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## Agricultural Experiment Station.

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POULTRY CULTURE IN MINNESOTA.

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# UNIVERSITY OF MINNESOTA.

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## **POULTRY CULTURE IN MINNESOTA.**

CHAS. S. GREENE.

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In response to numerous inquiries as to the advantages of poultry keeping in relation to other branches of farming in Minnesota, and the proper methods to pursue to insure a profit upon the investment, we have tried in this bulletin to describe some of the conditions necessary to insure success and the easiest way to bring these conditions about. The ideas here presented are based upon our own experience and that of others whom we know to be doing good work along these lines.

We have not as yet conducted many scientific experiments to get exact data pertaining to any particular branches of the business. No apology is offered for this as we have had neither time nor money for this purpose. We know however, that the general farmer is not using even what information is available. It is the privilege and duty of the Agricultural Experiment Station, which is an educational institution, to use every possible means to promote this industry, that it may develop into a more important source of income to farmers and poultrymen in the Northwest. With her natural advantages Minnesota should occupy a place among the foremost poultry producing States in the Union.

By far the larger part of the eggs and dressed poultry on our markets at the present time comes from the farm where poultry are kept only as a side line. We find these fowls are being kept in houses of nearly every conceivable style and generally receiving very little care from their owners. We believe that this state of affairs exists chiefly because of the erroneous idea that poultry keeping is a small business, not worthy of a man's attention. According to the Twelfth Census the eggs and poultry produced in the United States in one year are valued at \$281,178,247.00. Minnesota produces about seven and one half million dollars worth of poultry and eggs in a year which could easily be doubled if proper attention were given to this branch of farm work.

A great deal could be said in regard to the profits of the poultry business but here it is only necessary to repeat what has been written before. "Profit with poultry is gained in ex-

act proportion to the care and thought devoted to the business." There is no luck connected with it any more than in any other branch of farming. We would suggest, that unless a person is willing to comply with the conditions of success he had better not venture a very large capital in the poultry business.

### LOCATION.

One of the first and most important questions to decide in starting a poultry plant is the location. The factors determining the location are; the markets, soil, and climate. We believe these are here named in the order of their importance. It is of little use to produce a good article if we are out of reach of markets that are willing to pay reasonable prices for our produce. People living near cities and large towns will therefore have an advantage over those living in remote regions. While this should be considered carefully in starting it should not discourage people from keeping poultry because they do not live near a large city. Many large and successful poultry farms ship their produce from one to three hundred miles. By making contracts ahead they are enabled to realize a good profit on the investment.

### SOIL.

The soil should be a sandy loam and high enough so that all surface water may drain away. When such a location is not at hand and it is necessary to build upon low or level land, a foundation for the house should be built of brick about two feet high and the inside filled in with earth (preferably gravel or sand) to the top of the foundation and graded up to the same level outside. The ground should be sloping away from the building on all sides. This will materially aid in keeping the house dry. We do not advise locating a house in a bank as it is almost sure to be damp. Dampness must be guarded against in all our dealings with poultry or disease and failure are apt to follow.

### CLIMATE:

While it is true that poultry will live and thrive in nearly every clime we find that about  $40^{\circ}$  North latitude is best adapted to their requirements. We would prefer a colder climate than this rather than warmer for several reasons. The hot summers in the South furnish ideal conditions for the

rapid multiplication of all kinds of vermin which prey upon the birds. Disease germs are more numerous and seem to develop much faster than in a colder climate. A very hot climate has a depressing influence on laying hens and will greatly retard the growth of chicks, if it does not ruin them entirely. Eggs laid when the weather is moderately cool are of better quality; that is they have what is called "more body" than those laid in hot weather unless the latter are kept in refrigerators until used.

The cold of the winter, in the northern part of Minnesota is not so difficult to overcome as the heat of a southern climate. Here we can build our houses practically frost proof so that, barring the extra expense of warmer houses, the only disadvantage we have to contend with is the prolonged winters. Usually we are compelled to keep stock housed a little more than five months. During this time we do not allow the birds to go out of the house.

### STOCK.

With nearly a hundred varieties of pure bred poultry to choose from we can certainly find one that is suited to our requirements. One breed is enough for any farmer. If he tries to keep more than one breed the result is almost sure to be a mixture which practically ruins his whole flock. There is abundant proof that it will pay every one better to keep pure bred stock than it will to keep mongrels. This is true even if stock is kept solely for market purposes without selling eggs for hatching or stock for breeding purposes. Here at the Experiment Farm we are breeding White Leghorns, White Wyandottes and Barred Plymouth Rocks. The Leghorns are the best layers, and have another advantage in coming to laying maturity at least a month before the other breeds, which makes it possible to hatch them so much later in the spring and bring them to laying maturity in October or November. In Canada 42 per cent of all the fowls kept are Barred Plymouth Rocks. In England and Ireland the Orpingtons and Dorkings are taking the lead especially for market poultry. Considerable attention has been paid to Buff varieties during recent years. The Buff Plymouth Rocks, Wyandottes, Orpingtons, and Leghorns all seem to be growing in favor especially among fanciers. Nearly every breed or variety has some good qualities. If a selection is made with a view of supplying a certain demand for either eggs or meat it will be very easy to find a variety that will produce the desired results.

