

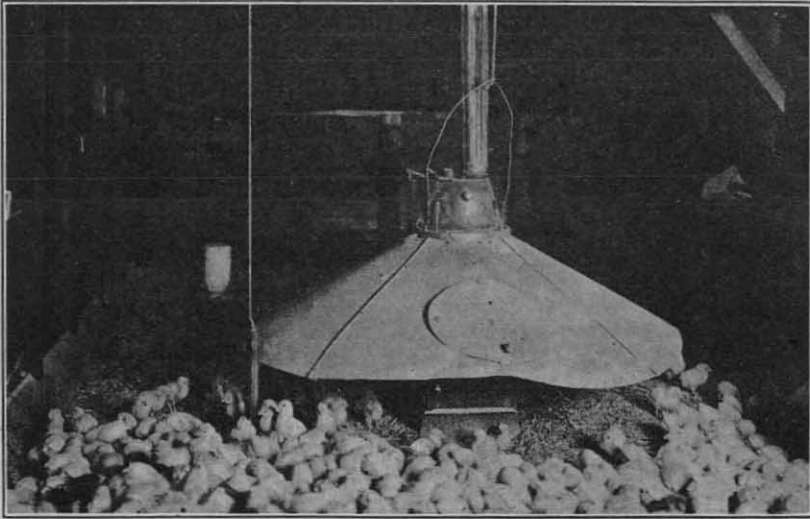
UNIVERSITY OF IDAHO

AGRICULTURAL EXPERIMENT STATION
Department of Poultry Husbandry

Artificial Brooding

By

R. T. PARKHURST



Brooding Chicks by a Coal Stove Hover at the Agricultural Experiment Station, Poultry Farm, Moscow.

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ARTIFICIAL BROODING

By

R. T. PARKHURST

In this bulletin, the methods of housing, feeding and management of chickens from hatching to maturity are given as developed at the Idaho Agricultural Experiment Station.

Early hatching has made both the incubator and the modern brooder a necessary part of the poultryman's equipment. There are two popular types of artificial brooding now in common use. These are the colony and the semi-permanent brooders. The source of heat in the colony brooders usually is the coal stove, altho electric and oil hovers are being used under certain conditions. Kerosene or coal oil is the main fuel for the hovers in the semi-permanent brooder. Dutch ovens are also being used as heaters in this type of brooder.

HOUSING THE BROODER

The essentials of a brooder house are roominess, sufficient ventilation, dryness, sanitation and warmth. Adequate room should be provided for the hover. In addition, there must be plenty of space for the chicks to exercise and to prevent crowding at night. A satisfactory allowance for baby chicks is one square foot of floor space for each $2\frac{1}{2}$ or 3 chicks. At six weeks, allow one square foot of floor space to each $1\frac{1}{4}$ to $1\frac{1}{2}$ chicks. For example, a house 8 feet by 16 feet will care for about 325 to 400 chicks at the start and about 150 to 200 chicks at six weeks of age.

The house should supply plenty of fresh air without drafts. The chicks give off a large amount of moisture and poisonous gases which must be removed. Sufficient ventilation will, to a great extent, relieve dampness in the house. The floor should be made of wood and placed at least one foot off the ground. It should be made of tongued and grooved flooring or two layers of shiplap, with building paper between. These precautions will assure its being dry. Unclean litter and droppings should be removed often as they are a source of moisture in the house.

It is an excellent policy to prevent diseases rather than attempt to control them after they appear. A thoro cleaning and disinfection of the house before the chicks are placed in it is a worthwhile precaution. Occasionally the house should be given a thoro cleaning and then sprayed with a 5 per cent solution of any standard stock disinfectant. The house

NOTE: The author is glad to give credit for assistance rendered in preparing this bulletin to George Van, plant foreman of the University Poultry Farm.

must be well constructed and easily heated. A brooder house that is open to the weather is rarely satisfactory. In some localities, it even is advisable to line the house with beaver board. This especially is desirable when the hover used is of a type that does not heat the room. Because of the importance of warmth in the house, good quality lumber should be used in its construction.

The Half-monitor Colony House

This house is especially adapted to the use of the coal stove for colony brooding. It is roomy, easily heated, properly ventilated and satisfactory from the standpoint of light, dryness and convenience.

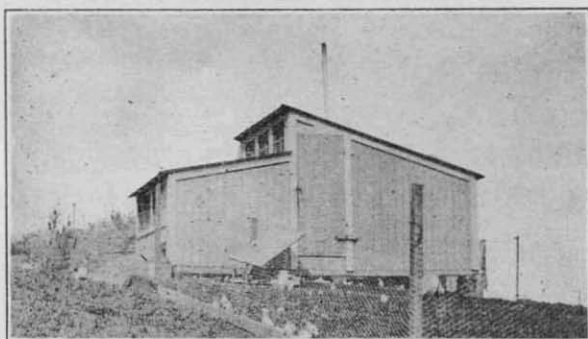


Fig. 1. A Half-monitor Colony House in use at the University Poultry Farm.

