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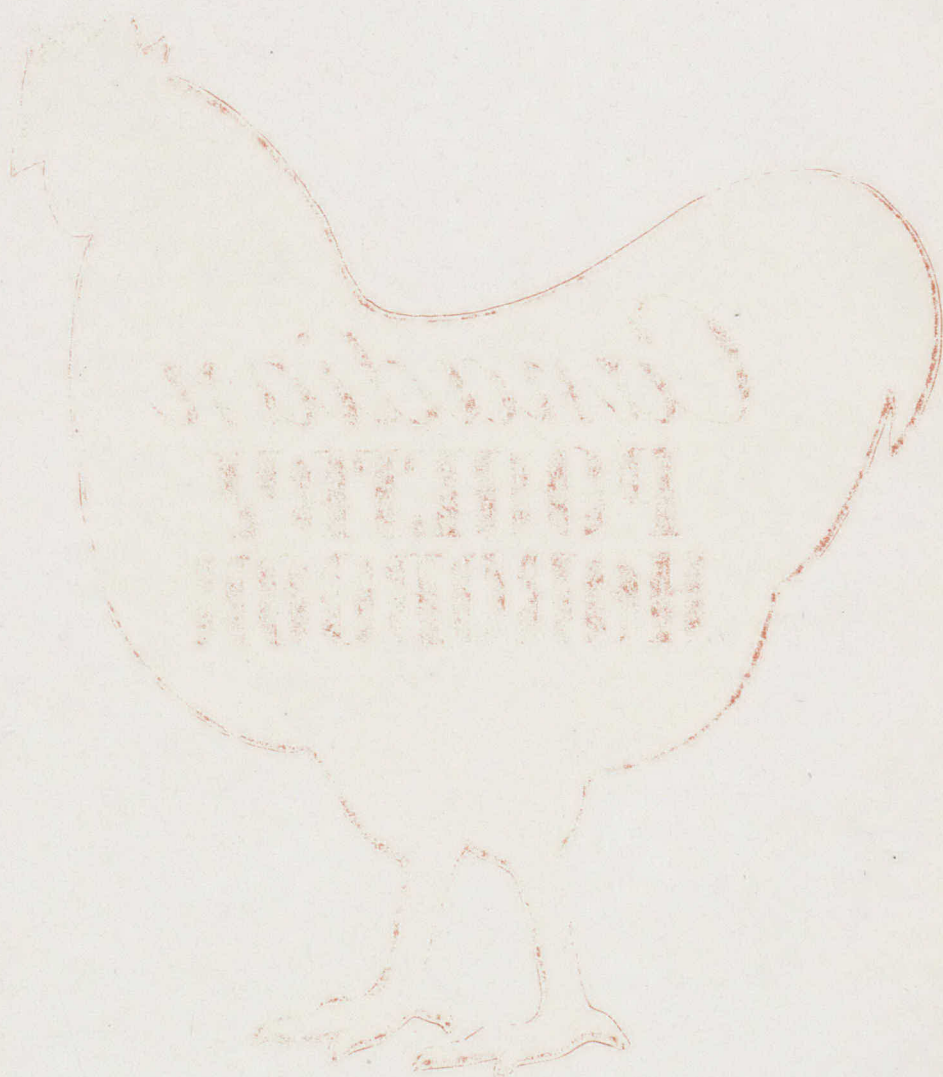
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**POULTRY  
HANDBOOK**

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DOMINION OF CANADA—DEPARTMENT OF AGRICULTURE

# CANADIAN POULTRY HANDBOOK

PRODUCTION SERVICE



Published by authority of, the Hon. JAMES G. GARDINER, Minister of Agriculture  
Ottawa, Canada

ISSUED MARCH, 1910

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## PREFACE

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The remarkable advancement of poultry husbandry during the past twenty years has been one of the outstanding features of agriculture on the North American continent. Poultry raising has been developed from a hobby to an important industry. All phases of the industry have made rapid progress. With that progress it is not surprising that new discoveries and new ideas have sometimes been given wider publicity and put to wider use than their importance warranted. In the preparation of this handbook the author has made an effort to emphasize essentials rather than passing fads, to recognize the possibilities which lie in recent inventions and research, and to present the material in a clear, concise and not too technical form.

A need has been apparent for some time for a publication of this kind that would prove equally useful to farm poultrymen throughout the Dominion. The present edition is published by the Dominion Department of Agriculture in collaboration with the New Brunswick Department of Agriculture. Mr. Wood has revised the text to give it more general application to the country at large. Considerable new material has been added and in this as well as in the general revision, officers of the several services of the Dominion Department of Agriculture, Experimental Farms, Science, Marketing and Production, have been freely consulted.

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## LESSON I

### POULTRY HOUSING PRINCIPLES

#### Topics for Study

1. The requirements of a good poultry house.
2. Size of the poultry house.
3. Location.
4. Materials.
5. Ventilation.
6. Insulation.

#### 1. The requirements of a good poultry house

It is believed that the domestic fowls have been developed from the wild jungle fowl of southeastern Asia. The jungle fowls lived, as do the wild birds, without the protection of houses. Hens will live through severe Canadian winters with only scant protection, but to get good egg production from them, they must be made comfortable, contented and happy. The requirements of a poultry house, that will provide such conditions for the birds and will be equally satisfactory from the owner's viewpoint, might be listed as follows: protection for the flock, good ventilation, ease in cleaning, provision for admitting sunlight, economy and convenience.



PRACTICAL LAYING HOUSE

Incubator cellar is located beneath one end.

(a) *Protection.*—Protection is needed against the extremes of both heat and cold. Egg production may be affected by either and the male birds lose their activity when their combs become frozen. Draughts should be guarded against and besides needing protection from unfavourable weather conditions, the flock must also be protected against such marauders as owls, raccoons, skunks, rats, minks, and weasels.

(b) *Ventilation.*—Adequate ventilation is needed to replace the oxygen used by the fowls in respiration and to remove dampness, most of which is caused



by the condensation of moisture, given off by the birds in breathing, when it comes in contact with the cold walls, ceiling and floor of the house. In the process of respiration, hens give off about three times as much moisture per one hundred pounds of live weight as do other farm animals. The removal of this moisture makes ventilation a problem of great importance since a damp atmosphere favours the development of disease and retards the activity of the hens.

(c) *Ease in cleaning.*—Cleanliness has a bearing on the comfort and health of the flock. The house should be built so that it can be cleaned easily and thoroughly. This requires a smooth, tight floor, walls with as few hiding places for vermin as possible and with all interior fittings removable for ease in cleaning.

(d) *Importance of sunlight.*—Sunlight is important in maintaining the health of the flock and has a great disinfecting value. A well lighted house is more agreeable for both the birds and the caretaker and is more likely to be kept clean than a poorly lighted building.

(e) *Economical construction.*—The poultry house should be built as economically as is possible, consistent with durability. The cost will vary in different localities, with fluctuations in prices of materials and with the grades of materials used. It is plainly unwise to burden the business with needless overhead, but efficiency and durability should not be overlooked in an effort to reduce costs.

(f) *Convenience.*—Convenience should be considered, both in the house and in its location. If poultry houses are conveniently located in relation to other farm buildings and so constructed that the necessary daily care requires a minimum of effort, the attendant will find his work more enjoyable and the birds will receive better care. Convenient interior fittings, relative to the feeding, watering and general care of the flock, will save many steps. For the large laying house, a feed room is a convenience which should not be omitted.

## 2. Size of the poultry house

It is impossible to give in this publication poultry-house plans to meet the varied needs of numerous farmers. The following dimensions should be a useful guide to those who are planning new poultry buildings intended for birds of American breeds. Leghorn capacity will be ten to twenty per cent greater.

For 25 to 30 hens a 10 by 12 foot colony house will meet the requirements.

For 50 to 60 hens, a house 16 by 16 feet is suitable.

For 100 hens, convenient sizes are 20 by 20 feet, 16 by 25 feet, 16 by 30 feet or 16 by 32 feet. For a single pen laying house, the 20 by 20 feet house is preferred to narrower buildings, especially if there is any likelihood of one or more units being added at a later date. The narrower houses are more satisfactory if they are to be divided into small pens.

For 200 hens, 20 by 40 feet.

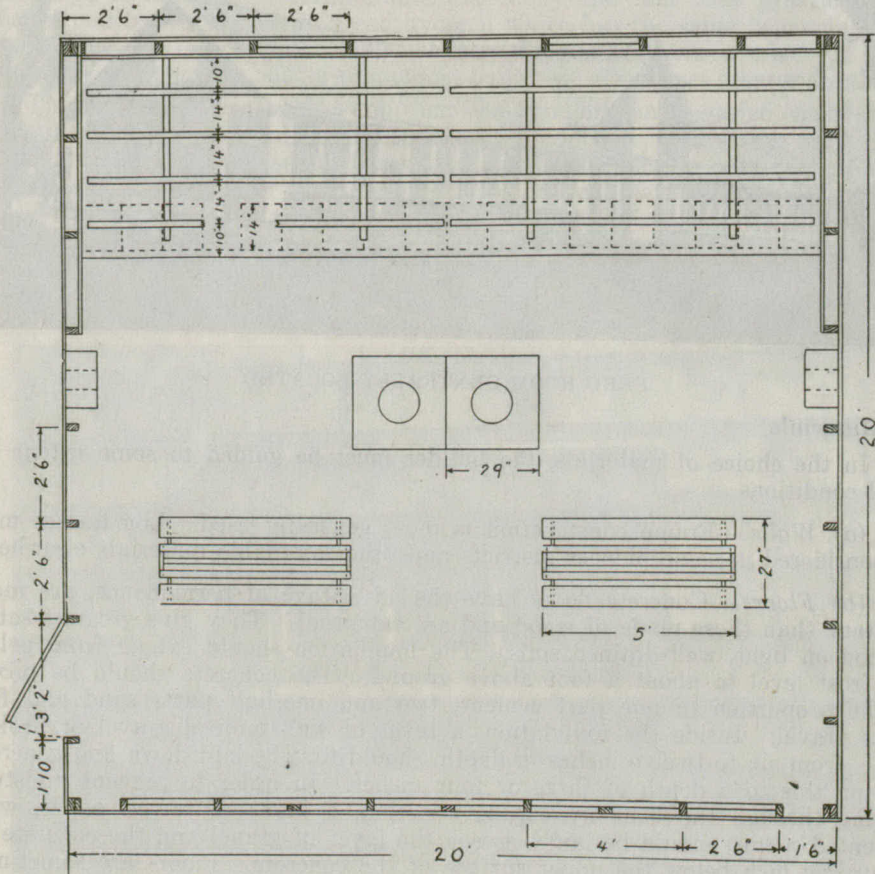
For 400 hens, 20 by 80 feet for a single deck or 20 by 40 feet for a double deck house.

For 1,000 hens, 20 by 200 feet in single deck or 20 by 100 feet in double deck.

The above dimensions make no allowance for feed rooms which are necessary and should be provided for in large poultry houses. In a poultry house with only one or two pens, a small storage bin may provide all the space necessary in which to hold a convenient feed supply. On a large poultry plant, a special feed room is a necessity. Its size will depend largely on the size of the plant. It will frequently be found profitable to buy considerably in advance of present feed requirements in order to take advantage of favourable prices. This fact should be given due consideration in planning the space allotted to feed storage. As a "rule of thumb" guide it may be borne in mind that one hundred hens will consume four tons or more of mash and scratch feed in one year. The feed room should be centrally located. In a long laying house it



is usually placed in the centre of the building. A root cellar is frequently placed beneath and in multi-deck houses the stairs leading to the upper stories may be located in the feed room. Facilities for heating water in the feed room are desirable. When planning poultry buildings, the possibility of an increase in the size of the flock at some later date should be given due consideration.



PLAN OF 20' x 20' LAYING HOUSE

### 3. Location

Before building a new poultry house, the location should be studied, and a site chosen which has the greatest possible number of advantages. The land should have good drainage and the lighter types of soils are preferred to the heavy clay soils. Air drainage is important but there should be protection from high winds. It is desirable that the house receive an abundance of sunlight through its windows and to get a maximum amount it should face in a southerly direction. This does not imply that a southern exposure is indispensable. Good results have been secured from houses facing southeast, southwest or even east and west. The slope of the land, the location of other buildings, windbreaks, the layout of roads and other factors will have a bearing on the choice of direction in which the house will face, but it should be kept in mind that a southern direction is preferred. The importance of a good water supply, close at hand, cannot be overestimated.





FEED ROOM CENTRALLY LOCATED

#### 4. Materials

In the choice of materials, the builder must be guided to some extent by local conditions.

(a) *Walls*.—Frame construction is most generally used. Log houses may be considered in some pioneer districts and other available materials elsewhere.

(b) *Floors*.—Concrete floors have the advantage of permanence, are more sanitary than those made of wood and are rat proof. They give greatest satisfaction on light, well-drained soils. The foundation should extend from below the frost level to about a foot above ground. The concrete should be mixed in the proportion of one part cement, two and one-half parts sand and five parts gravel. Inside the foundation, a layer of well tamped gravel or broken stone, from six to twelve inches in depth, should first be laid down and concrete laid on this to a depth of three or four inches. In order to prevent moisture coming through the floor by capillary action, a layer of tarred paper, with cemented seams, should be laid between the layer of gravel and the concrete or about one inch below the upper surface of the concrete. Floors are sometimes laid with a slope of four to six inches towards the front of the building to aid in preventing the hens from scratching the litter towards the rear of the building while they face the light in their search for grain.

Wood floors give good satisfaction under many conditions. They should be double boarded with tarred paper between in permanent houses. A single floor of matched lumber may be used in colony houses where lightness in weight is a consideration. The floor should be high enough from the ground that neither it nor the supporting joists will come in contact with constant dampness which would result in decay. Too great a height above ground is not desirable and the space between the floor and the ground level should be boarded in to prevent the house being cold and draughty.

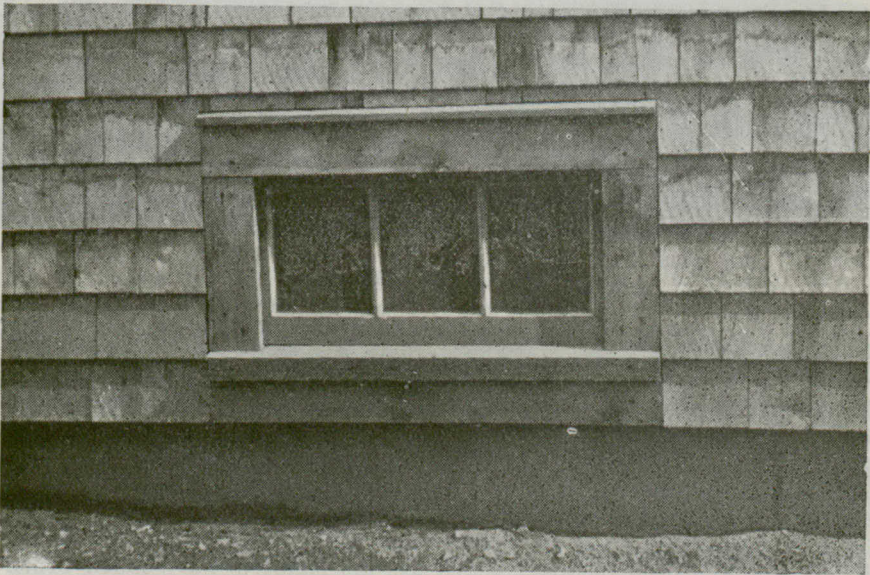
Earth floors are unsanitary and cause much objectionable dust in poultry houses. They require frequent renewal to keep them at all clean and should be considered only as a temporary expedient.

(c) *Roof*.—Shingles and roll roofing are the common materials used on poultry-house roofs.



(d) *Windows.*—Glass is recommended for windows in preference to the many glass substitutes which are on the market. The better grades of substitutes are made on a base of fine wire netting which makes them very convenient to use. In recent years, the durability of these materials has been improved. It has been shown by experiment that glass substitutes admit the beneficial ultra-violet light rays which do not pass through ordinary window glass. This advantage is offset to a considerable degree by the fact that practically all modern poultry rations contain cod liver oil which has the same beneficial effect on the birds as ultra-violet light. Glass substitutes have a place in more temporary construction but for permanent buildings, glass gives greater durability.

The size and style of sashes and their arrangement can be varied considerably without affecting the usefulness of the house. Frequently, used sashes are already on hand or can be purchased at much cheaper prices than new ones. The builder should take advantage of such circumstances and can easily place the studding in the front of the house to suit the sizes of windows available. In houses more than sixteen feet in width, it is advisable to place cellar sashes in the rear of the building, near the floor, to permit a more even distribution of light. If these are removable, they make possible additional ventilation in hot weather.



SMALL WINDOW AT BACK OF HOUSE

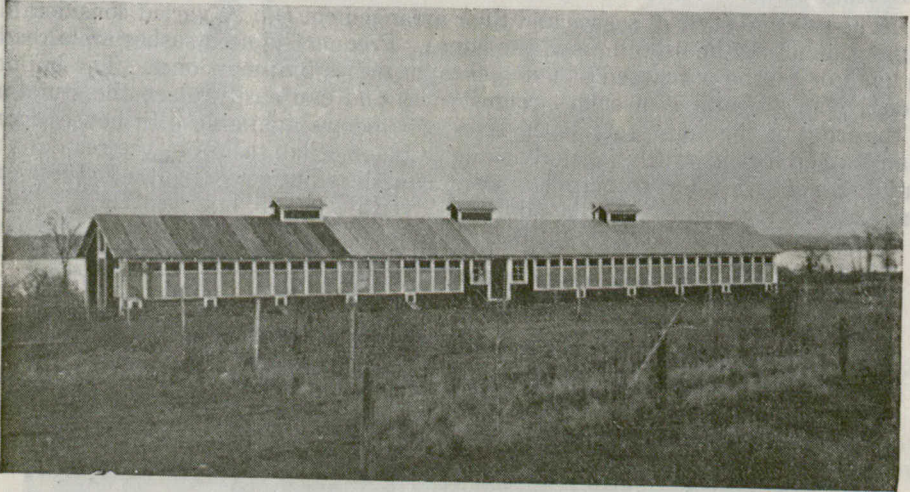
Factory-made frames can be dispensed with in the poultry house. The sashes can be placed between the studding and held in place by the trimming on the outside and by stops nailed to the studding on the inside. The windows should be protected with wire netting.

Cotton curtains can be made by tacking cotton or burlap to a home-made frame. These may be hinged at top or bottom to open inward or may be arranged to slide vertically either on the inside or outside of the house. If hinged curtains are hinged from the bottom, there is less likelihood of cold draughts of air striking the birds. Cotton bellows attached to the sides of windows and cotton curtains used for ventilation so that the air must enter over the top of each, will also help in the prevention of draughts. Sliding curtains can be made to work very easily by fitting them with cords, pulleys and counterbalancing weights.



## 5. Ventilation

The installation of an effective ventilating system presents the greatest problem in poultry-house construction. For twenty-five or more years, cotton windows or curtains have been recommended as the best means of poultry-house ventilation and have been used with a fair degree of satisfaction. It has been realized, however, that in many cases the cotton-front building did not give ideal conditions for egg production. The houses, so ventilated, have frequently been too cold for the hens to be comfortable during severe winter weather, and moisture control has been far from perfect.



LONG LAYING HOUSE

This poultry house is well lighted and with feed room in centre is convenient to work in. Ventilation is provided by cotton curtains above the window space and by roof ventilators.

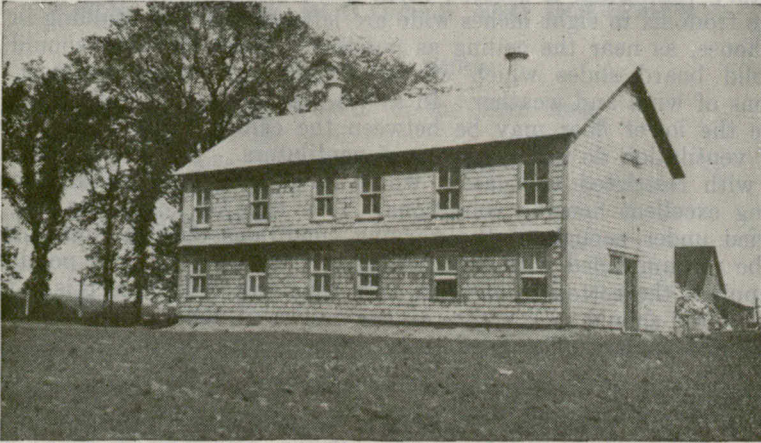
(a) *Ventilation of cotton-front houses.*—The straw loft is a valuable aid in the ventilation of a cotton-front house. The layer of straw overhead absorbs some dampness and gives some insulation to that part of the building. Openings should be made in each gable of the laying house. These help in ventilating the building and facilitate the filling or removal of straw. The openings may be fitted with doors, louvers, or covered with burlap.

Roof ventilators, both of the home-made and patented types, are sometimes used. Many have been installed which are too small to have much beneficial effect. Where roof ventilators are used with the gable-roof straw-loft type of house, the flues should extend from the peak of the roof down to the ceiling, and a damper should be installed to govern the movement of air through the flue. One should guard against having a type of roof ventilator that will admit snow during windy winter weather. Houses that are not more than twenty feet in length seldom require a roof ventilator. Longer buildings may require one ventilating flue, about 14 by 14 inches in size to each twenty feet in length. In two-storied open-front poultry houses, it is very important that such flues and ventilators be installed. Opinion seems to be divided as to whether or not one flue will serve both decks of a two-storied house.

(b) *Restricted ventilation.*—Recent experimental work in Eastern United States has shown that more effective ventilation takes place when the building is well insulated on the side walls and ceiling and the openings in the front of the house are restricted in size. The insulation retains the body heat of the hens and prevents, to a large extent, the condensation of moisture on the walls,



floor and ceiling. Insulation will add materially to the cost of building a poultry house but the added expense may be warranted if it results in greater egg production because of increased comfort to the birds. It is doubtful if restricted ventilation will be of value in a cold house.



POULTRY HOUSE WITH RESTRICTED VENTILATION

The trend in poultry housing seems to be towards warmer buildings. The use of heating systems has given good results in some cases but cannot be recommended under general farm conditions. The more practical plan seems to lie in conserving the body heat of the birds by the use of insulation. Warm air has a much greater water-carrying capacity than cold air. If the air within the house can be kept warm and without coming in contact with cold



RESTRICTED VENTILATION

Narrow openings across the front of the house at ceiling height. These may be closed to any degree by means of sliding boards.



walls, ceiling or floor during its removal, the dampness which presents the greatest problem in ventilation, will be avoided. Naturally, if the openings left for ventilation are large, as in the cotton-front house, so much cold air enters that the interior becomes cold, the water-carrying capacity of the air is low and the house is damp in winter weather. In the insulated house, the most satisfactory ventilation is secured when there are no cotton curtains and when openings from six to eight inches wide are left between the studding in the front of the house, as near the ceiling as possible. These openings should be fitted with solid board slides which can be raised or lowered to meet changing conditions of wind and weather. In a two-deck house, the ventilating openings to serve the lower floor may be between the ceiling joists. Houses with this type of ventilation do not require roof ventilators. The few insulated poultry houses with restricted ventilation which have been built in this country are providing excellent housing conditions. This type of house has not, however, been tried under enough of the varying conditions of Canadian climate that it can be recommended without reservation. While it is quite possible that it may supplant the cotton-front type, only time will determine this. Those who intend to build should seek advice on the matter of ventilation from the various departmental poultry officials of their respective provinces.

## 6. Insulation

It has been a common practice for years to cover the walls and ceiling surrounding the roosting quarters with sheathing. This has some insulating value and should be omitted only when strict economy must be practised. Insulating board is sometimes used for this purpose. It has a greater insulating value than wood of the same thickness and since it can be purchased in large sheets, it can be applied very quickly. Hens will pick holes through insulating board and it must be protected with paint or screening.

The modern trend in poultry housing seems to be towards a more completely insulated house. Probably the most practical way to insulate the walls of the poultry house cheaply is to apply sheathing to the inside of the studding and to fill the space between the walls with well dried planer shavings. It is claimed that hydrated lime mixed with the shavings will effectively keep rats out of the wall. In order to insulate a building so that a system of restricted ventilation will be effective, it will also be necessary to insulate the ceiling. A layer of straw overhead will be of value in this regard but more effective insulation can be provided by tightly boarding the ceiling and placing a layer of about six inches of dry planer shavings above. The use of insulating board on walls and ceiling, will also provide good insulation. For new buildings, it can be applied outside the studding and covered with the regular boarding with an air space the width of a lath between. When used to insulate a building already erected, the sheets can be placed between the studs, inside the boarding and with a similar air space between the two.



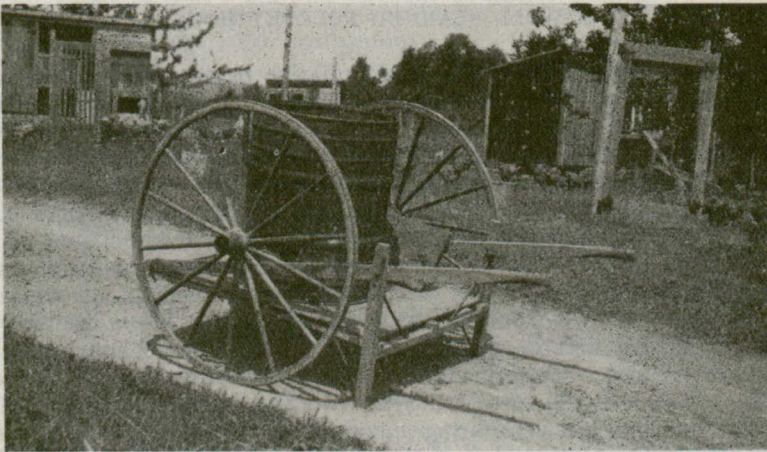
## LESSON 2

**FARM POULTRY BUILDINGS AND EQUIPMENT****Topics for Study**

1. Buildings and equipment for the farm flock.
2. The laying house.
3. Laying house fittings and equipment.
4. The breeding house.
5. The colony house.
6. The range shelter.
7. The range hopper.
8. Remodelling.

**1. Buildings and equipment for the farm flock**

Building requirements naturally vary in different districts but, in general, where a flock of one hundred or more laying hens is kept, there will be a need for three types of buildings, namely, laying house, colony house and range shelter. A special breeding house may be required by those who undertake pedigree breeding, and a range hopper for each flock of chicks will greatly simplify summer feeding.



A HOME-MADE CART

Useful equipment on the small poultry farm.

**2. The laying house**

(a) *Single-deck buildings.*—A laying house of some description is to be found on most farms, but where one is to be built, its size should be a first consideration. Usually about 4 square feet of floor space is allowed for each bird of the American breeds and  $3\frac{1}{2}$  square feet for those of Mediterranean breeds. Best results will be had from buildings 16 to 20 feet in width. The length should be ample to allow the required floor space for the number of birds to be kept. For 100 Plymouth Rock hens, 16 by 25 feet or 20 by 20 feet are suitable sizes.



The house 20 feet wide is preferable if it is intended to build an addition to it at any future time. Otherwise the house 16 feet wide should be chosen since it will be a more satisfactory shape, particularly if divided by a partition to make two pens. If the poultry house is made high enough for the caretaker to work in comfortably, it will provide plenty of air space for the hens. The gable roof with about one-third pitch is as satisfactory as any type for most districts and with it, studding should be about six feet in height. Shed roofed buildings are cheaper in construction cost and may be preferred in warmer districts where straw lofts are not considered necessary.



A WELL PLANNED POULTRY HOUSE

The building may be placed on a foundation or on posts. With the latter, sills should be 6 by 6 inches, while with a cement foundation heavy sills will not be needed. Walls should be boarded and shingled, and preferably the interior should be sheathed at least as far forward as the roosting quarters extend. The floor may be double-boarded with tarred paper between or may be of concrete. Glass will be found more durable for windows than glass substitutes. Replacements will be fewer and less expensive if small panes of glass, such as 8 by 10 inches are used. There should be one square foot of window space to each 20 to 30 square feet of floor space and in open-front houses about an equal area of cotton curtains. In open-front buildings where a straw loft is desired, a ceiling is made by nailing narrow boards, spaced one or two inches apart, to the under side of the ties. The roof may be shingled or covered with roll roofing.

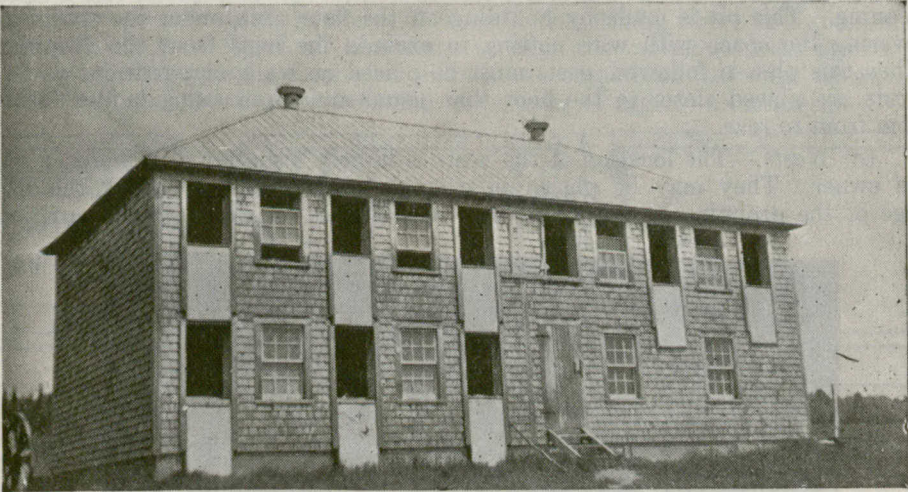
If the house is to be insulated and with restricted ventilation, the cotton curtains are omitted and ventilating space, fitted with slides for the purpose of controlling air movements, is left through the front wall at ceiling height. The ceiling is boarded tightly and covered with several inches of straw or planer shavings. If shavings are to be used for insulating the walls, it will be necessary to sheath the entire interior of the building, the shavings being placed in the space so formed.

(b) *Multi-deck buildings.*—The house of two or more stories deserves consideration where large flocks of layers are kept. The upkeep of a roof is considerable over a period of years and, certainly, roofing costs are proportionately lower on multi-deck buildings. It is seldom possible to get the birds out of doors from any except the ground floor but with modern feeding methods it is not considered essential that layers have access to yards.

Naturally, the houses of two or more stories will require heavier framing than will a single storied one. While the general plans for a single storied



house can be followed, it is advisable to use 2 by 5-inch or 2 by 6-inch material for studding and to place the studs not more than two feet apart. Ceiling joists should be placed to correspond with the studding and, to prevent their sagging, they should be supported by a stringer running lengthwise through the centre of the building and supported by posts at intervals of ten feet.



TWO STORIED LAYING HOUSE

Note curtains which slide vertically on outside of house.

### 3. Laying house fittings and equipment

(a) *Roosts*.—Roosts are usually placed, running lengthwise, in the rear part of the house. The first roost should be about ten inches from the rear wall, while others are placed fourteen inches apart, from centre to centre, for American breeds or at twelve inch centres for Mediterranean breeds. For the heavier breeds about nine inches of roosting space and for the light weight breeds, about seven inches should be allowed per bird. With this allowance of space, a 20 by 20 foot pen will need four roosts, running the entire length, if filled to capacity.

In houses not over sixteen feet in width, where no more than three longitudinal roosts are needed, these may be placed on one level. In wider houses, requiring more than three roosts, it is frequently found that the first birds going to roost at night, perch on the front roost and form a barrier to their pen mates in reaching those farther back. In these wide houses, it is advisable to depart from the usual roost arrangement and to either place the roosts level and running at right angles to the back of the house or to have them running lengthwise and rising slightly in height from front to back.

For material, 2 by 4-inch scantling is preferred to round poles, since it is less likely to check on drying and thus make hiding places for mites. The upper edges of the roosts should be rounded off. The roosts may be suspended from the ceiling by wires, cords or small chains, they may be hinged to the rear wall of the house, or so made that each roost may be removed separately. It is unwise to build them solidly in place since this makes proper cleaning and disinfecting difficult.

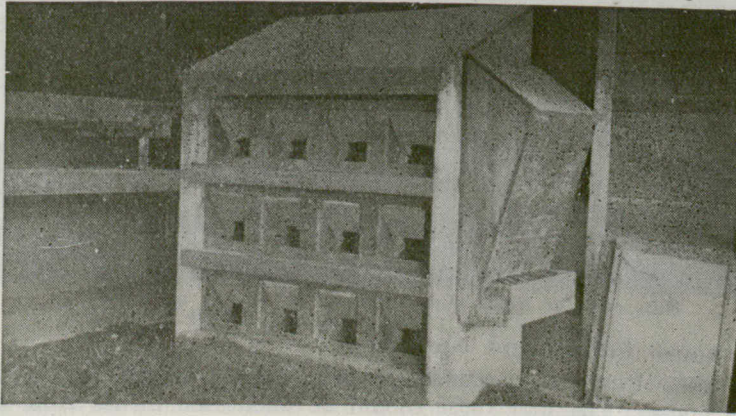
(b) *Dropping boards*.—Dropping boards, if properly installed and regularly cleaned, will help in producing clean eggs. Cleaning will be more easily done if dressed lumber is used and if the boards run at right angles, rather than parallel, to the rear wall of the building, so that scraping is done with the grain of the wood. When nests are placed beneath the dropping boards, the latter



should be made from matched stock. They should be built in sections for easy removal at cleaning time. Wire netting, nailed to the under side of the roosts in such a manner as to exclude the hens from the dropping boards, will aid in the control of disease and in the production of clean eggs.

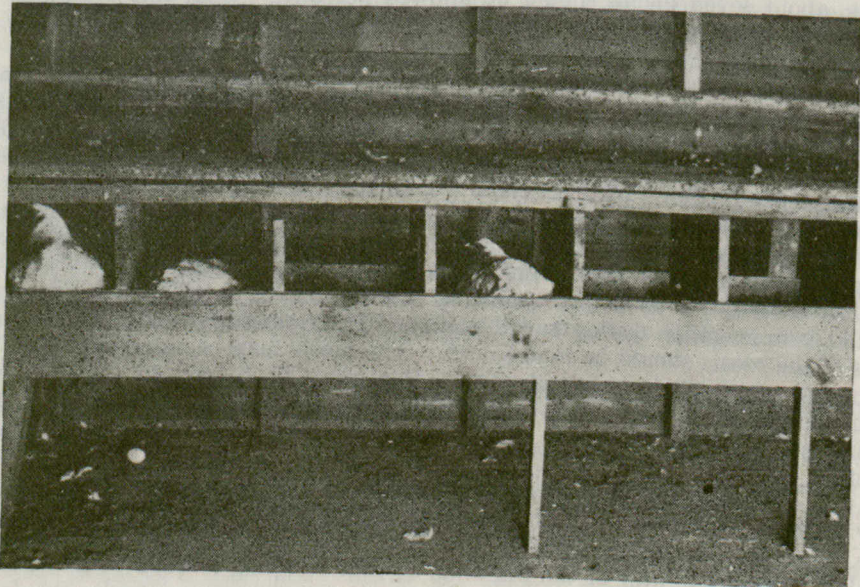
There is a growing tendency, where hens are kept in large numbers, to eliminate dropping boards and substitute a dropping pit which requires less frequent cleaning. This pit is made by boarding off the floor area under the roosts and covering the space with wire netting to exclude the hens from the droppings. When this plan is followed, nests must be placed on walls or partitions and the roosts are placed closer to the floor than usual and often rising ladder fashion from front to rear.

(c) *Nests*.—The location of the nests is largely a matter of preference with the owner. They may be placed in a single continuous row under the front edge of the dropping boards or in tiers or batteries on the walls or partitions.



BATTERY OF TRAP NESTS

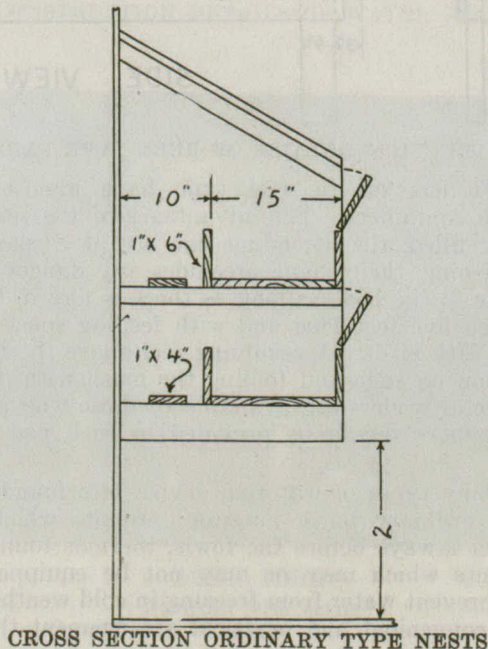
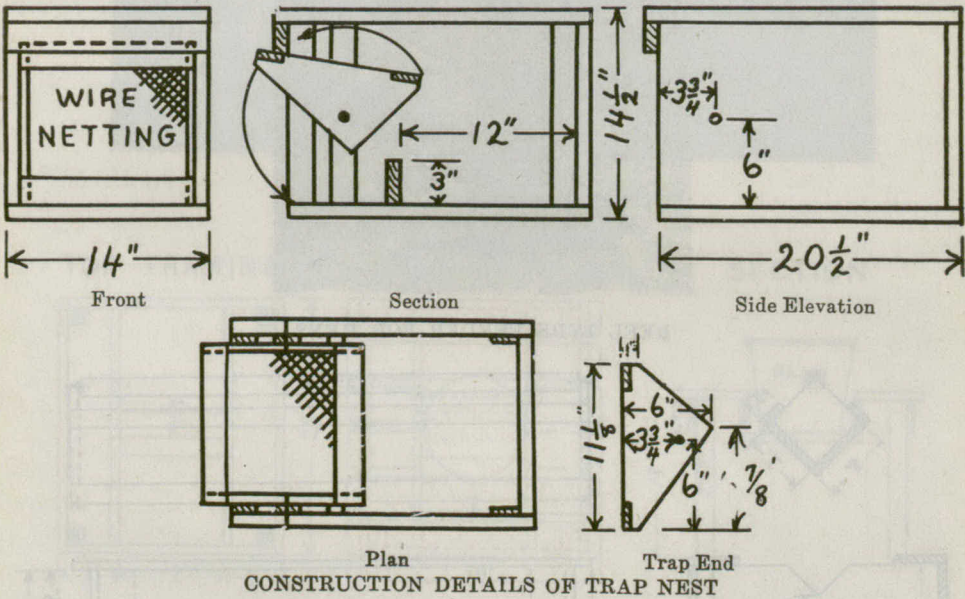
Note small hopper for grit and shell attached to nests.