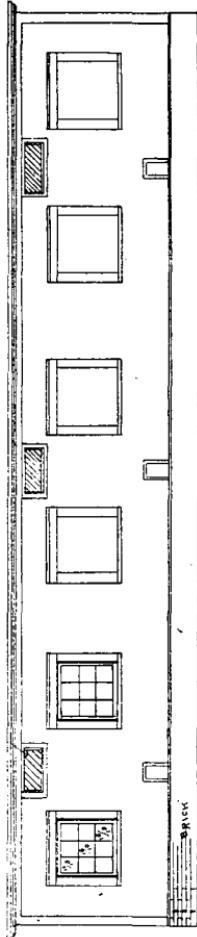
## HOUSES AND RUNS.

A poultry house in this latitude must be warm, dry, light, and well ventilated without draughts. The neglect of any one of these requirements is enough to destroy the usefulness of a flock of birds for the whole season. There are many theories advanced, for building poultry houses, that will not bear a practical test. Great care should be used to have all buildings and fixtures connected with a house as simple as possible thus reducing to the lowest point the labor in caring for the birds.

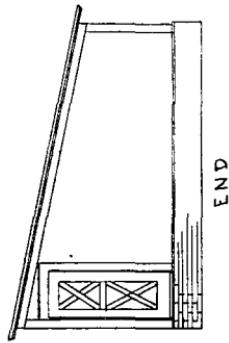
The two most common plans of building are what are known as the scratching shed plan and the continuous long house. The scratching shed plan is to build a small roosting and laying room and connected with it, a room somewhat larger with an open front facing the south. The floor of this room is covered with straw for the hens to exercise in during the day time. The open front is covered with wire netting to confine the birds. It is also fitted with cloth covered frames hinged at the top to be closed during stormy weather. The object of this plan is to furnish the fowls with fresh air and exercise in a natural way, with a warm place in which to sleep at night. The continuous closed front house with a shed roof sloping to the rear, and fitted with windows enough in front to furnish sufficient light for the fowls is the most common style. There should be no trees, board fence, or buildings within 150 feet of the south side to obstruct the sunlight.

We have no proof that one method of building is better than the other. We know that both are being used extensively and with varying success. In this country where the mercury has a range of at least 130 degrees, we do not advise building a house with an open front if winter eggs are desired. Neither do we advise building a house nearly air tight and keeping it closed all winter regardless of the weather. We try to avoid both extremes by building a warm closely built house and ventilating it by a method which will be described under that head. We are unable to state exactly at what temperature a room should be kept for laying hens in cold weather. We know this depends largely upon weather conditions. If it is from 32 degrees to 40 degrees above zero inside the house when the mercury shows 20 degrees to 40 degrees below in the open air, we can feel sure our house is built well enough so we should be able to obtain very good results in eggs. We have never produced eggs profitably in a house whose temperature was ranging much below the freezing point for any considerable length of time. We do not say that this cannot be done.

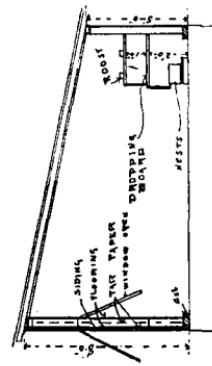
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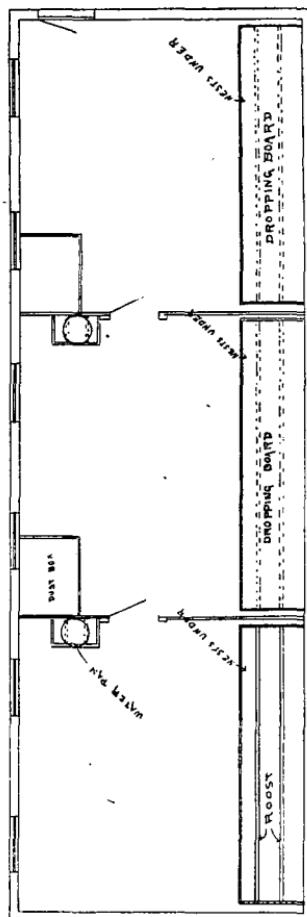
FRONT ELEVATION



