY ARTIFICIAL MEANS

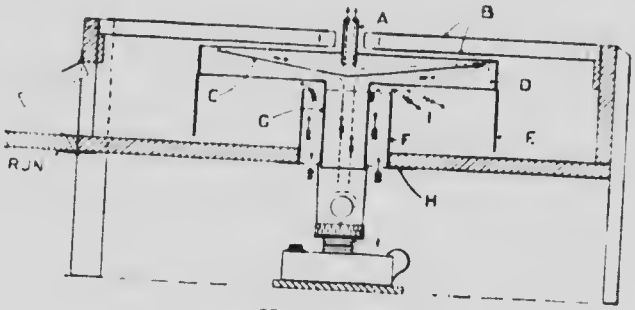
70. Brooders. The brooder is a warm, ventilated box in which chickens can be reared without a hen. The brooder (71) is warmed by means of a lamp; the fumes of the lamp are not permitted to enter the chick compartment. Warm fresh air continually flows into the brooder and ventilates it. The management of the brooder is simple. It should be placed in the movable house (75 76) or in a vacant room or pen. It is not intended for outdoor use. The brooder can be satisfactorily constructed at home; the heater and lamp can be made by any tinsmith; the cost of the complete brooder is nominal.

71. Brooder Construction. – *Box.* The box that forms the brooder is 34 inches square and 8 inches deep, inside measurements. It is made of $\frac{7}{8}$ inch lumber planed on both sides. A 5 by 10 inch chick door should be sawed in one of the sides of the box; the chick door should be hinged at the top.

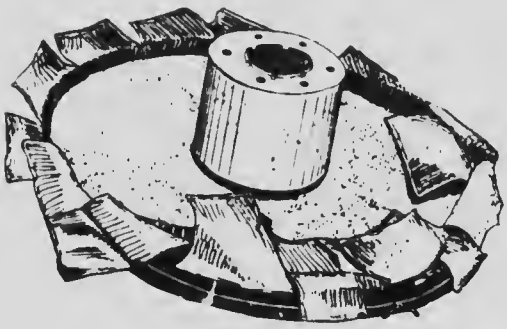
The floor is $\frac{7}{8}$ inch matched lumber. At centre of the floor a round hole (diameter $6\frac{1}{4}$ inches) should be sawed. The heater is placed in this opening and rests on a galvanized iron rim (inside diameter $5\frac{1}{2}$ inches).

Four legs, 2 by 2 inch, should be attached to the box, they should project $8\frac{1}{2}$ inches below it.

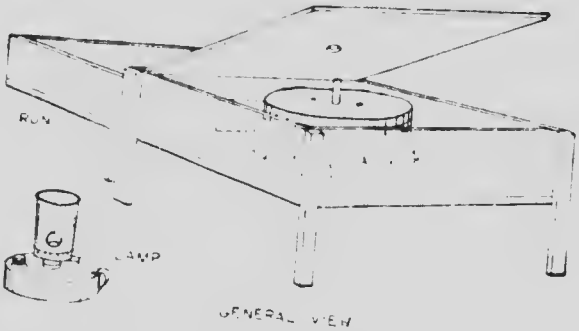
The roof is a light wooden frame covered on both sides with heavy cotton. It should fit inside the box level with the top, and be supported on $\frac{1}{2}$ inch cleats. The roof frame is 34 inches square and one inch deep, outside dimensions. There should be a 4 inch board across the middle of the frame. At the centre of this board a 2 inch hole is required for the upper smoke pipe of the heater.



CROSS SECTION



HEATER - VIEW FROM BELOW



GENERAL VIEW

FIG. 21.—The indoor brooder.

A. Upper smoke pipe to carry off the fumes of the lamp. B. Cotton-covered frame, or roof of brooder. C. Heat reflector. D. Heating chamber. E. Two-ply flannel to form the warm hover for the chicks. F. Fresh-air chamber. G. Lower smoke pipe. H. Galvanized iron rim on which the heater rests. I. Warm fresh air entering the hover.

Run.—The run is 2 feet by 3 feet. It should be hinged to the front of the brooder on a level with the brooder floor. A three-section hinged frame 6 inches high should be placed around the outside of the run to confine the chicks for the first few days. The floor of the run can then be lowered to the ground, and will form a runway into the brooder.

Heater.—The heater is complete in itself and can be successfully operated in a box of any size. No separate hover is required, and the chicks are continually supplied with warmed fresh air. In cleaning the brooder if the heater and lamp are removed, and a pan is placed beneath the hole in the floor of the brooder, the litter can be caught and removed in the pan.

The heater is made of galvanized iron with the exception of the heat-reflector. This should be cut from bright tin. The dimensions of the different parts of the heater are as follows:—

Lower smoke pipe: diameter, 3 inches; length, 5½ inches.

Fresh air chamber: diameter, 6 inches; length, 5 inches. The fresh air chamber is attached to the smoke pipe at the bottom. In the floor of the fresh air chamber ½ inch holes should be punched for the ingress of fresh air. The fresh air chamber is open at the top.

Heating chamber: diameter, 20 inches; depth, 2 inches. A heat-reflector (inverted cone) is placed in the heating chamber. The diameter of the cone is 18 inches; depth, 1½ inches. The upper edge of the cone is ¼ inch below the top of the heating chamber. The apex of the cone is ½ inch above the bottom of the heating chamber. The cone is riveted to the heating chamber by three clips at the top. The upper and lower surfaces of the heating chamber should be rigid; they can be stayed to the cone, or held by two wire nails driven through the chamber and soldered.

Upper smoke pipe: diameter, one inch; length, 4 inches. The upper smoke pipe should be soldered ¾ inch inside the heating chamber.

To complete the heater two strips of flannel should be placed around the outside of the heating chamber and tied with a cord to it. The flannel strips should extend 4 inches below the heater. They reach to within ½ inch of the floor of the brooder, and form a warm hover for the chicks. The strips should be cut every 4 inches, and alternately, so as to prevent the escape of heat.