NESTS BENEATH DROPPING BOARDS



The latter arrangement is usually preferred for trap-nesting because of greater ease in tending the nests. When placed under the dropping boards, the nests are generally planned so that the hens enter from the rear, while a hinged door in front gives the caretaker access to the eggs. When ordinary nests are placed on the side walls of a pen, a similar arrangement of entry is recommended because hens prefer nests which provide some seclusion and are less likely to start the egg eating habit when nests are partially darkened. Sometimes, where no trap-nesting is done, it has been found an advantage to omit the individual nest partitions from the nesting space. This plan eliminates competition between layers for special nests and prevents the breaking and soiling of eggs to some extent.

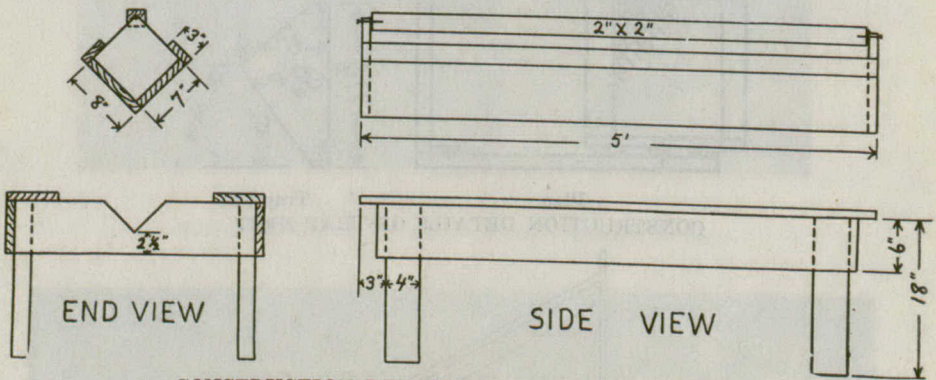




Home made nests of wooden construction are most commonly used although metal nests are available and have some advantages in convenience and sanitation. A common rule for estimating the number of nests required is to allow one trap nest for each four hens or one ordinary nest for each six hens in the flock.



REEL TYPE FEEDER FOR HENS



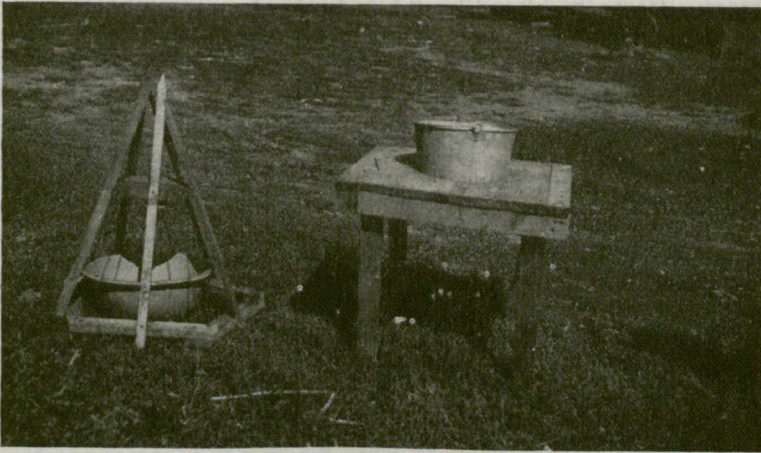
CONSTRUCTION DETAILS OF REEL TYPE FEEDER

(d) *Feeders*.—Feeders of the reel type have almost entirely replaced hoppers as dry mash containers. The advantages of the reel type feeders are, that they are easily filled, the attendant can see at a glance when the food supply needs replenishing, their shape precludes any danger from clogging and the mash is available to the hens as long as there is any in the feeder. One of this style with trough five feet long and with feeding space on both sides will accommodate about fifty birds. A revolving reel above the trough prevents the birds from roosting on its edge and fouling the mash with droppings.

Very efficient metal feeders are available to those who prefer them. Small metal or wooden hoppers should be provided in each pen to hold grit, shell and charcoal.

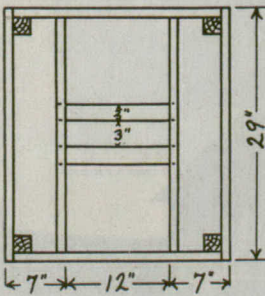
(e) *Founts*.—Many types of watering devices are found in poultry houses. The range includes ordinary pails, automatic founts which keep a constant supply of fresh water always before the fowls, thermos founts and many other types of metal founts which may or may not be equipped with electric or kerosene heaters to prevent water from freezing in cold weather. A simple stand holding a pail is a convenient and practical arrangement that can be used in



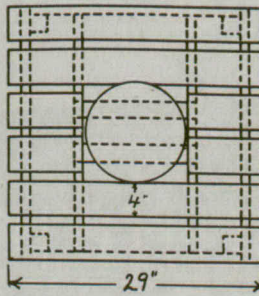


STAND FOR WATER PAIL

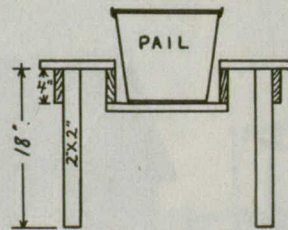
TOP FRAMING



TOP VIEW



SECTION



CONSTRUCTION DETAILS OF WATER STAND

METAL FOUNT  
Equipped with heater

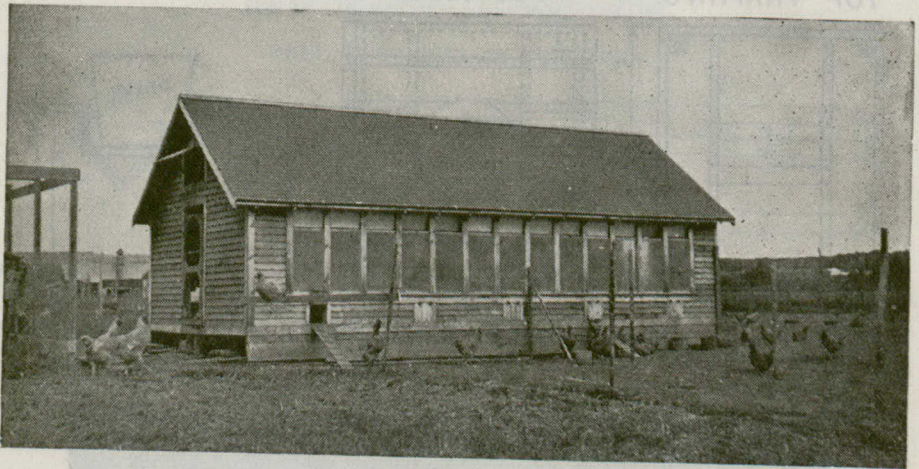


several ways. It can be placed by the wall of a house, in the centre of a large pen, or in a partition so that it serves the birds in adjoining pens. Where liquid buttermilk is given, a double stand holding two pails, should be provided.

(f) *Electric lights*.—Where electric current is available, it is advisable to have poultry houses wired for lighting. A 20 by 20 foot laying house unit requires two 40-watt bulbs. These should be spaced to distribute the light evenly over the floor and should be fitted with reflectors if night feeding is to be practised. Electric lighting is not only a convenience but can be used to increase profits during the winter months by lengthening the working day of the flock. Electric current is sometimes used to prevent the freezing of water in drinking fountains.

#### 4. The breeding house

For ordinary farm flocks, no breeding house is necessary. Where pedigree breeding is to be followed, the 20 by 20 foot unit does not lend itself to division into small pens and a narrower building is more suitable. More desirable shapes in a breeding house for one hundred hens, where pen matings are to be made, are 16 by 25 feet and 16 by 30 feet; divided in either case into five pens of equal size. The same general plan of window and ventilating space used in the laying house should be followed.



BREEDING HOUSE

The hen exits indicate that the interior is divided to make five small pens.

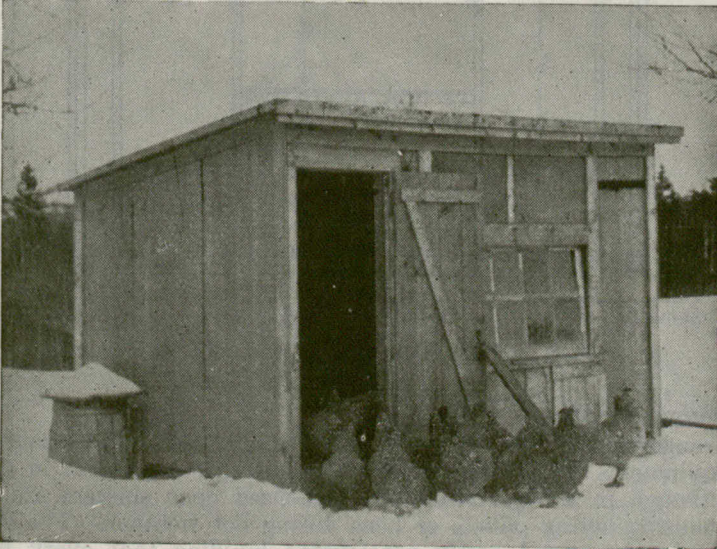
#### 5. The colony house

The colony house is one that can be put to many uses. It is a suitable size for a brooder house, can be used as a rearing house for chicks all summer, will house a small flock of layers and can be converted into a one- or two-pen breeding house. The colony house should be built upon skids, which in every day practice will be rough hewn from small logs which almost any woodlot will provide. The 10 by 12 foot colony house is a convenient size for brooding chicks and about as large as can be moved easily with a team of horses. The sills and floor joists should be securely spiked to the skids and corners well braced. All framing material is 2 by 4 inch scantling, with two timbers spiked together to make the sills and corner posts. If matched flooring is not available, the floor should be double boarded with tarred paper between. Colony houses are usually built with shed roofs which for durability should be surfaced with three-ply roll roofing. Posts seven feet high in front and five feet at the back

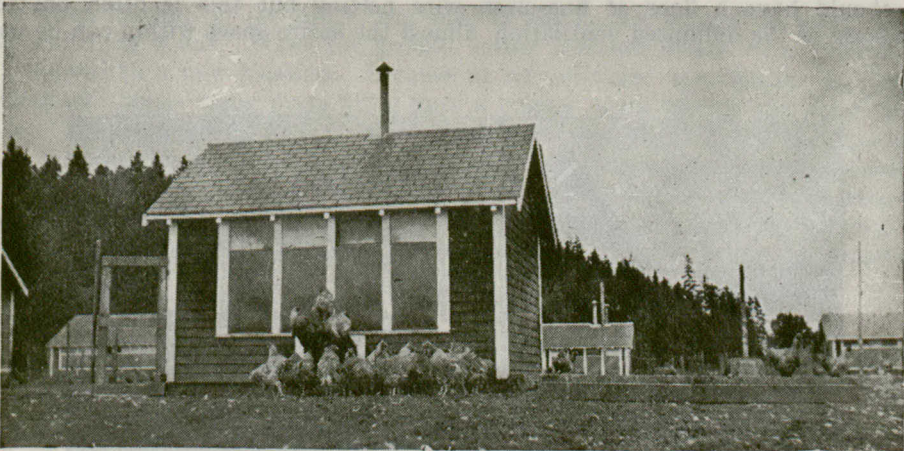


will give sufficient head room. The outside walls will be more durable if shingled, but if preferred, roll roofing can be used. The door can be of matched lumber or of ordinary boards with cracks battened.

The glass and cotton in the front of the colony house should have the same general arrangement as in the laying house. Cotton curtains can be hinged at the bottom to open inward or arranged to slide vertically between the studding. The glass windows should be removable in order to give greater comfort to the



CHEAPLY CONSTRUCTED COLONY HOUSE

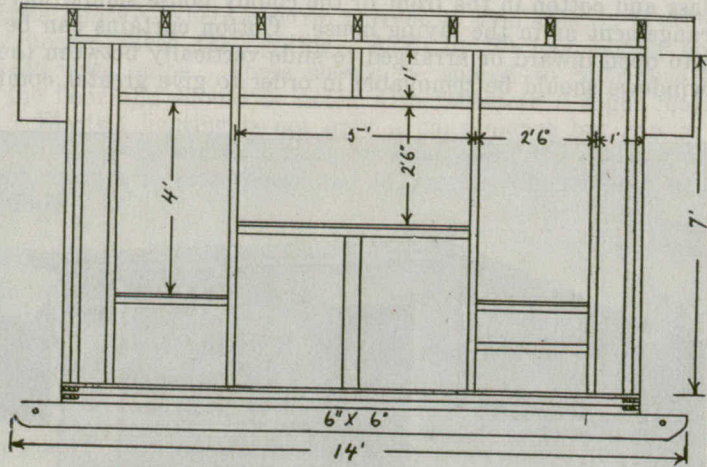


COLONY HOUSE WITH PITCHED ROOF

birds in hot weather. Both glass and cotton window space should be covered with fine-mesh poultry netting. The door may be placed in either end and the chick exit can be placed to suit the owner's convenience. The chick doors should be of generous size to prevent crowding.



To convert the colony house into a small laying house, it is only necessary to add roosts, dropping boards and nests. It can be divided into two breeding pens by installing a centre partition.



FRONT DETAIL OF 10' x 12' COLONY HOUSE

#### 6. The range shelter

The range shelter has become a popular and almost necessary article of housing equipment. It is used, chiefly, to house growing chicks in the summer season, although in warmer climates, large-sized open shelters are frequently used for housing laying pullets or hens during hot weather. The shelter is a comparatively cheap and easily constructed building that every poultryman should have for his growing flock. It is a squatty structure with posts about eighteen inches high and with sides and ends covered with wire netting. It should have a tight roof to give the birds protection from storms. Preferably it should have a floor of fine-mesh wire netting but this is often omitted. Because of the unlimited ventilation, almost the entire space within can be used

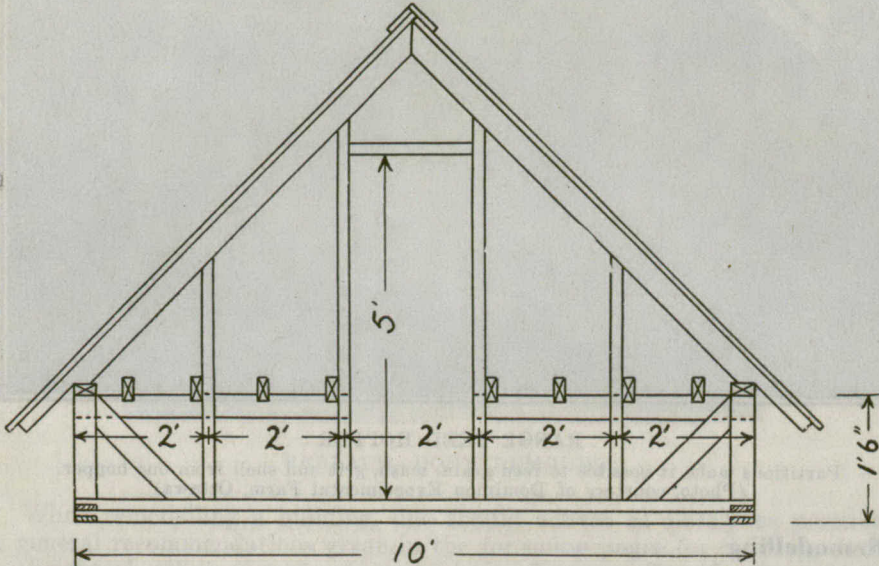


RANGE SHELTER

Sides and ends covered with paper as used during cold spring or fall weather.



for roosting quarters. Many variations in construction can be made to suit local conditions. For example, the roof may be of composition board, sheet metal, heavy canvas, matched boards running up and down or boards applied in the usual manner and covered with roll roofing or shingles. The shelter can be mounted on skids for convenience in moving if desired. In size, 10 by 12 feet will be found practical although much variation exists in this regard.



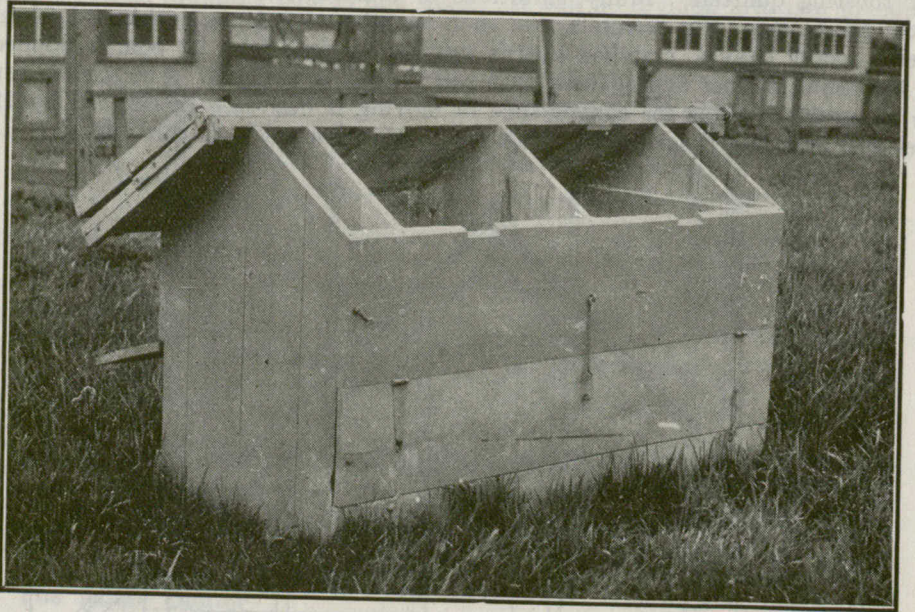
END DETAIL OF 10' x 12' RANGE SHELTER

When located on the range, the ends of the shelter should be away from the prevailing winds. When the ground within becomes fouled with droppings, it is moved to a new location. Because of its unlimited ventilation, the range shelter will house many more birds than a colony house having the same floor space. A shelter 10 by 12 feet in size will house one hundred and fifty pullets until they go into winter laying quarters. When it is necessary to keep chickens in shelters before the weather is warm in early summer, or after it is uncomfortably cold in the fall, tarred paper, feed bags or boards may be fastened to the studding on the outside of the building to give protection from the elements.

## 7. The range hopper

A hopper of large capacity, with a roof that will shed water, greatly simplifies the feeding of chicks on range. By putting divisions in the hopper, space can be provided for grit and shell as well as for grain and mash. The top can be covered with roll roofing and should have a strip of canvas over the ridge to make it water-tight. One side of the roof should be hinged to the other for opening to replenish the food supply. The hopper may be mounted on skids and, when in use, should be blocked up off the ground, to a height convenient for the chicks, to prevent decay of the bottom boards. By the use of such a hopper, the feeding of the flock on range becomes a weekly task rather than a three-times-daily one.





RANGE FEED HOPPER

Partitions make it possible to feed grain, mash, grit and shell from one hopper.  
(Photo, courtesy of Dominion Experimental Farm, Ottawa)

### 8. Remodelling

On many Canadian farms there are unused barns or other buildings from which very satisfactory poultry houses can be made at a comparatively low cost. Many of the existing poultry houses could serve their purpose better if remodelled. In many cases, the greatest part of the undertaking is the addition

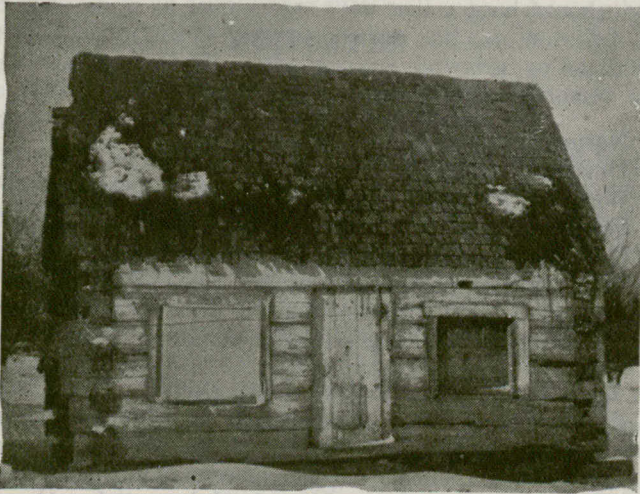


REMODELLED BARN

Unused barn space may often be converted into satisfactory quarters for laying hens, at small cost.

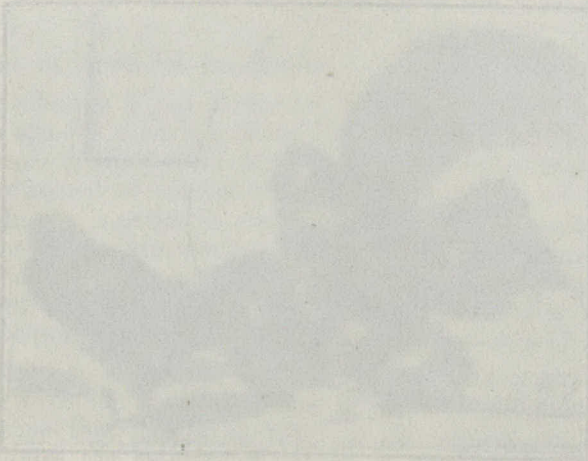


of windows to provide light and openings for proper ventilation. Some poultry houses could be improved by widening, others by having the ceiling lowered and still others by having walls and floors made free of draughts. In many, better ventilation is the chief problem.



REPLACE—DON'T REMODEL

When remodelling a building, one should adhere as closely as possible to the general recommendations given in the foregoing pages for lighting, ventilation, height of ceiling, size of pens and interior fixtures. Considerable variations from standard rules can, however, frequently be made. For example, there are remodelled barns facing east and west and with pens up to forty feet in width in which reasonably good housing conditions will be found.





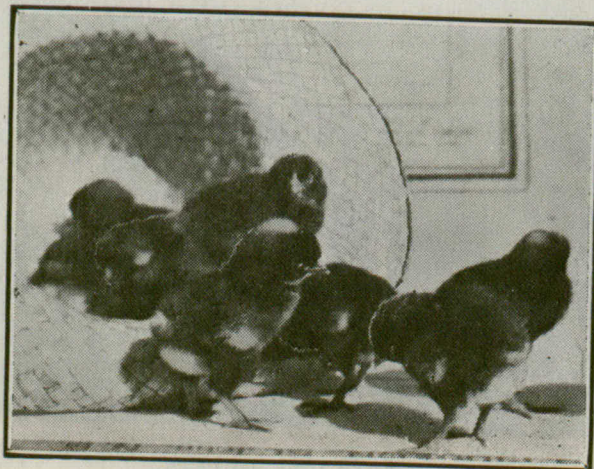
## LESSON 3

## INCUBATION

## Topics for Study

1. Natural method of incubation.
2. Development of artificial incubation.
3. When to hatch.
4. Selection of hatching eggs.
5. Care of hatching eggs.
6. The small lamp-heated incubator.
7. Where to operate the incubator.
8. Operation of the lamp-heated incubator.

The hen, in comparison with other farm animals, has a very short productive life. So short is it that it is necessary to replace half, or more of the flock each year. When the farmer produces his own chicks, the percentage hatch may have a very decided influence on the success of his poultry work because eggs which fail to hatch are obviously a dead loss and replacement hatches often produce chicks too late in the season to bring much profit from the sale of either eggs or meat. The hatching of chicks seems to be gradually becoming the work of hatchery specialists rather than a part of the routine of farm work in the spring months. While good arguments can be advanced for hatching the yearly requirements in chicks at home, the purchase of chicks from a reliable hatcheryman will remove from the farm home considerable work, much uncertainty concerning the chick crop and the anxiety that accompanies incubator operation. The management of mammoth incubators is a specialist's job and beyond the scope of this publication. Hatching with hens and with lamp incubators are described for the benefit of those who renew their flocks by home hatching.



HEALTHY CHICKS

The start towards success in poultry keeping.



## 1. Natural method of incubation

There are two methods of incubating eggs, the natural and the artificial. The setting hen gives her services in the first case and the incubator is used in the second. It is doubtful if an incubator will ever be devised which will hatch a higher percentage of fertile eggs than will a good broody hen. The hen provides the proper temperature and ventilation, and can be relied on to turn the eggs as often as is necessary. It is not possible, however, to hatch with hens the large numbers of chicks required by the modern poultry industry although they are still used to some extent by owners of small flocks.

Where eggs are to be hatched by hens, roomy nests should be provided in a cool, well ventilated place. The bottom of each nest should be rounded enough to keep the eggs from rolling away from the hen but not enough that there will be a tendency for them to pile up. Straw makes a good nesting material.

Hens of the medium-weight breeds make the best setters and even among them will be noted a great difference in temperament. Where a selection is possible, birds should be chosen that are of medium size and quiet in disposition. The hens selected for incubating eggs should be transferred to their special nests towards night. Those which appear to be satisfied with their surroundings, and leave the nest only for feed or water during the next day, can usually be entrusted with settings of eggs. Each hen should be dusted with sodium fluoride, as a precaution against lice, before the eggs are placed in the nest. From twelve to eighteen eggs, depending on the size of the hen and the time of year, make the usual setting. During the period of incubation, setting hens should receive hard grain as food and it, together with grit, and water, should always be available in the pen. An occasional supply of green feed will be relished. Ordinarily, hens leave the nest only once daily while setting. Candling of the eggs may be done on the seventh and fourteenth days of incubation as is the custom in artificial hatching. When several hens have been set at one time, it is possible after candling to put the fertile eggs under a smaller number of birds. Those released may be broken up or given new settings of eggs. Hens should be carefully watched at hatching time. Sometimes it is necessary to remove some of the chicks which hatch first from the nest until the hatch is complete. When the chicks are from twenty-four to thirty-six hours old, they may be placed with the hen in the pen or coop in which they are to be brooded.

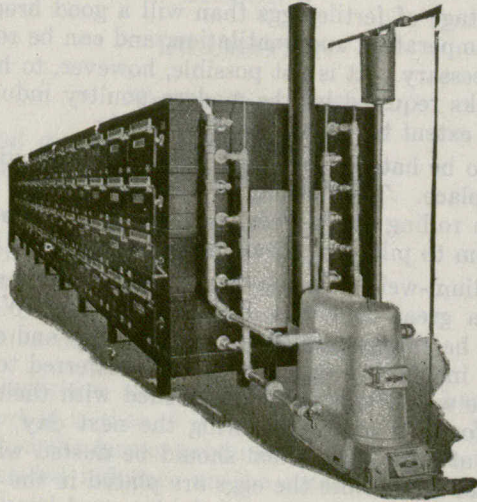
## 2. Development of artificial incubation

Artificial incubation is not a new art. It was practised in China and in Egypt centuries ago. Although artificial hatching has been done for thousands of years, incubators of the present-day type are of comparatively recent invention. The improvement of incubators has been rapid and the development of artificial incubation in America so great that within a few years there has been a remarkable change in farm poultry management. There has been, and still is, a growing tendency towards the purchase of chicks from commercial hatcheries instead of home hatching. In other cases, farmers have eggs from their own flocks custom hatched in the mammoth incubators of such hatcheries.

There is nothing to indicate that incubator chicks are in any way inferior to those hatched by hens and it is certain that artificial hatching has made possible the great expansion that has taken place in the poultry industry. Artificial incubation facilitates the hatching of chicks in numbers and at seasons that would be impossible with hens. It makes possible the keeping of breeds such as Leghorns which have almost completely lost the broody tendency. Where



practised, the hens are relieved of the duties of hatching and mothering chicks, with the result that higher egg production is possible. Without artificial hatching, the modern poultry industry could not exist.



MAMMOTH INCUBATOR

### 3. When to hatch

Chicks should be hatched early enough to mature and come into laying before cold fall weather begins. With birds of the American breeds, egg laying will not be general among the pullets until they approach six months of age. Leghorns mature from three weeks to a month earlier. Thus in order to have pullets laying before November 1, the hatching of chicks of the American breeds should be completed by April 30 and of Leghorns by May 31. Contrary to what might be expected, it is much easier to brood chicks in the early part of the season than in warm weather. Early hatched birds are likely to be most profitable.



EGGS FOR HATCHING

Note the special container used for shipping a single setting of eggs.



#### 4. Selection of hatching eggs

Eggs for incubation from the common breeds of poultry should weigh at least two ounces each or twenty-four ounces to the dozen. Extremely large eggs, which may be double-yolked, should be discarded as well as those which have pronounced ridges on the shell or signs of any shell weakness. Birds of the Mediterranean breeds, such as Leghorns, lay white shelled eggs and any with a tinted shell should be discarded. Likewise with the American breeds which normally lay brown or tinted eggs, any which are white should be discarded. It has been proved that shape, size, colour and quality of eggs are characters which are inherited to a considerable degree, so a selection for these points at hatching time should lead to a better percentage of typical eggs from the resulting pullet flock.

#### 5. Care of hatching eggs

Eggs are most valuable for hatching purposes when newly laid. Good hatchability may be expected when they are held for periods up to ten days before incubation begins, but their value decreases very rapidly after that time. It is often necessary to hold the eggs until enough accumulate to fill the incubator and where this is the case they should be kept in a cool, well ventilated place where the temperature is between 40 and 60 degrees F. The eggs may be kept in ordinary egg cases and the cases turned from one side to another daily. This turning will prevent the yolk from rising and bringing the germ in contact with the shell which would cause its death. Eggs should be gathered often, in the early season to prevent freezing and at all seasons to prevent their being soiled. Dirty eggs should not be washed. If slightly soiled they may be cleaned with steel wool. If very dirty they should not be used for hatching.

#### 6. The small lamp-heated incubator

The small lamp incubator is still used on many farms and in at least one respect it has a special value. It enables the owner to maintain a flock free of pullorum disease to a degree not possible where he must patronize the commercial hatchery. In buying an incubator, both the present and future needs of one's poultry business should be considered. Machines are often purchased which prove too small for economical operation. Small incubators are more affected by outside temperatures than larger machines, cost nearly as much to operate and do



LAMP INCUBATOR

Small, two-deck, lamp-heated incubator.

not hatch enough chicks at one time for economical brooding. There is a decided advantage in having all chicks in the farm flock of one age and where one hundred layers are to be kept, an incubator of from 400- to 600-egg capacity will not be too large. One cannot rely on hatches averaging much better than 50 per cent of all eggs set nor of having much more than one-third of the chicks hatched to mature as pullets suitable to enter the laying houses in the fall. A reasonable surplus over actual requirements allows a more rigid selection of the birds to be kept as winter layers. Surplus chicks can usually be sold locally at remunerative prices.



Incubators with a capacity of six hundred eggs or less may be heated satisfactorily with either hot air or hot water. Most of those in common use to-day are hot-water heated. The water is heated by means of a kerosene lamp, circulates through a system of pipes from which the heat radiates downward over the eggs. An incubator is not as complicated as is often supposed. The cabinet or egg chamber is an insulated box in which the eggs are placed on trays. Heat is supplied as already described and controlled by means of a thermostat which, by a series of levers, operates a damper directly over the top of the lamp. A thermometer is used in the egg chamber in order that the proper amount of heat may be supplied. Modern incubators have a ventilating system, are usually equipped with some automatic device for turning the eggs and may have special provision for supplying moisture during the hatch.

When buying an incubator one should be sure to get the product of a reliable manufacturer. Cheap, poorly constructed incubators may give good hatches under ideal conditions for a time, but will not give the lasting service that may be expected from a better built and necessarily higher priced machine.

### **7. Where to operate the incubator**

An incubator will operate best in a room having good ventilation without draughts and where the temperature can be kept at about 65 or 70 degrees F. without marked fluctuations. A cellar is a good place provided it is warm enough, but any room that meets the above requirements should be satisfactory.

### **8. Operation of the lamp-heated incubator**

In many details of incubator operation such as care of the lamp, temperature, moisture control, ventilation and cooling of the eggs, the operator must be guided by the manufacturer's directions which always accompany the machine, since different makes of incubators differ widely in their means of control of these factors. The following points give general information only.

(a) *Levelling the incubator.*—The incubator should sit level since otherwise the higher sections will have a higher temperature than will the lower.

(b) *Disinfecting the incubator.*—If the incubator has been used previously it should be thoroughly cleaned and disinfected before being reset.

(c) *Testing the thermometer.*—The thermometer should be tested by comparing it with a certified or clinical thermometer before using.

(d) *Regulate before filling.*—The incubator should be operated for a day or more to satisfy the caretaker that everything is in perfect working order and that a proper temperature can be maintained before eggs are placed in it.

(e) *Filling the trays.*—When sufficient eggs are available and the incubator is operating properly, the trays may be filled and put in place. The eggs should lie in a natural position and no attempt should be made to put more than one layer on each tray.

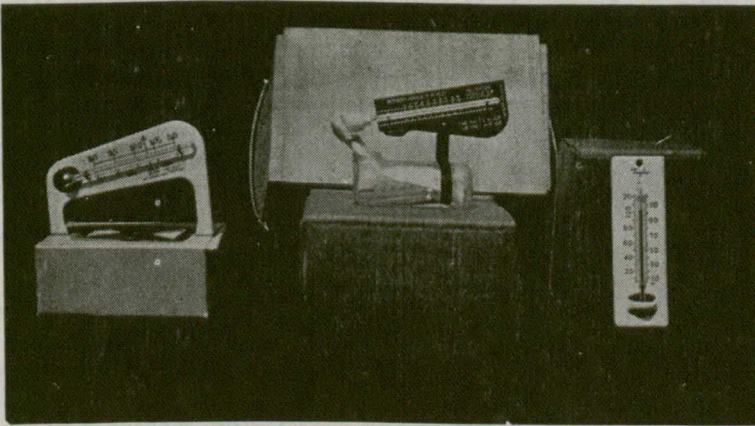
It should be kept in mind that the chicks will be hatching on the same day of the week the eggs are set, three weeks later and the eggs should accordingly be placed in the machine so that the hatch may be completed at a convenient time.

(f) *Turning the eggs.*—With small incubators it is customary to turn the eggs twice daily. More frequent turning is desirable but not always practicable. Devices for turning the eggs automatically are found on the newer incubator models. These greatly simplify the operation and do their best work when the trays are not crowded with eggs. Turning prevents the germs from coming in contact with the shells and may have other benefits that are not well understood. When eggs are to be turned by hand they are simply rolled to a new position with the palms of the hands after removing a few eggs from each tray if necessary, to give working space.



(g) *Tending the lamp.*—The incubator lamp requires daily attention. In replenishing the kerosene supply, overfilling of the tank should be guarded against as this may result in a fire. The wick should be trimmed once daily and care taken that no high points of flame remain after the trimming. Since there is a tendency for the flame to creep higher after relighting the lamp, the caretaker should remain nearby for about five minutes before leaving the room. The lamp should be attended to after the eggs have been turned, rather than before, to prevent the smearing of the eggs with kerosene.

(h) *Temperature.*—Since thermometers are not placed in the same location in all makes of incubators, it is impossible to state absolutely what temperature should be provided. The manufacturer's instructions must be followed in this regard. In general, with lamp incubators, a temperature of about 103 degrees F. is supplied at the upper surface of the eggs. A slightly lower temperature may be recommended at the beginning of the hatch.



THERMOMETER AND HYGROMETER

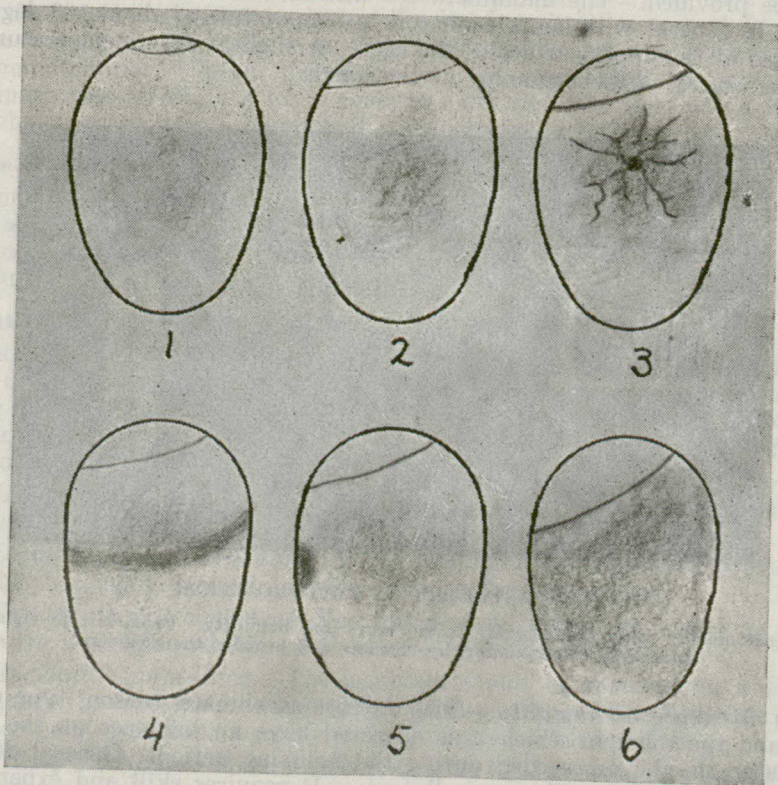
Instruments which indicate air temperature and humidity. From left to right: Incubator thermometer, hygrometer and brooder thermometer.

(i) *Moisture or humidity.*—Such factors as climate, season, type of incubator and the room in which it is operated have an influence on the amount of moisture in the air needed during the hatching period. General directions cannot be given that will cover all cases. It requires skill and experience to tell as the hatch progresses, by the increase in the size of the air cell due to evaporation of the contents of the shell, whether or not sufficient moisture is being supplied. There is more danger of having too little than too much moisture. The sprinkling of the floor in the room in which the incubator is being operated, or even sprinkling the eggs with luke warm water, will assist in raising the moisture content of the air. An instrument called a hygrometer may be placed in the incubator to show the amount of moisture present. From 50 to 60 per cent relative humidity, as determined by the hygrometer, is considered about right for a good hatch.

(j) *Ventilation.*—Ventilation systems are so entirely different in different makes of incubators that no general instructions can be given and the operator is advised to follow the manufacturer's directions. Ventilation is increased as the hatch progresses, to provide an abundance of air for the developing chicks and to remove poisonous gases which are given off in increasing quantities as the hatch advances.



(k) *Testing*.—Eggs are usually tested twice during the hatching period. With ordinary candling equipment these tests are made at about the seventh and fourteenth days of incubation. By using a 75-watt bulb in the candling device, it is possible to attain a high degree of accuracy in testing as early as twenty-four hours after the eggs have been placed in the incubator. By testing, it is possible to remove the infertile eggs while they still have a value for the feeding of chicks or foxes, and the dead germs, which in the heat of the incubator will cause gases, harmful to the developing chicks. The first candling gives a check on the fertility of the eggs and the removal of infertile eggs and those containing dead germs makes the daily turning of the remaining eggs easier.