END



SECTION



FLOOR PLAN

but that we have never been able to do it. We give here a plan for a house that will comfortably accommodate 150 hens. It is 16 feet by 48 feet on the ground with  $7\frac{1}{2}$  feet studs in front and 4 feet studs behind. The foundation is a brick wall, twelve inches thick and from one to two feet high depending on the lay of the land. The space inside is filled with earth to the top of the foundation before the building is erected. 4x6 inch sills are then placed on the foundation and the studding set two feet apart. The plates are 4x4 inch made by nailing two 2x4's together. The rafters are 2x6 inch placed the same distance apart as the studs. The outside is then covered all over with matched flooring. Over this are two thicknesses of tarred paper which is covered with shingles on the roof and lap siding on the sides. The inside is boarded up with cheap lumber and the space between the rafters and studding is filled with planer shavings or flax straw packed in very tightly. The house can be plastered inside or not as desired.

Another very good plan, and perhaps a better way in a hilly country or where there are good wind breaks, is to build the house four or five feet higher than the dimensions given and instead of packing the roof, construct a floor of cheap lumber six feet above the main floor of the house leaving a space of two inches between the boards. The space between this loose floor and the roof to be filled with dry straw in the fall and allowed to remain there over winter. When spring comes this can be used for litter on the floor making room for fresh straw for the next season. This furnishes ventilation through the straw overhead. There should be a door in each end of the loft above the straw to be opened when the weather will permit. This house will keep as dry and comfortable as it is possible to make it.

A house of this size should be divided by wire partitions into three pens. Each pen is then long enough to accommodate about 50 birds. There are two windows in each room, set so that the sills are two and a half feet from the floor. Each window contains nine lights of 10x12 in. glass and is hung on hinges at the top. Storm windows are necessary in this climate and are hung outside on hinges at the top the same as the ones that swing in. The storm windows are held open with long hooks and the inside windows are hooked up against the ceiling when the weather is warm enough to permit.

The inside arrangement should be as simple as possible. An alley way in a house is generally only a waste of room that the fowls should use. A person only has to care for a flock of fowls in a house fitted with an alley way to see its disad-

vantages. The most practical arrangement that we have been able to find for a house like this is to first build a platform along the rear of the house, 2 feet from the floor and three feet wide. One foot above this the two roosts are placed by first fastening, in each room, three arms to the wall with hinges. The front end of the arms should have legs one foot long which rest on the platform when in position. The first roost is placed thirteen inches from the wall and the second one fourteen inches from the first and nailed solidly to the arms. These arms or cross pieces being hinged to the back wall make it very easy to raise the front and fasten to a hook in the ceiling so that the roosts are entirely out of the way for cleaning. This platform has a one inch cleat around it. Under the front of the platform and resting on the floor is a bench six inches high, eighteen inches wide and ten feet long. This forms the bottom of the nests. The nests are made continuous, eleven inches square on the inside, eight inches high and without top or bottom. They are set so that the front comes flush with the front side of the bench. The bench is long enough so as to make room for ten nests. This makes the top of the nests ten inches below the platform. A board one foot wide and twelve feet long, hinged to the front edge of the platform, will lap down on the nest box a little, hiding the nests from view and making a partially dark place for the hens to lay in. This is a very important part of the plan. The board can easily be raised when gathering the eggs.

In one corner of the room is a dust box 3x4 feet and kept well supplied with fine dry sand and ashes. The water pans are galvanized iron made any size to suit the number of birds in the pen. We have them four inches high and fifteen inches in diameter and set on a frame fifteen by 28 inches. This frame is placed eighteen inches from the floor. It is made of two long pieces and four short ones. The two center cross pieces are placed ten inches apart to support the pan. The hens jump up onto the two outside slats to drink. A triangularly shaped box is fastened to the wall half an inch above the pan. This box should be six inches narrower than the pan, leaving three inches on either side through which the birds drink. This box being slanting on the top keeps the hens from getting into the pan and the pan being eighteen inches from the floor keeps the hens from scratching dirt into the water. It is difficult to overestimate the value of arranging the water pan in this way as it combines all the advantages to be found in any drinking device, except where running water can be used, and eliminates every objection. A house

built and furnished as above described has been given a thorough test on the Experiment Farm and has proved to be very satisfactory.

### ARTIFICIAL INCUBATION.

Artificial incubation has been practiced so many hundred years that the date of its origin cannot be fixed. History, however, teaches us that the Egyptians were among the first people to hatch chickens artificially. They used brick hatching ovens and were very successful but, unlike the Americans, they did not try to hatch chickens during the whole year. They were content with a hatching period of about two months. The climate of Egypt has much to do with their success as the temperature of the atmosphere during the hatching period is but little below that required for incubation. A very warm climate makes the natural method impractical as hens become restless and produce very poor results, so it seems that they were driven to it by necessity.