Lamp.—Dimensions: diameter of the oil fount, 7½ inches; depth, 2 inches; total height of lamp (including chimney) 8 inches. There should be a small handle on the oil fount, and a screw cap for filling with oil. A large size burner (1¼ inch wick) can be used, or a special water-cooled burner; the burner screws into an ordinary lamp collar soldered to the oil fount. The iron chimney is about 5 inches high; the diameter of the top of the chimney is 3¼ inches; the bottom diameter is 3 inches. A 1½ inch hole should be punched in the chimney and covered inside with mica in order to see the flame. The top of the chimney is placed over the lower smoke pipe.

Heat Circulation.—The fumes of the lamp enter the lower smoke pipe and ascend to the centre of the lower part of the heating chamber. The heat-reflector compels their circulating to the outer edge of the heating chamber. They then ascend to the upper part of the chamber, flow back to the centre of the heater, and are carried off by the upper smoke pipe. Fuel is saved by this forced circulation of the lamp fumes: the hover is warmer at the outside than towards the centre, so that crowding of the chicks is materially prevented.

Warmed fresh air is supplied to the hover by means of the fresh air chamber. Fresh air enters at the bottom of the chamber. It is warmed by contact with the hot smoke pipe, and flows into the hover below the heating chamber and above the heads of the chicks.

72 **Situation of Brooder.**—When the chicks commence hatching the brooder should be placed in position, and the brooder floor covered with one inch of earth and gravel. The brooder run should be raised and the run floor covered with earth and gravel also. The lamp should be lit, and the brooder warmed to 100° F. under the hover.

When the brooder is operated in the movable house (75), or in a warm, bright pen, the floor of the pen should be dry earth and gravel; this soil should be covered with short straw or clover chaff. The chicks should be fed their dry food scattered through the chaff. As soon as the weather is suitable, the chicks should be allowed outside.

In rearing early chickens, the brooder should be placed in a bright, artificially heated room. If an unoccupied room in a house is used, the floor should be first covered with building paper. Earth and chaff should cover the building paper.

73 Operation of Brooder. The chicks should not be removed from the incubator until they are dry and strong, or until the chicks first hatched are 30 hours old. The chicks should be conveyed to the brooder in baskets covered with warm cloths. The brooder must be thoroughly warm (72) before the chicks are placed in it. Not more than 75 chicks should be housed in a brooder.

The first meal should consist of stale bread crumbs scattered on thin boards placed in the brooder run. When the chicks appear cold, they should be placed under the hover and the chick door closed. They should be again called for feeding in two hours tapping with the finger on the feed boards will call them. The chicks should receive at each feeding sufficient food to satisfy them (62). They require to be confined in the hover for a day or two after hatching. When the chicks become strong and lively they should not be confined in the hover, but permitted to enjoy the run. After a few more days the run should be lowered and the chicks given the liberty of the pen.

The chicks should rest quietly in the brooder at night. When comfortable they will be found with their heads popping out from under the flannel. It is advisable to have the hover temperature too *warm* than too cold; if the hover is overheated, the chicks will secure a suitable temperature outside it. The operator should ascertain from the appearance of the chicks whether it is necessary to increase or decrease the temperature. When the chicks are huddling together and are crowding, additional heat is required. In warm weather when the chicks are a few weeks old the lamp can be extinguished during the day; a moderate heat (70° to 80°) is required at night. The lamp should be filled with oil daily and the charred portion removed from the wick. The brooder should be cleaned out twice a week and fresh earth placed on the floor.

FIG. 22.—A feed trough for chicks.

74. Feeding Chickens.—*First Month.*—The chicks should be fed five times a day. Soft mashes composed from ground oats (the coarser hulls removed), ground corn, ground barley, ground buckwheat, wheat bran, shorts and low grade flour mixed with thick sour skim milk should be fed three times a day. It is advisable to feed the mash in a small trough formed from a piece of tin 3 inches wide nailed to the edge of an inch board (Fig. 22). The chicks should be given sufficient mash to make certain that all have been satisfied; no food should be left in the trough to sour. Dry meals and grains such as cracked wheat, cracked corn, pinhead oatmeal, rolled oats, broken rice or millet seed scattered through litter to induce exercise should constitute the other two meals a day. Animal food (48, 62) is also required daily.

Second and Third Months.—The chicks should receive three meals a day, the mash in the morning and the middle of the day and the grain at night.

Animal Food.—If the chicks cannot secure worms, bugs or similar insects, animal food (48) must be supplied them. Animal food is necessary for the rapid growth of

chickens. When the chicks are fed a wide ration, or a ration that contains a large proportion of carbohydrates and fats they droop and die. A grain ration is not sufficient, there must be animal food included.

Water.—The chicks should have access to fresh water after they are one week old. At first a cup or tin can be filled with water and inverted over a saucer. A small piece of wood should be inserted under one edge of the cup to allow the water to escape. This improvised water fountain will prevent the chicks becoming wet. Later the large water fountains should be used.

Grit.—Chicks at liberty should find sufficient grit to digest their food. Chicks reared indoors require to have grit supplied them.