CANDLING CHART

1. Fresh egg.
2. Infertile egg at 7th day test.
3. Normal development of germ at 7th day test.
4. Dead germ showing blood ring at 7th day test.
5. Dead germ stuck to shell at 7th day test.
6. Normal development of germ at 14th day test.

Eggs are tested by holding them before a strong light in a dark room, exactly as is done when candling for market. Each egg is held before the light, with the large end uppermost, and rotated slightly to set the yolk in motion. At the time of the first test, the infertile egg closely resembles a fresh egg, except that the yolk may be seen a little more plainly and the air cell will be noticeably larger because of evaporation in the heat of the incubator. The egg which is developing normally has a movable dark spot, with blood vessels radiating from it, resembling a spider in appearance. The egg containing a dead germ may have a dark spot, either floating or stuck to the shell,



without radiating blood vessels, or may have a reddish ring about the egg. At the second test there are usually some additional dead germs, and eggs in which normal development is taking place will have a very large air cell but the remainder of the egg will appear opaque or black. The breaking of a few eggs to check one's judgment while candling, is advisable when in doubt regarding their development.



#### PREVENT THIS IF POSSIBLE

Chicks have died after pipping their shells.

(1) *Completing the hatch.*—At the eighteenth or nineteenth day, turning of the eggs is discontinued. If the incubator has nursery trays, the openings leading to these are removed and from this time to the completion of the hatch, the doors are kept closed to conserve the moisture which seems to play a great



#### DAY OLD CHICKS

Active, healthy chicks. The product of good eggs, properly incubated.



part in securing a good hatch. When the incubator has no nursery trays, it may be necessary to cover the glass in the front of the incubator to prevent the chicks crowding towards the light. The temperature will need careful watching at hatching time. When the hatch is complete, the empty shells and eggs which failed to hatch should be removed. It is then advisable to decrease the temperature, by lowering the flame or increasing ventilation, to harden off the chicks. If the incubator is to be used immediately, this hardening off may be done in chick shipping boxes but if not, they may remain in the incubator for from 24 to 36 hours. When properly hardened off, the chicks are ready to be removed to the brooder.

(m) *Storing the incubator.*—At the end of the season's hatching operations, the lamp and heating system of the incubator should be well drained. The interior fittings and cabinet as well, should be thoroughly washed and disinfected and the machine stored in a reasonably dry room until again required. Dampness will cause swelling or warping of the wood and possibly the rusting of metal parts.



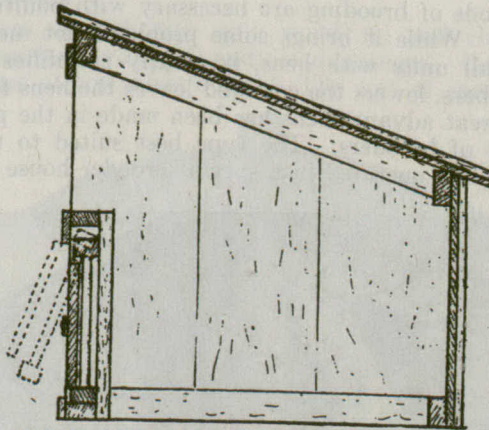
## LESSON 4

**BROODING AND REARING THE CHICKS****Topics for Study**

1. Natural brooding.
2. Artificial brooding.
3. The brooder house.
4. The colony brooder.
5. Brooder capacity.
6. Preparing for the chicks.
7. Regulating the temperature.
8. Placing chicks in the brooder house.
9. Feed and water containers.
10. Getting the chicks out of doors.
11. Brooding troubles.
12. Summer care of the flock.
13. Feed consumption and growth rate.

**1. Natural brooding**

Just as with incubation, there are natural and artificial methods of brooding chicks. For the natural method, requirements are few. A coop about three feet long, two feet wide, two feet high in front and fifteen inches high in the rear, with a tight roof, with provision for ventilation but screened to exclude such enemies as skunks, weasels and rats, will meet the needs of a shelter. Roof and floor should be removable to make cleaning easy. Often such a coop can be easily made from a packing box.



BROOD COOP FOR HEN AND CHICKENS

Hens of the medium-weight breeds make the best mothers but at best they are somewhat whimsical. Some will adopt chicks of any age or colour, some will accept only those of their own colour while others will accept only chicks of their own hatching. When chicks are given to a hen for adoption they should be placed beside and in front of her. If she calls them under her, she will, in all probability, mother them satisfactorily, but if she picks at them they should not be trusted to her care. A hen will brood from 15 to 20 chicks, depending on her size and the season of the year. Several days before the chicks hatch, the hen should be dusted with sodium fluoride as a precaution against lice.



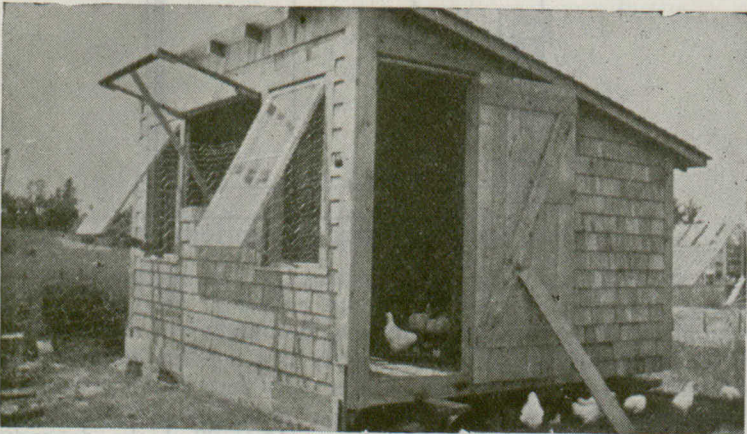
Chicks brooded by the natural method should be kept on a good clean range. It is usually most satisfactory to keep the hen enclosed in the brood coop and to give the chicks their freedom. The coop should be cleaned regularly and the floor kept covered with fine sand. It should be moved occasionally to clean sod. Feed requirements are less exacting than for artificial brooding since the chicks pick up much food which helps to balance their ration. It is usual for the hen to desert her brood when the chicks are from four to six weeks of age.



NATURAL METHOD OF BROODING

## 2. Artificial brooding

Artificial methods of brooding are necessary with poultry production on its present large scale. While it brings some problems not met with when chicks are brooded in small units with hens, it greatly simplifies the job of rearing chicks in large numbers, lowers the cost and leaves the hens free to continue their egg production. Great advancement has been made in the past quarter century in the development of brooders. The type best suited to use on farms is the colony brooder which is operated in a special brooder house or room.



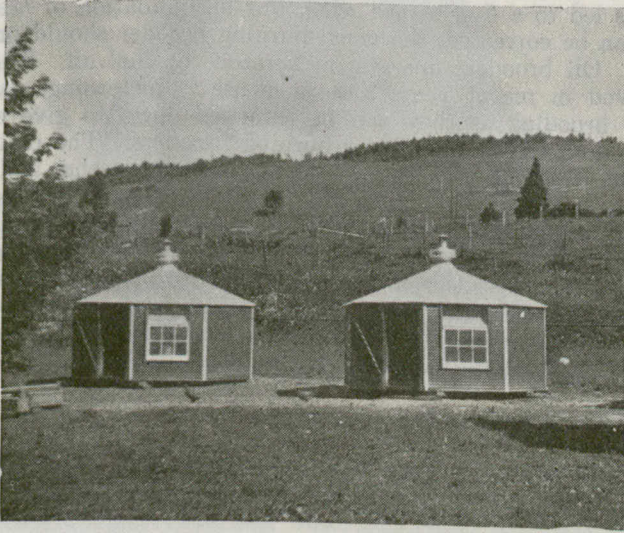
BROODER HOUSE

The 10 by 12 foot brooder house is a convenient size for farm use.



### 3. The brooder house

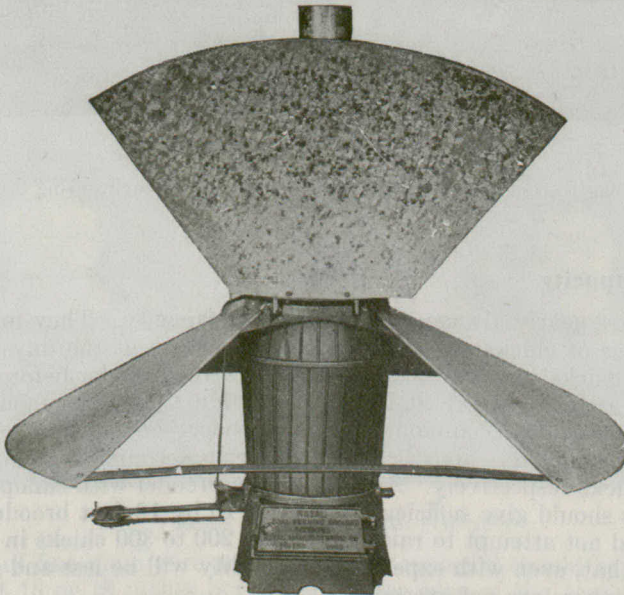
A convenient size for a brooder house is 10 by 12 feet. It should be mounted on skids so that it can be moved with a team of horses. Provision should be made for light and ventilation. The chick doors should be large to prevent crowding as the chicks enter or leave the buildings. More complete details of brooder-house construction will be found in Lesson 2.



OCTAGONAL BROODER HOUSES

### 4. The colony brooder

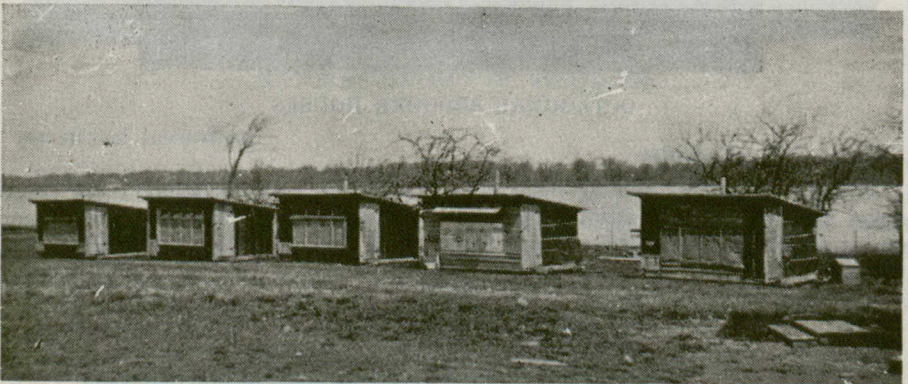
Colony brooders, heated with coal, wood, oil and electricity, are on the market and each has its advantages and disadvantages. Coal brooders are most popular for farm use at the present time. The cost of coal-burning brooders is



COAL BURNING COLONY BROODER STOVE



comparatively low, they are economical to operate and they provide a greater reserve of heat for cold-weather brooding than do other types. For warm-weather brooding, the operator of the coal-burning brooder may have difficulty in keeping the fire low enough to prevent excessive heat without danger of the fire going out. Wood-burning brooders are designed for use in districts where coal is difficult to obtain and where wood for fuel is abundant. They have been on the market for only a few years and in early models the smoke pipes creosoted badly and thus led to a fire hazard when this accumulation of creosote burned. If this fault can be corrected, the wood-burning brooder should prove useful in wooded areas. Oil brooders operate on kerosene or fuel oil. They have been greatly improved in recent years and their use is increasing, particularly for warm weather brooding as they can be throttled down to give a much lower degree of heat than can coal or wood-burning brooders. The cost of operation will probably be less than with coal brooders in warm weather and more in cold weather. Oil as a fuel is convenient to use though probably not as safe as coal, and some operators of oil-burning brooders have had trouble with the flame being blown out in extremely windy weather. The electric brooder, like the oil-burning type, does not have the same reserve of heat that is provided by the coal-burning style but requires the least attention of any type and should be highly satisfactory for warm-weather brooding in districts served with a constant supply of electricity at a moderate cost.



COLONY HOUSES HAVE MANY USES

Cheaply constructed buildings, drawn close together for early spring brooding.

## 5. Brooder capacity

Brooders are nearly always over-rated as to capacity. They may accommodate the number of chicks stated, when the chicks are at the day-old stage but because of the chicks' rapid growth they outgrow the brooder before it is possible to discontinue artificial heat. It is important that the chicks should have sufficient hover space. The common sizes of brooders have canopies of 42-, 52-, 56- and 60-inch diameters and these will properly accommodate about 200, 300, 350 and 400 chicks respectively. A coal-burning brooder with canopy diameter of 52 or 56 inches should give sufficient heat for a 10 by 12 foot brooder house. The beginner should not attempt to raise more than 200 to 300 chicks in one flock and it is probable that, even with experience, mortality will be less and growth better where these numbers are not exceeded.

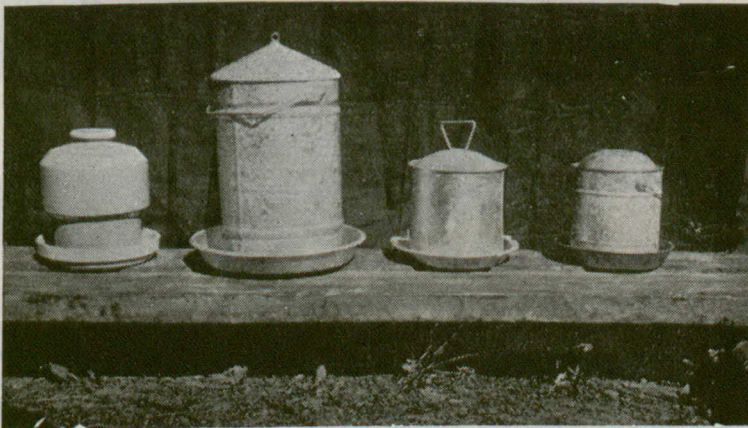




ON THE WAY TO THE BROODER

### 6. Preparing for the chicks

The brooder should be placed near the centre of the building, perhaps somewhat nearer the rear of the building than the front. This will allow space for feed and water dishes in the front where it is well lighted and will make replenishing the food supply easy. Something of a fire-resisting nature should be placed beneath the brooder even though its base is insulated with asbestos. This may be a sheet of zinc or iron, a layer of bricks, or a box of sand or gravel. With coal- and wood-burning brooders, the pipe should run, without elbows, through the roof to a distance of two or three feet to ensure good draught. A damper in the pipe will save fuel in windy weather. Brooder pipe usually has a short life but galvanized pipe will last longer than black.



TYPES OF DRINKING FOUNTS

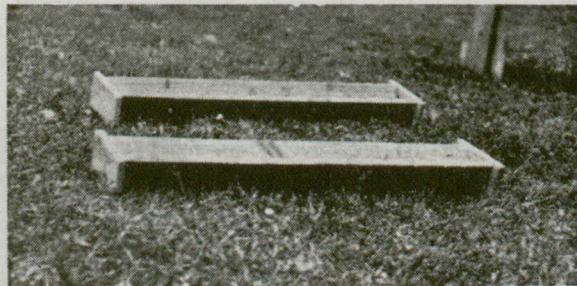
A guard of fine-mesh wire netting or other material should be placed to form a circle about 15 or 18 inches beyond the outer edge of the canopy, to keep the chicks from wandering too far from the heat during the first few days. The



circle may be widened as the chicks become better acquainted with their surroundings and removed altogether in a few days. The square corners of the building should be blocked off with boards, fibre board or wire netting to prevent loss from crowding. This material should remain in place until the chicks have learned to roost at night. A layer of fine sand over the floor, which may be covered with a light layer of cut straw or planer shavings, will complete the preparation for the young chicks.

### 7. Regulating the temperature

The amount of heat given off by any type of colony brooder is controlled by means of thermostats. The most common type of thermostat depends on the expansion and contraction of ether-filled brass disks or wafers which mechanically control the fuel supply or the draughts of the brooder. When preparing the brooder for chicks, the thermostat must be adjusted by the trial and error method so that the brooder will maintain a suitable temperature. At the beginning, the temperature at the outer edge of the canopy about two inches above the floor should be about 95 or 100 degrees F., or only slightly cooler than the incubator temperature from which the chicks came. This temperature may be decreased about 5 degrees weekly as the chicks grow and by the time they are about six weeks of age they will be sufficiently well feathered to get along without further artificial heat. As the period of supplying artificial heat draws to a close, the fire may be let out in the middle of some fine warm day. This daily period without heat may be lengthened gradually until none is supplied. The brooder should be left in place, however, for a week or two, as a cold or rainy spell of weather may warrant its use. The chicks should be given a temperature in which they are comfortable at all times. The person experienced in handling chicks can tell fairly accurately by their actions when the heat is right but a brooder thermometer is a useful instrument and one should be placed in each brooder house.



FEED TROUGHS FOR YOUNG CHICKS

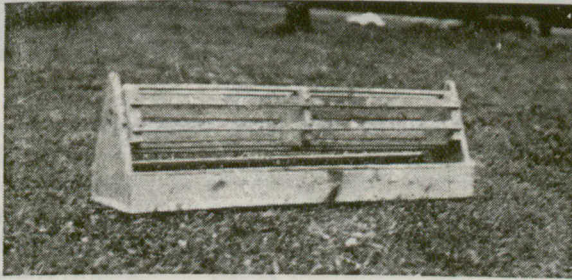
### 8. Placing chicks in the brooder house

When the chicks are from 24 to 36 hours old and have been well hardened off in the incubator, they may be removed to the brooder house. It is important to feed the chicks soon after they are placed in the brooder, since otherwise, they may gorge themselves with sand which may cause losses. The caretaker must give brooder chicks certain attention that is not required when they have a mother hen to look after them. They must be taught where to go for heat when they become cold and given other elementary training. This "brooder breaking" process requires close attention and considerable patience on the part of the attendant for a day or two but time thus spent usually prevents losses later.

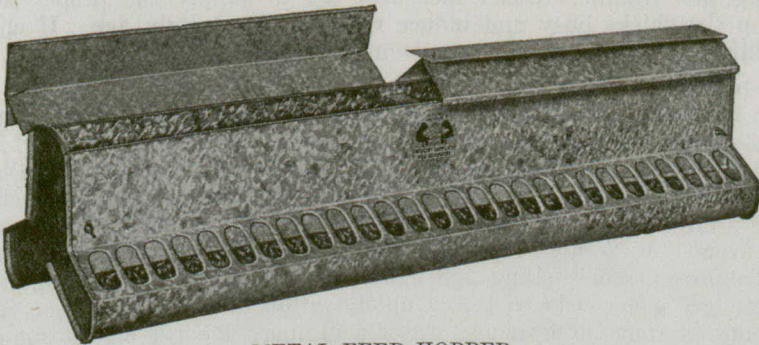


## 9. Feed and water containers

It is very important that sufficient feeding and drinking space be provided. The first few feedings may be given on papers, but small troughs should soon be substituted. Suitable galvanized ware feeders may be purchased for chicks of this age or very good troughs can be made from ordinary laths. A feeder, four feet long with feeding space on each side, will accommodate about one hundred chicks. As the chicks outgrow the small trough-type feeders, home-made reel-type feeders will be found very satisfactory. Still later, larger size reel feeders or range hoppers will meet the requirements. Galvanized founts of one-gallon capacity are very satisfactory for water but stoneware ones should be used for buttermilk since the acid of the buttermilk forms a poison in its action on the zinc coating of galvanized ware. Such founts can be used all summer but ones of larger capacity will be found to be labour savers as the chicks get bigger. Feed-hopper and drinking-fountain space must be increased to meet the needs of the growing chicks.



REEL TYPE OF FEEDER FOR CHICKS



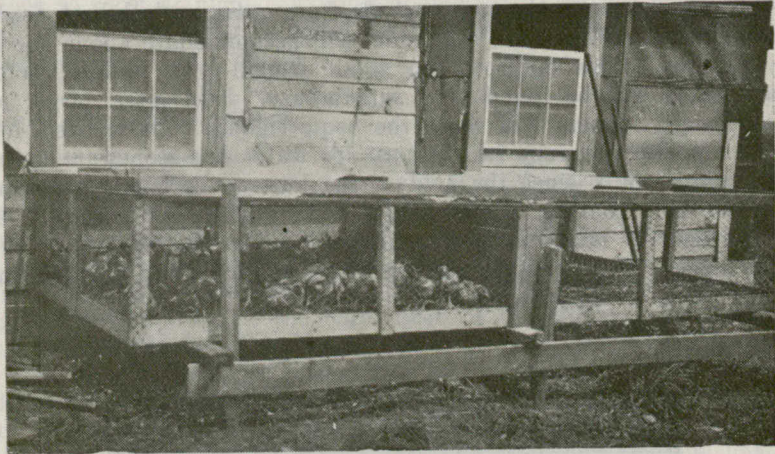
METAL FEED HOPPER

## 10. Getting the chicks out-of-doors

As soon as the weather permits, after the chicks are a week old, they should be given an outdoor run. This need not be large at first and it is sometimes advisable to make the enclosure of boards to break the force of spring winds. Earth may be mounded up in front of the door so that the chicks can enter the



house easily. At first it may be necessary to drive them indoors when they get cold but a few lessons in this regard are usually sufficient. As the chicks grow, the size of the yard should be increased.



SUN PORCH

Useful for early spring brooding.

## 11. Brooding troubles

Crowding, bunching up or huddling, toe-picking and cannibalism frequently start when chicks are overcrowded in the brooder house. The first rule of prevention therefore is to give the chicks plenty of room, avoiding overcrowding. Huddling may be the result of either chilling or overheating and sometimes starts in a flock without apparent cause. Danger lies in the chicks in the centre of the bunch being trampled to the floor and suffocated. Directions have already been given for rounding the corners of the brooder house to help in preventing this trouble. Other measures are to supply the proper degree of heat, keep the chicks busy and induce roosting at an early age. If chicks are seen huddling, they should be spread out with the hands or a broom.

Toe-picking may start at an early age. Chicks seem inclined to pick at anything bright, including a brother's toe nails. This inclination is increased when the chicks are hungry. If bleeding starts, the bright red blood becomes an attraction. They like the sample and return for more. Cannibalism may begin with an instance like this or as the result of an injury which causes bleeding. With larger chickens or hens, the picking may start on the wings or near the vent. It is noticed more often among white than among coloured birds. To prevent toe-picking and cannibalism, avoid overcrowding in houses and yards, feed generously with a complete ration that contains some roughage, allow plenty of space at feed and water containers and get chicks out of doors early. Curing an outbreak is not an easy matter. Some poultrymen claim that the feeding of a more bulky ration or putting paper in the brooder house, for the chicks to pick at, will often help. Darkening the windows, using ruby electric light bulbs, where this is possible, or painting all windows red may be resorted to in bad outbreaks. A paste of four ounces vaseline, one tablespoonful of bitter aloes and enough red pigment such as venetian red to give a blood colour, may be applied to the affected parts of chicks which have been bleeding. Aloes being exceedingly bitter is distasteful to the chicks and may check the habit. Pine tar has a similar value when used in the same way.



What is effective as a remedy in one case may fail in another. The poultryman should rely on prevention rather than cure.



RANGE SHELTER

## 12. Summer care of the flock

Towards the close of the brooding period some low flat roosts should be placed in the brooder house to encourage early roosting. These may be built so that the front roost is only a few inches above the floor and those back of it higher, rising ladder fashion to the back of the building. As the chicks develop, the roosts can gradually be raised higher. Early roosting is sometimes encouraged or forced by having the roosts attached to fine mesh wire netting or half-inch mesh hardware cloth on which the chicks are driven when they reach the age when roosting is desired.



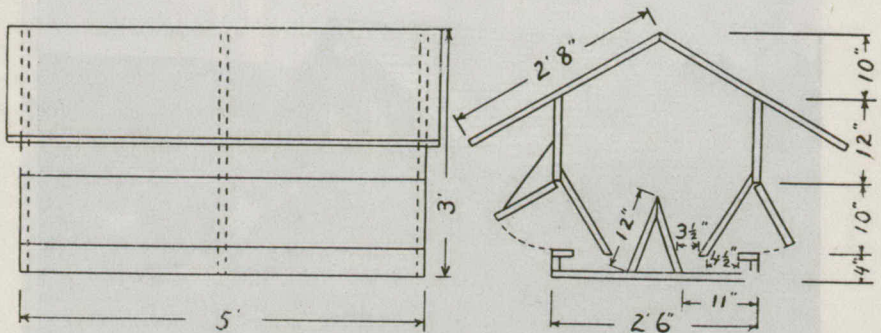
PEDIGREED COCKERELS ON RANGE

If the brooder house has been filled to capacity and mortality has been no more than normal, the house is certain to be overcrowded with the rapidly developing chicks as the weather becomes warm. It is very necessary that plenty of ventilation be given at this stage. The easiest way to relieve this



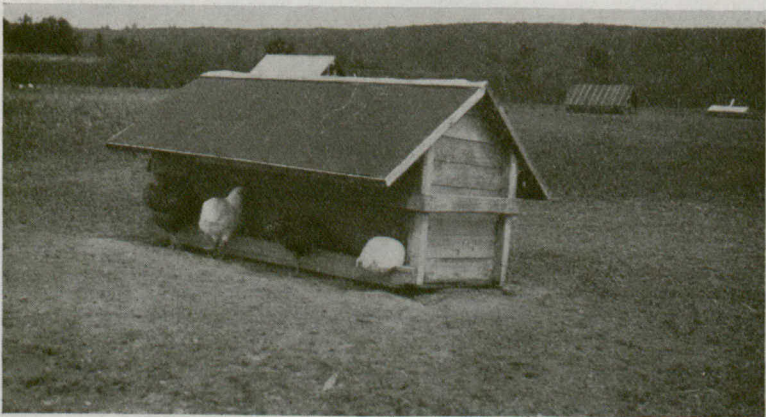
congested condition is to separate the sexes, leaving one in the brooder house and removing the other to new quarters such as the range shelter described in Lesson 2.

When possible, it is advisable to change the location of the brooder houses or range shelters often enough to keep the ground about the buildings reasonably clean.



CONSTRUCTION DETAILS OF RANGE HOPPER

Chicks need an abundance of feed and water, and care should be taken to see that these are always provided. Whether for meat or laying purposes, the chicks should be well cared for throughout the summer so that they will develop rapidly and without any check in their growth. With pullets, the aim should be to keep them growing steadily so that they will have good size and a fair surplus of body fat and begin production at from five to six months of age, depending on the breed. This will require the feeding of both scratch and mash feed with some animal protein included in the latter. The use of the range hopper will greatly lessen the labour of feeding chicks during the summer and fall months. If built large enough and with partitions, one hopper will serve to hold mash, scratch grain, grit and shell. Since the range hopper is used out of doors it should have a watertight, projecting roof.



CHEAPLY BUILT RANGE HOPPER

It is important to raise the chicks on clean range as a means of having them free of parasites. This calls for the rotation of fields used for range. A field after being used for this purpose should be cultivated and seeded to grass before again being used for range. Preferably two or three years should elapse before it is again used for this purpose and during this interval poultry



manure should not be applied to the land. Chicks should be reared entirely apart from older birds.

Shade is important for the chicks in hot weather. When no natural shade exists in the yards, it may be possible to grow corn or sunflowers for this purpose. Sometimes with larger chicks, the houses are raised from the ground so that the birds may use the shade beneath. This plan, when buildings are permanently located, has the danger that the soil may become contaminated through droppings and result in the spread of disease. Where possible, the feed and water dishes should be placed in the shade.

Pullets should be transferred to winter quarters before laying is at all general in the flock, since any sudden change in feeding or management after laying begins is likely to materially check egg production.

### 13. Feed consumption and growth rate

Every poultryman should be able to estimate the feed requirements of his flock. Beginners in poultry raising seldom realize how rapidly the feed intake of a growing flock increases. Too often, insufficient capital is retained for the purchase of feed, with the result that the chickens suffer from underfeeding. In the tables which follow, the feed consumption of Barred Plymouth Rock and White Leghorn pullets, cockerels and capons is shown. It should be borne in mind that both feed consumption and growth rate will vary greatly under different conditions. Reduced to round figures, it will require from 800 to 1,000 pounds of feed to produce 100 broilers, about 2,000 pounds to produce 100 light roasters and between 2,500 and 3,000 pounds to grow 100 pullets to laying age. One hundred laying hens will consume about 25 pounds of feed daily. These figures are for combined amounts of mash and grain feeds given.

TABLE 1.—WEEKLY BODY WEIGHTS AND FEED CONSUMPTION FOR PULLETS, COCKERELS AND CAPONS, BARRED PLYMOUTH ROCKS

Age in weeks	PULLETS			COCKERELS			CAPONS		
	Average weight per bird	Average feed consumed per bird	Lb. feed per lb. body weight	Average weight per bird	Average feed consumed per bird	Lb. feed per lb. body weight	Average weight per bird	Average feed consumed per bird	Lb. feed per lb. body weight
0	0.08			0.08			0.08		
1	0.16	0.14	0.88	0.17	0.14	0.82	0.16	0.14	0.88
2	0.22	0.38	1.72	0.22	0.38	1.73	0.22	0.38	1.73
3	0.38	0.66	1.74	0.34	0.66	1.94	0.34	0.66	1.94
4	0.57	1.10	1.93	0.50	1.10	2.20	0.54	1.10	2.04
5	0.76	1.74	2.29	0.80	1.74	2.18	0.83	1.74	2.10
6	1.05	2.36	2.25	1.13	2.51	2.22	1.14	2.48	2.18
7	1.42	3.20	2.25	1.49	3.45	2.32	1.31	3.13	2.39
8	1.72	4.22	2.45	1.93	4.48	2.32	1.66	3.78	2.28
9	1.86	5.32	2.86	2.09	5.77	2.76	1.96	4.85	2.47
10	2.07	6.29	3.04	2.33	6.87	2.95	2.22	5.85	2.64
11	2.32	7.39	3.19	2.72	8.36	3.07	2.52	6.70	2.66
12	2.49	8.49	3.41	3.07	9.90	3.22	2.73	8.01	2.93
13	2.71	9.52	3.51	3.22	10.99	3.41	2.82	9.09	3.22
14	2.92	10.77	3.69	3.34	12.49	3.74	3.13	10.49	3.35
15	3.15	12.11	3.84	3.65	14.09	3.86	3.46	11.94	3.45
16	3.47	13.62	3.93	4.03	15.86	3.94	3.83	13.68	3.57
17	3.84	15.27	3.98	4.52	17.84	3.95	4.45	15.74	3.54
18	4.05	16.78	4.14	4.76	20.33	4.27	4.91	18.11	3.69
19	4.08	18.21	4.46	5.23	22.68	4.34	5.09	20.26	3.98
20	4.31	19.73	4.58	5.59	24.79	4.43	5.44	22.26	4.09
21	4.49	21.82	4.86	5.82	26.96	4.63	5.57	24.49	4.40
22	4.63	23.99	5.18	6.05	29.23	4.83	5.46	26.67	4.88
23	4.84	25.55	5.28	6.43	31.64	4.92	6.49	29.01	4.47
24	5.11	27.53	5.39	6.70	33.65	5.02	6.67	30.89	4.63
25	5.22	29.34	5.62	6.87	35.78	5.21	6.72	32.82	4.88
26	5.41	30.86	5.70	6.91	37.64	5.45	6.98	34.79	4.98



TABLE 2.—WEEKLY BODY WEIGHTS AND FEED CONSUMPTION FOR PULLETS, COCKERELS AND CAPONS, WHITE LEGHORNS

Age in weeks	PULLETS			COCKERELS			CAPONS		
	Average weight per bird	Average feed consumed per bird	Lb. feed per lb. body weight	Average weight per bird	Average feed consumed per bird	Lb. feed per lb. body weight	Average weight per bird	Average feed consumed per bird	Lb. feed per lb. body weight
0	0.08			0.08			0.08		
1	0.15	0.14	0.93	0.15	0.14	0.93	0.14	0.14	1.00
2	0.19	0.38	2.00	0.19	0.38	2.00	0.19	0.38	2.00
3	0.24	0.69	2.87	0.23	0.69	3.00	0.25	0.69	2.76
4	0.33	1.16	3.51	0.31	1.16	3.74	0.36	1.16	3.22
5	0.46	1.75	3.80	0.44	1.75	3.98	0.48	1.75	3.65
6	0.63	2.38	3.78	0.62	2.38	3.84	0.67	2.38	3.55
7	0.85	3.08	3.62	0.89	2.98	3.35	0.87	2.94	3.38
8	1.07	3.94	3.68	1.16	3.84	3.31	1.12	3.71	3.31
9	1.30	4.76	3.66	1.46	4.79	3.28	1.39	4.69	3.37
10	1.48	5.72	3.86	1.71	5.84	3.42	1.67	5.81	3.48
11	1.64	6.46	3.94	1.90	6.75	3.55	1.93	6.80	3.52
12	1.76	7.23	4.11	2.11	7.79	3.69	2.19	7.64	3.49
13	1.95	8.23	4.22	2.37	8.74	3.69	2.52	8.75	3.47
14	2.15	9.15	4.26	2.72	9.88	3.63	2.66	9.85	3.70
15	2.47	10.22	4.14	3.20	11.20	3.50	3.09	11.13	3.60
16	2.66	11.44	4.30	3.40	12.69	3.73	3.35	12.64	3.77
17	2.85	12.80	4.49	3.75	14.40	3.84	3.68	14.30	3.89
18	3.07	14.18	4.62	4.03	16.21	4.02	3.96	16.12	4.07
19	3.19	15.82	4.96	4.30	18.12	4.21	4.29	18.20	4.24
20	3.18	17.11	5.38	4.24	19.76	4.66	4.34	19.87	4.58
21	3.37	18.68	5.54	4.28	21.52	5.03	4.77	21.99	4.61
22	3.55	20.05	5.65	4.71	23.36	4.96	4.85	23.91	4.93
23	3.67	21.40	5.83	4.78	25.08	5.25	5.08	25.81	5.08
24	3.70	22.59	6.11	4.88	26.55	5.44	5.11	27.49	5.38
25	3.78	23.75	6.28	4.92	28.43	5.78	5.26	29.10	5.53
26	3.93	25.00	6.36	5.07	29.55	5.83	5.37	30.83	5.74

NOTE.—Feed consumption is cumulative, the figures for 26 weeks, for example, representing consumption per bird from hatching to that age. Pounds of feed per pound of body weight represents the cost in terms of feed consumption of each pound of body weight up to any given age. Data from Central Experimental Farm, Ottawa.



## LESSON 5

**THE PRINCIPLES OF POULTRY FEEDING****Topics for Study**

1. The balanced ration.
2. Protein.
3. Carbohydrates.
4. Fat.
5. Ash or mineral matter.
6. Water.
7. Vitamins.
8. Nutritive ratio.
9. The practical application of feeding principles.
10. Considerations in selecting poultry feeds.

**1. The balanced ration**

In the feeding of any kind of live stock the first consideration is the maintenance of the body. With the hen it will probably take three quarters of what she will eat for this purpose. It is only from food given in excess of that needed for body upkeep that the bird can make growth, produce eggs, or lay on body fat. It should not be concluded from the above statements that the only essential in successful feeding is to keep the feed containers full. Practical experience has proved that there must not only be an abundance of feed but it must be of the right sort or composition.

This leads to a study of what are called nutrients. A nutrient is a food constituent, or group of such having the same general chemical make-up, that will help support animal life. The nutrients considered in poultry feeding are protein, carbohydrates, fat, ash and water. When these nutrients are present in the feed in the best known proportion for the type of feeding under consideration, (growing, fattening or feeding for egg production), the feed is considered to be a "balanced" one. A balanced ration is the amount of feed, balanced as to nutrients, to properly nourish a hen (or other animal) for one day. Strictly speaking the term "ration" implies a twenty-four hour supply of feed for one animal, but poultrymen frequently refer to their feed mixture, in any quantity, as a ration.

**2. Protein**

Proteins are distinguished from other nutrients by the presence of nitrogen in their chemical make-up. In addition to nitrogen, they always contain carbon, hydrogen and oxygen and may contain sulphur, phosphorus and iron. Proteins are very variable in their nature and some are much more valuable in poultry feeding than others. In order to get high egg production, it is necessary that part of the protein in the hen's diet shall come from an animal source. Proteins are used by the hen in the growth of muscles, nerves and feathers, and in producing the white of the egg. When present in excessive amounts, protein can be used to supply heat and energy, but since it is the most expensive nutrient in poultry feeds, there is seldom a surplus available for this use. Proteins are found in the cereal grains but not in large enough amounts that they alone will form a balanced ration. The feeds of animal origin such as milk, meat scrap and fishmeal are high in protein and one or more of these materials is commonly used to balance poultry feeds and to supply the protein of animal origin.



### 3. Carbohydrates

Carbohydrates contain the elements carbon, hydrogen and oxygen and are used in poultry nutrition to supply heat and energy, for the development of egg yolks and for the production of body fat. In this climate, some feed is undoubtedly consumed, during the winter months at least, to maintain the body heat of the birds. Energy is needed in all body activities such as the search for food, the grinding of food in the gizzard, the beating of the heart and many other involuntary as well as voluntary actions. When birds are laying heavily, large amounts of carbohydrates are needed in the manufacture of egg yolks. Carbohydrates include the starches and sugars which are largely digestible and also much indigestible woody tissue of plants such as is present in oat hulls.

### 4. Fat

Fats perform the same function in animal nutrition as do carbohydrates, but in proportion to their weight supply two and one-quarter times as much heat and energy. Small percentages of fat are found in the cereal grains and, as a rule, no special effort is made to increase the amount in a feed mixture.

### 5. Ash or mineral matter

Ash is the mineral matter in any feed, or that part which remains after complete burning. Ash is used in the growth of the bones, to a lesser extent in muscles and blood, and to a large extent in producing the shells of eggs. Because of the large amount of mineral matter needed in producing egg shells, laying hens require a higher percentage of ash in their feed than other farm animals. Ash is present in varying amounts in all feeding stuffs and that in ordinary feeds is supplemented by supplying marine shells and sometimes bonemeal and limestone grit.

### 6. Water

Water plays a very important part in poultry nutrition. The body of the hen and her product, the egg, both contain a high percentage of water. It is also needed in all the processes of digestion, absorption and assimilation of food. A continuous supply of clean fresh water is very important and should always be furnished.

### 7. Vitamins

In the feeds of all animals it is necessary that substances known as vitamins should be present. The names given to vitamins correspond with the letters of the alphabet—A, B, C, D, E and G. A partial lack of one or more of these in the feed will result in lack of vigour, unthriftiness and to some extent, failure to reproduce. The entire lack of any vitamin will eventually result in a specific deficiency disease.