Artificial incubation in this country began in 1870 so that all the progress which has been made in the art has been accomplished during the last 34 years. The first machines put upon the market were very crude and did not produce satisfactory results. This seemed to prejudice many persons against artificial incubation. When the first really practical machine came on the market, in 1878, it had to overcome the bad reputation its predecessors had made. Since that time the progress along this line has been rapid and marked with success. At present there are several patent incubators on the market that are entirely practical. If only a few chickens are to be raised each year by the average farmer, the natural method will generally prove more satisfactory. People who can spend but a small part of their time in caring for the flock will seldom devote enough time and study to make it profitable to invest the extra amount of money required for incubators and brooders and a proper place in which to run them. If a person has a particular liking for poultry and enough time to devote to it, both methods should be tried and the one adopted that best suits the conditions.

### SELECTING AND RUNNING INCUBATORS.

It is not necessary to give here explicit instructions for running incubators, as each manufacturer furnishes complete instructions for operating his particular machine, but a few

general rules may be helpful to those who are thinking of buying machines.

The first thing to consider in selecting an incubator or brooder is whether it will hatch or raise chicks when run by a beginner. We know there are several very good machines on the market, and others that are practically worthless. We would therefore recommend testing a new machine before buying it or else buy machines known to be doing good work when run by people who are not interested in their manufacture.

The best place to run an incubator is in a room made for the purpose, either partly or wholly above ground and constructed preferably of stone, brick or concrete and banked up with earth so that the inside of the room will be but slightly affected by changes in the weather.

A house cellar is often a good place to operate an incubator. The room should have an even temperature if the best results are to be expected. Beginners should start as soon as spring opens. Pullets hatched during April and May will develop into the best winter layers. It is much easier to get strong fertile eggs at this time. This is of the utmost importance. The eggs must first be hatchable before good results can be expected.

Select eggs of medium size with a smooth shell and as perfectly formed as possible. There is no way of telling before placing in the incubator whether an egg will hatch or if it will produce a male or female chick.

#### BROODERS.

Leave the chicks in the incubator until they are all hatched and thoroughly dry, then remove to the brooder. This requires the greatest care so as not to let them become cold. Young chicks that are accustomed to a temperature of 95 degrees or 100 degrees in the incubator will catch cold very easily when first taken out. A cold contracted at this time is almost sure to affect their lungs and they will die of pneumonia in a short time. The brooder should first be heated to a temperature of 90 degrees to 100 degrees, depending on the location of the thermometer and the temperature of the room. After the first week the temperature should be gradually lowered, giving only just enough heat to make the chicks comfortable. The poultryman should study the comfort of the chicks as well as observe the thermometer.

There are two methods of brooding that are used extensively. One is the long brooder house fitted with a heater

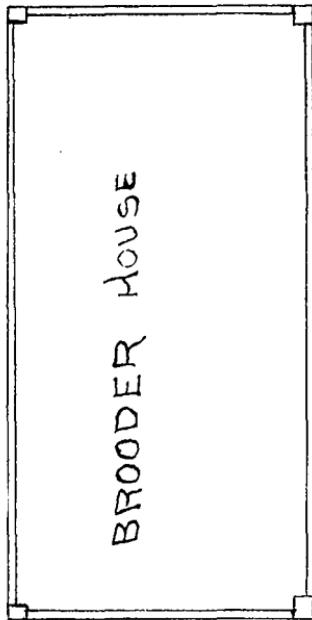
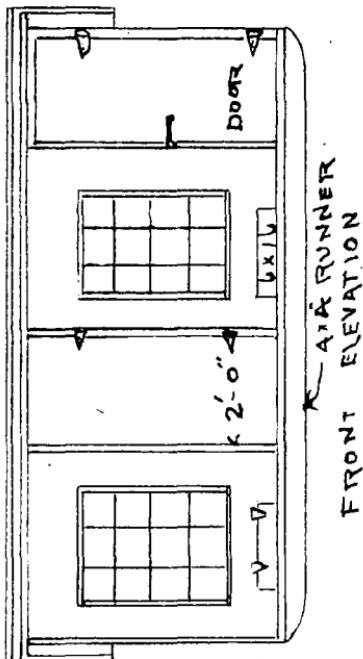
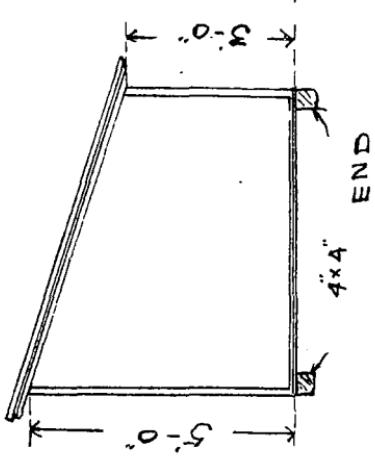
and pipes. This style is used for raising chicks in large numbers in cold weather. It is used almost entirely for brooding ducklings. As this style is not adapted to the use of farmers we will consider only the individual brooder heated with a kerosene lamp and large enough to accommodate from 50 to 75 chicks. We do not advise putting 100 chicks in one brooder because better results are generally obtained with a smaller number.