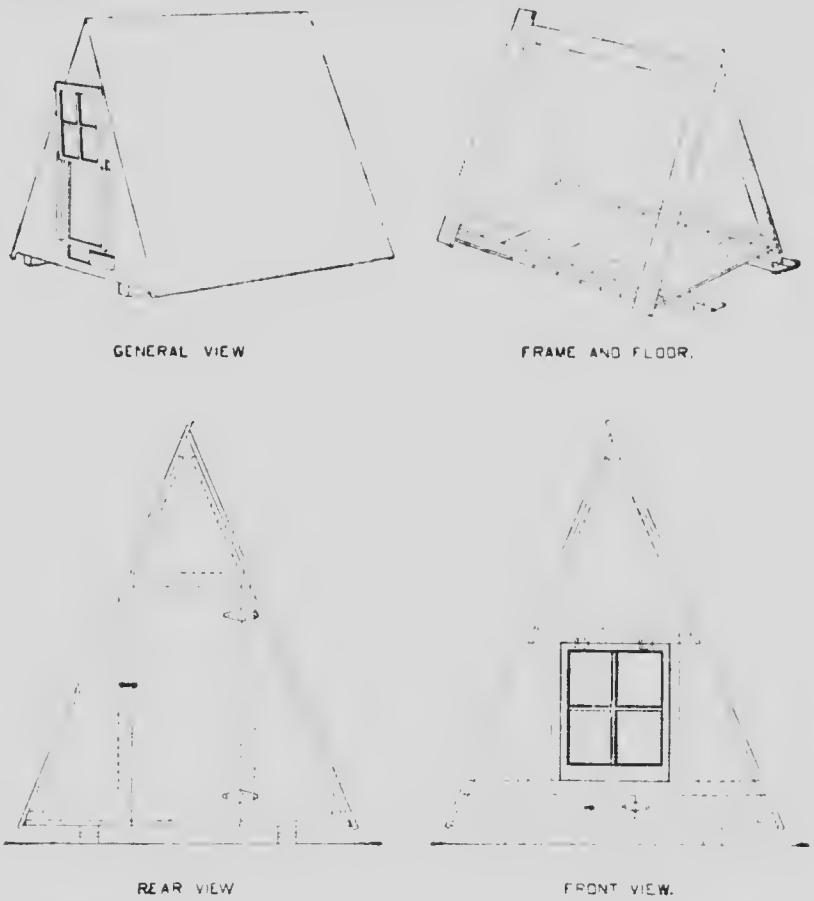


FIG. 23.—The movable house.

75. Housing Chickens. *Movable Houses.*—Besides forming practical chicken houses movable houses are useful for housing other stock. The house described is in use at the Illustration Rearing Stations conducted by this Department, and is quite satisfactory. In each house one brooder (71) is placed, and our men have found that the chickens require little attention in inclement weather, the house is bright and cheerful during the day and when the chicks cannot be allowed outside they scratch for grain among the litter on the floor.

The cost of the materials and paint of the house is $7. The house will last for years and should prove a profitable investment. One house and brooder will rear 75 chickens to the market age. The brooder can be removed from the house when the chicks are a month or six weeks old and used for a later hatch.

76 **Movable House Construction.**—Two pieces of 4 by 4 inch cedar should be cut s feet 10 inches long for the sills, one end of the pieces should be bevelled (Fig. 23) and ironed, and either rings placed at the ends or one inch holes bored through the sills and a chain and clevis used for hauling. These sills are placed 4 feet apart and on them a 6 by 8 feet floor is nailed. The bevelled ends of the sills should project 10 inches beyond the floor. The floor boards should be cut 6 feet long of $\frac{7}{8}$ inch matched lumber planed on one side. At each of the 8 feet sides of the floor a 2 by 4 inch scantling should be nailed. These two scantlings require to have their outer edges bevelled, the must be well secured to the floor.

The slanting sides should be covered with (1) dressed $\frac{7}{8}$ inch lumber with $\frac{7}{8}$ by 2 inch battens over the joints, or (2) matched siding; or (3) half cut siding (**10**). The dressed and the matched siding should be laid vertically, the half cut siding horizontally.

When the dressed or matched siding is used the boards should be cut 8 feet long. Two boards are fastened in position at each end of the house, and the triangular piece at the peak set in. The sides can then be boarded. The upper ends of the boards on one side of the house are bevelled, the ends of the boards on the other side are nailed on the face of the bevelled ends.

One inch inside each end of the house, four pieces $\frac{7}{8}$ inch thick and 3 inches wide are nailed the full length of the slanting sides. The end boards of the house are nailed to these pieces.

There is a hinged window, 2 feet 6 inches long and 2 feet wide, opening outwards, in the front end of the house, the bottom of the window is 10 inches from the floor. In the rear or north end of the house there is a door 2 feet wide and 4 feet 6 inches high. Above and below the window and on a level with the top of the door are $1\frac{1}{2}$ by 3 inch cross pieces. Two 6 inch holes should be sawed in the front and rear ends of the house near the peak for ventilation. In the front of the house there should also be a small chick door.

THE FATTENING AND MARKETING OF CHICKENS.

XXII. FATTENING CHICKENS IN CRATES.

77. **The Fattening Crates.**—The fattening crates in use at the Illustration Stations are 6 feet long, 16 inches wide and 20 inches high, inside measurements. Each crate is divided by two tight wooden partitions into three compartments, and each compartment holds four chickens. The frame pieces are 2 inches wide and $\frac{7}{8}$ inch thick. This frame (Fig. 24) is covered with slats. The slats are placed lengthwise on three sides—bottom, back and top—and up and down in front. The slats for the bottom are $\frac{7}{8}$ inch wide and $\frac{5}{8}$ inch thick; the back, top, and front slats are the same width, but only $\frac{1}{2}$ inch thick. The spaces between the slats in front are 2 inches wide to enable the chickens to feed from the trough. The bottom slats are put on $1\frac{1}{2}$ inches apart, and the slat nearest the back of the crate is $2\frac{1}{4}$ inches from the corner piece. The bottom slats are raised 2 inches from the bottom of the crate, to prevent the chickens' feet being bruised when the crate is placed on the ground. The top slats are 2 inches apart and the back slats $1\frac{1}{2}$ inch. The top slats are cut above each partition, and six strips 2 inches wide are nailed under them. The three doors so formed are hinged to the rear corner piece.

The crates are placed on stands 16 inches from the ground. The droppings from the chickens are received on sand or other absorbent material. A light 'V' trough 2½ inches inside, is placed in front of each crate, and is carried on two brackets nailed to the ends of the crate. The bottom of the trough is 4 inches above the floor, and the upper inside edge is 2 inches from the crate.