In the summer season when there is an abundance of sunlight and hens have access to a good range, they usually receive plenty of the required vitamins. When they must be enclosed for long periods, it may be necessary to add supplements which will provide additional amounts of vitamins A, D, and G. Vitamins B, C and E are present in sufficient amounts in the ordinary ingredients of poultry feeds. Vitamins A and D are found abundantly in cod liver oil and some other fish oils. Vitamin G is found in milk products and alfalfa leaf meal. These three products—cod liver oil, milk and alfalfa leaf meal, because of their vitamin content, have a special value in poultry feeding during the winter months and particularly before and during the hatching season.



### 8. Nutritive ratio

The term "nutritive ratio" is used frequently in writings which deal with animal nutrition. It is the ratio which exists between the protein and combined carbohydrates and fat in a ration. The nutritive ratio of a laying ration might be shown thus, 1:4.5 which means the mixture contains one part of protein to four and one-half parts combined carbohydrates and fat (carbohydrates + fat  $\times 2.25$ ). The nutritive ratio of feeds is less quoted than it was formerly. The present tendency is to provide a sufficient percentage of protein and take it for granted that with the ordinary feeds used in a mixture there will be sufficient energy-producing nutrients. A good laying ration will contain 14 to 16 per cent protein, a mixture for starting chicks from 16 to 18 per cent and a fattening mash 12 to 14 per cent.

### 9. The practical application of feeding principles

Under farm conditions it is seldom necessary to figure out an exactly balanced ration. As a matter of fact it is practically impossible to do so because of the variation in the composition of feed ingredients and the choice which the feeding of mixed grains gives to any individual hen. However, it must not be overlooked that a balance between nutrients is necessary. This need can be clearly shown by an example.

Wheat is one of the most desirable grains for poultry feeding yet if considered as a sole feed its nutrients would be found to be very poorly balanced. Suppose, for example, that 100 hens are fed wheat only. After the requirements of body maintenance are met, there will remain enough carbohydrates and fat for the daily production of 300 eggs, enough protein to produce 35 eggs and enough mineral matter to supply shell-making material for 8 eggs. If 50 eggs daily are considered as being a reasonable production from a flock of 100 layers then it is clear that with the wheat diet there will be an enormous waste of carbohydrates, a shortage of protein and a still greater lack of mineral matter. With the food supply being divided among the 100 hens, no individual bird would receive enough protein to lay more often than every third day, nor enough mineral matter to produce the shell of an egg more often than once in twelve days. It has been assumed for the purpose of illustration that hens would thrive and produce eggs on a sole diet of wheat. In practice they would not. Oats and barley are little, if any, better than wheat from the standpoint of balance of nutrient and corn is definitely poorer because it is decidedly lacking in protein and mineral matter. What protein is present in corn is lower in quality than is the protein in wheat. It must not be concluded, however, that these grains are not useful poultry feeds. They are all very desirable if used in combination with other materials which contain the nutrients in which they are lacking.

Rarely can one nutrient replace another in animal nutrition. Therefore for successful feeding rations must be prepared which will supply enough of the required nutrients. For reasons of economy, there should be no wasted surplus. Experimental stations and agricultural colleges have carefully calculated, and proved by test, the rations they recommend. These should be used as a guide in the home mixing of feeds. Typical poultry feeding recommendations will be found in Lesson 7.

### 10. Considerations in selecting poultry feeds

Under farm conditions it will not always be possible to use one feed mixture exclusively. Changes must be made from time to time to make use of



feeds that are available and reasonable in price. Abrupt changes should be avoided. Some important considerations in the selection of feeding stuffs follow.

(a) *Composition*.—The nutrients which any feed contains should be considered.

(b) *Digestibility*.—Some coarse, bulky feeds which are useful in the feeding of dairy cows are of little or no value in poultry feeding because of the birds' different digestive system.

(c) *Palatability*.—The flock will do best when given food it relishes. Rye, although satisfactory from the standpoint of nutrients it contains, is an unsatisfactory poultry feed largely because it is unpalatable.

(d) *Suitability*.—Some feeds, though rich in nutrients, may have an unfavourable effect on the hen's product, the egg. For example, cottonseed meal produces eggs which will not keep in storage and which have poorly coloured yolks.

(e) *Variety*.—A variety of feeds has a stimulating effect on the appetite of the birds and gives the owner greater assurance that all nutrients are being provided.

(f) *Succulence*.—Some feeds of a succulent or juicy nature are necessary at all seasons, not because of nutrients they contain but because of their beneficial effect on the digestive system.

(g) *Vitamins*.—These food factors, while required in small quantities, must be present, or deficiency diseases will result. Fortunately, the feeds from which poultry rations are made contain most of the needed vitamins in sufficient quantity. Cod liver oil, alfalfa meal and milk in any form will supply those most likely to be lacking.

(h) *Cost*.—It is quite evident that the cost of poultry feeds must be a consideration in making the flock profitable.



## LESSON 6

## THE FEEDS AND HOW TO USE THEM

## Topics for Study

1. Grains and grain by-products.
2. Protein supplements.
3. Mineral supplements.
4. Green feed.
5. Vitamin supplements.
6. How to combine the feeds.

**1. Grains and grain by-products**

(a) *Barley*.—Barley is not so palatable as corn and wheat, is lower than both in digestible nutrients but contains more digestible nutrients than oats. Good plump barley is a satisfactory poultry feed and should be used in the grain mixture in districts where it is grown.

(b) *Barley meal*.—Ground barley, or barley meal, is a valuable ingredient for the laying mash and fattening ration. It should be finely ground or else the hulls should be sifted out before using.

(c) *Buckwheat*.—Where buckwheat is grown, it can be used to good advantage in the grain mixture. It has a high percentage of indigestible hull and because of its dark colour may be unattractive to hens unless it has been part of their ration as chicks.

(d) *Corn*.—Corn is one of the most valuable grains for poultry feeding. It is relished by the birds and has a high percentage of digestibility. Yellow corn contains vitamin A in much greater amounts than the other grains. It is lacking in protein and mineral matter so cannot be fed without supplements. When price warrants, it can be used to make up a large percentage of the grain ration. Unfortunately it can be grown commercially in only a few restricted areas in Canada.

(e) *Cornmeal*.—Cornmeal is just as desirable in the mash as corn in the grain mixture, if ground from good quality corn. Naturally it has the same good qualities and deficiencies as the whole grain. It is used in mixtures for growing chicks, laying hens and for fattening purposes. When used in a fattening ration, meal ground from yellow corn has a tendency to give a yellow colour to the skin and fat of the carcass so should not be fed where such colour is an objection on the market. Cornmeal from white corn does not give this yellow coloration.

(f) *Kafir and milo*.—Kafir and milo are not grown in Canada but are often included in commercial grain mixtures. Their feeding value is similar to that of corn.

(g) *Oats*.—The kernel of the oat is not unlike wheat in composition but the heavy hull gives a high percentage of fibre which is of little value in poultry feeding. Good heavy oats, with a low percentage of hull, form a valuable part of grain mixtures.

(h) *Oat groats*.—Oats with hulls removed are known as oat groats and are very valuable when fed, either whole or ground, to any class of poultry. Hulless oats should be equally desirable. The use of oat groats is frequently limited because of its price.

(i) *Ground oats*.—Ground oats are valuable ingredients for the growing, laying or fattening mash. When fed to young chicks the hulls should be sifted out.



(j) *Rolled oats*.—Before commercial chick starting rations were as generally used as at present, rolled oats were often given as a first feed for young chicks, but because of the cost their use is limited.

(k) *Rye*.—Although the composition of rye is similar to that of wheat, it is unpalatable to poultry and otherwise unsatisfactory as a poultry food.

(l) *Wheat*.—Wheat is one of the most valuable grains for poultry feeding. It is palatable and contains a high percentage of digestible nutrients. Shrunken wheat, if shrunken because of drought or frosting, contains a higher percentage of protein than plump wheat and is often a much more valuable feed than its appearance indicates. It may be fed whole, in the grain mixtures of chicks and laying hens, or ground, in mash mixtures for poultry of all ages.

(m) *Wheat bran*.—A percentage of wheat bran is used in almost all laying rations. It is useful to add bulk and to lighten heavier or more concentrated feeds.

(n) *Wheat shorts*.—Shorts are not as generally used in mash mixtures for poultry as are bran and middlings, but can be used as a part of laying mash and fattening mixtures. They contain more carbohydrates and fat, a similar percentage of protein and less mineral matter and fibre than bran.

(o) *Wheat middlings*.—Middlings are lower in fibre and mineral matter than bran but higher in carbohydrates. They form a useful ingredient in mash mixtures for growing chicks, laying hens and for fattening.

## 2. Protein supplements

Since the common grains and their by-products are lacking in proteins, not only in quantity but quality as well, it is necessary to give additional feeds which will make up this deficiency. Proteins from animal sources have a much greater value in poultry feeding than those from vegetable sources and because of this, protein supplements are mostly of animal origin.

(a) *Milk*.—Milk products are among the most desirable protein supplements. Skim-milk and buttermilk can be fed in the liquid, semi-solid or powdered form with equally good results. As a means of comparison, one pound of powdered milk is about equal in feeding value to three pounds of condensed milk or nine to ten pounds of liquid milk. Milk is specially valuable for young chicks and for breeding stock.

(b) *Fishmeal*.—Fishmeal has gained in popularity as a protein supplement in recent years. Its quality varies with the kind of fish from which it is made and the method of manufacture. High grade fishmeal contains a high percentage of protein, is rich in mineral elements and some of the vitamins, and low in its oil content.

(c) *Meat scrap*.—Meat scrap or meat meal is a by-product of the packing industry. It is largely used in poultry mashes and the best grades are highly desirable.

(d) *Vegetable proteins*.—Vegetable protein supplements seem to be quite satisfactory for the feeding of cattle but do not give equally good results when fed to hens. Oilcake meal may be used up to five per cent in the laying mash mixture. Cottonseed meal is unsatisfactory because of the undesirable colour and quality it imparts to the yolks of eggs. Soybean meal is probably the best high-protein feed from a vegetable source.

It is possible that part of the superiority of animal protein over vegetable proteins, in poultry nutrition, may be due to the greater amounts of minerals present in feeds supplying the former and not entirely to the low quality of the proteins present in feeds supplying the latter.

## 3. Mineral supplements

Hens require a greater percentage of mineral matter in their feed than other farm animals and need it in a form that can readily be made use of. This is because of the large amount of mineral matter used in forming the shells of eggs.



The dry matter of an egg is more than one-third mineral matter. The mineral elements most likely to be lacking in a hen's diet are sodium, chlorine, calcium and phosphorus. Sodium and chlorine are easily supplied by the use of common salt. Phosphorus is an ingredient of bones and is usually present in meat and fish scrap in sufficient quantity to supply the needs of laying hens. Specially prepared bonemeal is a common ingredient of growing chick mashes and is used occasionally in laying mash mixtures. It contains calcium as well as phosphorus but cheaper forms of calcium are available in oyster, clam or other marine shells. Shells crushed to a size suited to the birds should always be available to the laying flock. Some other mineral elements are necessary in the hens' diet, but the amounts needed are small and the ordinary feeds usually contain a sufficient amount. Recent experimental work has shown that slipped tendon in growing chicks is caused by a lack of sufficient manganese in the diet and that very minute additions of this element will give protection against this disorder.

Grit is also necessary in poultry feeding, not because it supplies nutrients, but because of its help in grinding the food in the gizzard. Commercial grit, or gravel of a suitable size will serve the purpose. It should be of a material not quickly dissolved by the digestive juices or easily worn out with use.

#### **4. Green feed**

Green feeds are much relished by fowls of all ages. They are low in nutrients but because of their juicy nature they have a mild laxative effect on the birds' digestive system and have the further beneficial value of containing important vitamins. Green feed has a particular value in the feeding of growing chicks and breeding stock. Alfalfa leaf meal is sometimes considered a green feed and is often the only source provided laying hens. Dehydrated alfalfa leaf meal, where procurable, is a reasonably priced and efficient green feed substitute. Because of its laxative nature it should not be fed in greater quantity than five per cent of the total ration. When the more succulent green feeds are used, the amount given should be limited to five or six pounds daily per 100 layers because if larger amounts are fed, the consumption of other feeds which are richer in nutrients is too much lessened and egg production is reduced. Good alfalfa, clover or grass range offers an ideal source of green feed. When birds must be housed, or for other reason are not on range, such feeds as freshly cut alfalfa, clover or lawn clippings, sprouted oats, cabbage, kale, mangels and turnips should be provided.

#### **5. Vitamin supplements**

The greatest need for vitamin supplements comes during the winter and spring months when the birds must be confined for long periods and when fresh green feeds are not available. The common grains are likely to be lacking in three vitamins which are required by poultry. Cod liver oil is rich in two of these and the third is found in milk products and alfalfa meal.

#### **6. How to combine the feeds**

While poultry must receive some feed from animal sources, the greater part of their diet comes from cereal grains and their by-products. Experimental work has shown that one grain is just as valuable for egg production as another if proper supplements are given. Grains are decidedly lacking in protein and mineral matter, and a feeding plan must provide for the inclusion of these in proper quantities, together with vitamins in some seasons, in a manner that will be suitable and palatable to the birds and economical to the flock owner.

The method of feeding laying hens which is most used on farms is the giving of part of the feed in the form of whole or cracked grains and the remainder in the ground state. The poultryman calls the former "scratch grain," "scratch feed" or "grain mixture" and the latter "mash" or "mash mixture." The scratch feed consists of two or more grains such as wheat, cracked corn and oats. The bulk of the mash mixture consists of three or more ground grains or grain by-



products such as bran, middlings, cornmeal and ground oats. The animal supplement feeds such as powdered milk, meat meal and fishmeal, the mineral supplements such as common salt and vitamin supplements such as cod liver oil and alfalfa meal are usually added to the mash. The actual mixing of the scratch grain or mash ingredients is done by shovelling these over three or four times on the floor of the feed room. The only ingredient likely to give trouble in mixing is the cod liver oil. It can best be incorporated with the mash by first mixing it with cornmeal or bran and then adding the resultant mixture with the other ingredients.

In feeding practice, approximately equal parts by weight of mash and grain are given in a year's feeding. The actual proportions will vary with the season, with the condition of the birds, with the rate of egg production and possibly with the breed. The grain mixture is higher in heat and energy producing nutrients than the mash so more grain than mash will be fed during winter months. The mash contains a greater percentage of protein than the grain, so in summer when hens need the stimulus of added protein to maintain egg production, they are forced to increase their consumption of mash by reducing the allowance of scratch grain.

A rule-of-thumb method for feeding layers is to give one quart of grain daily to each twelve hens, one-third of this to be fed in the early morning and the remaining two-thirds at night and to keep mash constantly before the birds in hoppers or reel feeders. Hens prefer grain to the mash so the proportions can be readily changed by increasing or restricting the grain allowance from the amount stated. Some poultrymen get good results by giving one feeding daily of the regular mash mixture moistened with milk or water, but more commonly the mash is fed dry. Grain may be fed in troughs or in the litter on the floor. When fed in the litter, the birds get some exercise in their search for the grain and their scratching during this search for food has resulted in the application of the term "scratch" to grain mixtures.

The grain and mash method of feeding has many practical features. In grain growing areas it may be possible to produce all the feeds which enter into the grain mixture and the basal ingredients of the mash mixture. Where grain growing is conducted on a less extensive scale, part of the materials for both mixtures may be home grown. This system of feeding lends itself to easy change to meet local or seasonal conditions. Changes in mixtures can be made, without seriously affecting the balance of nutrients, to take advantage of favourable prices, and the balance of nutrients can be changed to meet various conditions as has been explained in a previous paragraph. The feeding of pellets, of all grain, all mash and other systems of feeding may at times serve a useful purpose but have not the wide application of grain and mash feeding.

The principles which have been described for the feeding of laying hens, apply also to the feeding of growing chickens. During the first few weeks of their lives, chicks require a higher percentage of protein in their diet than at any other time and this need grows less as they develop. The changing requirements of the growing chicks are easily met by adjusting the percentage of protein in the mash and the proportions of mash and grain. Chicks are usually fed an all-mash mixture, which contains a relatively high percentage of protein, for the first six weeks. Later the protein content should be reduced. Grain feeding begins at from four to six weeks of age. At first, the percentage given should be small but it is increased as the chicks develop until as they approach maturity they are getting about three-quarters of their food in this form. The size of grain kernels or particles given to chicks must be varied to suit their needs at different ages. This presents a problem in the home preparation of chick feeds since, frequently, facilities are not available for providing the finely cracked grains necessary during the first few weeks. As a result, commercial chick feeding mixtures are widely used.



## LESSON 7

## POULTRY DIETS

## Topics for Study

1. Diets for starting chicks.
2. Diets for growing or developing chicks.
3. Diets for laying hens.
4. Diets for breeding flocks.
5. University of British Columbia "Foundation" formula.
6. Diets for finishing poultry.

It is generally recognized that there is no one best feed mixture for any specific poultry feeding purpose. Local conditions will have a distinct bearing on the feeds used in any district. The mixtures given in this lesson have proved satisfactory in the districts for which they were designed. The home mixing of feeds makes possible the use of home-grown grains and may have advantages in economy. Feed mixtures for most purposes are easily prepared. The preparation of starting mixtures may be an exception in districts which do not have good grinding facilities and in such districts the use of commercial starting feeds is often warranted. Commercial feed mixtures are available for all poultry feeding purposes. They have the advantages of convenience, thorough mixing and uniformity of composition.

The knowledge regarding poultry nutrition has been expanding rapidly and it is reasonable to suppose, with the amount of investigational work being done, that changes from present day recommendations may be expected. Recent research work indicates that the starting rations which follow may be definitely lacking in the mineral element manganese, in one of the necessary vitamins or in both. The manganese deficiency can be reduced by the greater use of oats in the mixtures or corrected by adding powdered manganese sulphate at the rate of one-quarter pound to each ton of the feed mixture. A higher percentage of milk products will correct the vitamin deficiency. In recent years, Feed Boards have been set up in many of the provinces which revise the recommendations for their respective provinces yearly. Poultrymen should secure up-to-date information regarding rations from such Feed Boards, from local Departments of Agriculture, Agricultural Colleges and Experimental Farms.

**1. Diets for starting chicks**

(a) *University of Saskatchewan formula.*

30 lb. cracked wheat	1 lb. chick size grit
20 lb. granulated oatmeal or oat groats	1 lb. chick size oyster shell
10 lb. cracked barley	1 lb. chick size wood charcoal
15 lb. commercial meat meal or fishmeal	2 lb. cod liver oil
1 lb. bonemeal	4 lb. alfalfa leaf meal

*Feeding directions.*—The above mixture is recommended for the first five weeks. Green feed should be given in addition to the ingredients listed.

(b) *University of Manitoba formula.*

35 lb. ground wheat	5 lb. milk powder (see feeding directions)
20 lb. ground oats (coarse hulls sifted out)	5 lb. alfalfa leaf meal (see feeding directions)
20 lb. ground barley (coarse hulls sifted out)	1½ lb. fine oyster shell
12 lb. meat meal (60 per cent protein)	½ lb. fine salt
	1 lb. cod liver oil



*Feeding directions.*—Since the above mash does not contain cornmeal, care must be taken not to grind the wheat too fine or the feed may paste inside the beaks of the chicks. Where liquid milk is available, the milk powder may be omitted from the mash. If clean chaff from clover or alfalfa hay is available, the alfalfa leaf meal may be omitted. Grit or clean gravel is provided in a small box. After the chicks are one month old, small wheat or wheat screenings may also be fed.

(c) *Maritime Feed Committee formula No. 1.*

100 lb. ground hullless oats	16 lb. beef meal
100 lb. yellow cornmeal	19 lb. milk powder
100 lb. wheat middlings	16 lb. bonemeal
100 lb. shorts	10 lb. cod liver oil
16 lb. white fish meal	

*Feeding directions.*—The chicks are first given fresh, clean water with the chill taken off and some very fine chick grit. The above starting mash is kept continually before them until they are ten or twelve weeks of age. When hullless oats are not available for the mixture, ground oat groats or finely ground oats with any coarse hulls sifted out are recommended. When skim-milk is plentiful, the chicks are given all they will drink, the milk powder is omitted and other protein supplements are reduced in quantity. Finely ground oyster shells are provided at all times and the chicks given range as early as weather permits.

(d) *Ohio Agricultural Experiment Station formula.*

70 lb. yellow corn, coarse ground	5 lb. meat scraps (50 per cent protein)
20 lb. winter wheat middlings or coarse ground wheat	4 lb. poultry bonemeal (granulated)
	1 lb. salt

The above mixture was recommended by the Ohio Agricultural Experiment Station several years ago. It is given here because it has been used extensively in some Canadian provinces and also because it illustrates the high percentage of corn which can be used in a mixture when this material is plentiful or cheap.

*Feeding directions.*—Skim-milk or buttermilk should be given for the first eight or ten weeks. When the chicks must be kept inside most of the time, two pounds of finely crushed oyster shell or ground limestone and from one pint to one quart of cod liver oil should be added to the above mixture. Finely crushed oyster shell should always be available in hoppers. Chicks are allowed on range when weather permits and secure green feed from this source. When they must be kept enclosed, green feed is supplied. This ration can be fed in hoppers or reel feeders, without change, until the birds reach maturity.

## 2. Diets for growing or developing chicks

(a) *University of Saskatchewan formula.*

### MASH MIXTURE

200 lb. ground wheat	50 lb. meat scrap
100 lb. ground oats	20 lb. fishmeal
200 lb. ground barley	10 lb. wood charcoal

### GRAIN MIXTURE

200 lb. wheat	100 lb. oats
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*Feeding directions.*—After the chicks have reached five weeks of age a gradual change is made from the starting formula to the above mash and grain mixtures which are used until the pullets show signs of beginning to lay. When the chicks have to be confined to the brooder house, they should be given green feed daily. It is also advisable to add from one pint to one quart of cod liver oil and five pounds of alfalfa leaf and blossom meal to each hundred pounds of feed. These, if used with bonemeal and oyster shell, should ensure normal growth and avoid leg weakness as well as most of the troubles from crooked keel bones.



(b) *University of Manitoba formula.*

## MASH MIXTURE

100 lb. ground wheat	20 lb. meat meal
100 lb. ground barley (heavy)	5 lb. bonemeal
75 lb. ground oats (heavy)	3 lb. salt

*Feeding directions.*—The chicks are gradually changed from the starting mash to the growing mash at seven or eight weeks of age. A mixture of whole wheat and other whole or cracked grains is also fed. Both grain and mash are kept before the birds in troughs throughout the growing period. Oyster shell is provided in a separate hopper. If milk is available as part of the drink, the meat meal may be omitted from the mash. Green pasture is essential with this ration.

(c) *Quebec Department of Agriculture formula.*

## MASH MIXTURE

800 lb. cornmeal	75 lb. fishmeal
240 lb. ground oat groats	50 lb. meat meal
100 lb. wheat bran	200 lb. powdered buttermilk
300 lb. wheat middlings	40 lb. ground limestone or oyster shell
100 lb. alfalfa meal	20 lb. iodized salt
75 lb. soybean oil meal	

## GRAIN MIXTURE

700 lb. corn	500 lb. barley
500 lb. wheat	300 lb. oat groats

*Feeding directions.*—After the first seven to eight weeks, the all-mash feeding which has been followed to this age, is supplemented by feeding scratch grain in hoppers. The protein requirements of the chicks are lower as growth advances. This is taken care of by the introduction of the grain ration. Grit and shell of chick size, are fed in hoppers only after the grain feeding has commenced. All feed is hopper fed in a dry form throughout the growing period. Sufficient feeding space should be provided. One four-foot hopper, with feeding space on both sides, is needed for each hundred chicks at the start. This space must be enlarged as the chicks grow.

(d) *Maritime Feed Committee formula No. 2.*

## MASH MIXTURE

100 lb. fine ground oats	15 lb. white fish meal
100 lb. yellow cornmeal	15 lb. bonemeal
50 lb. wheat bran	5 lb. charcoal
100 lb. wheat middlings	4 lb. salt

## GRAIN MIXTURE

200 lb. wheat	100 lb. barley
100 lb. oats	100 lb. cracked corn

*Feeding directions.*—After the chicks reach the age of ten weeks, they are gradually worked over to the above grain and mash mixtures. Both may be hopper fed. Range will supply the necessary green feed and water, grit and oyster shell should be provided at all times. Skim-milk can be used to replace the fishmeal, and the amount of whichever of these animal feeds is being given should be reduced as the season advances to prevent too early development and production of the pullets.



### 3. Diets for laying hens

#### (a) University of Saskatchewan formula No. 1.

##### MASH MIXTURE

200 lb. ground barley  
100 lb. shorts  
50 lb. oat chop  
20 lb. bran  
35 lb. meat meal

15 lb. fishmeal  
5 lb. milk powder  
15 lb alfalfa leaf meal  
5 lb. pilchard oil  
5 lb. wood charcoal

##### GRAIN MIXTURE

250 lb. wheat  
100 lb. oats

100 lb. barley

*Feeding directions.*—Fowls should consume about equal parts by weight of mash and grain mixtures. When hens are on range or are being given green feed from the field or garden, the alfalfa leaf meal may be omitted. The pilchard oil may be omitted when the birds are getting plenty of outdoor sunlight. Water or milk, oyster shell and limestone grit should always be available to the birds.

#### (b) Manitoba Feed Board formula No. 1

##### MASH MIXTURE

100 lb. ground wheat  
100 lb. ground oats  
100 lb. ground barley

70 lb. meat meal (50 per cent protein)  
4 lb. charcoal  
2 lb. salt

##### GRAIN MIXTURE

100 lb. whole wheat

50 lb. whole oats or whole barley

*Feeding directions.*—Dry mash is always available to the birds in self-feeding hoppers. Grain is fed at the rate of twelve to fifteen pounds daily to one hundred hens, one-third being given in the morning and two-thirds in the evening. The amount of meat meal may be reduced fifty per cent if plenty of skim-milk or buttermilk is available. Grit and oyster shell should always be available to the birds. Green feeds should be fed in moderation. One-third cupful of cod liver oil should be given daily to each hundred hens from November 1 to May 1. The oil may be fed in a moist mash given at noon in the amount that the hens will eat in fifteen or twenty minutes. Cheap meats, raw or cooked, may be fed at the rate of two or three pounds per hundred hens daily.

#### (c) Maritime Feed Committee formula No. 2

##### MASH MIXTURE

100 lb. fine ground oats  
100 lb. yellow cornmeal  
100 lb. wheat bran  
100 lb. wheat middlings  
50 lb. white fish meal

12 lb. bonemeal  
5 lb. charcoal  
3 lb. salt  
9 lb. cod liver oil

##### GRAIN MIXTURE

200 lb. wheat  
200 lb. cracked corn

100 lb. oats

*Feeding directions.*—Most mash is fed dry in hoppers but a daily feeding of moist mash may sometimes be advisable and makes it possible to include table scraps which are very palatable to the birds. Twelve to sixteen pounds of grain mixture is given daily to one hundred hens, the larger portion of this being given at the evening meal. The actual amount of grain given should be varied according to the body condition of the birds. Water, grit, oyster shell and charcoal are constantly supplied in hoppers. Green feed in the form of cabbage, mangels, swede turnips or sprouted oats should be provided regularly.



*(d) New England College Poultry Feed Conference Board formula.***MASH MIXTURE**

200 lb. yellow cornmeal	25 lb. alfalfa leaf meal (not more than 20 per cent fibre)
100 lb. wheat bran	25 lb. dried skim-milk or dried butter-milk
100 lb. wheat flour middlings	15 lb. ground oyster shell or ground limestone
100 lb. ground oats (38-40 lb. per bu.)	5 lb. common salt
50 lb. meat scraps (not less than 50 per cent protein)	14 lb. cod liver oil (biologically tested)
25 lb. fishmeal (not less than 50 per cent protein)	

**GRAIN MIXTURE**

200 lb. yellow corn, whole or cracked	100 lb. wheat
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*Feeding directions.*—Both dry mash and grain are fed in hoppers or troughs. The amount and the proportion of each varies with the rate of egg production, the body weight of the birds and the weather. The grain mixture may be modified to include oats and barley but should never contain less than 50 per cent corn. Green feed should be provided at the rate of about five pounds per one hundred birds when they do not have a grass range. The cod liver oil may be omitted when the birds are running out of doors. Grit, shell and water should be supplied regularly.

**4. Diets for breeding flocks**

With poultry, production and reproduction are virtually the same. It might seem, therefore, that a ration which will give reasonably good egg production should be equally satisfactory for the breeding flock but such is not the case. To give good hatchability of eggs, the breeding flock requires more of the element manganese and more vitamins than are needed for growth or for egg production. The addition of one-quarter pound of powdered manganese sulphate to each ton of total ration will correct the lack of this mineral element and the substitution of one of the powdered milk products for most of the animal feed in the mash together with the use of cod liver oil and alfalfa leaf meal, previous to and during the hatching season, should supply vitamins in sufficient quantity. The changes in laying rations during the breeding season, which follow, are typical of many which could be quoted.

*(a) Manitoba Feed Board*

It is recommended that the amount of meat and fishmeal in the laying mash be reduced to five per cent and that ten per cent of dried milk powder be added to the mash or twenty-five pounds of skim-milk or buttermilk given as a drink daily to each hundred hens. The usual mineral content of the ration is maintained and, in addition, bonemeal provided in a separate container. Sweet clover or alfalfa leaves are to be given daily and if not available, five per cent of alfalfa leaf meal should be added to the dry mash. Two pints of cod liver or other fish oil should be added to each 100 pounds of dry mash and such oil should be of high quality.

*(b) Fredericton Experimental Station*

The following changes from the standard ration are recommended to be made, about January 1, with breeding flocks. The amount of bran is reduced from 100 pounds to 50 pounds, and 50 pounds of alfalfa leaf meal is added. Fishmeal and meat scraps (25 pounds each) are eliminated and 75 pounds of milk powder used to replace them. No green feed or liquid milk is given, although where an abundant supply of liquid milk is available, it could probably be used to replace part or all of the powdered milk and thus reduce the cost of the ration.



### 5. University of British Columbia "Foundation" formula

In Bulletin No. 107 of the British Columbia Department of Agriculture is given a "foundation" formula for chick developing, laying and breeders' mashes which should serve as a useful guide to poultrymen in preparing feed mixtures. The formula shows the approximate minimum and maximum percentages of the different feeds which can be used without seriously altering the quality of the mash.

FOUNDATION FORMULA

Chick Mash	Developing Mash	Laying Mash	Breeders' Mash	Constituent	Range
42*	39*	26*	30*	Corn.....	20-50%, according to price.
				Wheat.....	10-30%, according to price.
				Barley.....	10-30%, according to price.
10	20	20	20	Oats.....	10-20%, according to price and quality.
10	10	10	10	Bran.....	10-20%, according to price.
10	10	10	10	Middlings or Shorts....	5-15%, according to price.
		5		Rice.....	0-10%, according to price, quality and availability.
5	5	5	5	Dehydrated Alfalfa....	5-10%, according to quality.
10	8	10	10	Fishmeal.....	5-10%, according to quality and price.
5	5	5	5	Meat scrap.....	5-10%, according to quality and price.
5	0	0	5	Milk powder.....	0- 5%, according to price.
	0	5		Soybean Meal.....	0- 5%, according to price and quality.
1	1	2	2	Oyster shell or Lime...	1- 2%.
0	1			Bonemeal.....	0- 1%.
1	1	1	1	Common or Iodized Salt.....	$\frac{1}{2}$ - 1%.
1		1	2	Fish oil (85 units Vitamin D).....	1- 2%, according to season.
100	100	100	100		

\* At least two grains.

### 6. Diets for finishing poultry

In districts where they are available, corn and buckwheat are specially valuable for the finishing of poultry. Yellow corn produces a yellow-coloured fat and skin in the carcass which some markets object to. White corn has the same value as a fattening feed and does not produce this yellow coloration.

#### (a) University of Saskatchewan formulae

##### MIXTURE No. 1

200 lb. shorts  
100 lb. feed oatmeal

100 lb. shorts  
100 lb. feed oatmeal

##### MIXTURE No. 2

100 lb. ground wheat  
200 lb. ground barley

100 lb. ground oats

*Feeding directions.*—Mix the required amount for one feeding with twice the weight of skim-milk or buttermilk and let stand for ten or twelve hours. When fed, it should pour from a dipper in a medium batter which the birds can pick up easily from a V-shaped wooden trough. When milk cannot be used, the grain may be mixed with water and from five to ten per cent of meat meal should be added to the mash mixture.



(b) *Manitoba Feed Board formulae*

## MIXTURE No. 1

100 lb. finely ground wheat  
200 lb. finely ground oats  
100 lb. finely ground barley

## MIXTURE No. 2

100 lb. finely ground wheat  
100 lb. finely ground oats  
100 lb. finely ground barley

*Feeding directions.*—For crate fattening, mix the mash with skim-milk or buttermilk to make a batter that will pour nicely. If milk is not available, add seven pounds meat meal to each one hundred pounds of grain and use water to make the batter. Feed lightly at the start, then all the birds will eat twice a day. They need nothing to drink. For pen fattening, feed the wet mash crumbly only once a day and also keep a dry mash and hard grain in hoppers in front of them all the time. About three weeks from killing date, discontinue dry mash and whole grains and feed wet mash two or three times daily. Give milk or water to drink. Boiled potatoes may be added to the wet mash. Whether fattening in crates or pens, allow twenty minutes for wet mash feeding, and do not leave any in the troughs from one meal to the next.

(c) *Quebec Department of Agriculture formula*

## MASH MIXTURE

500 lb. ground wheat  
600 lb. ground oats  
580 lb. ground barley

200 lb. meat meal  
100 lb. powdered buttermilk  
20 lb. iodized salt

*Feeding directions.*—Mix with water so that the feed will run freely from a pail. No water is required as a drink when the feed is given in proper form. The feeding period in crates or batteries will range from 10 to 21 days depending on the age and condition of the birds.

(d) *Maritime Feed Board formula No. 1*

## MASH MIXTURE

200 lb. ground wheat  
200 lb. yellow cornmeal

100 lb. ground oats

*Feeding directions.*—This mixture will not produce birds that will class as "milkfed" but may be used where markets do not discriminate against yellow-skinned poultry. The mash is mixed to a batter-like consistency, similar to porridge, with skim-milk or buttermilk.

*NOTE.*—See Lesson 14 for further particulars regarding the finishing of poultry for market.



## LESSON 8

### ANATOMY OF THE DOMESTIC FOWL

#### Topics for Study

1. Feathers.
2. Skin.
3. Skeleton.
4. Muscles.
5. Digestive system.
6. Respiratory system.
7. Urinary system.
8. Reproductive system.

When compared with other farm animals, hens are "fast-living" or "high-gearred" creatures. The rate of breathing, pulse rate and rate of digestion are faster than with horses, cattle, sheep or swine. The temperature of the body is higher and generally speaking hens are short lived although there are records of birds having lived at least 25 years. They differ from other animals in having a coat of feathers and in the fact that the development of the young takes place almost wholly outside the body of the mothers.

#### 1. Feathers

The coating of feathers helps in keeping the body warm, protects the bird from injury and assists it during flight. While the body appears to be completely covered with feathers these will be found, on close examination, to be arranged in rather distinct regions or tracts including the shoulder, thigh, rump, breast, neck, abdomen, leg, back, wing coverts and head.

Feathers differ in size and shape on different parts of the body. They are made up of the quill or round, hollow part, which attaches the feather to the body, the extension of the quill throughout the length of the feather known as the shaft and the barbs which branch from the shaft. The barbs branch to form barbules and the barbules in turn branch to form barbicules. The shaft with attached barbs is spoken of as the vane.

The annual shedding or molt of the feathers is a considerable physical drain on the bird. The large wing and tail feathers are molted and replaced in a definite and regular order and this fact is made use of in estimating how long a hen has been out of production as is explained in Lesson 10. A knowledge of feather type is often useful in determining the sex of growing chicks. The neck, back and saddle feathers of males are longer and more pointed than those of the females.

#### 2. Skin

The skin of the hen has no sweat glands so no sweating takes place. Body wastes are voided through the respiratory and urinary systems. The comb, wattles, ear lobes and the scales of the legs and toes are specialized developments of the skin.

#### 3. Skeleton

The bones of the hen are strong but light in weight, many of them being hollow. The skeleton is thus well adapted to a creature of flight. The most distinctive feature of the skeleton is the keel-shaped breast bone or sternum.

#### 4. Muscles

The breast muscles are specially developed for flying. This results in the great lean meat or muscle development, so much desired for table purposes, that is found on either side of the breast bone.



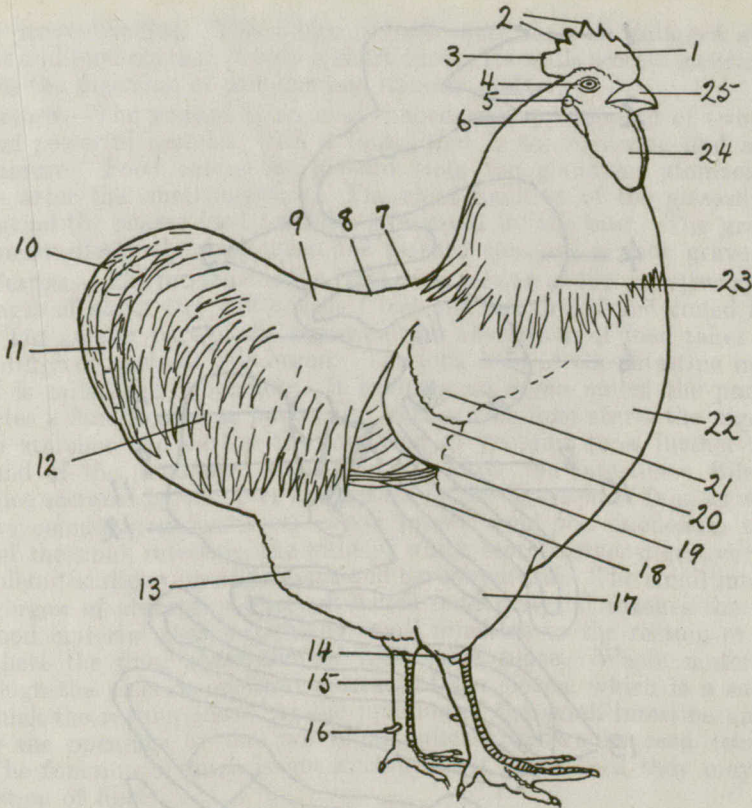


DIAGRAM SHOWING PARTS OF THE FOWL

- |                     |                 |
|---------------------|-----------------|
| 1. Comb             | 14. Hock        |
| 2. Points           | 15. Shank       |
| 3. Blade            | 16. Spur        |
| 4. Eye              | 17. Thigh       |
| 5. Ear              | 18. Primaries   |
| 6. Ear lobe         | 19. Secondaries |
| 7. Cape             | 20. Wing bar    |
| 8. Back             | 21. Wing bow    |
| 9. Saddle           | 22. Breast      |
| 10. Sickles         | 23. Hackle      |
| 11. Main tail       | 24. Wattles     |
| 12. Saddle feathers | 25. Beak        |
| 13. Fluff           |                 |

## 5. Digestive system

The digestive system of the hen differs from that of both carnivorous (flesh eating) and herbivorous (vegetable eating) animals. It resembles both in some particulars. The hen eats both animal and vegetable food and the term omnivorous is applied to it. Hens have not the capacity to digest bulky and fibrous foods as have cows and sheep. Their digestive systems are best adapted to the use of more concentrated feeds but some bulky material must be given or indigestion will result.