There are four very important features that must be considered in a brooder. First, the heat must be distributed among the chicks in such a way that all are made comfortable; second, ventilation, which has been a very common cause of failure. The system of ventilation must be arranged in such a way that fresh air is warmed first and then forced into the brooder, driving the foul air out. The third consideration is simplicity. It must be easy to clean and operate. A short time spent unnecessarily, every day with each brooder amounts to hours or even days during the season. The fourth is economy. With oil costing from 8 cents to 18 cents a gallon the brooder that will maintain the required heat with the least oil has a decided advantage. Some brooders require twice as much oil as others. We admit that brooders have been run very successfully without complying with these requirements but the conditions must have been very favorable. We want a brooder that will do the required work even under unfavorable conditions and in quite cold weather. The careful consideration of the merits of the different machines before purchasing will often make the difference between profit and loss.

Although there are many so-called out-door brooders on the market we do not recommend their use in this section of the country. There are often several days at a time when very young chicks cannot be allowed out of doors and if confined to a brooder serious results will soon follow. In a warmer climate or very late in the season here, out door brooders will sometimes give good satisfaction provided they are fitted with a cold brooder attachment in which to confine the chicks when the grass is wet and where they can be fed in rainy weather.

#### BROODER HOUSES.

The proper place for a brooder is in a house built for the purpose. Each house should contain one or not more than two brooders, and the houses should be placed in a sheltered and well drained place where cold winds cannot strike them. One



of the best locations for brooder houses is in an orchard or along the south side of a grove or thicket. The trees protect the chickens from enemies to some extent and furnish needed shade during the warm summer days. The houses are placed at least 150 feet apart so that each flock is practically separate from the others. The best and most economical brooder houses that we have been able to devise at present are such as we use here at the Experiment Farm. They are twelve feet long, six feet wide, three feet high in rear and five feet high in front, with a partition in the center dividing the house into two rooms, each six feet square.

The house faces the south and a brooder is set in the northwest corner of each room. Each brooder should accommodate about 50 chicks. This house is built upon 4x4 in. runners so it can be easily moved with a pair of horses. The sills are 2x4's nailed to the runners. The studs and rafters are 2x2 in. placed 3 feet apart except on the south side where extra studs are inserted each side of the windows and doors. There is a window containing six lights of 7x9 in. glass in each room in front of the brooder. There is a door into each room two feet wide and about as high as the house. As this house is only intended to be used through the summer months, no attempt is made to build it warm enough to keep out the frost. The only object being to make the roof, walls, and floor tight and durable. Matched flooring may be used to good advantage for the floor, roof and sides. The roof is then covered with one ply Paroid roofing and the sides with Neponset red rope roofing. This makes a house that is wind and water proof and which will last many years if cared for and kept well painted.

This system of brooding has several advantages. The house furnishes comfortable quarters for the chicks during inclement weather. When the chicks are six or eight weeks old and no longer need artificial heat the brooders can be removed and the house used as a summer roosting coop until the stock is ready to go into winter quarters in October. By arranging the houses in this manner we avoid building fences and at the same time chicks cannot crowd much as the houses are far enough apart to prevent it.

#### RUNS.

When chicks are first placed in these houses a yard about twelve feet square is built in front of each pen. The fence used for this purpose is a light frame, 2½ feet by 12 feet, made out of 1x4 inch material on which is nailed one inch mesh wire

netting thirty inches wide. These hurdles make a light portable fence that is very easy to use. When the chicks are old enough to fly over this fence it is removed and they are allowed free range.

### NATURAL INCUBATION.

Quite frequently it happens that hens do not become broody until the best of the season for hatching is past. When this is the case we have always found that the hens did not begin to lay until late in the winter or early spring. The only way out of this difficulty that we know of unless artificial incubation is resorted to, is to give the fowls proper care at all times so they will lay all winter and thus produce early sitters.

As with the artificial method, April and May are the best months in which to hatch, but if necessary the last broods may come off as late as June 15th. These late hatched chicks will do very well if kept separate from older ones. It is very important that we never keep young chicks with older ones as the holder ones will crowd the young ones away from the feed and run over them which often stunts their growth.