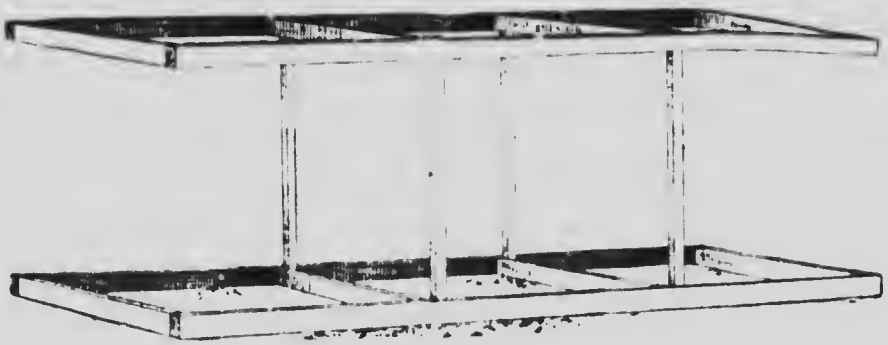


Fig. 24.—The frame of the fattening crate.

78 Situation of Crates. In *warm* weather the crates should be placed outdoors in a sheltered position.

In *unsettled* weather it is advisable to construct a rough board shelter above the crates so as to shed the rain, or the fattening should be carried on inside a shed or barn.

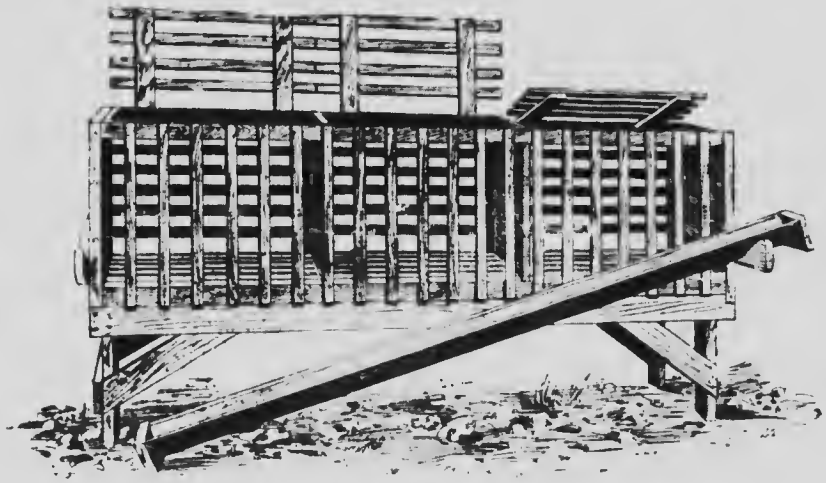


Fig. 25.—The fattening crate.

During *cold* weather the crates should be placed in a warm building. Abundant ventilation is required at all times.

79. The Age to Commence Fattening. The experiments that were conducted by this Department with large numbers of growing chickens determined that four months of age was the most profitable time to place chickens on the market (45).

In order to have the chickens plump and well fitted for the market when they are at the most profitable age, they should be placed in the fattening crates when they are three months old. It is not meant by this that chickens cannot be fatted profitably when they are more than three months old. Suitable market chickens of any age will show gains in the crates. In selecting chickens for fattening, those should be fatted that are of medium size, and are of a broad square shape, with short, straight legs set well apart.

80. **Equipment for Fattening.** — In fattening chickens for market, it is advisable to use the fattening crates described in this bulletin (77). If only a small number of chickens are to be fatted, packing boxes of suitable dimensions can be adapted for the purpose. The open top of the box should become the bottom of the crate, and one side should be removed for the front. Laths should be nailed up and down the front, and also lengthways of the crate to form the floor. The laths are placed the same distance apart as recommended in the construction of the fattening crate (77). A board should be loosened in the top of the crate to remove the chickens from, and a feed trough arranged in front. A shaping board and shipping boxes are also required.

81. **Cost of Feed and Gain in Weight.** — Taking the results from five lots at four of the Fattening Stations where the men managed the work best and had good chickens of large breeds, I find that 365 chickens in five lots gained on the average 2·35 pounds each; and the average cost for food consumed was 5·27 cents per pound of increase in live weight. That shows a great increase, nearly two and a half pounds per chicken, and the cost for food was five and a half cents per pound of increase in live weight.[1] (The ground grain was valued at $1.20 per 100 pounds and the skim milk at 15 cents per 100 pounds.)

82. **Fattening Rations.** A satisfactory fattening ration is one that is palatable and that will produce a white coloured flesh. Ground oats, finely ground or with the coarser hulls sifted out, should form the basis of all the grain mixtures. Ground corn fed in excess will result in a yellow coloured flesh of inferior quality; ground pease impart a hardness to the flesh that is not desirable. Ground oats, ground buckwheat, ground barley, and low grade flour are the most suitable meals for fattening.

Satisfactory Meal Mixtures:

(1) Ground oats (coarser hulls removed).
(2) Siftings from rolled oats (no hulling dust should be included).
(3) Two parts ground oats, two parts ground buckwheat, one part ground corn.
(4) Equal parts ground oats, ground barley, and ground buckwheat.
(5) Two parts ground barley, two parts low grade flour, one part wheat bran.

The ground meal should be mixed to a thin porridge with thick sour skim milk or buttermilk. On the average, 10 pounds of meal require from 15 to 17 pounds of sour skim milk. A small quantity of salt should be added to the mash.

When sufficient skim milk or buttermilk cannot be obtained for mixing the mashes, a quantity of animal and raw vegetable food should be added to the fattening ration.

83. **Duration of the Fattening.** The chickens should remain in the fattening crates for a period of 21 days. It is well to divide this period into the first and second weeks, during which time the chickens are fed the ground meal and skim milk mashes, and the remaining 10 days, when tallow should be added to the mashes.

84. **Killing the Lice.** Before the chickens are placed in the crates they should be well dusted with sulphur to kill the lice (102). They should be again sulphured three days before they are killed.

85. **The First Week.** It is necessary to feed the chickens lightly the first week they are in the crates. A small quantity of the fattening food should be spread along the troughs, and as this is eaten more food is added, but not as much as the chickens

[1] "Fattening of Chickens." Evidence of 1901, by Prof. Jas. W. Robertson.

would consume. The food should be given three times a day, and after feeding the troughs should be cleaned and turned over. The chickens should receive fresh water twice a day, and grit (52) two or three times during the week.