(a) *Beak*.—The hen lacks the lips and teeth common to most animals and has, instead, a horny beak which is used for picking up and tearing apart the food.

(b) *Mouth*.—Hens have no teeth and no chewing of food takes place. It is swallowed immediately.

(c) *Gullet*.—The gullet is the passage or tube through which the food passes from the mouth to the crop and from the crop to the glandular stomach.



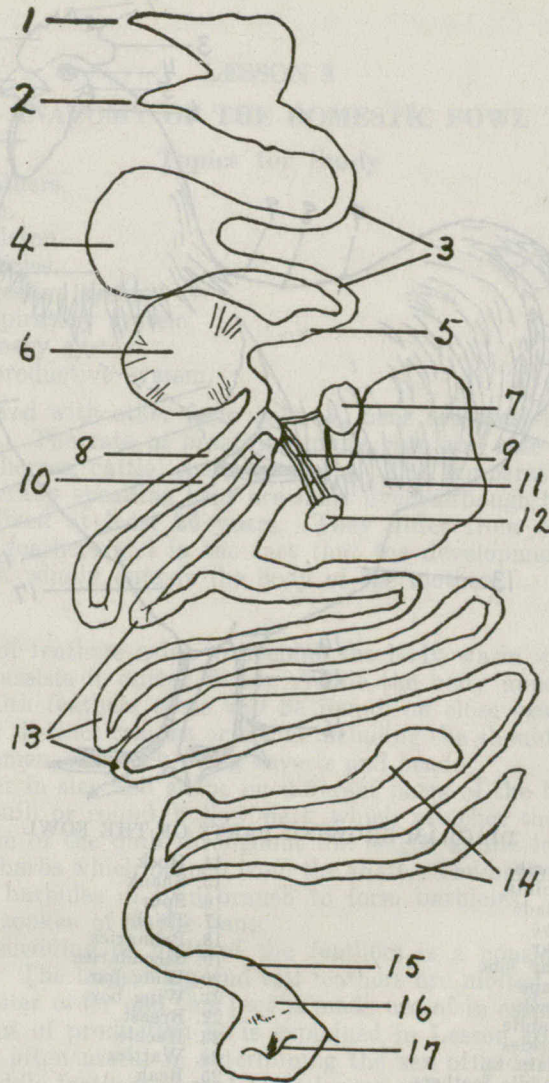


DIAGRAM SHOWING PARTS OF DIGESTIVE SYSTEM OF THE DOMESTIC FOWL

- |               |                     |
|---------------|---------------------|
| 1. Upper beak | 10. Pancreas        |
| 2. Lower beak | 11. Liver           |
| 3. Esophagus  | 12. Gall bladder    |
| 4. Crop       | 13. Small intestine |
| 5. Gizzard    | 14. Ceca            |
| 6. Spleen     | 15. Rectum          |
| 7. Duodenum   | 16. Cloaca          |
| 8. Bile ducts | 17. Anus            |

(d) *Crop*.—The crop is an enlargement of the gullet, midway in its length, which serves as a storage space for food and in which softening and partial digestion takes place. In these respects its function is somewhat similar to that of the paunch of cud-chewing animals.

(e) *Glandular stomach*.—From the crop the food is carried through the continuation of the gullet well into the body cavity where it enters the glandular



stomach or proventriculus. This organ is little more than an enlarged section of the gullet and food stays in it only a short time. Its walls secrete gastric juice which begins the digestion of proteins and mineral matter.

(f) *Gizzard*.—The gizzard is an oval-shaped organ, composed of two pairs of thick and powerful muscles, with a lining that is thick, strong and almost horny in nature. Food enters the gizzard from the glandular stomach and leaves it to enter the small intestine. The chief function of the gizzard is to crush and grind the coarse food particles swallowed by the bird. The grinding process is most effectively done when the gizzard contains grit or gravel.

(g) *Intestine*.—The intestine is the remaining section of the digestive system. It has a length of about two and one-half feet and lies folded and coiled in the abdomen. The greater part of the digestion and absorption of food takes place within the different parts of this organ. The long loop of the intestine nearest the gizzard is called the duodenum. It encloses an organ called the pancreas which secretes a fluid known as pancreatic juice. This fluid starts the digestion of fats and starches and carries the digestion of proteins to a further stage. Near the end of the duodenum the bile ducts enter the intestine. Bile is a digestive juice secreted by the liver and assists in the digestion of fats, as well as having more complicated functions. Food passes from the duodenum to the remainder of the small intestine, the walls of which secrete other digestive juices which complete the digestion of proteins and carbohydrates. The small intestine is also the organ of absorption through which food material reaches the blood stream. Food material passes from the small intestine to the rectum or large intestine where the final absorption of food takes place. Waste material is voided through the anus or outward opening of the cloaca, which is a sac-like organ in which the rectum ends. At the junction of the small intestine and the rectum are the openings of the two blind pouches known as ceca (singular cecum). The function of these is not known but it is believed they may help in the digestion of fibre.

## 6. Respiratory system

The lungs of the hen are not capable of expansion as is the case with other farm animals and they also differ in that breathing out (expiration) is the active part of respiration. There is a definite connection between the lungs, the hollow bones and the air sacs which are found within the body thus providing for ease in flight.

## 7. Urinary system

The kidneys lie close to the back bone and are long, irregularly shaped and dark-coloured organs. They filter waste matter from the blood and discharge it into the cloaca from which it is voided with the droppings.

## 8. Reproductive system

The reproductive system of the female is of special interest since this is the egg-manufacturing plant of the hen. The ovary is located on the left side of the bird, back of the lung and below the forward part of the left kidney. In the laying hen it appears as a grape-like cluster of yellow ova or yolks varying in size from a fully formed yolk down to those too small to be seen with the unaided eye. The oviduct lies in the upper left side of the abdomen. It is a coiled tube through which the yolk passes when mature and in which the white of the egg or albumen is added and the shell formed. While not directly connected with the ovary, the oviduct has a funnel-like part which reaches upward towards the ovary and receives each yolk, as it reaches full size and breaks away from the ovary. The length of time from when the yolk enters the oviduct until the egg is laid may vary somewhat but is estimated to be about 24 hours.



## LESSON 9

**BREEDS OF POULTRY****Topics for Study**

1. Economic classification of chickens.
2. Standard classification of chickens.
3. Description of common breeds and varieties.
4. What breed to choose.

**1. Economic classification of chickens**

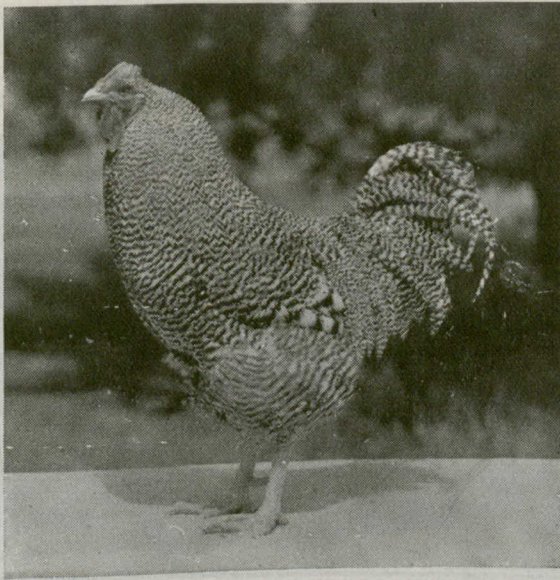
It is usual to consider breeds of chickens as being either ornamental or productive. The Bantams, Games and Polish are examples of the ornamental class while Plymouth Rocks, Leghorns and Orpingtons are typical of the productive class. Birds of the former class are kept chiefly as a hobby, while those of the latter class are bred for the production of eggs and meat. The productive class may be sub-divided into egg, dual purpose and meat breeds. Leghorns, Minorcas and Anconas are examples of egg breeds; Plymouth Rocks, Wyandottes and Rhode Island Reds are well known dual purpose breeds; while Brahmas, Langshans and Cochins are typical meat breeds. It should be pointed out that all breeds of the productive class produce both eggs and meat. The egg breeds are kept primarily for egg production and do not provide a high quality of meat. With the dual purpose breeds, egg production is of greater importance than meat production but the production of meat is relatively more important than with the egg breeds and it is from birds of these breeds that most poultry meat comes. The so-called meat breeds produce the largest carcasses and finest quality of meat but because of the slow maturity of the birds they are relatively unimportant in the poultry meat industry. No breed remains popular in farm flocks unless it has reasonably good egg production.

**2. Standard classification of chickens**

The American Standard of Perfection is a book published by the American Poultry Association which describes all recognized breeds and varieties of domestic poultry. Each variety is described in detail as to shape, size and colour and most varieties are illustrated. Particulars are given as to defects and disqualifications. It is the standard by which exhibition poultry is judged on the North American continent. The Standard is revised frequently to include new breeds and new ideals regarding existing breeds. It is invaluable to the poultry judge, the fancier or the breeder of exhibition poultry. It is not within the scope of the Standard to compare the economic values of different breeds nor to give advice in selection and breeding that will help the poultryman attain the ideals described and illustrated in its pages.

The terms "class", "breed" and "variety" are used in describing Standard-bred poultry. Class indicates chiefly the country of origin as for example the English, American and Asiatic classes. Breeds are distinguished chiefly by body shape or type. Varieties within a breed are distinguished by the colour pattern of the feathers or by the type of comb. Thus with the Plymouth Rock breed of the American class there are Barred, White, Buff, Columbian and other varieties having the same type and size, and differing only in the colour of the plumage. Varieties within a breed do not necessarily have a similar ancestry.





BARRED PLYMOUTH ROCK COCK

An exceptionally valuable male. His 86 daughters gave an average production of 197.8 eggs. (Photo, courtesy of Dominion Experimental Station, Fredericton.)



BARRED PLYMOUTH ROCK HEN

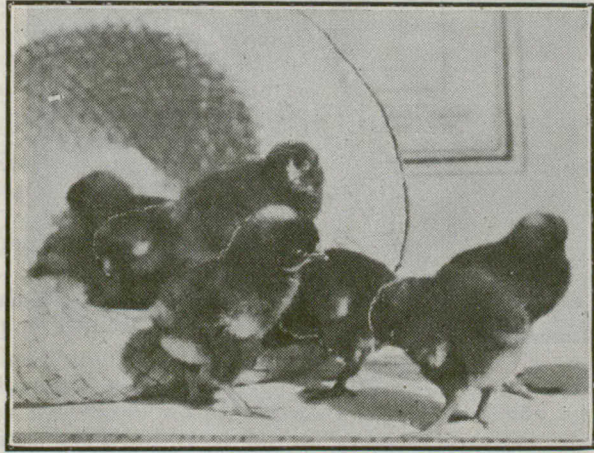
This hen laid 313 eggs in the New Brunswick Egg Laying Contest.

### 3. Description of common breeds and varieties

(a) *American breeds.*—Most breeds of the American Class have been developed in the United States and Canada to meet the particular market demands of these countries. Generally speaking they are medium in size and good producers of both eggs and meat. They are yellow skinned, clean legged and with one exception, their eggs have brown or tinted shells. Their ability to stand confinement well, coupled with the characteristics noted above make them desirable and popular for farm flocks. They are less excitable than Mediterranean breeds, more inclined to broodiness and do not give as high



fertility and hatchability. The American breeds of poultry are Plymouth Rock, Wyandotte, Java, Dominique, Rhode Island Red, Rhode Island White, Buckeye, Chantecler, Jersey Black Giant, New Hampshire, and Lamona. A brief description of those having greatest economic value is given in the following paragraphs.



BARRED PLYMOUTH ROCK CHICKS



WHITE PLYMOUTH ROCK COCK

#### PLYMOUTH ROCK

Seven varieties of Plymouth Rocks are recognized, viz. Barred, White, Buff, Silver-Pencilled, Partridge, Columbian, and Blue. All have single combs. Only the Barred and White varieties have yet achieved much commercial importance. The Barred variety is one of the oldest, has had much done with it to develop its egg laying qualities and for many years has enjoyed widespread popularity. Very high egg laying strains have been developed and the birds are very desirable for the production of both broilers and roasters. The dark-coloured pin feathers in dressed carcasses are objected to by some but many markets pay a premium for poultry of this breed. Selection for extremely high



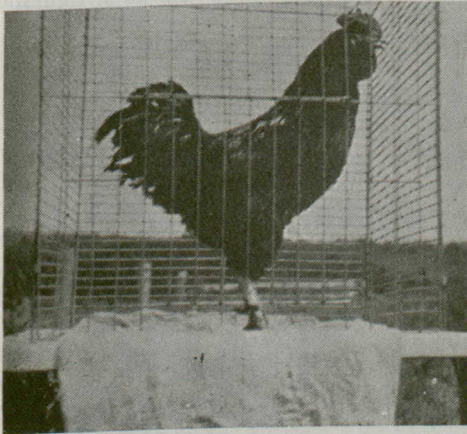
egg production may, in some cases, have resulted in loss of size and vitality and in reduction of egg size but these defects can be corrected by better balanced selection. Slow feathering and late maturity are defects in some strains of this breed, particularly those having narrow barring in the feathers. White Plymouth Rocks are splendid fowls for meat production but have not gained the same popularity for egg production that the Barred variety has.



WHITE WYANDOTTE COCK AND HEN

#### WYANDOTTE

Birds of this breed are a little smaller than Plymouth Rocks, rounder in shape and more loosely feathered. They are useful for both egg and meat production. Of the eight varieties, White, Black, Buff, Columbian, Silver Laced, Golden Laced, Partridge and Silver Pencilled, the White has been most popular on commercial poultry farms. The Standard calls for rose combs in this breed but the appearance of single combs is quite a common fault in some strains. It is believed that this breed has been injured from an egg producing standpoint by continued selection for a short-bodied, loose-feathered bird.



RHODE ISLAND RED COCK

#### RHODE ISLAND RED

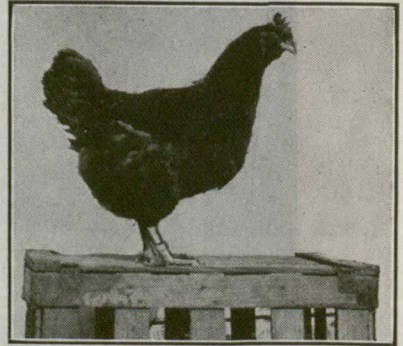
This utility breed has long been popular in the Eastern States and is widely distributed elsewhere. In type it is somewhat brick shaped, being more up-



standing and longer in body than either Plymouth Rocks or Wyandottes. Two varieties are recognized, the only difference between them being that one has single combs and the other rose combs. The former are most popular in commercial flocks. Defects noticed in some strains are slow maturity and a persistent broody tendency.



NEW HAMPSHIRE COCK



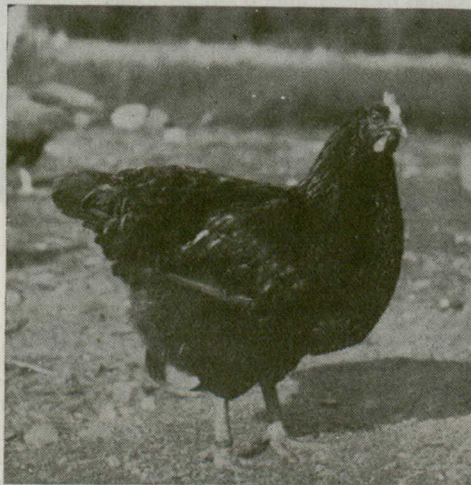
NEW HAMPSHIRE PULLET

## NEW HAMPSHIRE

Single combs only are recognized in this breed which was admitted to the Standard in 1935. The plumage is of a lighter shade of red than that of Rhode Island Reds and the body less rectangular in shape. They are good producers of large eggs which have high hatchability. The chicks feather quickly, mature early and large egg size is reached at an early date after laying begins.

## JERSEY BLACK GIANT

This breed was developed to furnish heavy roasters and capons for special trade and its principal value lies in supplying such demand.



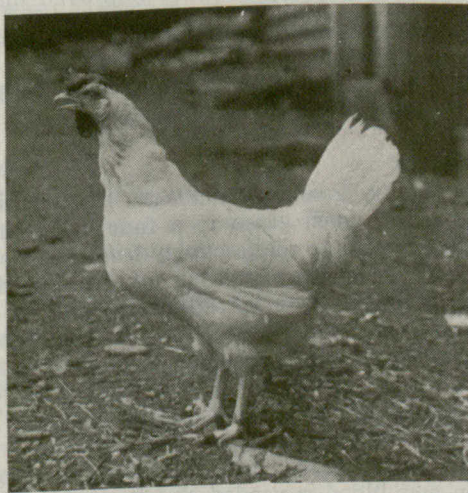
JERSEY BLACK GIANT



(b) *Mediterranean breeds*.—The breeds in this class originated in the countries such as Spain and Italy which border on the Mediterranean Sea. They vary considerably in size but are all of egg type and all lay white-shelled eggs. Two breeds, the Leghorns and Anconas, are yellow skinned while Minorcas, Black Spanish, Blue Andalusians and Buttercups have white skin. In this class are found the most efficient egg producers. They are heavy layers of good sized eggs. Fertility and hatchability of eggs are usually higher than with American breeds. Some of the Mediterranean breeds produce good broilers but in general they are not well suited to meat production. The birds are nervous in temperament, are almost lacking in broody tendency and consequently make unreliable mothers. While hardy, they have large combs and wattles which freeze easily in severe winter weather.

#### LEGHORN

There are White, Brown, Buff, Black, Silver, Red, Black-Tailed Red and Columbian varieties of Leghorns. With White and Brown Leghorns there are both single and rose combs and with Single Comb Brown there are colour differences designated as Light and Dark. Because of their small size, Leghorns require less floor space and less feed per bird than do birds of the American breeds. The Single Comb White Leghorn has gained great popularity on commercial egg farms and it greatly outnumbers all other varieties.

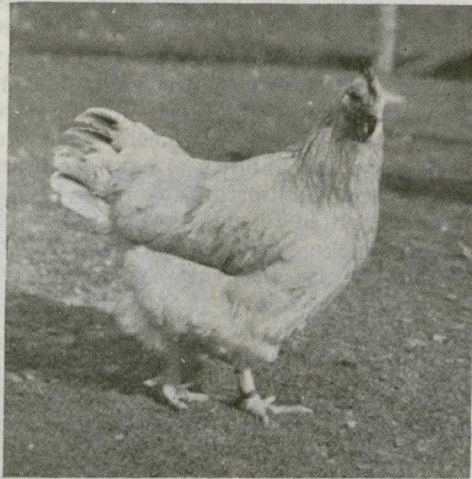


SINGLE COMB WHITE LEGHORN HEN

(c) *Asiatic breeds*.—The Asiatic class includes Brahmas, Cochins and Langshans. These birds have relatively little importance in Canada at the present time although they have been used extensively in the development of many of the newer and more popular breeds. The birds are large in size and produce meat of highest quality but they mature slowly and are comparatively poor egg producers. Their usefulness has suffered because of selection for extremely heavy feathering.

(d) *English breeds*.—The English breeds of poultry incline to the dual purpose type, being somewhat similar in shape to the American breeds. Dorkings and Red Caps lay white-shelled eggs while Orpingtons, Cornish, Sussex and Australorps lay brown-shelled eggs. All except the Cornish have white skin. Orpingtons, Sussex and Australorps are the most popular breeds in this group.





BUFF ORPINGTON HEN

Dark Cornish and Light Sussex birds have been crossed with American breeds in some cases, in an effort to produce poultry of improved market type.

(e) *Other breeds.*—Polish, Hamburg, Houdan, Campine, Game and Bantam varieties are occasionally seen at exhibitions. These have some value as producers of human food but have not been developed to the point that they have great economic value in this climate.

#### 4. What breed to choose

The advice so frequently given beginners to "start with the breed you like the best" is probably sound when given to a fancier but may be entirely misleading to the person who wants to make money from his flock. The fancier may derive great enjoyment from the breeding of Golden Spangled Hamburgs, Bearded Silver Polish or Silver Seabright Bantams and he is probably justified in selecting a breed different from those owned by his friends and neighbours. The advantages in commercial poultry raising seem to lie in raising varieties that are popular and the choice of any one of the varieties mentioned above for commercial egg farming could only result in financial failure. Better advice to the beginner in commercial poultry farming is to start with a variety that has proved profitable in his own locality. It is easy to get stock of such a variety, easy to renew it when new blood is needed and frequently easy to make sales to other breeders. The person who is raising poultry as a means of making a living will usually soon learn to like a breed that is profitable. Comparatively few breeds, in their present state of perfection, have commercial possibilities.



## LESSON 10

### CULLING POULTRY

#### Topics for Study

1. The meaning of culling and selection.
2. Why culling is done.
3. When to cull.
4. Catching and handling the birds.
5. Laying vs. non-laying hens.
6. Culling chart.
7. Estimating present and past production.
8. Practical application of culling methods.

#### 1. The meaning of culling and selection

The term "culling" is usually applied to the removal of poor layers from the flock. In its broadest sense it might be applied to the sorting of undesirable hatching eggs, chicks, pullets, cockerels, hens or cock birds from the more desirable ones. The word "selection" is commonly used to denote the choosing of the best individuals in the flock. The points considered in culling and selecting poultry are the same. The poultryman culls out his poorest layers because they are unprofitable and selects the best for breeders because he knows that high egg production is an inherited tendency.

#### 2. Why culling is done

In practically all flocks of laying hens that have not been culled, will be found good, medium and poor egg producers. There is no clean cut distinction between these grades. A poor producer may pay some profit when eggs are worth 40 cents a dozen but will be kept at a loss when eggs will bring only 20 cents. A flock that has not been culled may contain hens which have never laid and at some seasons of the year there certainly will be birds which have stopped laying and are being kept at a loss. There are cases on record where half an entire flock was marketed as culls, without affecting its egg production. Frequently birds will bring a better price if marketed as soon as they stop laying, than if kept until later in the year. The owner, in such a case, not only gets a higher price for the birds culled from the flock but makes a saving in his feed bill. The birds left in the flock, because of less crowded conditions, frequently lay more eggs than before the culling was done. In addition to immediate benefits, the flock owner has retained the birds which are most likely to produce well in their second year and to be the most valuable breeders.

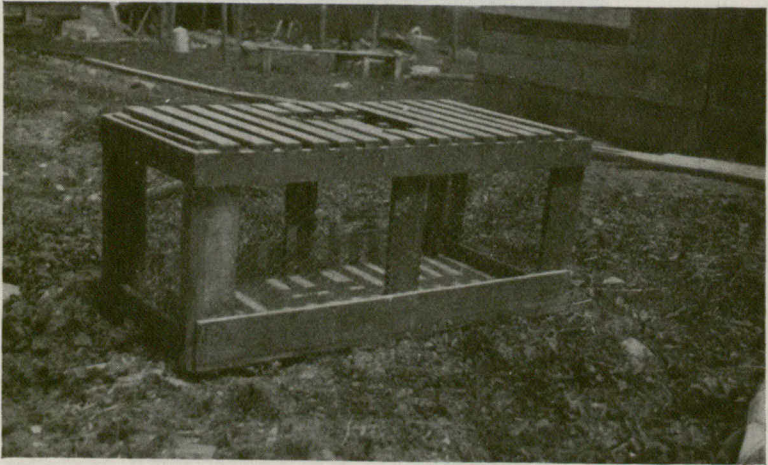
#### 3. When to cull

Culling should be somewhat of a continuous procedure with the poultryman. When a bird becomes unprofitable as a layer, it is best to get rid of her. Under usual farm management many hens become unprofitable during the summer and fall months. Culling should be rigorous at this time but should not be limited to this season. In any good sized flock there will be birds, in every month of the year which should be disposed of.

#### 4. Catching and handling the birds

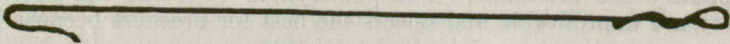
An experienced poultryman will be able to detect many culls by their general appearance in the flock but when a systematic culling is undertaken, all birds in the flock should be caught and handled. A catching crate, which will





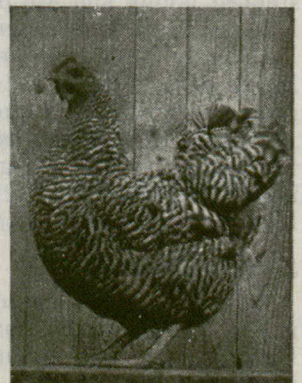
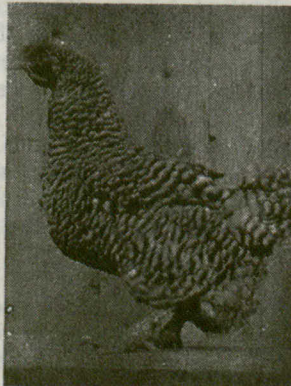
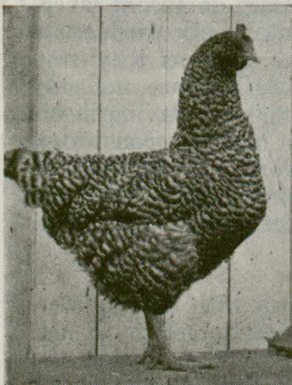
CATCHING CRATE

hold about twenty hens, is useful where a large flock is to be handled. In smaller flocks, the birds may be caught with a wire hook but care should be taken in its use to avoid injury to their legs. Egg production of the flock will be least affected when the birds are caught and handled quietly.



HOME-MADE WIRE CATCHING HOOK

For examination, the birds are held, in turn, with the body resting on the palm of the hand and facing the operator. The fore-finger extends between the bird's legs while pressure, from the thumb on one side and the second finger on the other, holds the bird securely. This manner of holding is comfortable to the hen and leaves the operator with one hand free to make a thorough examination of the bird.



A STUDY IN BODY TYPE

Left, a good type for high egg production. Note her horizontal back, sloping underline, good length of keel and full abdomen. Centre, a low-producing type. This bird has a relatively short keel bone and is inclined to deposit internal fat which causes sagging of the abdomen at the rear of the keel bone. The abdomen of this bird is quite hard to touch. Right, a low-producing type. This bird is very short and has a round underline which is seldom found in high producers. She is also relatively loose-feathered.



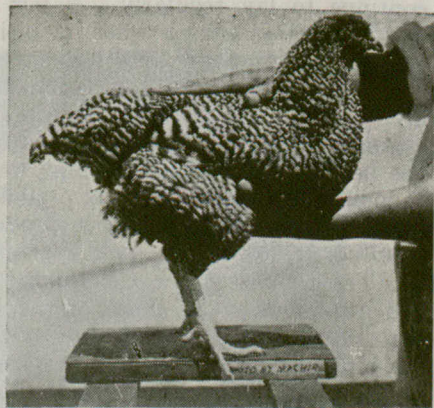
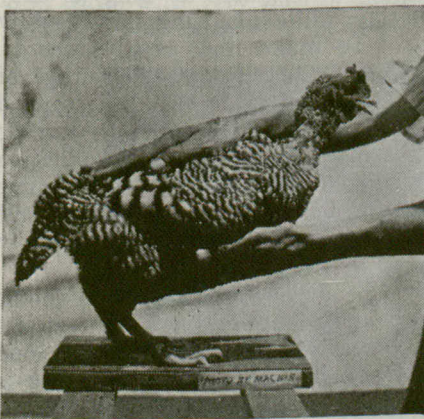
## 5. Laying vs. non-laying hens

The comb, ear lobes and wattles of the bird which is not laying will be dry, shrivelled and cold to the touch in contrast to the larger, full, waxy and warm head parts of the bird in full production. The eye ring and beak of the non-layer will bear a decided yellow colour, while those of the layer will be bleached to white or pinkish white. The pubic bones (the bones slightly below and on either side of the vent) are close together in the bird which has not been producing and spread wide apart in the bird that is in full production. The abdomen of the non-layer will feel hard, shrunken and "tucked-up" with its skin covering harsh and thick, while in the laying hen it will be full and soft with a thin and pliable skin. The vent of the bird which has been out of production will be small, rounded, puckered and yellow in colour compared with the large, oval, moist and well bleached vent of the producing hen.

## 6. Culling chart

The points to be considered in culling the non-producing hens from the flock are well summarized in the following culling chart:—

Character	Layer	Non-layer
Health .....	Good, active, alert, in good flesh	Dull, listless, thin or overfat and broken down behind
Moult .....	Not moulting until last of September or later	Moulting in August or early September
Comb and Wattles ...	Large, red, waxy	Shrunken, dull in colour, scaly in appearance
Face .....	Clean cut, lean	Wrinkled, beefy
Eye .....	Bright, prominent and full of life	Sunken, dull, listless in appearance
Eye Ring .....	Thin, white	Thick, yellow
Pubic Bones .....	Thin, flexible, wide apart	Thick, less flexible, close together
Abdomen. . . . .	Deep, soft, pliable	Shallow, hard, unyielding
Skin .....	Soft, thin, silky	Hard, thick, harsh
Vent .....	Large, expanded, oval, moist	Small, puckered, round, dry
Shanks .....	White, flat, thin	Yellow, round, thick
Beak .....	White	Yellow
Plumage .....	Worn, broken, faded, close-feathered	New, or bright, glossy, loose-feathered



DETERMINING RELATION OF KEEL TO BACK

With the high producer (left), the finger tips of the lower hand point downward. With the non-producer (right), the finger tips of the lower hand point towards the tail. (Photo. courtesy of Kansas Agricultural Experimental Station.)



## 7. Estimating present and past production

The preceding paragraphs give information which will enable the flock owner to determine whether or not his birds are laying. Such information is sufficient for the culling of birds which are out of production but where breeding pens are to be selected, the owner wants to know when each hen began to lay, how long she laid, the rate of her production and whether or not she took any rest periods. Trapnesting will furnish this information most accurately but is not always possible on the farm. A further knowledge of the principles of culling will enable the poultryman to make a reasonably accurate estimate of the production of his birds.

(a) *Pigment changes.*—Most of the common breeds of chickens have a yellow skin. The pullets, before laying starts, have a decided yellow colour in the shanks, beak, eye ring and vent. With birds of the Mediterranean breeds this colour is also found in the ear lobes. This yellow pigment or colour comes from the food the hen eats and is the same material which colours the yolk of the egg. When a hen is laying, the colouring matter from her food goes into the eggs she lays and that which was present in the parts named above fades out. If she stops laying, the pigment is again deposited in the body parts.

When a pullet's production begins, the yellow colour fades very quickly from the vent, disappearing when about half a dozen eggs have been laid. In most cases the production of a dozen eggs will bleach the eye ring. The ear lobes bleach just a little more slowly. The beak loses its colour, first at the base and gradually towards the tip, taking from four to six weeks and a production of from 30 to 40 eggs to become entirely bleached. The shanks bleach more slowly and are not entirely faded until the bird has been in continuous production for a period of from four to six months, during which time she will have laid from 125 to 175 eggs.

Many factors influence this rate of bleaching, including the size of the hen, the feeds given, the rate of production, the breed, variety, strain, individuality, age and health of the birds. When laying ceases the colour returns in the same order it disappeared but at a faster rate.

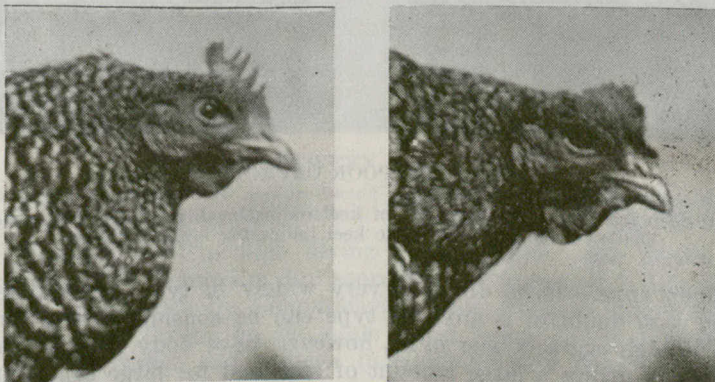
An examination of birds for pigment changes must be made in daylight. White and yellow cannot be distinguished under artificial light.

(b) *Moult.*—Hens usually retain their coat of feathers as long as they continue to lay regularly. A few hens will lay while moulting, but usually egg production ceases when moulting begins. To make high yearly records, hens must lay until quite late in the fall without interruption. The stage of moult during the fall months can be used in estimating when the hen stopped laying. With this information the length of her season's production can be estimated and this, in turn, is helpful in estimating what her yearly production has been. The time of hatching must be considered in its relation to the time of moulting, when estimating production. Hens which moult late usually moult most quickly and are back in production with a minimum loss of time. Early moulters seldom make high yearly records.

The neck feathers are usually the first to be dropped in a general moult and are followed by those of the back, body and wings. The wing feathers are dropped in a regular order which makes it possible to estimate how long the bird has been moulting and hence (usually) not laying. When a wing is spread out, it naturally divides into two sections. On the outer part are ten long feathers, with the shaft near one side, known as primary wing feathers. On the section nearest the body are the secondary wing feathers. These are also long feathers but with the shaft in the centre. Between primary and secondary feathers is a smaller feather known as the axial feather. When a hen moults, the first feather to be dropped from the wing is the innermost



primary, or the feather nearest to the axial feather. In about two weeks the next primary feather is dropped and they continue to shed in regular order at about two-week intervals, the outermost feather being the last to loosen and fall out. New feathers quickly replace those which have been shed. It takes about six weeks for each new primary feather to reach its full length. Knowing that the primary feathers drop at intervals of two weeks and that six weeks is taken in growing each replacement feather to its full length, it is easy to estimate how long the bird has been moulting. This regularity of moulting wing feathers is most pronounced with early moulters. Late moulters occasionally shed only part of the primary feathers and frequently lose two or more at one time.



A COMPARISON OF HEAD TYPES

Left, the lean or clean cut head of the heavy layer. Right, the beefy head of the poor producer.

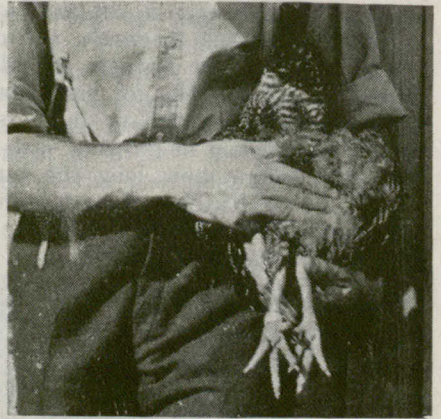
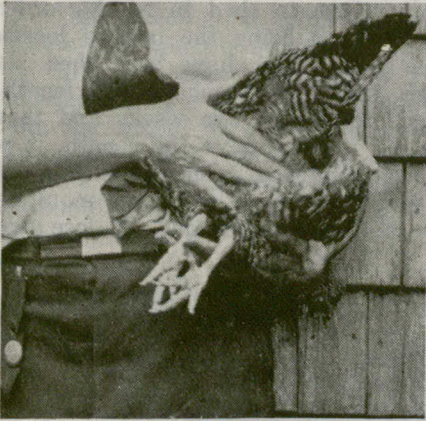
(c) *Head type*.—The typical head of a high-laying hen is medium in length and width, clean cut, free from wrinkles, beefiness or coarseness and with a bright prominent eye. Poor types of heads are those which are long and sunken in front of the eye or crow heads, those with overhanging brows, wrinkled or beefy heads, those which are overrefined, those which are sunken eyed and those with very narrow points on the comb. The head is usually a good index to the value of a hen as a layer.



GOOD VS. POOR BODY TYPE

Left, poor producer. Right, good producer.





#### GOOD VS. POOR CAPACITY

Left, deep from pubic bones to tip of keel indicating high production. Right, shallow from pubic bones to keel indicating low production.

(d) *Body type*.—Hens differing very widely in type have made high egg records and it is doubtful if any one type can be considered best for egg production. The high egg producer must, however, have body room for a digestive system that can utilize a large amount of feed and for large egg-laying organs. This requires a body that is relatively broad and deep. The back should be broad and flat and carry its width well back. The breast should be full and prominent with the keel bone long and straight. When in a laying condition, the good hen will be deeper behind than in front, and when handled will show good width between the pubic bones and good depth from the pubic bones to tip of the keel.



#### GOOD VS. POOR PRODUCERS

Left, good width between the pubic bones indicating heavy production. Right, narrow between the pubic bones indicating poor production.





#### WIDTH BETWEEN PUBIC BONES

Left, narrow width of the non-producing hen compared with right, the much greater width in a laying hen.

(e) *Temperament*.—The high laying hen is active. She leaves the roost early in the morning, spends the day searching for food and is late in going to roost at night. She is usually comparatively tame, appears happy and is often heard singing. Poor layers, on the other hand, spend much of their time on the roosts and are timid and inclined to squawk when handled.

(f) *Plumage*.—The bird which has laid heavily during the winter and spring months will lose much of the oiliness and gloss of her feathers. They become dry and brittle and are often ragged and broken.



#### A POULTRY CULLING DEMONSTRATION

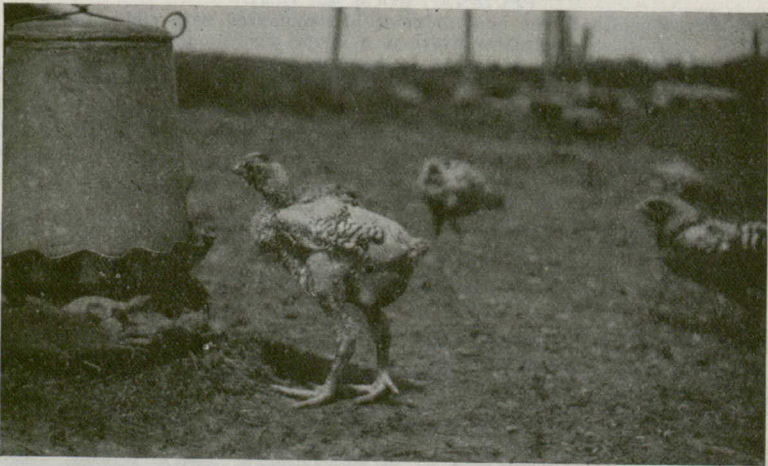
(g) *General considerations*.—Culling can not be accurately done by considering one point only. For example, an occasional hen is found which will carry considerable pigment after prolonged heavy laying. If judged by the amount of pigment in beak and shanks, she will be discarded as a cull. The same is true of the other points dealt with in preceding paragraphs. All points should be considered in arriving at a decision as to the hen's value as a layer, and most effective work can be done where the past history of the flock is known.