When a hen which we wish to set becomes broody we remove her to a room especially provided for the purpose and away from hens that are laying. The nest is made in a shallow box about one foot square, by first placing a shovel full of earth in the bottom and over this some fine hay or straw; making the nest slightly concave so the eggs will have very little pressure against each other. Artificial eggs are first placed in the nest and the hen removed to them at night and enclosed in the nest until the next night when she can be released and fed. This process of confining the hen to the nest should be continued until she returns to the nest of her own accord. The eggs she is to hatch should then be given to her at night so as to disturb her as little as possible. Whole wheat, corn and grit are kept in boxes where the sitters can eat whenever they come off the nest. Fresh water should be supplied every day and a box of road dust or ashes kept in the room for the sitters to dust in. Several hens may be set in one room if care is taken to see that they go back on their own nests every time. Each hen should be dusted with some good insect powder when she is set and again at the end of the first and second weeks. When this is neglected the chicks are almost sure to be infested with lice which will materially retard their growth and may decrease their number. When all are hatched and dry they should be carefully moved to a coop

located as described for a brooder house; but if the weather is very cold the coop should be located in a barn or under a shed where it can be moved out in the sunlight on pleasant days. In very warm weather the coop should be placed in the shade of a tree. Nothing is better than a good grass run where chickens have not been kept the year before. The coop should be twenty by thirty inches on the ground, eighteen inches high in the rear and twenty-seven inches high in front. It should be made of one inch boards with the cracks battened except the front which is composed of slats two and a half inches apart. These slats are covered with two boards one foot wide. One of these is hinged three inches from the top and the other is hinged at the bottom so that when both are closed there is a space of three inches left at the top for ventilation. This space should be covered by netting to keep out rats. When open, the lower door serves as a feeding board and the upper one should be fastened on a slant to serve as a sort of porch roof.

The floor, which is separate from the coop, is made to fit the inside of the house loosely. The coop can then be lifted off the floor and cleaned every day. The floor should be covered with some dry sand or dust and over this is put a little chaff or straw. The chicks are given free range after they are two days old, if the ground is dry, but should be prevented from running in wet grass until well feathered.

#### FOOD AND CARE OF CHICKS.

There are a few principles that must be understood before any directions for the feeding and care of chicks can be successfully followed under varying conditions. First it has been shown that no two fowls are exactly alike. Corn, wheat, or other food stuff grown in one part of the country may be quite different from that grown in another part. There are also many different grades of the same kind of grain. This makes it practically impossible to reduce the feeding of chicks to an exact science. Then, too, the different seasons of the year change the effects of food so that judgment must be the guide in feeding after all printed instructions have been learned.

Another very important item to learn is that how and when we feed makes just as much difference with the results as what we feed.

Chicks require considerable exercise to maintain health and promote growth. During mild weather in summer when free

range is allowed they will take exercise enough naturally, and it would be useless to make them work for their food. When the weather is cold or where they are raised on a limited area, it is necessary to confine them to the house or a very small yard. This condition naturally makes them indolent and they become unprofitable unless we adopt some means of compelling them to exercise. Greater care must be given chickens in confinement because everything that is necessary to their health and growth must be supplied, while chickens that are allowed free range will find for themselves grass, insects and many other things that help to make them thrifty.

When the chicks are first taken from the nest or incubator and placed in the coop or brooder, they should be kept as quiet as possible for at least thirty-six hours. Great care should be used to keep them from straying away and getting chilled. When they are about thirty-six hours old they are fed for the first time. The best food for this purpose is wheat bread dried in the oven until crisp. This is then rolled or ground fine and mixed with about one fourth of its weight of raw egg. This should then be dried just enough to make it crumbly and not sticky. It can be kept before them constantly the first day and should be fed every two hours the second day. After the second day only one feed a day of this food should be given for two or three weeks. As soon as the chicks have learned to eat it is well to place grit, granulated charcoal and warm water within easy reach. Care should be taken that the grit is very fine so it will go through a sieve ten meshes to the inch. The water should be placed in such a way that the chicks cannot get into it. A saucer six inches across and two inches deep is a very convenient dish for them to drink out of. The water in this dish can be replenished by inverting into the dish a can filled with water and having a small hole less than two inches from the top. This will supply water as fast as it is used up and will also prevent the chicks from getting into the water. After the second day and until the chicks are five or six weeks old they are fed johnny cake two or three times a day, alternating with cracked wheat, pinhead oatmeal, millet seed or cracked corn, all fed together or alternately. If the chicks need exercise the whole or cracked grain can be scattered in litter on the floor. Care should be taken not to feed too much of the johnny cake as they will not work for the grain if they have all the johnny cake that they can eat. This johnny cake is made by mixing five parts cornmeal, one part wheat middlings, and one-half part beef scrap or one part egg (the infertile eggs tested out of a machine

will do) mixed with butter milk and a little soda added. This is stirred quite stiff in a pail. The pail is then covered and set in a kettle of boiling water and steamed two or three hours until thoroughly cooked. Enough of this can be cooked at once to last two days. When it is cooked in this way there is no crust on it so it is all eaten.