86. The Second Week. The chickens should be given twice a day as much food as they will eat. Half an hour after feeding the feed troughs should be cleaned and turned over. Water and grit should also be supplied as in the first week.

87. The Last Ten Days. At the commencement of this period one pound of tallow a day should be added to the mashes for every 70 chickens. The quantity of tallow should be gradually increased, so that at the latter part of the period one pound of tallow is fed to 50 chickens. The tallow should be melted and while hot thickened with meal. This paste can be mixed with the mashes. The chickens should receive the fattening food twice a day in the feed troughs, and also water and grit as previously stated.

88. Cramming Chickens. The cramming machine is not necessary for fattening chickens, and only when well fed chickens are placed in the fattening crate is it a profitable method of feeding. When young chickens are placed in the fattening crate in a moderately lean condition and are fed a suitable fattening food from the feed trough, they will make substantial gains throughout the fattening period.

A lot of 131 chickens that were fatted at the Smithville, Ont., Illustration Chicken Fattening Station, gained 2 lbs. 10½ ozs. each in four weeks fattening. One crate of 12 chickens weighed 39 lbs. when they were placed in the crates. At the end of the four weeks they weighed 78¾ lbs., a gain of 39¾ lbs., or 3 lbs. 5 ozs. each. The cost of feed per pound of gain in live weight for the lot was 4·9 cts.; the cost of feed for the 12 chickens was 4 3 cts. a pound gain in weight. These chickens were utility type Barred Plymouth Rock cockerels, and were fed from the trough *throughout* the fattening period.

89. Feather-plucking. Chickens that are fattening in crates sometimes pluck the feathers from one another. This habit is caused by an irritation at the roots of the feathers, and which results from either over-heated blood or parasites.

The remedy is to remove the chickens that are affected; to feed the others more skim milk in their mashes, or to add animal food and vegetable food to the fattening ration.

If the trouble is caused by parasites, the mites can be found amongst the white powdery matter at the base of the quill. A sulphur and lard ointment should be applied to the affected parts.

XXIII. PREPARING CHICKENS FOR MARKET.

90. Killing. *Starving.* The chickens should be starved 36 hours before killing. This will prevent food remaining in the crop and intestines, which would decompose and spoil the flavour of the birds. Several hours after the last feed allow the chickens what water they wish to drink. They should then have a complete fast until they are killed.

Directions for Killing. - Kill the chickens by dislocating the neck. With the left hand hold the chicken's legs and wings in one firm grasp. Place the first finger of the right hand on the right side of the neck, and the remaining fingers on the left side. Grasp the head in the hollow of the hand, with the fork of the fingers behind the head where it joins the neck. The back of the chicken being upwards, hold the legs against the left hip, and the head near the right thigh or knee. Bend the head backwards as far as possible, and at the same time stretch the neck, when it is dislocated immediately; pull the head about 1½ inches from the neck. Hold the wings firmly after killing, and allow the chicken's head to hang down, so that the blood can collect in the neck; the head is attached to the body simply by the skin of the neck.

Advantages of this Mode of Killing.—When a chicken is killed in this way, the body is as free from blood as when any other method of killing is employed, but the air is not permitted to enter, and dry out the chicken. If an incision is made in a fowl, it will not keep as long as if sent to market intact.

FIG. 26.—The chicken as it is held preparatory to killing.

91. Plucking. Dry plucking should be commenced as soon as the chicken's neck is dislocated.

Directions for Plucking.—While still holding the chicken in the left hand, extract the tail feathers and the quill feathers of the wing. Allow the chicken's head to hang down, and commence plucking the feathers on the back and wings; then pluck the breast and lower part of the neck, and work back on the body to the tail, and turning the bird over again, finish the back and wings.

Leave the feathers on the neck for 3 inches from the head. Leave, also, a ring of feathers around the legs at the hock joints, and the small feathers on the outside joint of each wing.

Clean pluck the rest of the chicken. Remove all pinfeathers, and make the chicken as attractive as possible. Use care in plucking so as not to tear the skin. If a tear is made have the flesh brought together with white thread.

92. Shaping. Chickens fatted for market should be properly shaped. This gives them a compact, plump appearance, and the returns received for shaped chickens are greater than when they are shipped in a rough, unprepared condition.

The shaper (Fig. 27) is made by nailing two $\frac{3}{4}$ in. planed boards together at right angles, so as to form a trough of 6 inches inside measurement. This trough can be

made 6 feet long and nailed in a frame (Fig. 28), or 12 feet long with ends on it, and placed on the top of two barrels; the trough should lean slightly backwards.

FIG. 27.—The position of the chicken in the shaper, with a brick on top to shape it.

Directions for Shaping.—As soon as the chicken is plucked, place its legs alongside its breast; then with its breast downward, force the chicken down into the angle of the shaper. Cover the chicken with paper and place a brick on top to shape it, also one against it to hold it in position. Continue this same process as the other chickens are

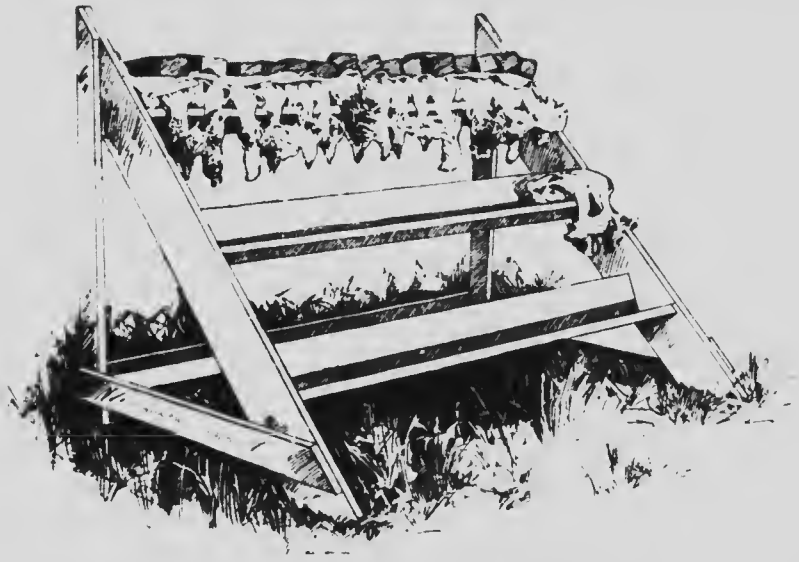


FIG. 28.—A number of chickens in a shaping frame.

plucked, placing each chicken in the shaper close to the last, and moving the lower brick along to hold the row in position. Allow the chickens to remain in the shaper for at least 6 hours.