Even the high-producing hen must have a rest period at some time. When not laying her head becomes coarser, the pubic bones become closer together and increase in apparent thickness. The distance from pubic bones to tip of keel becomes less. The handling quality of the skin becomes poorer, and comb and wattles shrink in size and lose their bright red colour. When moulting, all birds are sensitive to handling and even good layers are timid at this stage and squawk when caught. The above statements will indicate the need of repeated cullings, since the best birds may easily be classed as culls if only one culling is given and it happens to be at a season when these birds are not producing.

## 8. Practical application of culling methods

(a) *Culling chicks.*—There is perhaps no better way to add to the income from the laying flock than by rigid culling. Time may also be profitably spent in culling the growing chicks. All crippled, deformed and very weak chicks should be destroyed at hatching time. Throughout the growing season it will pay to cull out chicks which fail to thrive or to feather out properly.



SLOW FEATHERING CHICK

(b) *Culling pullets.*—It is important to make a selection of the pullets as they are put in winter quarters. It is practically impossible with present knowledge to estimate how many eggs a pullet will lay, but selection may be based on size, vigour, health, head points and pigmentation. The most desirable birds will carry a good reserve of body fat and will be deeply pigmented in skin, shanks and beak. They should have straight keel bones and be free from any physical deformities.

(c) *Culling layers.*—The need for culling the layers will be greatest when egg production begins to decline rapidly during the summer months. It should not be limited to this season however. In large flocks, some culling can be profitably done in every month of the year. During the winter and early spring the pullets which have failed to lay, or have been poor layers, should be marketed. Through the summer the poorer producers are disposed of and in the late summer and fall the final cullings remove the early moulters and make room in the laying houses for the developing pullets. By making culling a continuous feature of the routine in the poultry yard, culls are disposed of before they cause the owner serious loss, the sale of poultry meat is distributed throughout the year and the flock is reduced in time to make room for the maturing pullets.



## LESSON 11

**BREEDING, SELECTING AND MATING****Topics for Study**

1. The breeder's objective.
2. Trapnesting.
3. Pedigree breeding.
4. Progeny testing.
5. Who should practise pedigree breeding.
6. Breeding systems.
7. Sex determination.
8. Selection of breeders.
9. Management of breeding stock.
10. Matings.

It has been pointed out in Lesson 3 that there is a definite trend towards the purchase of chicks from commercial hatcheries and a reduction in numbers of chicks being hatched on farms. In this lesson are included some of elementary principles of poultry breeding and mating for the information of those who prefer to do their own hatching.

**1. The breeder's objective**

Such characteristics as early maturity, high egg production, persistency of production, intensity of production, good egg size, longevity, meat type, absence of broodiness and freedom from standard defects and disqualifications are desirable. The aim of the breeder should be to strive, through the agency of natural selection toward improvement in these qualities and toward the elimination of those which are undesirable. This is a difficult problem because, while there is a tendency for offspring to resemble parents, a great deal of variation exists and progress, at best, is slow. Really skillful breeders of poultry are exceedingly rare.

**2. Trapnesting**

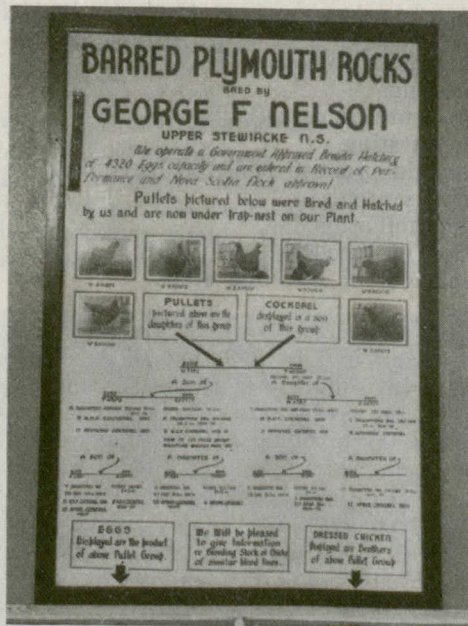
Trapnesting is done by specialized poultry breeders, primarily to secure the individual egg records of the birds in their flocks. Trapnests have doors or traps which close as the hens enter and keep the birds within until they are released by the caretaker. The individual hens are identified by means of numbered leg bands. When a hen has laid and is being released from the nest, her production is recorded first on the egg and later on a form made specially for this purpose. A season's accumulation of such forms will give not only the individual egg records of the hens in the flock but much other valuable information such as the dates when production began, a record of broody spells or other pauses in production, the length of each hen's laying season and the rate of production during this season. Trapnesting also makes it possible to keep a record of each hen's egg size, egg shape, colour and texture of shell, fertility and hatchability.

**3. Pedigree breeding**

Pedigree breeding is the practical application of the information gleaned by trapnesting to the improvement of the flock. Just before hatching time, the



eggs from the more desirable hens in the flock are placed in individual bags or baskets so that on hatching they may be individually tagged or wing banded and a record kept of their parentage. This procedure of trapnesting, breeding from the best individuals and keeping records of their progeny goes on year after year until a mass of record material accumulates. Pedigree breeding requires the keeping of a fairly complicated system of records.



PEDIGREE DISPLAY

Advertising Display in Breeders' Exhibit, Maritime Winter Fair, 1938.

#### 4. Progeny testing

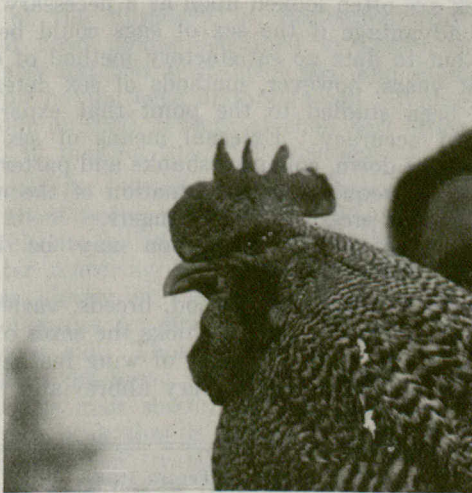
While there is a tendency for chicks to resemble their parents, they are sometimes quite widely different in their characteristics. Thus it is quite common to find that none of the daughters of a high-producing hen may equal their dam's egg record. Progress in breeding is usually slow when the breeding plan includes only the selection of individuals on the basis of their egg production records. Geneticists agree that selection on the basis of the progeny test will give best results. A progeny-tested individual is one which produces progeny which are appreciably better than average in respect to the desired characteristics. A proved progeny-tested male, with respect to egg production for instance, is one which, when mated to a pen of females, produces daughters which are exceptionally good layers of standard sized eggs. Likewise, a proved progeny-tested female is one which, over a period of three or four years and when mated to a different male each year, always produces daughters which are better-than-average layers of standard sized eggs. An individual which is proved by progeny test is termed a prepotent individual. The ideal mating is a prepotent male with prepotent females, but in practice, because of the rarity with which prepotent individuals are found, it is seldom possible for the individual breeder to make such a mating. The next most ideal type of mating is the mating together of the progeny of prepotent birds. Here again, however, and for the same reason, it is not often possible for the individual



poultry breeder to do this. A third type of breeding and the type which the average breeder is in a better position to undertake, is the segregation and mating together of sister-tested birds. Such birds are those from families all female members of which have been exceptionally good layers. This latter method of breeding is preferable to selection on the basis of individual record alone.

### 5. Who should practise pedigree breeding

Trapnesting and the keeping of records necessary in pedigree breeding call for a great expenditure of time, with painstaking attention paid to details. The records must be kept in a complete and accurate form to be of value. Several year's work are necessary before the breeder can reap much benefit from his efforts and he often finds that comparatively few people will pay a sufficient price for pedigreed stock to make its production profitable. Only those who have a natural inclination to do such work, and can plan a long-term breeding program should undertake it. Few realize until they have undertaken pedigree work how complex the breeding problem is. Properly conducted, pedigree breeding is a real means of flock improvement, but it requires too much skill and time to be considered under most farm conditions. Most work of this nature in Canada is conducted under the National Poultry Breeding Program. The inspectors under this policy can be relied upon to give useful leadership to those who have the time and inclination to undertake this important work.



A HEAD WHICH RADIATES VIGOUR

### 6. Breeding systems

The terms inbreeding, linebreeding, crossbreeding and outcrossing are frequently applied to systems of breeding and these terms require a brief explanation.

(a) *Inbreeding*.—The mating of related birds is termed inbreeding. This plan is often followed as a means of intensifying or making greater the good qualities of a flock. The breeder should keep in mind that weaknesses are just as likely to be intensified as good qualities and that too close inbreeding may result in decreased vigour, lowered egg production and poor hatchability. In farm flock management it is not necessary to secure males that are unrelated to the flock every year, but matings as close as father and daughter, mother and son, and brother and sister, should not be made too frequently.



(b) *Linebreeding*.—Linebreeding is the use of related birds in matings according to a definitely planned system. Under proper management, it will intensify the good qualities of a flock without the dangers of close inbreeding and it is generally believed to be the most desirable method of attaining flock improvement.

(c) *Crossbreeding*.—This is the mating of two distinct pure breeds. Crossbreeding is sometimes done to increase vigour, to improve the birds from a meat producing standpoint or to produce chicks of which the sex can be determined by colour differences. It is generally believed that crossbred or hybrid chicks have more vigour than the purebreds used in making the cross. An example of crossbreeding to improve the birds for meat production is the Cornish-Barred Plymouth Rock cross. The Cornish breed is noted for its breast muscle development and plump breasts are possessed by the progeny of such a mating. Many crosses will produce chicks in which the sexes have different colour markings. Crossbred birds should not be used in matings as wide variations in type, colour and economic qualities will characterize the progeny.

(d) *Outcrossing*.—The term outcrossing is applied to the mating of birds of the same breed but of entirely different strains. This practice often results in improved vigour but when the two strains do not combine perfectly there may eventually be a lack of uniformity in the flock.

## 7. Sex determination

Because egg production is usually more profitable than meat production, the cockerels in a flock are often looked upon as a necessary evil. Undoubtedly it would be of great advantage if the sex of eggs could be determined before they were incubated, but to date no satisfactory method of doing this has been discovered. In recent years, however, methods of sex determination of newly hatched chicks have been studied to the point that experienced persons can reach a high degree of accuracy. External means of sex distinction include rate of feathering, colour of down, colour of shanks and patterns of plumage. The so-called Japanese method requires an examination of the cloaca after causing an eversion of the anus by pressure of the fingers.

The various methods of sex determination may be briefly outlined as follows:—

(a) *Sex-linked breeding*.—In this method, breeds, varieties or strains must be crossed in a definite manner to produce chicks the sexes of which differ either in colour or pattern of plumage, or in length of wing feather. The possibilities in sex-linked breeding are summarized in very abbreviated form in the following table:—

Type of Cross	Male Parent	Female Parent	Appearance of Chick
1. Unbarred male.... × Barred females.	Any coloured variety except barred or cuckoos and any white variety except White Rock and White Leghorn.	Barred Rock.....	Females have black head crown and black shanks. Males have white on crown of head and lighter shanks.
2. Gold males..... × Silver females.	Rhode Island Red. New Hampshire Red. All Buff varieties. All Black Red and Partridge varieties.	All Columbian patterned varieties. All silver laced and silver pencilled varieties.	Females are Buff or Red, males are cream or white. Both sexes may show red or black ticking or striping.
3. Fast feathering males..... × Slow feathering females.	Any fast feathering male such as normal White Leghorn.	Any slow feathering female such as Barred Rock may be same breed as male or different breed.	Females have wing feathers longer than $\frac{1}{4}$ " with alternate long and short feathers. Males have feathers usually not longer than $\frac{1}{4}$ ". All feathers uniform in length.



(b) *Autosexing*.—Genetic knowledge recently gained makes possible the development of new pure breeds called autosexing breeds, the sexes of which can be distinguished at hatching time by shade of down colour with complete accuracy. Examples of these are the Cambar and Legbar in England. These autosexing breeds will breed true and produce differently coloured sexes without crossbreeding. More recently it has been found that the plumage pattern on Barred Rock chicks varies with the sex. With practice Barred Rock chicks can be sexed with over 95 per cent accuracy, merely by pattern of the down.

(c) *Japanese method*.—The method calls for considerable skill but can be applied to all breeds. The work must be done carefully to avoid injury to the chicks.

### 8. Selection of breeders

Since it is seldom necessary to mate the entire flock, there is usually an opportunity to make a selection of the birds in the breeding pen and this should be as rigid as possible.

(a) *Selecting females for breeding*.—From the standpoint of egg production, the hens which have withstood repeated cullings throughout the summer and fall and have been retained for a second year's production, will naturally be the most desirable birds to have in the breeding pens. Yearling and older hens lay larger eggs than pullets and usually the largest and strongest chicks come from their eggs. In addition to having been good egg producers, the birds put in the breeding pens should conform to the size, type, colour and other requirements of the Standard of Perfection and have the desirable handling quality and head points described in Lesson 10. Pullets used for breeders should be early hatched, well developed, and should show a reasonable egg production without having been unduly forced. Where trapnesting is done, the size of eggs, colour of shell, texture of shell and other desirable characters should be considered in making the final selection.

(b) *Selecting males for breeding*.—The selection of breeding males should begin when they are about twelve weeks of age. Too often all the rapid-growing, early-hatched cockerels are killed for market and the breeders are kept from the younger and later maturing birds. Chicks which feather early, mature reasonably early, are blocky in shape and of good size are most desirable. The final selection of males for breeding should not be made until the birds are at least six months old. Those chosen should be of the size shape and colour that is typical of the breed and should be free from Standard disqualifications or defects. The male should have the same good, deep yellow colour in the skin, shanks and beak that is desired in the pullet. He should have a good full breast and stand on straight legs which are well apart. He should show vigour and masculinity but be free from coarseness in skin, comb, wattles or bone. Qualification in progeny testing as referred to in Lesson 17 together with reasonably high record ancestry and the physical qualifications mentioned above are considered the most desirable qualities in the breeding male from the standpoint of improving the egg production of the flock.

### 9. Management of breeding stock

The results at hatching time are influenced by the care given the breeding flock before and during the hatching season. Good care does not call for a great expenditure of time or money.

(a) *Care of males*.—Male birds are not necessary in the flock for the production of market eggs. Egg quality will be better if they are permitted in the flock only during the breeding season. The usefulness of males is often injured by the freezing of their combs, and if the laying pen provides the best



protection against freezing, it is permissible to keep the males in the laying flock throughout the winter. They should always be removed at the end of the breeding season because fertile eggs deteriorate quickly in hot weather.

Metal guards, such as are attached to the beak to prevent feather pulling, are often effective in checking fighting among males. Frequently when two or more males are placed in one pen, fertility will be poor because of the interference, one with another, as they try to mate with the females. Temporary partitions, two and one-half or three feet high, can be used to give the birds greater seclusion and usually will solve this problem. When the spurs of old cock birds become very long and pointed, it is advisable to cut off their tips with a hacksaw as a means of preventing injury to the hens during mating.

(b) *Care of females.*—The management of females in breeding flocks is not greatly different from the management of layers. Special attention should be paid to the provision of proper vitamins in the diet, as is pointed out in Lesson 7. In large flocks, kept mainly for egg production, it is a common practice to keep the birds enclosed in houses from the time they enter the laying pens until they are finally marketed. This is not considered the best practice for breeders. It is believed that hens which are to be retained as breeders should be given a rest from egg production during their moult and that they should have access to yards of generous size, at least during this period. Probably, range throughout the summer would be nearer an ideal condition. The sunlight and green feed they secure at this time are both beneficial and it is believed they result in better hatchability in the following spring. Birds that are to be used for breeders should not be unduly forced for egg production during the winter months. In general, hatchability is high when production is good, and the best chicks are produced during the period when the production of the flock is increasing.

## 10. Matings

With flocks of the American breeds, one male may be mated with about fifteen females in the early spring and about twenty after the weather becomes warmer and the birds get out of doors. With the lighter-weight breeds, such as Leghorns, one male may be mated with about twenty females early in the season and with about twenty-five later. These recommendations are for matings where active cockerels are used. With cock birds the matings should be somewhat smaller.

Birds should be mated from a week to ten days before eggs are collected for incubation. If a previous male has been running with the females a three-week period is necessary before one can be certain that all chicks are from the new male. Reasonably good fertility may be expected for two weeks after males are removed from the flock.



## LESSON 12

**JUDGING POULTRY****Topics for Study**

1. Utility vs. exhibition poultry.
2. Class arrangement.
3. Examining the birds.
4. Giving reasons for placings.

This lesson was written primarily for the guidance of boys and girls who take part in poultry club judging competitions where only utility poultry is featured. It is presented here with the belief that many producers, young and old, will find it useful in comparing the value of their birds. The would-be exhibition judge should use the American Standard of Perfection as his guide in learning this art.

**1. Utility vs. exhibition poultry**

Exhibition or Standard bred poultry is that which has been selected and bred to approach as nearly as possible the ideals of the different breeds as stated in the American Standard of Perfection. Utility poultry has been selected and bred for the production of human food. Utility poultry breeders have emphasized egg production, but in some cases have disregarded Standard type and colour requirements to such an extent that the birds of farm flocks differ widely from the description of the breeds in the Standard of Perfection. While the breeders of utility poultry have sacrificed colour and in some cases type, size and other characters, from an exhibition standpoint, they have greatly increased egg production and have produced earlier-maturing birds. Utility or bred-to-lay poultry is the backbone of the poultry industry. Since there is no accepted standard by which utility poultry is judged, the birds must be evaluated by considering the points used in culling and selection and by attempting to place most emphasis on those points which have the greatest bearing on the usefulness of the birds.

**2. Class arrangement**

Classes of birds entered in competition are placed in special wire coops which give the judge an opportunity to see every bird to advantage. Each coop has a hinged or sliding door to permit the removal of birds for detailed examination. Suppose there is a class of four laying hens which are to be placed in the order of their worth as breeders. The coops will be numbered 1, 2, 3, and 4 or lettered A, B, C and D, and these designations will be used in writing, or giving orally, reasons for placing the birds. Before handling the birds, it is advisable to stand well back from the coops and look over each bird carefully. The type and apparent size of each can be noted at this time and often disqualifications, such as wry and squirrel tails, or defects such as crooked toes or lameness can be better detected here than while the birds are being handled.

**3. Examining the birds**

There is a right and a wrong way to remove a hen from an exhibition coop. To remove one properly with the right hand, she should be gently driven with the hand towards the left side of the coop and facing the judge.



The bird is then caught firmly but gently by the left wing and drawn carefully head-foremost through the door of the coop. Next, the bird is held as described in Lesson 10 and is examined systematically. The following procedure is suggested.

(a) *Head*.—When examining the head, its general shape should be noted and attention paid to whether the bird has an alert or dull appearance, whether or not the head is clean cut and free from coarseness, beefiness or wrinkles, and whether the eye is bright and prominent or dull and sunken. The size, shape, colour and texture of the comb and wattles should be noted. The comb should be examined for side sprigs and other defects. The beak, eye ring and, with Leghorns, the ear lobes as well should be examined for presence or absence of yellow pigment.

(b) *Body width*.—The width of the body is determined by placing the hand firmly over the back immediately behind the wings and running it backwards towards the tail. In this manner the width can be determined at the heart girth, hips and at the rear of the body and at the same time it can be learned whether the back is flat or rounded.



POULTRY JUDGING DEMONSTRATION

(c) *Body depth*.—The depth of the body can be determined by spanning, with the thumb and fingers, the distance from the keel bone to the back. Such measurement should be made at both the front and the tip of the keel. Another method of measuring body depth is by holding the bird with the keel bone running along one hand and with the other hand placed lengthwise on its back. The distance the hands are apart will denote the body depth.

(d) *Body size*.—The bird's weight should be noted during the general examination it receives while judging is in progress.

(e) *Body shape*.—The comparative depth of the bird's body at front and rear can be noted while it is being examined for depth. Examination will show whether the keel bone is long or short, straight or crooked or of any unusual shape. Handling will denote whether the ribs are well arched or if the bird has a tendency to be slab-sided. The distances between the pubic bones and from the pubic bones to the tip of the keel are measured with the fingers and it is important to remember that the latter measurement is affected by the length of the keel.

(f) *Handling quality*.—The skin of the abdomen should be felt between the thumb and finger to determine its handling quality. The abdomen can also be handled to find out whether it is soft or filled with hard unyielding fat.



(g) *Pigmentation*.—The vent, eye ring, beak, shanks and, with breeds having white ear lobes, the lobes also should be examined for the degree of yellow colouring.

(h) *Plumage*.—Both the surface and undercolour of the feathers should be examined for excellence and notice taken of any feather colour present that is foreign to the variety being judged. While this is being done, the judge will notice whether the plumage is sleek and bright or faded and ragged in appearance and whether the bird is of the close or the loose feathered type. Each wing should be spread out to display the colour of its feathers, to show if any moulting has taken place and to learn if any disqualifications such as "twisted feathers", "split wing" or "slipped wing" are present.

(i) *Vigour*.—It is important that birds of both sexes and of all ages should show an abundance of vigour. It is indicated by a strong, healthy body and an active or alert appearance.

(j) *Production*.—High egg production leaves its mark on the body of the hen. Bleaching of the yellow pigment and a faded or ragged appearance of the feathers are indications of hard work. Great distance between the pelvic bones, good handling quality of the skin and fine head points usually add further proof that the hen has been a good layer.

(k) *Disqualifications and defects*.—Defects are departures from the ideal in any breed or variety of poultry. A disqualification is a defect considered serious enough to debar a bird from competition in exhibition. Six points on the comb where the ideal calls for five is a defect. Feathers on the shank of a bird, where the ideal is supposed to be free from such, form a disqualification. Most of the common disqualifications do not affect the egg production, or in other words the usefulness, of the bird and in this respect differ from unsoundness in a horse such as heaves or spavin. However, they are generally considered undesirable and birds bearing them should be culled from breeding flocks. The recognized disqualifications are listed in the American Standard of Perfection. A description of some of the more common disqualifications follows:—

Sprigs are points growing from the side of the comb. Stubs are feathers or down growing from the shanks of clean legged varieties. They may be found at the hock, on the sides of the shank or between the toes. A split wing is one having a distinct gap between primary and secondary feathers. A wry tail is one which is permanently carried to one side. A squirrel tail is one which is carried so far forward that it forms an acute angle with the back. Positive enamel white in the ear lobes of birds of American breeds is a disqualification. With Barred Plymouth Rocks, two or more solid black primary or secondary wing feathers or main tail feathers disqualify the bird. General inferiority, deformed beaks and crooked backs are disqualifications which need no explanation.

#### 4. Giving reasons for placings.

In judging poultry, one must have in mind an ideal of the breed with which he is working. Naturally no birds will equal this ideal but some may closely approach it. After handling the birds in a class, the judge must decide how closely each one approaches his ideal and must place them, according to his judgment, in the order of their excellence. The next problem is to be able to give reasons for the placings made. Whether delivered orally or written, the reason should be given systematically. First the complete placing of the class should be stated. This is followed by a comparison of the birds placed in first and second position. Next the second and third place birds are compared and finally, a comparison is made between the third and fourth place individuals. If one bird in the class is found to have a Standard disquali-



fication, this fact is stated, the bird is debarred from competition and no further reference to it is necessary. An example of reasons given in a junior judging contest follows:—

#### POULTRY JUDGING CONTEST

Contestant's Number: 12.

Class: *Barred Plymouth Rock hens.*

Placing: *A. C. D. with B. disqualified for stubs on left shank.*

Reasons: I place A over C because she has a cleaner cut head, a brighter and more prominent eye, is slightly broader in the back and carries her width back towards the tail better. While her skin is not quite so pliable as that of C. she is a larger bird, has greater spread between the pubic bones and greater depth from pubic bones to keel.

I place C over D chiefly because of her greater size, the bird D being decidedly too small to be retained as a breeder. In addition to having greater size, C has more distinct barring in both surface and under colour.

D has relatively good width and depth of body, an exceptionally clean cut head and a more pliable skin than C but is placed last because of her small size.

When giving reasons for placing, it should be remembered that a comparison of the birds in the class under consideration is wanted, not a detailed description of each individual. An attempt should be made to be positive in the statements made and to further this end, the expression "I think" should be avoided. When the difference between two birds is not great, it should be made clear that the difference is only slight and when the difference is great, this fact should be stated emphatically. The bird placed in a higher position is not necessarily superior in all respects to the one placed next below it and recognition of this fact strengthens, rather than weakens, the reasons given. A mistake frequently made is the repetition of exactly the same reasons for all comparisons in the class. Such reasons may be true to some extent but leave the impression that a set of reasons has been memorized rather than that the points of comparison have been noted in the birds under consideration.



A POULTRY CLUB FAIR



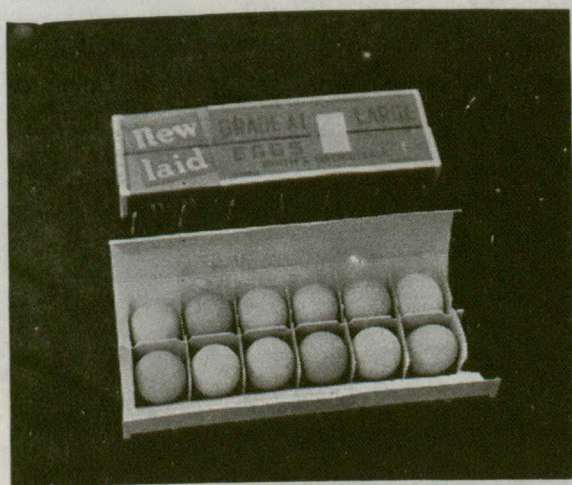
## LESSON 13

## MARKETING EGGS

## Topics for Study

1. Breeding for egg quality.
2. Feeding for egg quality.
3. Producing clean eggs.
4. Producing infertile eggs.
5. Gathering the eggs.
6. Holding eggs.
7. Grading eggs.
8. Candling eggs.
9. Packing eggs for shipment.
10. Methods of marketing eggs.

In recent years the manufacturers of many articles have stressed the advantages to the consumer of buying goods in convenient, sanitary and attractive packages. The hen was a pioneer in the art of packaging goods. She provides one of the choicest food products that nature gives us, wrapped in a sanitary package of convenient size for table use and sealed within the shell, untouched by human hands. Eggs are never better for human consumption than when first laid. It does not follow, however, that all new laid eggs are of the highest quality, for occasionally new laid eggs are defective to the point that they are unfit for human consumption. The quality of the eggs may be very easily affected by the management of the flock and the conditions under which they are kept after being laid. Consumers are quick to detect poor quality in eggs, so the marketing of a high grade product becomes a matter of first importance to the poultryman.



EGGS IN CARTONS



### 1. Breeding for egg quality

Unlikely as it may seem, fundamental improvement in egg quality begins with the breeding stock. Such factors as egg size, shape and colour, are known to be inherited. Interior quality is also inherited to some extent. Selection for the last-named factor is work which must be done by specialists in breeding, but the culling of birds which lay eggs of poor size, shape and colour may be easily done in any flock.

### 2. Feeding for egg quality

The size of eggs, shell strength, yolk colour, quality of white or albumen and the flavour are influenced by the feed given. Plenty of good, pure and well balanced feeds and clean, fresh water should be supplied. Some feeds such as cottonseed meal, and certain weeds which may be found on the range, such as shepherd's purse, as well as rape, onions and garlic, have a very decided harmful effect on the colour or flavour of the egg yolks. Care should be taken to see that laying hens do not have access to these. Oyster or clam shells or other shell making material should always be available to the birds so that they will have lime in a quickly available form for the production of strong shells.

### 3. Producing clean eggs

A sufficient number of roomy nests, with the nesting material renewed often enough to keep it clean, will aid in the production of clean eggs. Dropping boards beneath the roosts, which preferably should be screened, will also help in this regard. The floors should be kept well covered with litter and as dry as possible. When the yards are muddy, the hens should be kept in the house until the day's output of eggs has been laid.

Eggs are sold largely on appearance and should be spotlessly clean. Even with good management some will become soiled. These should not be washed. The dirt may be brushed off with steel wool. When possible soiled eggs should be used at home.

### 4. Producing infertile eggs

A slow development of the germ of an egg will begin at a temperature as low as 70 degrees F. Thus on summer days development may be considerable if eggs are not gathered frequently. Infertile eggs do not deteriorate as quickly as those which are fertile, so much better quality eggs will be sold if the males are not allowed in the laying pen except during the breeding season. It is particularly important that eggs should be infertile during hot weather.



WIRE EGG BASKETS

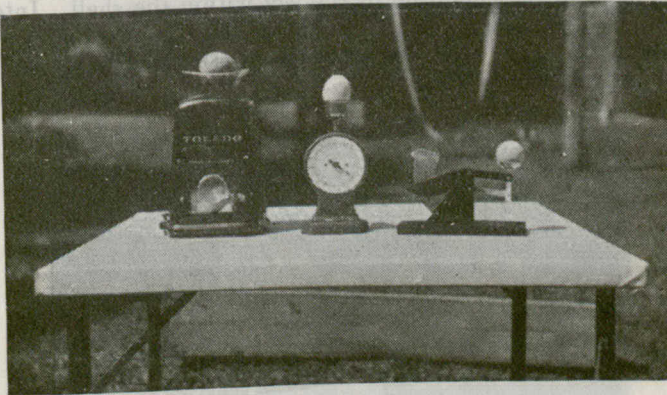


## 5. Gathering the eggs

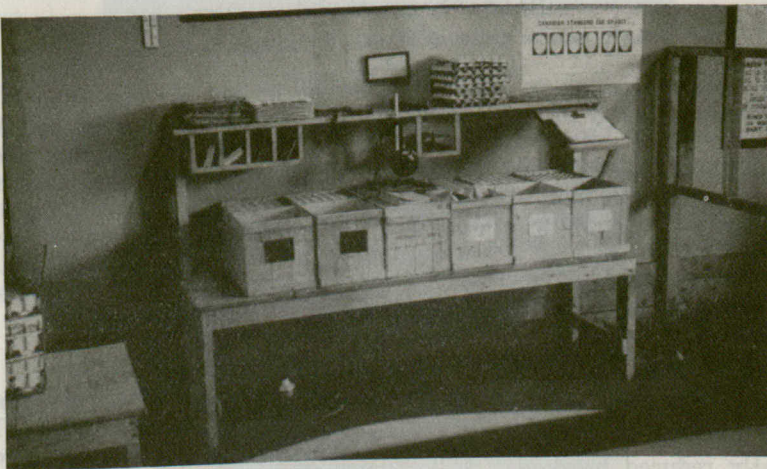
Eggs should be gathered frequently in hot weather to avoid their becoming overheated and in cold weather to avoid freezing. Fewer eggs will become broken or dirty when they are gathered often. For small flocks, pails or baskets are suitable containers for collecting the eggs. Where layers are kept in large numbers, the special egg baskets are ideal for this purpose since they allow the eggs to cool more quickly than do pails.

## 6. Holding eggs

A cool, well ventilated room with a moderate amount of moisture in the air makes the best place to hold eggs. The temperature should not be higher than 55 degrees F. and the sooner the eggs are cooled to this temperature, the better their quality will be. Frequent marketing should be the rule, since eggs deteriorate with age even when held under favourable conditions.



TYPES OF EGG SCALES



EGG GRADING BENCH

## 7. Grading eggs

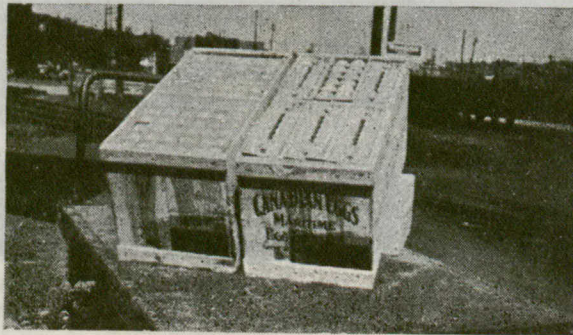
The sale of Canadian eggs on a graded basis since 1923 has been the foundation of this country's splendid egg trade. The Egg Grading Regulations first became effective because producers, wholesalers and retailers realized that



the Canadian egg trade was in a very poor condition and appealed to the Dominion Department of Agriculture for a remedy. It is probable that none of these interested groups is entirely satisfied with the present egg grades, but all admit that definite progress has been made. The Canadian egg trade is in a decidedly better position than before grades were first established and the regulations are amended as experience shows that changes are needed. The sale of eggs on a basis of quality is the fairest method of sale to producer, wholesaler, retailer or other middleman and to consumer alike. A wholesale movement of eggs on any basis other than graded, would be impossible at the present time and the trend is towards a better understanding and appreciation of the regulations by all concerned.

### 8. Candling eggs

The candling of eggs is the means by which the grade is determined. It is done by twirling each egg before a strong light in a darkened room in such a way that one can tell the condition of the egg within the shell. Interior quality is the basis of grade distinction. Candling shows the size of the air cell, the ease with which the yolk may be seen, the presence of meat or blood spots, mould spots and other qualities.



THE STANDARD 30 DOZEN CASE

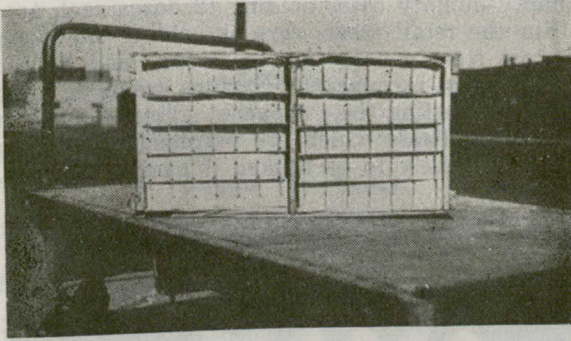
Left, eggs in ordinary fillers. Right, eggs in cartons.

Any person wishing to become proficient in egg grading should get, for thorough study, a copy of the Regulations Respecting the Grading and Marking of Eggs from the Publicity and Extension Division of the Department of Agriculture, Ottawa. The grades of eggs are clearly defined in this pamphlet and it contains much other information about the sale of eggs according to grade. Actual practice in a plant where eggs are being graded or under the supervision of an egg inspector is necessary before one can become an expert candler. When an egg producer is not in a position to grade his eggs, he should sell to a dealer who is prepared to grade them and pay according to grade.

### 9. Packing eggs for shipment

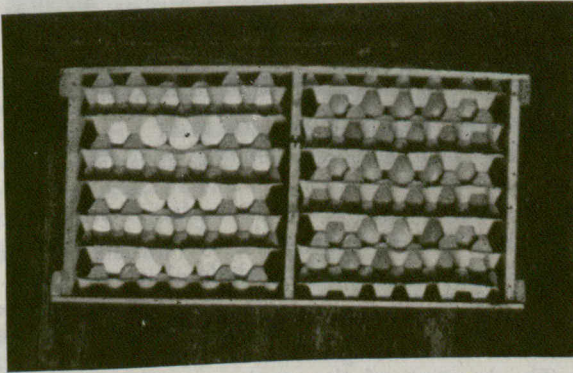
The standard 30-dozen wooden case with honey comb fillers and plain flats has long been the most popular container for the shipment of eggs. The use in recent years of cup and other styles of flats manufactured from wood pulp has greatly reduced breakage. Filler flats, also made from wood pulp, make the use of honey comb fillers unnecessary, their use results in little breakage and they can be used for making attractive window displays of eggs. Each filler flat holds two and one-half dozen eggs as compared with three dozen in each honey comb filler, but because the eggs are staggered in their position in the former when packed, the capacity of a 30-dozen case is the same. Corru-





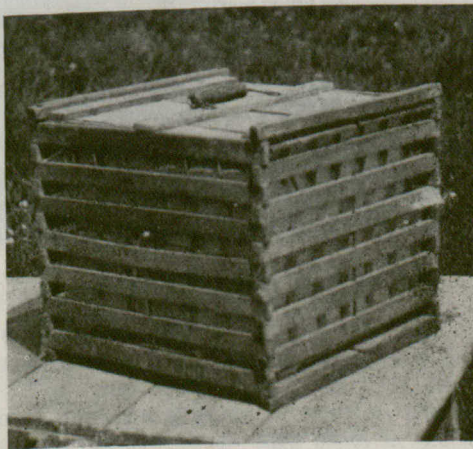
### PROPER METHOD OF PACKING EGGS

Egg case with side removed to show proper packing. Excelsior pads on bottom, between fourth and fifth fillers and on top.



### STANDARD EGG CASE

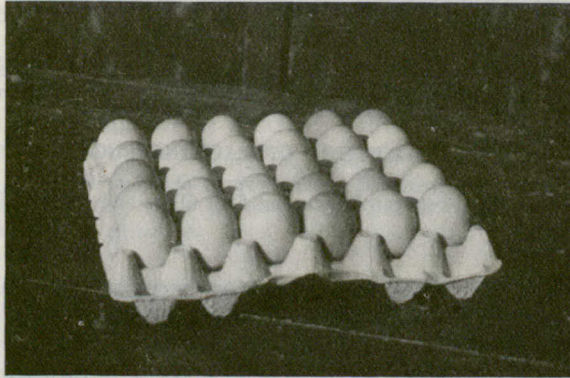
Eggs packed in filler flats.



### HUMPTY-DUMPTY EGG CASE



gated cardboard cases in 30- and 15-dozen sizes are being used in an experimental way. Humpty-dumpty cases holding 12 dozen each are sometimes used for local trade. For the retail trade, cartons holding one dozen eggs are very desirable. These cost from one to two cents each and their use adds to the labour of preparing the eggs for market. Cartons are made to fit in all ordinary shipping cases without affecting their capacity. Eggs should always be packed with the large end up. Those which are extremely long should be kept for home use since they are likely to be broken if packed in cases.



EGGS IN FILLER FLAT

Flats of this style are very useful for display purposes.

#### 10. Methods of marketing eggs

Eggs may be sold direct to consumers, to retailers, to hotels, restaurants or bakeries, to commission merchants, wholesalers, jobbers, country stores, pedlars or through the medium of auctions, pools or egg circles. The sale of eggs direct to consumers will, of course, give the producer the greatest gross return, but this method takes the greatest toll of his time in making deliveries and collections. The location of the producer and other circumstances must guide him in his choice of marketing methods.