Chicks should be fed every two or three hours for the first three days and then five times a day until they are six weeks old. When more than six weeks old three or four times a day is sufficient. Regularity should be observed at all times in feeding either chicks or fowls. They know when it is feeding time as well as the attendant does and if kept waiting they will not make nearly as rapid growth.

Great care should be exercised in keeping the drinking water clean. If allowed to become dirty the water will poison the chicks and they soon show its effects. It should be kept in the shade in warm weather and changed twice a day when chicks are very young and once a day after they are two weeks old.

Green food should be fed every day from the time the chicks are three days old until they are ten days old if the best results are to be expected. The best green food is young tender grass cut in 1-8 inch lengths. When this is not obtainable raw vegetables such as beets, turnips, potatoes or cabbage can be ground or chopped very fine, and fed once a day. After the chicks are ten days old they can obtain a sufficient supply of green food if allowed the range of a grass plot.

From the time chicks are six or eight weeks old until winter they will do well on free range with very little care. The house should be kept clean and well ventilated. As the chicks grow they require more room. They must not be allowed to become crowded. It is wise to visit the coops at night occasionally to see the exact condition of the birds. The kind of feed that is given during this time is not so important as with the young chicks. A variety of good wholesome foods should be supplied in liberal quantities.

#### LAYING HENS. FALL AND WINTER CARE.

To produce eggs in paying quantities during the winter months it is first necessary that the stock should be in proper condition not later than November first. Old hens, as a rule, that molt late in the fall cannot be put in condition for laying until the last of January. We rely principally on the pullets hatched the spring previous for our early winter eggs. We

may make one exception to this rule. Yearling hens that molt in August will generally get in condition to lay by December and make very profitable winter layers. They must be fed and cared for so as to hasten molting if they are expected to molt early, as ordinarily a hen will not molt until September. The process of hastening the molt consists of first reducing the feed so as to stop the production of eggs during the last week of July. When they have stopped laying and have been kept on about one fourth of a ration for about three weeks the feed is then increased gradually for a few days until a complete egg producing ration is fed in liberal quantity. At this time one pound of oil meal to each hundred hens or a small feed of sunflower seed every other day can be profitably fed.

Hens and pullets should all be in winter quarters before the cold fall rains or freezing weather. The temperature of the house should be kept above the freezing point but should not be forced above 40 degrees by keeping the house closed at the expense of ventilation. The entire floor of the house should be covered with about six inches of dry clean straw which must be changed as often as it becomes damp or soiled. All whole or cracked grain is scattered in this litter. The variety of grain must depend largely upon its availability and cost. A very good mixture would be one-hundred pounds each of whole wheat and cracked corn and fifty pounds of oats. This makes a very good scratching feed for winter. This can be fed to them, all they will eat the first thing in the morning. Hens will always work for feed in the morning as that is when they are most hungry. At eleven o'clock A. M., the mash can be given but it should be very dry, not wet or sloppy. A great variety of mixtures have been used for this mash feed with very good success and we do not pretend to know which is the best. 100 pounds bran, 100 pounds middlings, 100 pounds cornmeal, 100 pounds green cut bone, and 50 pounds peameal make a very good mixture, but hens are very fond of it and should not be fed all they will eat of it. 100 pounds ground oats, 100 pounds ground barley, 50 pounds wheat middlings, and 75 pounds green cut bone or beef scrap is another mixture that has given very good results when fed very dry. A very little hot water can be used in cold weather but too much water will injure the effect of the food. This ground feed should be fed in V shaped troughs about four and one-half inches deep. After they have eaten about two-thirds as much as they care for a very little of the scratching feed can be scattered on the floor to keep the fowls busy. After this is fed they should be supplied with all the green food

they will eat. Mangel-wurzels are the most palatable of any of the vegetables commonly used. Taking their cost and the ease of keeping them into consideration they will generally prove the most satisfactory of anything for green food in the winter. They are fed by cutting them in two lengthwise and throwing them in the pen on the floor. The fowls will also relish cabbage, turnips and potatoes. A little second growth clover or alfalfa, cut fine and steamed makes a change greatly relished by the hens. This however cannot be fed in unlimited amounts like the raw vegetables but the quantity must be limited to the requirements of the flock. No exact rule can be given for this as it depends much upon the other food that is given, the breed of fowls, and their condition.