93. Packing.—After being *thoroughly* cooled, the chickens should be packed into the shipping cases. The chickens *must* be cooled and dry on the skins before packing. Unless the chickens are artificially cooled, they should not be packed into the cases until 20 hours after killing.

The Shipping Case.—Each case holds one layer of 12 chickens. The cases are of basswood or spruce, and the corners are lock jointed. The different sizes follows.

Number.	Weight in Lbs.	Inside Measurement in Inches.	Thickness of Wood: Sides.	Thickness of Wood: Ends.	Cubic measurement in inches.	Number of cases to a ton.	Cost per box in cents.
0	6	$19\frac{11}{16} \times 15\frac{1}{16} \times 4$	$\frac{5}{16}$	$\frac{3}{8}$	1621	42	$8\frac{1}{2}$
1	7	$21\frac{1}{8} \times 16 \times 4\frac{3}{16}$	$\frac{5}{16}$	$\frac{3}{8}$	1847	37	$9\frac{1}{2}$
2	8	$23\frac{3}{16} \times 16\frac{1}{2} \times 4\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	2254	30	11
3	9	$24\frac{13}{16} \times 17\frac{1}{16} \times 4\frac{1}{2}$	$\frac{5}{16}$	$\frac{3}{8}$	2617	26	12
4	10	$26\frac{1}{8} \times 18 \times 5\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	3191	21	$13\frac{1}{2}$

Case No. 0 is for 12 chickens weighing (plucked) from $2\frac{1}{2}$ to 3 lbs. each.
" No. 1 " " " 3 to $3\frac{1}{2}$ "
" No. 2 " " " $3\frac{1}{2}$ to 4 "
" No. 3 " " " 4 to $4\frac{3}{4}$ "
" No. 4 " " " $4\frac{3}{4}$ to $5\frac{1}{4}$ "

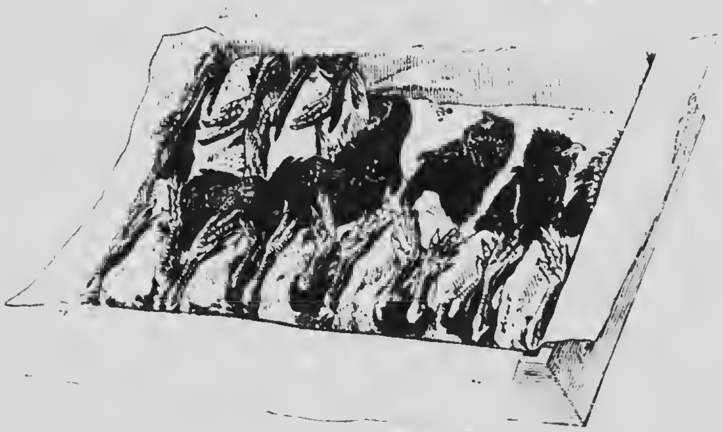


FIG. 29. The shipping case. The first row of chickens packed and two chickens in the second row.

On one end of the shipping case should be stencilled the name and address of the shipper, the word *Canadian*, the number of chickens, and spaces for the gross weight, tare and net weight of the box.

As it is necessary to open the shipping case on the opposite end to which it is packed, the printing on the end of the box should be reversed.

Directions for Packing.—The chickens should be graded in size, and each chicken packed into the proper size shipping case. Small chickens should not be packed in a large case. The case should be lined with parchment paper[1] before the chickens are placed in it.

The chickens are packed with their breasts up (Fig. 29), but the case is so made that it opens with the chickens' backs up (Fig. 30). The heads of the first row (6) of chickens are placed straight out on the bottom of the box, and the backs of the row of chickens packed last are placed against them. The heads of the row of chickens packed last are arranged in the centre of the case.

The parchment paper should be neatly tucked around the case, and before the cover is nailed down, the upper (18 by 26 inch) sheet of parchment paper should be placed in a 25 per cent solution of formalin. This will prevent the development of mould.

The box of chickens should be weighed and the gross, tare and net weights stencilled or plainly marked. Fractions of a pound should not be given.

Fig. 30. The shipping case. The appearance of the chickens when the case is opened.

XXIV. MARKETING CHICKENS

94 The Equivalent Market Prices of Chickens.—The following table shows the results of an experiment conducted by this Department of Agriculture at the Glenfinnan, P.E.I., Illustration Chicken Fattening Station to ascertain the loss in weight of fattened chickens (1) when starved 36 hours and ready to kill; (2) when killed by dislocating or breaking the neck, dry plucked and cooled 20 hours; (3) when drawn and prepared for roasting.

In order to secure an accurate live weight of the chickens before the experiment was commenced, the chickens were weighed two hours after their last feed and this weight is given in the first column: –

[1] Six sheets of light-weight parchment or butter paper are required: two sheets 18 by 26 inches, two sheets 10 by 26 inches, and two sheets 10 by 18 inches.

Loss in Weight of Twelve Fatted Chickens.