## LESSON 14

**MARKETING POULTRY****Topics for Study**

1. Selling live *vs.* dressed poultry.
2. The fattening quarters.
3. Selecting birds for fattening.
4. Feeding for finishing.
5. Killing poultry for market.
6. Dry plucking.
7. Scald plucking.
8. Wax plucking.
9. Cooling.
10. Drawing poultry.
11. Packing poultry for market.

Relatively little poultry other than turkeys, geese and ducks is raised primarily for the production of meat. The greater part of the revenue from farm flocks comes from the production of eggs. Meat production is of secondary importance and until recent years very little effort has been made to improve the type of fowls from the standpoint of meat production. It is quite possible that such improvement can be made by proper selection and breeding, without decreasing egg production and it is certain that the proper finishing of poultry before it is marketed will result in a much greater cash return to the producer.



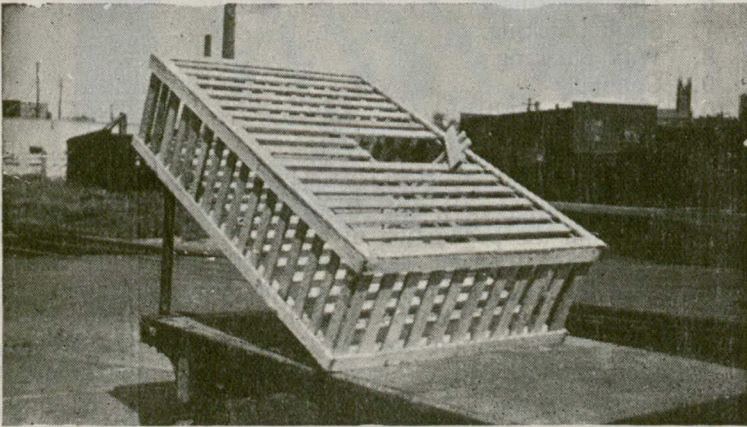
SPECIAL POULTRY CAR

**1. Selling live *vs.* dressed poultry**

Whether poultry should be sold alive or dressed will depend very largely on local conditions. For local sale, most poultry is sold dressed except for Jewish trade. When it must be shipped to market, the shipping charges will be lower and there will be less shrinkage with birds in the dressed state. When sold alive, the producer gets rid of the tedious work of killing and dressing the



birds. The ease with which live poultry can be shipped to distant markets in special poultry cars and trucks is well known. In the special railway cars, built-in compartments equipped with feeding troughs, are arranged several tiers high on either side of a central passage. For truck and express shipments, specially built crates with slatted sides and tops are used. These vary in size and style but a crate which has proved very satisfactory in use is fifty inches long, twenty-one inches wide and thirteen and one-half inches high outside measurements. Water troughs are suspended from the top of the crate by means of heavy iron hooks. Such a crate will hold from fifteen to twenty-five birds, depending on their size. Live bird shipments should be made so they will not reach their destinations on Saturday afternoons, Sundays or holidays. Crate-fattened birds, particularly if milkfed, will shrink heavily when shipped long distances.



POULTRY SHIPPING CRATE

## 2. The fattening quarters

Pen and crate fattening are the two methods commonly used in Canada.

With pen fattening, the birds are placed in a pen of small size, which restricts their exercise, and are given a fattening ration as outlined in Lesson 7. Best results are obtained where not more than 20 or 25 birds are placed in one pen and where about two square feet of floor space is allowed per bird. This method requires less skill and less labour than crate fattening but will not usually produce as good gains or give quite as high quality meat.

For crate fattening, the birds are enclosed in crates which greatly restrict their movements. As a result, high quality of flesh and rapid gains in weight are produced. The term "finishing" is perhaps more suitable than "fattening" since the softening of the muscles, because of restricted exercise, plays as great a part in the improvement of the flesh for table purposes as does the addition of body fat.

For finishing poultry on the farm, crates six feet long, two feet wide and eighteen inches high, are of suitable size. These should be slatted on sides, top and bottom. Ends are solid and the two partitions, dividing each crate into three compartments, may be either solid or slatted horizontally. On the front side the slats are placed vertically so that the birds can reach between them to eat from a trough held in front of the crate by brackets. Each compartment of a crate will hold about six chickens or four hens. Crates may be tiered or decked where necessary.

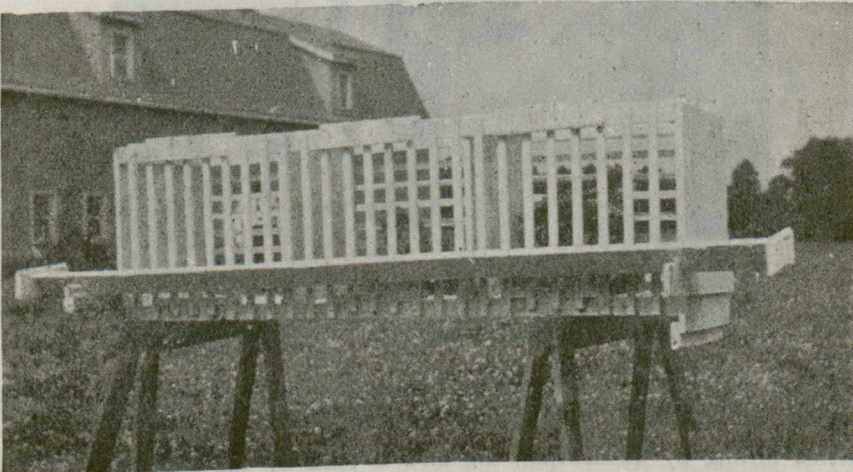


### 3. Selecting birds for fattening

The change from range conditions to the restrictions of the fattening pen or crate, accompanied by the change from hard grain feeding to the feeding of a sloppy mash is a heavy strain on the constitution of the bird. A recommendation frequently made is that only strong vigorous birds should be selected for fattening. It is true that such birds will make the most satisfactory gains, but the flock owner must market his less vigorous individuals also and should know how to fit them for market. In most cases they will make some gain in weight and the quality of the meat will be improved by putting them through the finishing process. It is good practice, however, to keep the weaker birds in separate compartments or pens from the stronger individuals.



FATTENING BATTERY



FATTENING CRATE

### 4. Feeding for finishing

Several fattening mixtures are given in Lesson 7. Cornmeal is a specially valuable fattening feed, but when ground from yellow corn, produces a yellow fat and skin which debars birds from the milkfed class under Canadian standards for dressed poultry. Many local markets do not seriously object to yellow-

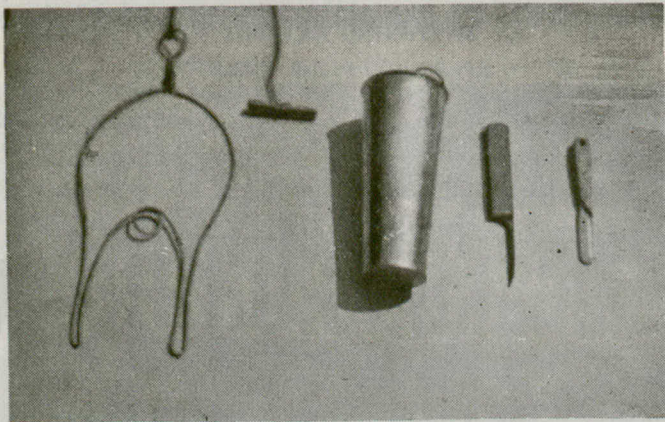


skinned birds and some show a definite preference for them. Where the poultryman wants to produce milkfed poultry, a feed mixture should be chosen which does not contain yellow corn. White corn, while not as generally available as yellow, has the desirable fattening qualities of the latter and when used for finishing does not produce a yellow skin. It is, therefore, a very valuable ingredient in finishing mixtures. Buckwheat is likewise a valuable fattening feed which is not available in all districts. It is recommended that fattening mixtures be made to batter-like consistency with sour milk or buttermilk and fed in this sloppy condition. The milk in a ration seems to produce a tender, juicy meat but milkfed birds shrink heavily when shipped alive.

The finishing period will require about two weeks. Feed should be withheld the day the birds are placed in the crates or pen and light feedings only given the following day. After the second day, the amount of feed can gradually be increased. Good feeding requires the giving of enough food to satisfy the birds appetites without having any left in the troughs. Any surplus should be removed. Two or three feedings are given daily. Grit, shell and green feed are not necessary during the fattening period. Milk or water may be given in hot weather. When any birds are noticed that have gone off their feed or are not making satisfactory gains they should be removed from the fattening quarters. At the end of the fattening period the birds should be left without food for twenty-four hours before killing, so that the digestive system may be emptied. Water should be given at this time.

### 5. Killing poultry for market

Birds may be killed by beheading, by dislocation of the neck and by sticking and debraining. Beheading with an axe is an easy, rapid and effective way of killing birds which are to be scald-plucked for immediate use.



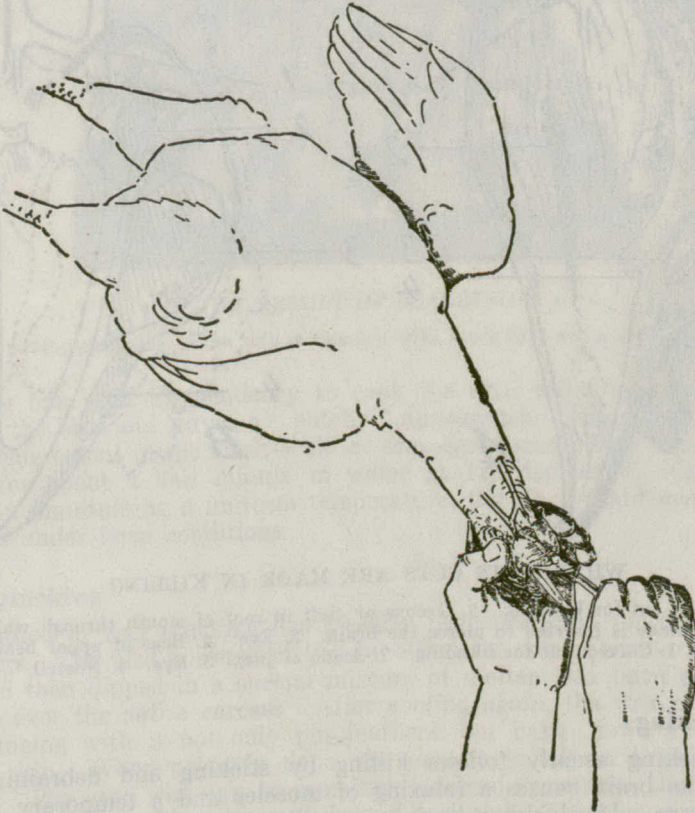
EQUIPMENT FOR KILLING AND DRESSING POULTRY

Left to right: Shackle, cord and block, blood cup, sticking knife and pinning knife.

When killing by dislocation, the bird is held by the legs with one hand and with the head stretched forward in the other. By pulling the head forward and bending it backward at the same time the neck bone is separated from the head. At the same time the arteries of the neck are broken and the blood accumulates in a clot where the bones have been parted. This is a useful method of killing a bird for post mortem examination, since there is no outward bleeding. It is not a desirable way to kill market poultry which is to be sold in an undrawn state because the clot of blood in the neck is objectionable.



Killing by sticking and debraining is the most satisfactory method of killing poultry for market. The birds are dry plucked and present a much better appearance than most scalded birds. The skin is unbroken, which improves keeping qualities. To kill by this method, the bird is hung by a cord fastened to the legs, at a height convenient for work while standing. The head is grasped in the left hand with the comb of the bird towards the palm. The mouth is forced open and the blade of the special killing knife thrust back to its full length in the throat. A cut is then made in the roof of the mouth or throat forward and towards the right hand of the operator. If the jugular vein is properly cut the blood will gush from the mouth in a

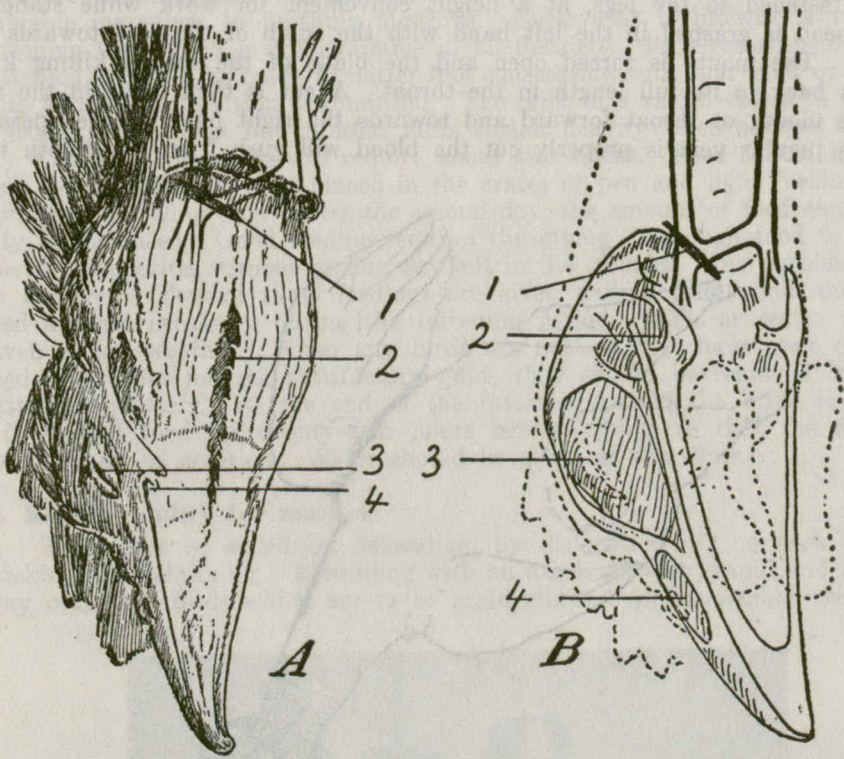


METHOD OF HOLDING BIRD FOR STICKING

steady stream. When proper bleeding begins, the knife is thrust through the cleft in the roof of the mouth to the brain. The knife blade is turned once or twice to destroy the brain tissue as much as possible and immediately withdrawn. Next, a weighted cup, specially made for the purpose, is hooked to the lower beak to catch the blood, and plucking begins immediately. It is important that both cuts in the operation be properly made. If rapid bleeding does not take place, the birds will not die quickly and the spots where feathers are removed from the principal feather tracts may remain a reddish colour. If the brain is not properly pierced, the feathers are not loosened and plucking



without tearing the skin is difficult. When the brain is properly pierced the bird usually gives a characteristic squawk and flutter. Practice is required to become expert at this method of killing poultry.



WHERE THE CUTS ARE MADE IN KILLING

- A. 1. Correct cut for bleeding. 2. Groove or cleft in roof of mouth through which the knife blade is inserted to pierce the brain. 3. Eye. 4. Base of upper beak.  
B. 1. Correct cut for bleeding. 2. Angle of jaw. 3. Eye. 4. Nostril.

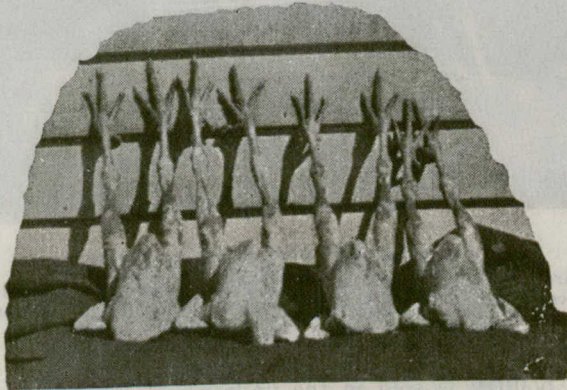
## 6. Dry plucking

Dry plucking usually follows killing by sticking and debraining. The piercing of the brain causes a relaxing of muscles and a temporary loosening of the feathers. If plucking begins immediately and is quickly done, the feathers will be removed before they become "set". Plucking should be done in a systematic manner although all experts do not follow the same order of feather removal. Those which are hardest to remove and where there is the greatest danger of tearing the skin should be removed first. Thus the order of removal might be: breast, neck, wings, tail, back, legs and fluff. One will soon learn with practice how to remove the feathers in handfuls rather than a few at a time and also how great a pull on the feathers is possible without tearing the skin. The tail feathers are removed by a twisting pull and the large feathers of the wing jerked out with one hand while the base of the wings is held next the bird's body with the other hand. After rough picking the birds by this method, pin feathers are removed as a separate operation. The carcasses are then placed in a cool room until all body heat is removed.



## 7. Scald plucking

Scald plucking may be used on birds for immediate consumption but is not a satisfactory method where they are to be placed in cold storage or held for a considerable length of time. Each bird is dipped in water just below the boiling point (about 190 degrees F.) for a few seconds. When the feathers on the breast and the flight feathers of the wing can be removed easily, the bird is taken from the water and the feathers stripped off immediately. An objection



THE RESULT OF SCALDING

A patchy condition of the skin is common with birds that are scald plucked.

to scalding has been the tendency to cook the skin which spoils the keeping quality of the bird and leaves a "patchy" appearance. This objection is overcome to some extent in the slack-scald or semi-scald method by which the birds are held for about a half minute in water at 128 degrees F. Owing to the difficulty in maintaining a uniform temperature, the slack scald method has its limitations under farm conditions.

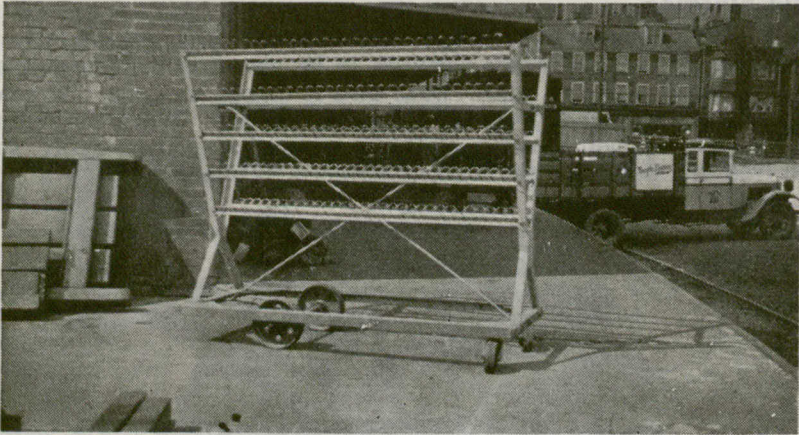
## 8. Wax plucking

A method of wax plucking has recently been perfected for the removal of pin feathers. The bird is rough picked by either the dry or semi-scald methods, cooled and then dipped in a special mixture of molten wax until a heavy coat is formed over the entire carcass. After cooling again, the wax is removed in sheets bringing with it not only pin feathers, but hairs, down and any loose scales of skin. When properly done, the carcass is left in a very attractive condition. The used wax can be remelted, strained to remove the pin feathers and used repeatedly with only small loss of material. The cost of wax per bird is small but considerable preparation must be made for its use and it is not recommended unless 25 or more birds are being dressed at one time.

## 9. Cooling

Before cooling, the feet of the birds should be washed, the vents flushed and if they have been killed by sticking, any clotted blood removed from the mouth by giving the head of each a vigorous shake. Cooling may be done by hanging the birds in a cool cellar for several hours or by putting them in tubs of ice water for three or four hours. Soaking in water lessens the keeping quality of the birds but improves their appearance by plumping them somewhat and is not objectionable if they are for immediate use.





**COOLING RACK**

Cooling racks are used in large poultry killing establishments. Nails driven in the floor joists of a cellar at suitable distances will serve the same purpose on the farm.

## **10. Drawing poultry**

While most poultry is sold in the undrawn state, there still remain some sections in which the custom of selling fully drawn poultry prevails. In such districts the poultryman must know how to draw birds properly and the knowledge may be useful elsewhere when sales are made direct to the consumer who may prefer buying poultry in the drawn condition.



**BOX OF DRESSED POULTRY**

Poultry of the highest grade, properly tagged and packed for shipment. (Photo, courtesy of Dominion Experimental Station, Charlottetown, P.E.I.)

In preparation for drawing, the birds should be singed, preferably with an alcohol flame since it will not discolour the skin. The neck bone is then removed by slitting the skin down the back of the neck to the shoulder and cutting the bone off close to the body. Windpipe, gullet and crop are loosened and removed. The long strip of neck skin remains attached to the carcass and is drawn over the incision where the bone was removed and held in place by



the tips of the wings which are folded over it. In older birds, the quality of the drum-stick meat will be improved by drawing the tendons. The tendons are exposed by slitting the skin at the back of the shank and removed by pulling them forcibly. Following the removal of the tendons the legs are removed at the hock joints.

The intestines, gizzard, liver, heart, lungs and other organs are removed through a vertical incision in the abdomen. The oil sac, which is located near the tail, should be removed. The body cavity is washed or wiped clean and the carcass is then ready for sale or for home cooking. The contents and lining of the gizzard are removed, the gall bladder cut from the liver, any clotted blood removed from the heart and these edible organs retained or sold with the neck as giblets.

Small broilers are sometimes drawn by splitting the carcass down the centre of the back with either shears or a heavy sharp knife. The bird is thus laid open, and the internal organs, neck and breast bone are removed. If broilers so dressed are wrapped with cellophane they present a very attractive appearance.



DRESSED POULTRY BOX PROPERLY STENCILLED

## 11. Packing poultry for shipment

Special packing is not necessary with poultry for local sale but is a requirement for export shipment. Birds for export sale should be dry- or wax-plucked, undrawn and with heads wrapped in parchment. They are graded according to size and quality, packed in specially made wooden boxes holding one dozen birds each and labelled as to kind, sub-kind, class, grade and weight according to the Canadian standards for dressed poultry. Particulars regarding these standards will be found in the Regulations Respecting the Grading and Marking of Dressed Poultry, copies of which are available from the Publicity and Extension Division of the Department of Agriculture, Ottawa.



## LESSON 15

## KEEPING ACCOUNTS AND RECORDS

## Topics for Study

1. The value of accounts.
2. The cash account.
3. The inventory.
4. Balancing the account.
5. Labour income.
6. Record keeping.

## 1. The value of accounts

While the keeping of records and accounts of the poultry flock may be an irksome task to most people, such records are of sufficient value to warrant regular attention. Without cost accounts, it is impossible to tell whether a flock is profitable or not. The information supplied by well kept accounts is often sufficient to make an unprofitable flock pay, or to materially increase the return from a flock which is already profitable. While the accounts and records of a single year's operation are useful, the greatest value in record keeping comes with the accumulation of several years' results.

## 2. The cash account

The cash account or daily record of income and expenses is a fundamental part of farm bookkeeping. The receipts and expenses are listed in the order in which they occur, in separate columns or pages of a cash book, which for small flocks need be nothing more elaborate than a five-cent scribbler. Table 3 shows the income and expense columns from a poultryman's cash book. The figures are purely fictitious, being used only to show the method of keeping accounts.

TABLE 3.—CASH ACCOUNT 1938

Date	Item	Income	Expense
Jan. 6	30 doz. eggs at \$0.35.....	\$ 10 50	
Feb. 10	1 ton laying mash.....		\$ 50 00
Feb. 23	20 lb. fowl at \$0.25.....	5 00	
Mar. 1	400 hatching eggs at \$5.00.....	20 00	
Mar. 15	200 hatching eggs at \$6.00.....		12 00
Apr. 6	1,000 egg cartons.....		16 00
Apr. 18	300 day-old chicks at \$15.00.....	45 00	
May 12	200 day-old chicks at \$12.00.....	24 00	
May 17	1 ton scratch grain.....		40 00
June 7	50 lb. broilers at \$0.30.....	15 00	
June 21	3 drinking founts.....		4 50
July 9	30 doz. eggs at \$0.20.....	6 00	
July 14	1 lb. sodium fluoride.....		0 30
Aug. 6	200 leg bands.....		2 50
Aug. 31	25 doz. eggs at \$0.25.....	6 25	
Sept. 3	250 lb. fowl at \$0.20.....	50 00	
Sept. 29	2 lb. nicotine sulphate.....		2 75
Oct. 4	blood testing.....		5 60
Oct. 14	25 pullets at \$1.50.....	37 50	
Nov. 1	1 ton laying mash.....		50 00
Nov. 6	10 breeding cockerels.....	30 00	
		\$ 249 25	\$ 183 65



A comparison of income and expenses for any period is easily possible by adding the figures in the two columns. The result, will not, however, indicate the owner's profit or loss, because consideration has not yet been given to the value of stock, feed and equipment on hand at the beginning and end of the period under consideration. It is quite possible for the owner's financial position to be improved at the end of the period even though expenses are greater than income, because of an increased value in stock, buildings, equipment or feed supplies. To arrive at a statement of profit or loss, it is necessary to take an inventory at the beginning and end of the period, which, with the poultryman, is usually twelve months, though not necessarily the calendar year.

### 3. The inventory

The inventory is an estimate of the value of all articles used in connection with any business. The poultryman's inventory lists such articles as buildings, equipment, feed and live stock. The logical time for making a yearly inventory is at the season when there is the least figuring to do. Tables 4 and 5 represent inventories taken at the beginning and end of a year's business. In making an inventory, the values of the different items should be estimated as closely as possible without too great an expenditure of time. For articles which wear out, a yearly allowance must be made for depreciation. Thus, for example, if the life of a poultry house is estimated to be twenty years it will be inventoried at cost price when new, at five per cent less in one year's time, ten per cent less at the end of the second year, fifteen per cent less at the end of the third and so on until the twentieth year is reached, if in the meantime no repairs have been made.

TABLE 4.—INVENTORY JANUARY 1, 1938

1 laying house 20 by 20 feet .....	\$200 00
1 colony house 10 by 12 feet .....	50 00
1 range shelter 10 by 12 feet .....	15 00
1 600-egg incubator .....	75 00
1 colony brooder stove .....	15 00
3 galvanized pails at \$0.50 .....	1 50
100 Barred Rock hens at \$1.75 .....	175 00
8 pedigreed cockerels at \$3.00 .....	24 00
800 pounds scratch grain at \$2.00 .....	16 00
200 pounds laying mash at \$2.50 .....	5 00
200 pounds oyster shell at \$1.25 .....	2 50
50 pounds grit at \$1.00 .....	50
10 dozen eggs at 40 cents .....	4 00
Total .....	<hr/> \$583 50

TABLE 5.—JANUARY 1, 1939

1 laying house 20 by 20 feet .....	\$190 00
1 colony house 10 by 12 feet .....	47 50
1 range shelter 10 by 12 feet .....	13 50
1 600 egg incubator .....	71 25
1 colony brooder stove .....	13 50
2 galvanized pails at 40 cents .....	80
3 drinking founts at \$1.50 .....	4 50
100 Barred Rock hens at \$1.75 .....	175 00
10 pedigreed cockerels at \$3.00 .....	30 00
100 pounds scratch grain at \$2.00 .....	2 00
1,700 pounds laying mash at \$2.50 .....	42 50
300 egg cartons at \$1.60 .....	4 80
	<hr/> \$ 595 35

### 4. Balancing the account

A balance of accounts is made to find out the financial standing of the business at the close of any given period. This procedure is frequently referred to as "striking a balance." In calculating the balance, it is necessary to have an inventory at both the beginning and end of the period under consideration.



The amount of the inventory at the beginning of the period is added to the column of expenses. With yearly accounts it would appear as the first item in the expense column at the first of the year. The amount of the inventory at the end of the period is placed as the last item in the column for income. When both columns have been added and the amount of the smaller subtracted from the larger, the difference is known as the "balance." When added to the lesser column it makes the sum of both equal or balanced. If, to do this, it must be placed in the expense columns, it represents "profit" and if in the income column it shows the "loss" which has been incurred. Table 6 shows in abbreviated form how to balance the accounts shown in Table 3, using the inventory figures of Tables 4 and 5.

TABLE 6.—CASH ACCOUNT 1938

Date	Item	Income	Expense
Jan. 1, 1938.....	Inventory.....		\$ 583 50
	Totals from Table 3.....	\$ 249 25	183 65
Jan. 1, 1939.....	Inventory.....	595 35	
	Balance profit.....		77 45
		\$ 844 60	\$ 844 60

### 5. Labour income

In farm bookkeeping, it is difficult to place a fair value on the work done by the owner's family. No direct charge for such labour is made in Table 3. The profit shown in Table 6 is therefore a labour profit to which the term "labour income" is often applied.

### 6. Record keeping

In addition to cost accounts, the poultryman will find it of value to keep records of breeding, feeding, egg production, incubation and brooding. No specific set of forms is necessary for such record keeping. Experience will guide the flock owner in adopting a system which will meet his needs without being too cumbersome and time-consuming. The accumulated records of several years' work will prove of great value to the owner.



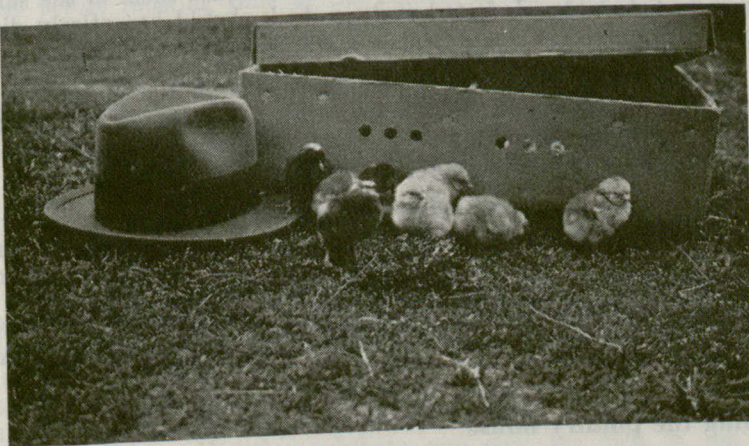
## LESSON 16

**POULTRY HEALTH****Topics for Study**

1. The poultry health problem.
2. How to maintain health.
3. Cleaning the poultry house.
4. Animal parasites.
5. Specific diseases.
6. Non-specific diseases.
7. A poultry tonic.

**1. The poultry health problem**

Since the beginning of the present century the poultry industry has undergone great changes. Poultry is kept in much larger flocks than formerly with the result that the danger of disease infection has greatly increased. Fortunately, high mortality has not been general in Canadian flocks. It must be recognized, however, that the percentage of losses is greater among poultry than with other farm animals and at times presents a serious problem.

**HEALTHY CHICKS**

Keep them that way.

The modern method of poultry raising demands a quick growth of chicks, unnaturally high egg production and rapid finishing in the fattening pen. This calls for forced feeding at all times, which undoubtedly weakens the vitality of the birds and lowers their resistance to the many diseases and parasites to which they are subject.

**2. How to maintain health**

The doctoring of sick hens is not a very satisfactory undertaking. A single hen has such a low money value that the expense of individual treatment is not warranted. Further, the treated and apparently cured bird may transmit to its offspring the weakness which was the underlying cause of its disease. To maintain a healthy flock, it is necessary to have vigorous stock, to keep the birds in



a suitable environment, to feed them properly and to take such steps as are necessary to control or get rid of transmissible diseases.

(a) *Vigour*.—One of the best indications of vigour in hens is the ability to live and reproduce for periods of two, three or more years. Hens in farm flocks are seldom profitable for periods of this length but long-lived birds are specially valuable to breeders of pedigreed poultry, particularly when found in family groups, and make ideal foundation stock. High egg production alone is not necessarily an indication of great vigour.

(b) *Environment*.—The importance of suitable surroundings for the flock should not be overlooked. The housing conditions must be such as will keep the birds comfortable at all seasons and this requires that there shall be proper shelter, light, ventilation and sanitation. Sanitation plays a vital part in providing a suitable environment. Clean incubators and brooders, clean houses and yards, clean litter, chicks free of transmissible diseases, clean feed and water in clean containers and placed on wire platforms, the rotation of fields used for range, avoidance of overcrowding, the keeping apart of growing and laying stock, the temporary quarantine of all birds brought on the plant, the exclusion of visitors from the poultry quarters, the immediate removal of sick birds from the flock and the disposal of dead ones are all necessary steps in a program of sanitation. It should not be presumed that a visible sanitation is sufficient, because carriers of such diseases as pullorum and tuberculosis may exist among the fowls kept in the cleanest of houses. It is clearly unwise to raise pullets under ideal conditions of sanitation and later to house them in the same buildings with infected stock. Infected mature stock should be entirely disposed of and complete replacement made from a disease-free source.

(c) *Proper feeding*.—Emphasis has been laid on the need of a properly balanced ration in Lesson 5. Feed has a direct bearing on the health of the flock. Where mineral elements or vitamins are lacking, the constitutions of the birds may be weakened to the point that definite diseases result.

(d) *The control of transmissible diseases*.—The control or, better yet, the complete eradication of pullorum disease by slaughtering the reactors or carriers which can be detected by blood testing, is now looked upon as an important step in the maintenance of a healthy flock. Another test is useful in locating the birds which are infected with tuberculosis. These are examples of control measures which may well become routine practice in the keeping of a healthy flock.

### 3. Cleaning the poultry house

Poultry buildings should always be kept reasonably clean and at least once yearly the cleaning job should be exceptionally thorough. With brooder houses, this special cleaning should be just before chicks arrive in the spring and with laying houses it should be just before the pullets are housed in the fall. Droppings, litter and other material should be removed with shovel, scraper and broom. Walls, floors and fixtures should then be scrubbed thoroughly with a hot lye solution made by adding one tablespoonful of lye to twenty gallons of water. Such washing should be followed by the application of a reliable disinfectant such as lye in two or three per cent solution, bichloride of mercury in the proportion of one part to 1,000 parts of water (about one ounce to six gallons of water) or one of the many disinfectants derived from coal tar and sold under various trade names. Chlorinated lime is both a disinfectant and deodorant and can be used in the proportion of six ounces to each gallon of water.



#### 4. Animal parasites

Fowls are subject to infestation from many kinds of animal parasites. Those which live outside the bodies of the birds are called external parasites and those which live within the body, internal parasites.

(a) *External parasites*.—The most troublesome external parasites of poultry are lice, roost mites, northern fowl mites and scaly leg mites. Both chickens and hens may become infested, with the result that development or egg production may be seriously affected.

##### LICE

Many species of lice are found on domestic fowls, the most prevalent being the common body louse which frequents the region about the vent of hens, and the head louse which is found on the heads of young chickens and turkeys. Lice spend their lives on the bodies of the birds and cause constant irritation. Several effective methods of treatment are known for the control of body lice. Dusting with sodium fluoride from a perforated-top tin or applying the same material to the skin, in pinches with thumb and finger, on eight or ten parts of the body are effective. Dipping the birds in a solution of one ounce of sodium fluoride to one gallon of water is a satisfactory treatment which can only be used in warm weather. Sodium fluoride is cheap and one pound will treat about one hundred birds. Nicotine sulphate has proved very effective and does not require that the birds be handled individually. It is applied to the roosts just before roosting time at the rate of about eight ounces to 100 feet of roosting space. The fumes from the material, released by the body heat of the hens, are deadly to lice. Some ventilation should be given to avoid injury to the birds but best results cannot be secured in a draughty house. Treatment with either sodium fluoride or nicotine sulphate should be repeated in about ten days' time. Head lice can be controlled by the application of a small amount of melted lard, vaseline or other mild grease to the top of the head of each chick or poult.

##### COMMON RED MITES OR ROOST MITES

Mites are tiny creatures related to spiders. The common species is red only when gorged with blood. They live in the crevices of the building, particularly around the roosting quarters and suck blood from the bodies of the birds during the night. Treatment must be applied to the roosts and their supports. Wood preservatives, or closely related products sold under different trade names, are very efficient as sprays because they possess both penetrating and lasting qualities. Nicotine sulphate and coal tar dips in ten per cent solution are quite effective. A cheap and fairly efficient remedy, if applied weekly, is spent crank case oil diluted with kerosene. Repeated treatments are necessary with all materials because of the difficulty in reaching all cracks and crevices and the speed with which these pests multiply in hot weather.

##### NORTHERN FOWL MITE

This pest, which resembles the common red mite in appearance, lives on the bodies of the birds. Injury to the birds is caused by the sucking of blood which may occur in patches to the extent that scab formation follows. This naturally ruins the appearance of the birds when dressed for market. The nicotine sulphate treatment, recommended for the control of body lice, will be found helpful in the control of this parasite. At least three treatments at three-day intervals are necessary for effective control.



## SCALY LEG MITE

These tiny mites burrow under the scales of the legs where they set up an irritation. This produces secretions which accumulate under the scales, harden and push the scales outward until the legs appear much enlarged. Eventually the scales may drop off and lameness is found in some cases. Scaly legs are rarely seen with young birds and in flocks which are kept under sanitary conditions. Any kind of oil which is penetrating enough in its nature to reach the mites will kill them. A time-honoured remedy is the dipping of the feet and shanks of affected birds in a mixture of one part kerosene and two parts raw linseed oil.



SCALY LEGS

(b) *Internal parasites.*—Internal parasites take a heavy toll from the poultry industry. Infected growing stock becomes stunted and thin and with mature birds, egg production is seriously reduced. The most common internal parasites are large round worms, cecal worms, tape worms, gape worms and coccidia.

## LARGE ROUND WORMS

These parasites inhabit the small intestine of fowls and may multiply in numbers until the bowel becomes literally clogged with their bodies. They may be found easily on post mortem examination since they reach a size of from one and one-half to four inches in length. Injury is caused to affected birds by irritation to the lining of the intestine, loss of blood, loss of weight, and probably from poisonous or toxic secretions of the worms. At best, treatment is only partially effective and to have any lasting value it must be followed by precautions to avoid reinfestation. Prevention is of much greater importance and lies in sanitation in houses and yards, particularly around feed and water containers. Worm eggs become infective under moist conditions, so it is important to have a well drained range and to avoid wet spots around the drinking dishes. The specially prepared capsules probably offer the most satisfactory treatment for infested birds. Flock treatment, where such materials as lye and tobacco dust are used with grain or mash as detailed under treatment for cecal and tape worms, has some value but has the disadvantage that the birds needing treatment most are likely to have poor appetites and consequently fail to get a sufficient dosage. Worm treatments are harsh in their action and for this reason it is inadvisable to treat a flock unless it is known to be infested.



## CECAL WORMS

Cecal or small round worms are much smaller in size than large round worms, being one-half inch or less in length and thread-like in appearance. They are found in the ceca or blind pouches of the intestine. A few may be present without causing noticeable injury but when present in large numbers the flock becomes unthrifty and examination will show that the walls of the ceca are inflamed. Prevention lies in the same sanitary measures recommended for the control of large round worms. The addition of two per cent of tobacco dust to the mash mixture given the flock, for at least one month, has proved a fairly effective treatment.