The evening feed is practically the same as the morning feed and given in the same way except that it is fed in more liberal quantity. The object being to give them all they will eat just before going to roost. They should be fed at least 2 hours before dark, so they will have plenty time to eat before going to roost. Fresh clean water, grit and crushed oyster shell must be constantly before them.

Regularity in feeding is of the greatest importance in the care of either laying hens or growing chicks. They seem to know when it is feeding time as well as the attendant and any diversion from the regular order or time can be quickly noticed in the results obtained.

#### FINISHING CHICKENS FOR MARKET.

There are two methods of finishing chickens for market that are practiced in both Canada and the United States. One is to place the chicks in crates and let them feed from a trough in front. The other is to remove the chicks from the crate and feed with a cramming machine. Both are very successful in the hands of experts. It seems to be easier to learn crate fattening than it is to learn the cramming system although better results are claimed for cramming. We made one test of crate fattening last year. Twenty-four well bred Plymouth Rocks were selected and placed in two crates. These crates were each six feet long, twenty inches high and twenty inches wide with doors at the top and divided into three pens, each containing four cockerels.

The crates are made of 1x1 inch strips running lengthwise of the crate and 1½ inches apart except the front where the strips are placed perpendicularly and two inches apart to enable the chicks to put their heads out between them to eat.

They are fed from a shallow trough set two inches from the front of the crate. The crates are set on saw horses twenty inches from the floor so the droppings can drop through the slatted floor onto sand underneath where they can easily be removed. The crates were placed in an open front shed so the chicks had plenty of fresh air without draught. In cold weather of course they should be kept in a fairly warm house.

These chicks were about three months old when the test began and the twenty-four weighed 87.4 pounds. At the end of twenty days they weighed 123.6 pounds making practically a gain of one and a half pounds each in twenty days. These chicks were fed ground oats (with the coarser hulls sifted out) mixed quite wet with butter milk or skim milk and slightly salted. They were fed three times a day for the first two weeks and twice a day thereafter. Care was taken not to feed too much at once, and they were never fed quite as much as they would eat. They were fed grit and charcoal occasionally and watered twice a day from the trough.

It required 5 2-3 pounds of clear ground oats or four pounds of the sifted oats for each pound of gain. With oats at 30 cents a bushel the cost of gain would be 5 1-2 cents a pound. With chickens worth from 10 cents to 15 cents a pound a good profit can be realized. The quality of the meat is improved very much so an extra price can be secured as soon as people learn what crate fattened chickens are. We would recommend that farmers try this method of fattening so they can realize the highest price and be able to market the extra birds in autumn.

#### MARKETING.

One of the most important details in conducting a profitable poultry plant even if only a very few fowls are kept is to put everything on the market as fresh as possible and in the most attractive condition. Eggs should never be more than a week old. They should be washed perfectly clean and graded for both size and color. If only one breed of fowls is kept the eggs will be very uniform. This adds considerably to their value when it comes to supplying a fine trade.

Each egg should be stamped with the name of the farm where it was produced. This is a guarantee to the consumer that it is a first class article which is always in demand at an advanced price.

Chickens and fowls should always be well fattened and dressed because there is never any profit in marketing an inferior article. They should be killed by bleeding from the

mouth and broilers should be dry picked, care being taken to remove all the pinfeathers. Old fowls can be dressed very well by scalding them in water a little below the boiling point and then dipping them quickly into cold water before picking. This makes the feathers stick together so they can be removed much quicker. It also keeps the outside thin skin from peeling off. They should then be cooled thoroughly and packed in boxes. Plain paper is used to line the box and between the layers. Each chicken should be labeled with the name of the producer. Both eggs and poultry should be marketed as soon as possible after they are ready.

### TURKEYS.

The high prices paid for turkeys in November and December and the ease with which they may be raised should stimulate a greater interest in turkeys among farmers who can give them a good range.

Turkeys are naturally a half wild bird so they will not bear close confinement. Generally a small flock of from five to eight breeders will do better than a large flock. We let the hens select their own nests in secluded places and then gather the eggs every day to keep them from being chilled. Each hen is given about fifteen eggs and when the young are hatched they are allowed to roam at will. They are fed johnny cake occasionally such as is recommended for chickens. Barley and corn soaked or boiled a few minutes are good feeds for fattening. If the turkeys are kept in a slightly darkened room and fed heavily for about three weeks the quality of the flesh will be very much improved, and they will generally pay for the feed in extra weight.

The winter care of the breeders is very simple. All they seem to require is some whole corn, wheat or barley, grit and water. Twice a day is often enough to feed them. They do not need a warm place in which to roost. They will do better in a rather cool house with plenty of fresh air.