Number of Chicken.	Live weight.		When starved 36 hours.		When killed, plucked and cooled 20 hours.		When drawn and prepared for roasting.	
	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.
1	5	8	4	12	4	7	3	15
2	4	12	4		4	2	3	6
3	5	8	4	12	4	13	3	
4	6	3	5	7	5	2	4	3
5	4	12	4		4	2	3	8
6	5	5	4	13	4	3	3	12
7	5	3	4	8	4	3	3	12
8	5	10	4	11	4	2	3	14
9	6	3	5	5	5	1	4	1
10	5		4	3	3	13	3	1
11	6	8	5	14	5	8	4	3
12	5	14	5	3	4	14	3	12
Total	66	08	57	11	54	0	36	4

Results of the Experiment.—(*1*). As a result of the 36 hours starving there was an average loss of three quarters of a pound in the live weight of each chicken. (*2*). There was a loss in weight of five ounces due to the killing, plucking and cooling of the chicken. This small loss would represent the weight of the feathers; there is no appreciable loss in weight owing to the 20 hours cooling.

Combined Results of (1) and (2).—The total loss in weight of the chickens when they were prepared for market by starving 36 hours, by having their necks broken, dry plucked and not bled or drawn, averaged one pound or 20 per cent from the live weight. All chickens that are exported to Great Britain are sold by this plucked weight. In a large number of Canadian cities and on the smaller markets where the improved quality of undrawn fatted chickens is recognized, a plucked chicken is more readily bought than one that has been drawn. A chicken that is not drawn until required for the oven, is more juicy in flesh than one that has been drawn as soon as killed and exposed to the atmosphere.

(*3*). In order to complete this experiment and to ascertain the loss in weight when chickens are prepared for the oven, the twelve chickens were drawn, and their heads, legs and outer joints of the wings were removed. There was an average loss in weight of one pound and one half on each chicken, or $33\frac{1}{3}$ per cent: 54 per cent of the live weight of the chicken was the drawn weight.

4. To ascertain the prices per pound at which the chickens could have been sold by drawn weight, plucked weight or live weight, and realize the same amount of money, the chickens were sold in a regular way on the Charlottetown, P.E.I. market. The selling price was $5.95, and the price per pound was $16\frac{1}{2}$ cts. This price per pound was for *drawn* chickens. If the chickens had been sold for 11 cts. a pound after killing, plucking and cooling, or by *plucked* weight, they would have realized $5.95 also. Or, if the chickens had been sold for 9 cts. a pound *live* weight, they would have realized $5.95. So that in this experiment a selling price per pound of 9 cts. live weight equalled 11 cts. plucked weight and equalled $16\frac{1}{2}$ cts. drawn weight. These figures are equivalent to the weights of the chickens. A value has not been placed on the time necessary to kill, pluck or draw the chickens.

By estimating equivalent values for the different selling prices the following table has been calculated:—

Equal Prices in Cents per Pound for Selling Fatted Chickens by Live Weight, Plucked Weight or Drawn Weight.

Live weight	6	7	8	9	10	11	12	13	cts. per pound.
Plucked weight	7 4	8·6	9 9	11	12 4	13 6	14 8	16	cts. per pound.
Drawn weight	11	12·8	14·7	16·5	18 4	20	22	23	cts. per pound.

95. Home Marketing.—*(1) Provision Merchants.*—In a number of markets throughout Canada fatted chickens, killed and plucked as described in this Bulletin, can be sold for 10 to 16 cents a pound. One Montreal provision merchant wrote this Department last August and guaranteed to buy 500,000 pounds of fatted chickens for 10 cents a pound, plucked weight. In October he increased the price to 12 cents. Last month (Feb. 12th, 1903) this Department sold to this Montreal provision merchant 10,592 lbs. of fatted farmers' chickens for 14 cents a pound, or $1,482.88—2,676 farm raised chickens realizing nearly $1,500—a substantial argument that the fattening of chickens is a profitable business.

The whole display of fatted chickens at the Eastern Ontario Poultry Show, Ottawa, last month was bought for 16 cents a pound, plucked weight. This Department of Agriculture sold fatted chickens last year at Goderich, Ont., Toronto, Ont., Montreal, P.Q., Sydney, C.B., and Charlottetown, P.E.I., at prices ranging from 10 cents a pound and upwards. These chickens were readily sold and created a favourable impression among the dealers and consumers.

(2) Exporting Firms.—Fatted chickens can also be sold alive to Canadian provision merchants and to exporting firms for 6 cts. a pound and upwards. These firms will ship crates for the chickens and will pay transportation charges to their packing houses.

96. Export Marketing.—The chickens can be shipped to Great Britain as soon as they are fatted in the fall, or they can be held in cold storage and forwarded between February and May of the following year. The shipment should go forward by refrigerator car or express to the port, and should be placed in the cold storage chamber of the steamer. It is advisable for several neighbouring farmers to fatten their chickens at one time, or have one farmer fatten for all, so that a large number of chickens can be shipped together. The price per pound realized in Great Britain is from 12 to 16 cts., plucked weight.

For several years this Department of Agriculture has been shipping chickens to commission merchants in Great Britain. The names and addresses of these merchants can be secured; also, information in regard to any other matter that concerns the poultry farmer, produce merchant or exporter.

The evidence of Prof. Jas. W. Robertson on "Fattening of Chickens" before the Agricultural Committee of the House of Commons for 1901 contains additional information about the fattening work, and will be mailed to all who desire it.

THE DISEASES AND PARASITES OF POULTRY.

XXV. THE DISEASES OF POULTRY.

97. Concerning Treatment of Poultry Diseases.—The treatment of poultry diseases should seldom concern the farmer. If the healthiest and most vigorous breeding fowls are kept, if the chickens are reared under satisfactory conditions, fed on wholesome food and not overcrowded, there will rarely be disease amongst them. When disease does appear, it will be found usually more satisfactory to kill and bury the sick birds than to treat the disease remedially. Two common poultry diseases are roup and gapes.

98. Roup.—*Symptoms. (1) Mild Type of the Disease.*—Puffed or swollen eyelids; watery discharge from the eyes and nose.

(2) Severe Type of the Disease.—Eyes swollen and closed by offensive cheesy matter; thick gelatinous discharge from the eyes and nose.

(3) Diphtheretic Roup.—Frothy mucous in the mouth and throat; throat covered with thick cheesy matter.

Treatment.—In the mild type of the disease the inflammation can be reduced by bathing the eyes and face of the fowl with a solution of equal parts of sweet oil and whiskey. The fowl should be removed from the flock and fed on soft food and animal food.