## TAPE WORMS

Tape worms have the appearance of ribbons made up of joints or segments and vary from almost microscopic size to nearly a foot in length. They are attached to the intestinal wall by the head end and grow by the development of more segments. When heavily infested, the intestinal wall becomes thickened and inflamed. The birds are unthrifty, thin in flesh and may even show lameness and paralysis. Injury to the bird is caused by the inflammation of the intestinal wall, by poisons given off by the worms in their development and by their practically blocking the normal passage of food through the intestines. Tape worm eggs must pass through intermediate hosts such as flies, beetles, snails and slugs before they reach a stage where they will again infect chickens. The removal of droppings, litter and any rubbish which serves as hiding places for these intermediate hosts will aid in controlling tape worms. The sanitary measures recommended for the control of round worms and the drainage of wet spots in the range are helpful. Drug treatment is not very effective. The feeding of grain steeped in a solution of lye has given good results in some cases. To prepare for this treatment, one gallon of oats or wheat is steeped for two hours in water containing one tablespoonful of lye. The treated grain is fed to the flock after they have been deprived of food long enough to whet their appetites. Plenty of drinking water should be provided while the lye treated grain is being eaten. The birds should be kept in their houses for twenty-four hours after treatment, after which all droppings should be removed in order to prevent reinfestation. This treatment has its limitations because the most heavily infested birds are likely to get the smallest dosage due to their reduced appetites.

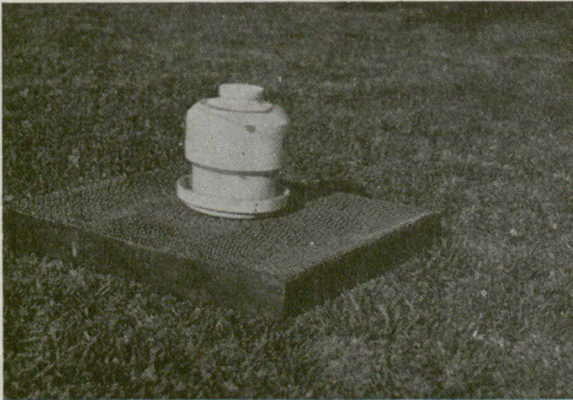
## GAPE WORMS

The condition in chicks known as gapes is caused by tiny parasitic worms which attach themselves to the inside of the windpipe. Here they irritate the lining of the windpipe and multiply in numbers until, in severe cases, suffocation results. Mortality is highest among chickens under six weeks of age. The affected chicks become very unthrifty and go about gasping for breath. With older birds, infestation causes less serious loss. Gape worm eggs which cause infestation are liberated when female worms, which have been expelled by infested birds, die and disintegrate. Chickens may pick these up with their food or by eating earth worms. Treatment is not very satisfactory and reliance must be placed on prevention. The rotation of fields used for range and cleanliness in the brooder house will aid in preventing infestation. Since chicks are less subject to serious harm from gape worm infestation after reaching the age of one month, it helps materially in controlling losses to keep the chicks enclosed in the brooder houses until they reach this age. The trend towards earlier hatching of chicks has resulted in a decrease in loss from gape worm infestation. Turkeys are sometimes responsible for the spread of gape worms and should not be allowed to run on chick ranges.



## COCCIDIOSIS

This is one of the most widespread and destructive contagious diseases of poultry. It is most common during the second month of the chick's life but may occur at an earlier age and is frequently found in chronic form among older birds. It is caused by organisms of microscopic size called coccidia. These have a peculiar and complicated life history. The organisms, when voided by diseased chicks, will not infect healthy members of the flock but if left under warm and moist conditions for periods varying from one to five days, reach an infective stage. Outbreaks are frequently noticed during periods of muggy weather.



DRINKING FOUNT ON WIRE STAND

The placing of drinking fountains and feed containers on screened platforms is a wise precaution against the spread of coccidiosis and other diseases.

Affected chicks are droopy in appearance, show little interest in eating or other activities, stand huddled up with feathers ruffled, lose weight and eventually many of them die. The droppings are often tinged with blood, this being caused by the destruction of the intestinal lining by the organisms. The heaviest mortality takes place within two weeks from the beginning of an outbreak but the flock usually shows unthriftiness for several weeks. With older birds, the disease runs a more gradual course. The affected birds become unthrifty in appearance, lose appetite, become pale in comb and wattles and gradually lose flesh. Diarrhoea and lameness may be present. On post mortem examination of young chicks the ceca are usually enlarged, dark red in colour and often filled with blood. With older birds the upper part of the intestine is more often affected, with white spots being visible through the intestinal wall. Various parts of the intestinal tract may show a thickening of the walls with the lining inflamed and bleeding.

Many medicinal treatments have been recommended but none has proved satisfactory. The elimination of grain from the ration and the feeding of a mixture composed of 60 per cent of the regular mash feed and 40 per cent powdered milk for a period of two or three days following an outbreak, has been recommended but the value of this practice is now largely discredited. Prevention lies chiefly in a program of sanitation. The chicks should be reared entirely apart from mature birds and on clean, dry range. Brooder houses should be kept dry and the litter removed frequently. It is advisable to place feed and water dishes on low platforms having screened tops. During an outbreak, the litter should be removed at least every second day from the brooder houses. The moving of brooder houses to new locations at the first



sign of an outbreak may reduce its severity. Scattered outbreaks of coccidiosis appear without warning so it is advisable to take all possible precautions to prevent them.

## 5. Specific diseases

A specific disease is one caused by a particular organism or agent such as a definite species of bacteria or type of virus.

(a) *Diseases caused by bacteria.*—Bacteria are single-celled organisms belonging to the plant kingdom. Many of them are beneficial to man but a few species cause disease. The common poultry diseases of bacterial origin are pullorum disease, fowl cholera, tuberculosis and coryza.

### PULLORUM DISEASE

Pullorum disease (formerly known as bacillary or contagious white diarrhoea) is caused by specific bacterial infection. At one time it was considered the most serious cause of mortality among young chicks but control measures have greatly reduced the losses in recent years. The most serious loss from pullorum infection occurs during the first three weeks of the chick's life but it is also found among older chickens and in mature birds. Among mature birds it is usually found in chronic form and it is these chronic "carriers" which transmit the disease to the succeeding generation of chicks.



DRAWING BLOOD SAMPLE FOR PULLORUM TESTING

The disease spreads rapidly among very young chicks and mortality may be high, particularly if the chicks are subjected to such unfavourable conditions as chilling, overheating or other mismanagement. Some chickens die shortly after they hatch without showing marked symptoms. Others linger in a droopy, huddled, inactive condition and frequently utter shrill cries as if in pain. Diarrhoea, which causes a "pasting up" of the down below the vent, is a common symptom though not always present. Post mortem examination may show changes from the normal condition in heart, lungs, liver and intestines but frequently such changes are not present. Mature birds which are carriers



of the disease seldom show any marked symptoms. Experiments have shown that the disease spreads slowly among older birds and that egg production is affected to some extent. An examination of the internal organs frequently shows the ova or developing egg yolks to be shrunken and dark coloured rather than round and yellow.

The symptoms described above in young chicks, particularly when accompanied with high mortality suggest the presence of pullorum disease. Positive proof requires a laboratory examination since almost any mismanagement of young chicks will result in similar symptoms. No effective treatment is known. The "carriers" among mature birds can be detected by means of a blood test and this offers the best method of control known. All breeding flocks should be given a yearly blood test and reactors should be promptly killed. After the reactors have been removed, the buildings should be given a thorough cleaning. When a flock having a high percentage of reactors is found, repeated testings at periods of one or two months are usually necessary to rid the flock entirely of the disease. Frequently it will be found more satisfactory and less expensive to replace such a flock, from sources free of pullorum disease, rather than to eliminate the disease by repeated testings. All eggs, chicks and other stock purchased should be secured from flocks having as good a record as possible in freedom from pullorum infection. Pullorum control in Canada is principally under provincial supervision and local Departments of Agriculture can supply the results of their control work to those interested in such information.

#### FOWL CHOLERA

In typical cases of this disease there is usually a high death rate and the affected birds die quickly, often without any symptoms being shown. A post mortem examination shows that comb and wattles are dark in colour and there are often small white spots on the liver. The heart, lungs and lining of the upper part of the intestine frequently show small hemorrhages. In less acute cases the first symptoms noticed may be a greenish or yellowish diarrhoea. The feathers are ruffled and the birds become dull or sleepy. Breathing is more rapid than normal. The appetite is decreased but there may be an unnatural thirst. Comb and wattles become purple and often there is a pronounced swelling of the wattles. No successful medicinal treatment is known. Where an outbreak has occurred, the ailing birds should be killed and burned. The droppings of infected birds are teeming with germs and every effort should be made to prevent healthy birds becoming infected from this source. Houses and feeding dishes should be cleaned and disinfected frequently. All birds brought to the premises should be quarantined for two or three weeks before permitted to run with the general flock.

#### TUBERCULOSIS

Tuberculosis is a bacterial disease found mostly in fowls over one year old. This disease should be suspected where occasional birds in the flock gradually become thin, show a dull and ruffled appearance in the plumage and sometimes diarrhoea and lameness. On post mortem examination, yellowish lumps or nodules are found on the liver, spleen, intestines and to a lesser extent on other organs. The disease is spread principally through the droppings. Medicinal treatment is of no value. Fortunately, the practice of keeping layers for one year only on commercial plants, reduces the occurrence of this disease and in many localities it is practically unknown. If a flock is badly infected it should be entirely disposed of, the buildings thoroughly cleaned and disinfected and where possible the plant left vacant for a year. Where the infection is light, affected birds should be killed and burned as soon as noticed and the buildings cleaned and disinfected at frequent intervals. A tuberculin test will help in detecting infection before advanced stages of the disease are reached.



## CORYZA, CATARRH, ROUP, COLDS

These names have all been applied to inflammation of the lining of the respiratory tract which occurs very commonly in varying degrees of severity. One species of bacteria is known to cause a typical coryza but it is possible that other organisms may also cause this condition when the birds are exposed to unfavourable conditions. Birds of all ages are subject to colds. The trouble is most commonly found where there is overcrowding, poor ventilation, improper feeding, or where the birds are housed under damp, draughty or unsanitary conditions. Very often an outbreak will follow the rather abrupt change which takes place when pullets are transferred from the range to winter quarters. The first symptom noticed is a watery discharge from the nostrils which is accompanied by sneezing and shaking of the head. The discharge soon thickens in the form of yellow crusts about the nostrils. The inflammation extends to the sinuses which become filled with mucus. This, on hardening, becomes cheesy in consistency and as it accumulates there is a bulging or swelling of the face. This cheesy material may sometimes be found in the eyes and also in the mouth and throat. There is loss of appetite and the birds become inactive with feathers ruffled. In the most severe cases, breathing is difficult and the birds lose weight rapidly. In laying flocks, egg production is usually seriously affected. Treatment is not entirely satisfactory but may reduce the suffering of the birds and assist in a quicker return to health. A dose of Epsom salts (one-half pound to one hundred birds should be given when symptoms are first noticed. Instilling a ten per cent solution of argyrol in the nostrils daily with a medicine dropper will benefit the birds and, where there is extreme bulging of the face, the distress may be relieved by opening the sinuses with a knife to permit the removal of the cheesy contents. A tonic in the mash may assist in getting the birds back to normal egg production. The avoidance of overcrowding, provision of dry and well ventilated houses, proper sanitation, the temporary quarantine of all birds coming on the premises and a plentiful supply of well balanced feeds will assist in preventing outbreaks of this type. The flock should be watched closely for symptoms of colds and all birds showing symptoms should be removed immediately.

(b) *Diseases caused by viruses.*—The agent which causes virus diseases will pass through very fine filters but cannot be seen with the aid of a microscope as can bacteria. The most common virus diseases of poultry are laryngotracheitis, infectious bronchitis, fowl pox, epidemic tremors, transmissible leucosis and inoculable tumors. Range paralysis, believed by some authorities to be a virus disease, is listed here although there is no definite proof that it is of virus origin.

## LARYNGOTRACHEITIS

This is a highly infectious disease of the upper respiratory tract which may affect birds of any age but usually causes most serious loss among those between six and twelve months of age. The first symptoms noticed are a watery discharge from the eyes and an inclination to remain quiet. Later there is a rattling sound in the windpipe and coughing which results in the discharge of bloody mucus. Frequently the head is raised and the neck extended as the bird gasps for inward breath, and lowered as it breathes outward. Post mortem examination shows an inflammation of the windpipe and larynx with the former frequently filled with blood stained mucus. It is this accumulation of mucus which causes laboured breathing and in many cases, death by suffocation. A proportion of the affected birds recover and it is probable some of these remain carriers of the virus. Neither flock nor individual treatment is very effective. The excitement caused by handling seems to increase the difficulty in breathing and offsets any benefit that might result from the application of argyrol as



mentioned in the treatment for coryza. When an outbreak occurs it is advisable to give the flock a dose of Epsom salts at the rate of a pound or pound and a half to each hundred mature birds. The birds should be disturbed as little as possible and well fed so that their body weight will be maintained. The introduction of new birds to a poultry plant or the return of birds from an exhibition are common means of spreading this disease.

#### INFECTIOUS BRONCHITIS

This disease resembles laryngotracheitis in its symptoms but is most commonly found among chicks between two days and three weeks of age. The affected chickens appear dull and listless and there is gasping for breath. Blood stained mucus in the trachea which is a very common condition in laryngotracheitis is absent in infectious bronchitis. Mortality may vary from ten per cent to a large proportion of the flock. Inhalants of a soothing nature, such as eucalyptus products may ease the distress of the chicks but cannot be considered a cure. Increased heat in the brooder house at this time may save the lives of many chicks. With this disease and laryngotracheitis, great care should be taken in the source from which chicks or other stock are purchased in order to avoid the introduction of the disease in this manner.

#### FOWL POX

Two forms of this disease exist and both may appear in one outbreak. One affects the comb, wattles and skin on the face and the other, the lining of the mouth, the tongue and the larynx. In the skin type, small wart-like growths appear about the head and spread in size until they become large scabby masses. In the diphtheratic type, raised, yellowish patches appear on the inside of the mouth and tongue and may increase in size until they interfere with eating and drinking. The eyes may also be affected. The disease spreads rapidly through a flock by the contact between diseased and healthy individuals. The severity of outbreaks varies greatly. If mild, the health of the birds is very little affected while in severe cases the appetite is lessened and egg production is reduced. Mortality is greatest in the diphtheratic type.

Treatment has little value except where the removal of scabs from mouth and tongue may be necessary to allow the birds to eat and drink. In such cases, the raw areas should be painted with tincture of iodine. Vaccination produces immunity to the disease but the careless use of vaccines may cause an outbreak of pox and this method of control is prohibited in Canada. Fortunately this disease is unknown in many districts. To prevent its introduction, any birds purchased or returning from exhibitions should be quarantined for a three-week period before being placed in the general flock. Following an outbreak, the buildings and equipment should be thoroughly cleaned and disinfected.

#### EPIDEMIC TREMORS

The outstanding symptom of this disease is a constant trembling of the body accompanied by a violent shaking of the head. It occurs among chicks during their first three weeks of life and mortality may be high among affected hatches. No satisfactory control measures are known.

#### TRANSMISSABLE LEUCOSIS OR INFECTIOUS LEUKEMIA

The term leucosis has been applied to several related conditions found in poultry. One of these conditions can easily be transmitted experimentally from diseased to healthy birds. The method of transmission under natural conditions is not definitely known. It is thought possible that the virus may enter the



blood stream through an injury or the bite of the ordinary fowl mite. Apparently the disease is not highly infectious. Birds approaching maturity seem to be most susceptible. Occasionally death takes place suddenly without marked symptoms being shown but usually there is a gradual loss of weight accompanied by dullness and weakness. The face and wattles are pale or yellowish in colour and sometimes a greenish diarrhoea is present. The blood is thin and watery and does not clot easily. On post mortem examination the liver is often greatly enlarged and greyish red in colour. The kidneys and spleen are usually larger than normal and may be mottled in appearance. The intestines may have small bleeding areas, particularly in the section nearest the gizzard. There is no satisfactory treatment known for leucosis. Strict sanitation and the culling of unthrifty birds as soon as noticed will usually control the disease. Where mortality is great, the replacement of the flock from a source known to be free of the disease should be considered.

#### INNOCULABLE TUMORS

It is known that some tumors are of virus origin and can be readily transmitted to healthy birds by inoculation. The cause of most tumors in poultry is unknown. Additional reference to their presence in fowls will be found among the non-specific diseases.

#### FOWL PARALYSIS, RANGE PARALYSIS

This disease has been considered by some authorities to be of virus origin, though proof of this point is lacking. It is here listed with virus diseases for convenience. Fowl paralysis is most commonly found in birds between the ages of three months and one year. Lameness is usually the first symptom noticed. It increases in severity until the bird cannot stand. One or both legs or wings, or both legs and wings may be paralyzed. Frequently the eye changes colour, producing the so-called "white eye," "grey eye," "pearl eye" or "fish eye." Diarrhoea is sometimes present. In early stages, the appetite may be good but eventually lameness or blindness will prevent the bird reaching the food supply. Birds seldom recover, death being caused by starvation or by ill treatment from other members of the flock. Post-mortem examination may show tumors on the internal organs and a swollen, water-soaked appearance of the nerves leading to the paralyzed limbs. A leukemic condition is frequently found in conjunction with paralysis and this fact has led some investigators to believe that leukemia and paralysis are two distinct manifestations of one disease. In many cases, the disease has disappeared from flocks after causing serious loss for three or four years. Some persons with practical experience believe that paralysis causes most loss when the resistance of flocks is weakened by internal parasites such as coccidiosis or intestinal worms. Because of the lack of knowledge regarding the disease, it is difficult to make recommendations for its control. Strict sanitary measures during the growing season including the rotation of fields used for range and the immediate removal of any birds showing symptoms, seem advisable. If the percentage of loss in a flock is great, it may be advisable to market the remaining healthy birds and to replace the flock from a source known to be free of the disease, after thoroughly cleaning and disinfecting the poultry buildings.

#### 6. Non-specific diseases

These diseases differ from those listed as specific diseases in that they are not caused by particular germs or viruses. Included in this group are deficiency diseases, impaction, cannibalism, leukemia, peritonitis, tumors, reproductive disorders and bumblefoot.



(a) *Deficiency diseases.*—Many poultry diseases are the direct result of deficient diets. A lack of vitamins or mineral elements or of proper balance between the two may result in serious disorders.

#### VITAMIN DEFICIENCY

More is learned each year concerning the vitamins required by domestic fowl. The entire lack of any required vitamin results in a specific disease, while a partial lack may be the cause of unthriftiness.

When vitamin A is lacking in the diet of young chicks, they make poor growth, become partly paralyzed and are unable to walk with a steady gait. There may be soreness of the eyes and small pimple-like spots inside the mouth and gullet. With mature birds, the symptoms are somewhat similar but the eyes become more swollen and both eyes and mouth contain cheesy patches which resemble those found in coryza or roup and has resulted in this condition being called "nutritional roup". Severe cases are not commonly seen but partial vitamin A deficiency may result where green feed is not plentiful and the birds do not receive cod liver oil. Vitamin A is abundant in leafy green feeds, in yellow corn and in cod liver and some other fish oils. Generous use of these materials will prevent vitamin A deficiency.

A complete lack of vitamin B will result in a paralyzed condition known as polyneuritis. Vitamin B is fairly abundant in the common grains and this form of deficiency is not common among birds raised under ordinary farm conditions.

When sufficient vitamin D is not present in the diet of a chick and it does not have access to direct sunlight, the condition known as rickets or leg weakness appears. Under ordinary farm conditions, chicks which are enclosed in brooder houses for more than a month and which do not receive vitamin D in some such supplement as cod liver or other fish oil, almost invariably develop a wobbly gait, the joints become enlarged and they eventually lose the use of their legs. The condition is not peculiar to growing chicks but may be found in the form of lameness and paralysis among fowls during the winter months. To prevent rickets, birds of all ages should have access to sunlight when this is possible. When they must be enclosed for extended periods, cod liver oil or other fish oil bearing vitamin D should be added to the diet. Since these oils vary in their vitamin D content, definite recommendations are difficult but, in general, from a pint to a quart of unfortified oils added to each 100 pounds of mash will be sufficient to prevent rickets. It is important that oyster or other marine shells be available to the birds in suitable sizes, at all times, since a plentiful supply of lime is a factor in the prevention of rickets.

Vitamin G contains two factors that are necessary in poultry nutrition. One promotes growth in chickens and among layers is needed to produce good hatchability of eggs. Without it, chicks fail to thrive, their legs become partly paralyzed and the toes curve inward. Green feeds, dehydrated alfalfa, milk products and liver meals are rich in this vitamin. An increase in the milk content of the diet, previous to and during the hatching season has proved an effective means of increasing hatchability.

The second vitamin G factor prevents the disease known as pellagra. Affected chickens have warty or scabby sores in the corners of their mouths, a sticking together of the eye lids and a cracking of the skin between the toes. The factor preventing this condition is abundant in milk products, alfalfa, wheat bran and yeast. Pellagra is not common under general farm flock management.

Several newly discovered vitamins, concerning which little is yet known, are said to have some importance in poultry nutrition. Vitamin K assists in the clotting of blood and prevents the profuse bleeding from small injuries which



occurs when this vitamin is lacking. Alfalfa is considered a good source of vitamin K. Another vitamin is said to prevent what has been called "crazy chick disease" and still another prevents a diseased condition of the gizzard.

#### MINERAL DEFICIENCY

The common grains and their by-products which make up the greater part of poultry diets are relatively low in mineral elements and it is probable that some of these elements may frequently be lacking in feed mixtures. Studies in the mineral needs of poultry have largely been concerned with the amounts of calcium and phosphorus required, because these two elements are needed in much larger amounts than are iron, copper, manganese, iodine or other mineral elements. Deficiencies of calcium and phosphorus are quite common and result in poor bone formation, lowered egg production and the formation of thin, poor shells. Fishmeal, meat meal and milk products are rich in these two elements, both of which are used by the birds to best advantage when vitamin D is abundant in the diet.

One of the most important recent discoveries in poultry nutrition has been the part played by the element manganese in preventing perosis or slipped tendon. This is a condition in which the tendons slide from their normal position at the back of the hock joints to one side and the legs become badly deformed. The hock joint and sometimes the entire leg becomes enlarged. This condition was formerly attributed to a lack of balance between calcium and phosphorus in the diet. Recent experiments indicate that one cause of the condition is a lack of the element manganese in the food supply. Only minute quantities of this element are needed and under most conditions the chicks receive all they require. The common grains vary considerably in their manganese content, oats containing about twelve times as much as corn. The addition of one-quarter pound of powdered manganese sulphate to each ton of feed will correct any manganese deficiency which may occur.

The elements sodium and chlorine, which unite to form common salt, are needed in small amounts by poultry. From one-half to one per cent of salt is usually added to the mash to ensure a sufficient supply.

Deficiencies of iron, copper and iodine are possibilities, with anaemia and goitre the result where they occur. With present knowledge of feeding, no special addition of these elements is needed.

(b) *Impaction or crop bound*.—Impaction may occur in different parts of the digestive tract. Crop bound is a term frequently applied when the impaction occurs in the crop. The condition usually results from birds eating coarse stringy material such as the leaves of dried grass or hay. The passage leading from the crop to the gizzard becomes clogged with this material and all food eaten accumulates in the crop. Without treatment, birds will eventually die from starvation. In early stages it may be possible to work the contents of the crop upward and through the mouth by manipulation. Long standing cases can be relieved by making an incision through the skin and the wall of the crop and removing the contents. After such operation the crop should be washed out and the incisions sewn separately with white silk or cotton thread. Food should be withheld for about twelve hours and following this period soft food only should be given for a few days. Operation for this condition is simple but rarely pays because of the time required, because of the loss of production which occurs at the time and because the hen with the tendency to eat material which causes the condition will probably continue the habit after the operation. It is possible that the craving for the coarse particles of food which cause impaction may be due to an insufficient supply of succulent green feed.



(c) *Toe picking, feather pulling and cannibalism.*—Toe picking is a habit of young chicks and feather pulling one of older chicks and mature birds. Both may lead to cannibalism. Feather pulling among laying hens spoils the appearance of the flock but does not seem to lessen egg production. It should be prevented or stopped, if possible, because of the danger of its leading to cannibalism. Sometimes the addition of coarse fibrous food to the diet will help in checking this habit. When it becomes general in the laying flock, the use of mechanical devices which fasten to the beak and allow the birds to eat but not to pull feathers will be of great assistance. Vent shields will aid in preventing cannibalism which follows prolapsus. Control methods for these habits among young chicks are given in Lesson 4. These troubles are most common in flocks which are crowded in houses or range or which have insufficient feeder space. Birds should be well fed and managed in a manner that keeps them busy. Faulty nutrition may be the underlying cause of these habits and this angle should be studied in an attempt to prevent their occurrence.

(d) *Leukemia or enlarged liver.*—This is a condition found among mature birds that is distinctly different from transmissible leucosis which has been described under specific diseases. On post mortem examination the liver is found to be greatly enlarged and in a soft pulpy condition. The colour varies from reddish to yellowish, depending on the relative amounts of blood and fat it contains. Frequently the liver becomes ruptured and internal bleeding follows which results in the death of the bird. Leukemia is usually found in hens which are in an unhealthy, overfat condition. No cure is known. Proper feeding and management have a preventive value.

(e) *Peritonitis.*—This is an inflammation of the thin membrane which lines the body cavity and connects the folds of the intestines. It is a common cause of loss among laying hens. The peritoneum, when inflamed, loses its lustrous appearance, becomes dull, thickened and the surface may be covered with a sticky discharge. Sometimes the body cavity may contain considerable fluid. There may be many causes for this condition which, like leukemia, is most often found in birds which are overfat or otherwise sub-normal in vitality. No remedy is known.

(f) *Tumors.*—Tumors are relatively common in poultry, occurring mostly among the older birds. They are masses of tissue, usually whitish or pinkish in colour, variable in nature and found on such organs as the ovary, liver, kidney, spleen, pancreas, gizzard, intestine and muscles. Some tumors grow slowly and do little harm, while others grow rapidly and seriously interfere with the body functions. Some outward tumors can be removed successfully, but most of them are located within the body cavity where removal is not possible. Tumors seem to be more common in some flocks than in others. This has led some authorities to believe that some strains of poultry are more susceptible than others. If such is the case, breeding stock should be secured from flocks which are relatively free. As pointed out in the section dealing with specific diseases, some tumors are transmissible.

(g) *Disorders of the reproductive system.*—The reproductive system of the laying hen is subject to several disorders, the most common being intra-abdominal ovulation, prolapsus and cloacitis.

#### INTRA-ABDOMINAL OVULATION OR INTERNAL LAYING

In this condition the egg yolks accumulate in the bowel cavity as they are released from the ovary, instead of passing down the oviduct and being laid in a normal manner. On post-mortem examination the abdomen will



contain a mass of yolks in an apparent cooked condition. Hens which frequent the nests but do not lay are often affected with this condition. No treatment is known.



THE RESULTS OF FEATHER PULLING

#### PROLAPSUS OR EVERSION OF THE OVIDUCT

White Leghorns seem more susceptible than other breeds to this condition, which is also known as "blowout" or "pickout" and it is most common with pullets beginning to lay. The eversion frequently follows an egg bound condition and may be partly due to the straining of the bird in an effort to lay. Some investigators believe the condition is associated with an inflammation of the intestine which accompanies coccidiosis and worm infestations. Frequently other birds are attracted by the reddish colour of the protruding part. Their picking at it may lead to cannibalism and has led to the term "pickout" being applied to prolapsus. If the condition is noticed shortly after it occurs, the tissue can be washed and returned to a normal position with the fingers covered with carbolized vaseline. If there is a recurrence, the bird should be disposed of. Pickout shields are mechanical devices which are useful in preventing cannibalism where prolapsus occurs.

#### CLOACITIS OR VENT GLEET

This disease is an ulcerated condition of the vent in which the discharge from the sores has a very offensive odour. Doubt exists as to whether or not it is contagious. Applications two or three times daily of mild antiseptic solutions such as mercurochrome or argyrol or at intervals of three or four days with a three per cent solution of chromic acid have been quite effective. Another simple treatment is the dusting into the vent of calcium sulphide.

(h) *Bumblefoot*.—This disorder is an abscessed condition of the foot resulting from infection which gains entrance through an injury or bruise. Usually a scab is formed on the bottom of the foot from which pus cores extend upward. The foot may be hot, considerably swollen and painful. This seems to be a common condition among mature male birds. Treatment is not always successful but is worth a trial with valuable birds. The scab and pus cores should be removed, tincture of iodine applied to the wound and in



severe cases the foot should be bandaged to keep it clean. Prevention lies in reducing the chances of injury to the feet by such means as lowering the roosts where they are too high, rounding off any sharp edges from roosts and supplying plenty of litter on the floor.

## 7. A poultry tonic

With normal, healthy flocks the use of drugs and tonics is not recommended. There are a few cases, however, where a tonic can be used to good advantage such as with old hens at moulting time, pullets which are undergoing a winter moult or pullets which remain unthrifty and underweight because their ability to digest and assimilate food has been injured by internal parasites. Equal parts of ground ginger, gentian, nux vomica and iron sulphate mixed together and fed at the rate of one to two tablespoonsful to fifty birds daily in a moist mash is recommended in such cases by the Poultry Division of the Central Experimental Farm, Ottawa. As the birds improve in appetite and weight, the amount of tonic should be reduced and finally discontinued.



## LESSON 17

**POLICIES FOR POULTRY IMPROVEMENT****Topics for Study**

1. The National Poultry Breeding Program.
2. Provincial aid in poultry work.

**1. The National Poultry Breeding Program**

The National Poultry Breeding Program, as its name suggests, is in operation in all the Canadian Provinces. This policy is very broad in its scope, as will be learned by a study of its objects and regulations. Provision is made for the testing of pullets for production, both on the owner's plant and in egg-laying contests. The value of males in a breeding policy is recognized and means provided for the identification, distribution and use of such birds as have two or more generations of sound breeding. Progeny test certificates are granted to both males and females meeting the requirements in prepotency. The approval of hatcheries and their sale of chicks according to grade is an activity which links the Breeding Program with the flock approval work of the provinces. While this policy or program was announced only in August, 1934, it embraces many important lines of work which had been conducted for many years before this date. Particulars regarding the different phases of the Program are available from the Department of Agriculture, Ottawa, or from the Fieldmen of this Department located in the different Provinces. The details of the National Poultry Breeding Program follow:—

In this program the Department, through its own organization and in co-operation with the various Provincial Departments, has for its objective a sound and effective breeding and distribution service for poultry. It is hoped that through the new basis of record work further possibilities will be provided for eligibility for registration. Consideration is also being given to the flock approval policies conducted by the provinces as a basis of approach to record work.

This program may be divided into four major headings: (a) Testing of stock for performance; (b) Breeding and testing for prepotency of stock meeting performance qualifications; (c) Planned distribution of progeny of A and B; (d) Flock Approval.

The details of the program proposed are as follows:—

(a) *Testing for performance.*—1. The two methods of record keeping, now in use, will be continued, namely, R.O.P. records and contest records.

2. In making inspections additional characters of economic worth, to include such factors as shell texture, shell strength, shape of egg, strength of albumen, position of yolk, type of bird most suitable for market, fleshing, texture of skin and flesh, etc., will be noted and reported upon by the Inspector and space will be provided on the certificates for notation of such of these as may be agreed upon.

3. Such of the characters referred to under No. 2, when proved to be hereditary, are to be included as additional primary qualification requirements.



4. R.O.P. certificates will be issued on the present standards for such birds as qualify in R.O.P. and in contests. Actual egg weights will be taken by the breeders and by the Inspectors.

(b) *Breeding and testing for prepotency.*—A review of the breeding work to date establishes the need of four things.

1. The recognition only of sound pedigrees, meaning those composed solely of qualified males and females for as many generations as are under consideration.

2. Recognition of breeding worth on a generation basis, first, second, third, fourth, etc.

3. Volume. The smallness of the unit and the relatively large numbers of males required suggest the need of volume production in commercial quantities.

4. The necessity of more advanced methods of breeding than those used to date.

Breeding work under this plan falls naturally into two divisions.

1. Production at a moderate cost of cockerels from qualified stock for approved flocks, etc.

Only those cockerels which have at least two generations of sound breeding on both sides will be recognized as R.O.P. cockerels.

2. Testing R.O.P. qualified males and females for prepotency—a new and higher type of breeding work carried on for the improvement of foundation stock, the results of which will eventually be used in the mass matings referred to under the first part.

Birds eligible for prepotency or progeny tests shall have at least three generations of sound pedigree behind them and shall have themselves passed the Performance test.

Progeny test certificates may be issued for such birds not otherwise disqualified, which meet the following requirements:—

(a) *Males:*

All normal mature pullet progeny from Prepotent Test Matings must be entered in R.O.P. Forty per cent (40%) of all progeny entered with a minimum of fifteen (15) from at least four dams, to qualify on R.O.P. standards.

(b) *Females:*

All normal mature pullet progeny from Prepotent Test Matings must be entered in R.O.P. Forty per cent (40%) of all progeny entered, with a minimum of four (4) to qualify on R.O.P. standards.

Registered males and females with the requisite breeding behind them are eligible for the Prepotency Test.

It is further proposed that the results of prepotent matings be closely analysed genetically in order that breeders may make effective future matings as far as possible.

(c) *Distribution.*—1. Grades of breeding stock—males, females and chicks will be established under the Live Stock and Live Stock Products Act.

Males—Two grades—R.O.P. males.

Prepotent males.

Females—Two grades—R.O.P. females.

Prepotent females.

Chicks—Two grades—Approved breeder hatchery chicks.

Approved hatchery chicks.



2. Cockerel distribution.—It is hoped to make this an integral part of Departmental policy, in order to link together the R.O.P. and commercial hatchery parts of the program.

3. Hatchery approval.—This includes the Hatchery Approval Policy as at present in operation, also expected developments upon the proclamation of the Hatchery Regulations in the Provinces.

Approved Hatcheries will be divided into two classes:—

- (a) Approved Breeder Hatcheries.
- (b) Approved Commercial Hatcheries.

(The requirements in connection with these two classes of hatcheries has not yet been finally settled.)

(d) *Flock Approval*.—This constitutes the regular flock improvement program of the Provinces. It does not include trap-nesting or pedigree breeding. Numbers of good pedigree breeders have risen from its ranks in the past. Provincial and Dominion officers in touch with this phase of the work will be urged to continue their efforts to encourage promising approved flock owners to enter in Record of Performance.

## 2. Provincial aid in poultry work

It is clearly impractical to assemble in pamphlet form the details of all the forms of government aid in poultry work that are provided by the nine provinces of Canada, since the regulations are subject to frequent change. Such activities as blood testing for pullorum control, flock approval, junior poultry club work and others of considerable importance to the poultry industry are conducted under provincial supervision. Details of such work may be secured from the Departments of Agriculture of the respective Provinces. Many valuable publications dealing with different phases of poultry work are prepared by Provincial Departments of Agriculture to supplement those which are available from the Publicity and Extension Division, Department of Agriculture, Ottawa.



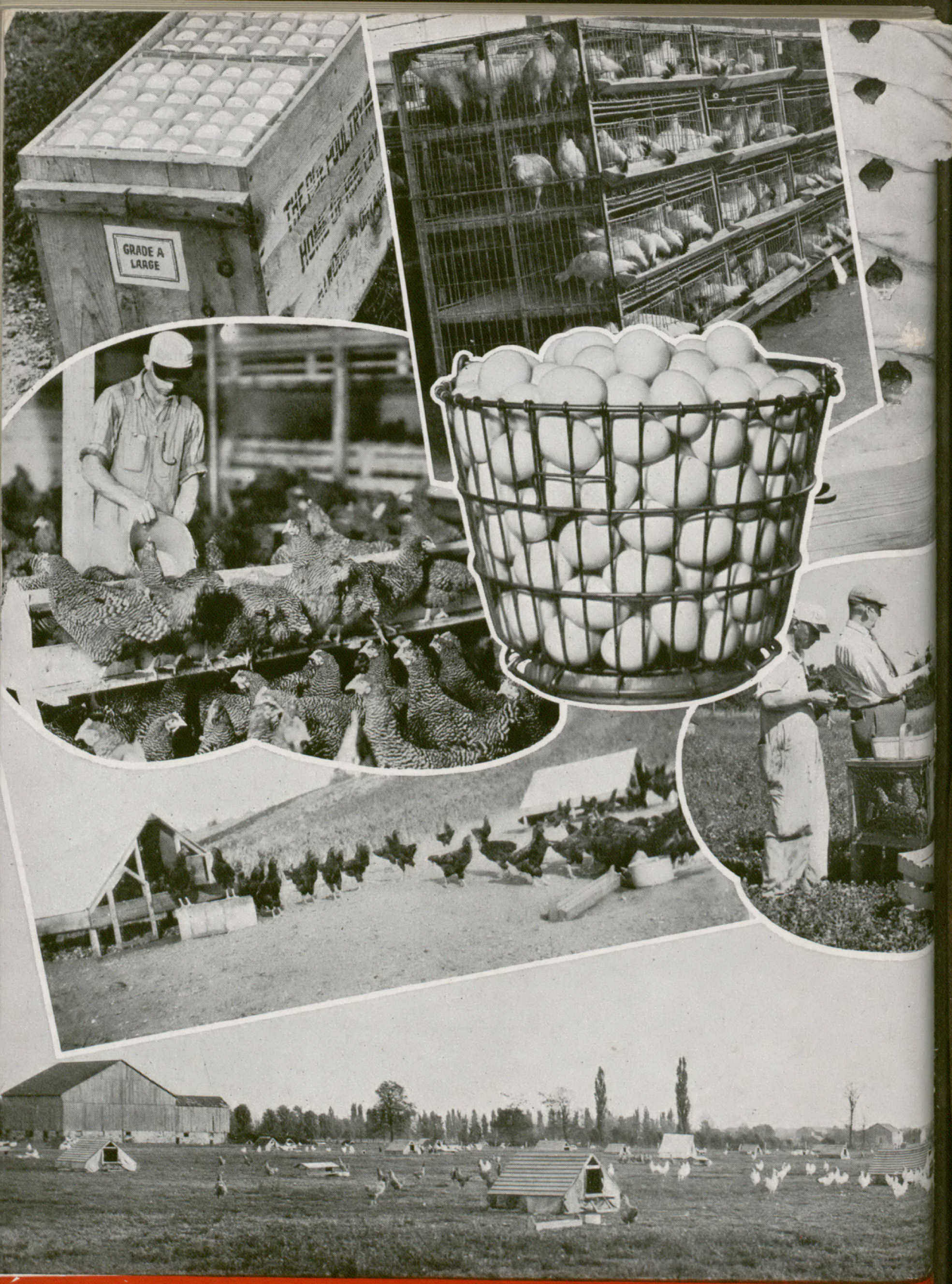




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