If the disease has reached the offensive stage the fowl should be killed; the house disinfected with sulphur fumes to prevent the spread of the disease, and the general health of the poultry improved.

Roup is more prevalent in overcrowded and dirty poultry houses. The inside of the house should be well cleansed, fresh earth placed on the floor, and the ventilation and lighting arranged so that the house can be made perfectly dry and cheerful.

99 Gapes. *Symptoms.*—Chicken gaping—opening its mouth at frequent intervals to get breath. As the disease proceeds the breathing becomes very laboured. Gapes result from the presence of worms (*Sclerostoma syngamus*) in the windpipe. The windpipe becomes inflamed and together with the worms the chicken is nearly suffocated. The inflammation extends to the lungs and death results from suffocation.

Treatment.—The worms should be removed by the fumes of sulphur or coal tar. A fumigator can be made from an old apple barrel. The ends should be removed from the barrel, and in the side near one end an opening 6 inches deep and 10 inches wide should be sawed out. This end of the barrel should be placed on the ground; a lath grating (laths one inch apart) is required to fit inside the barrel 10 inches above the ground. The chickens to be treated stand on the grating inside the barrel; the top of the barrel is covered with an old sack, and a plate of burning sulphur is placed on the ground inside the barrel.

Instead of the sulphur the inside of a barrel can be painted with a mixture of coal tar and coal oil. The mixture should be of the same consistency as paint. The chickens are placed in the barrel and the top of the barrel is covered with the sack.

The chickens should be observed while under treatment; they should be removed as soon as they show signs of being overcome by the fumes. Three treatments usually suffice; they are given night and morning. The worms are destroyed, lose their hold upon the internal surface of the windpipe and the chickens cough them up.

Chickens contract the disease when allowed to run on ground which has become infested with the gapeworm; the worms are conveyed from one chicken to another through the medium of food and drink. When the worms have been destroyed by fumigation, it is advisable to remove the chickens to dry, uncontaminated ground, or if this is impossible, to plough or dig up the earth about the pens and to scatter air-slacked lime around. This disease is rarely present among chickens that are reared on well drained soil, and away from the dampness about the farm buildings.

Chicken Diseases.—Leg weakness is found among chicks that are housed in badly constructed brooders, overfed with unsuitable food, or not allowed sufficient exercise on an earth floor. Chicks that are affected should be placed on ground that is covered with earth, and animal food and small grains made the principal part of their ration.

XXVI. THE PARASITES OF POULTRY.

100. Loss from Parasites.—The parasitic infestation of poultry is one of the primary causes of unprofitableness and disease. The fowls are rarely examined, and the reason of their poor condition is not ascertained or even considered. There are three distinct

groups of parasites preying upon the domestic fowl — Fleas (*Palæodes*), Lice (*Mallophaga*), and Mites (*Acarina*).

101. Groups of Parasites — *Fleas.*—Only one species of flea, the bird flea (*Pulex gallinæ*), lives upon the fowl. This flea is provided with a sharp, piercing mouth and attacks the fowls at night and through causing constant irritation and loss of blood does much harm.

Fig. 31.—Fowl louse (*Goniocotes hologaster*), greatly enlarged.

Lice.—The mouth of the louse differs from the mouth of the flea in that it is not sharp and used for piercing, but used simply for biting. Lice bite sharply and cause considerable pain.

Mites.—The most injurious form is the red fowl mite (*Dermanyssus avium*) (Fig. 32). This mite is yellowish white to dark red in colour, according to the quantity of blood it contains. The blood is drawn from the fowls at night, and during the day the mite hides in the cracks and crevices of the house. When the chickens appear in poor health they should be examined at *night*, and if mites are found treatment should be resorted to.

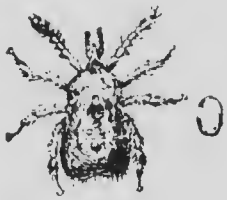


Fig. 32.—Fowl mite (*Dermanyssus avium* and *ovum*), greatly enlarged.

102. Prevention and Extermination.—If the poultry house is old and contains many crevices, all the nests, roosts and other fixtures should be removed from it, and the walls and ceiling covered with paper and limewash (**33**). The material taken from the house should be burned. New roosting quarters (**21**) and inside fittings (**28-30**) should be placed in the house, and an additional window inserted if required.

Before the fowls return to the new house they should be thoroughly dusted with insect powder or sulphur. By dusting each fowl over a box or paper, the powder can be well rubbed among the quills of the feathers, and the excess will not be wasted.

The coal tar treatment for the destruction of the gape worm (**99**) can be effectively used to rid fowls of vermin. The fowls are placed in the barrel and the top of the barrel is covered. The lice are overcome by the coal tar fumes and fall to the bottom of the barrel. The bottom of the barrel should be covered with a paper so that the vermin can be destroyed.

The poultry house requires cleaning and limewashing twice a year. The roosts should be removed and treated with coal tar or kerosene every week, and the nests frequently cleansed and new straw placed in them.

Lice on Chicks. It is necessary to regularly examine young chicks for head lice. If present, the lice will be found in the down or feathers on the chick's head. If the lice are not destroyed, they will so weaken the chick by loss of blood that it will die. The lice can be removed by smearing the chick's head with grease or sweet oil to which a few drops of carbolic acid have been added.

103 **Scaly Leg.** This disease is quite prevalent in flocks of neglected poultry, and is due to a species of mite (*Sarcoptes mutans*). The scales of the legs and feet become raised and separated, and a chalk-like excretion accumulates between and over them; rough, lumpy crusts are formed, and under these the mites live and breed.

Remedy. The diseased legs and feet of the chickens should be well washed with a small, stiff brush, warm water and soap. The crusts should then be removed and a mixture of equal parts of sulphur and lard rubbed into the affected parts. After three or four days the legs of the chickens that were treated should be cleansed with soap and warm water.

Copies of this Bulletin may be obtained free, in English or French, by application to the Commissioner of Agriculture and Dairying, Department of Agriculture, Ottawa, Canada.