The Two-room Brooder House

The two-room brooder house is well adapted to brooding chicks in large numbers and is practical on the commercial farm. It is adapted to the use of either a large oil burning hover or a large type coal stove hover. The plans and method of construction of these two houses are given in Extension Bulletin No. 42, "Housing Farm Poultry."

RANGE HOUSES

Range houses are valuable for developing the growing stock on free range after weaning. They may be used in connection with either the semi-permanent or the colony system of brooding. They are portable houses constructed to give an abundance of ventilation and fresh air and may be with or without floors.

BROODING EQUIPMENT AND OPERATION

The Coal Stove Colony Brooder

The coal stove colony brooder may be defined as a moveable house heated by means of an automatically regulated coal stove hover. This

type of brooder is usually adapted to from 150 to 400 chicks. It is a very satisfactory method of artificial brooding for the farmer or small poultry raiser. Many commercial poultrymen find it more profitable to brood in small numbers because of the increased vigor of chicks raised and smaller loss from disease.

In selecting the coal stove hover, attention should be paid to the simplicity and effectiveness of the automatic regulator, the ease of coaling and firing and the size of the combustion chamber. The safety of the chicks depends upon the reliability of the draft controls. The draft controls should respond quickly and should be simple in principle. The more complicated mechanism easily gets out of order. The way in which

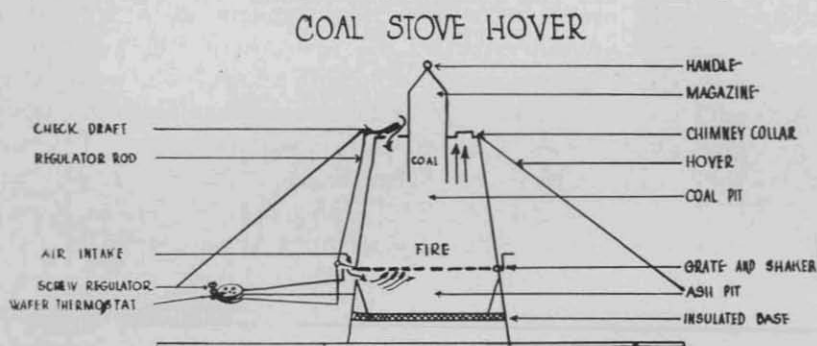


Fig. 2. Diagram Showing the Construction of a Coal Stove Hover.

the stove is shaken and coal added should be convenient. The size of the combustion chamber, to a considerable degree, determines the number of chicks that can be placed under the hover. The large hovers usually have a coal magazine to hold additional fuel which feeds into the combustion chamber as needed.

Operating the Coal Stove Hover

The brooder house containing the coal stove hover should be located so that trees and buildings do not interfere with the draft. It is advisable to follow the instructions that come with the stove when setting it up. It should be set about six feet from the rear wall in order to maintain a more uniform temperature in this part of the house. The stove-pipe should extend at least five feet above the roof. If there is too much draft, reduce the height of the pipe. If there is not enough draft, lengthen the pipe. Back drafts can be prevented by having a protector three or four inches above the pipe. The stove-pipe should fit tightly in a metal holder, where it comes thru the top of the house. The stove-pipe should be taken down each week in order to clean out the soot. It is not

necessary or advisable to use a damper. Soft coal can be used, but anthracite coal, chestnut size, is better. If it is necessary to use larger size coal, more attention must be given the stove. Other fuels used are briquets, charcoal and coke. These are sometimes mixed with soft coal when hard coal is not available. Dust in the coal often causes trouble, and, if present, must be sifted out.

If the fire goes out before all the coal is consumed, it usually is due to insufficient draft. This may be remedied by lengthening the stove-pipe, regulating the thermostat to decrease the check draft or emptying the ash chamber. The fire usually requires some coaling and shaking in the morning, late afternoon and just before retiring. Twice a day the fire should be shaken until the coals show bright underneath and the ashes removed once a day. After putting the new coal in, the lower draft should be left open long enough to give the fire a start. The temperature of the hover one-half the distance from the stove to the edge of the hover at chick level should be about 98° during the first two days. The temperature the last of the first week should be about 95°, the second week 90-95°, the third and fourth week 85-90° and about 5° less each week until the heat is removed. These temperatures are approximate. The action of the chicks and their rate of growth is a better guide. Regulation of temperature is made in most cases by means of a wing nut on the thermostat.

The Large Oil-burning Hover

The large type of oil-burning hover is used for brooding about 1000 chicks. The advantage in its use lies principally in the saving of labor. Under some conditions, there also is a saving in the cost of fuel. When selecting an oil-burning hover, the following points are important: Simple, effective regulation of oil supply, the least possible danger of fire, durable construction and economy of fuel consumption.

Operation of the Oil-burning Hover

The brooder house in which the large size oil-burning hovers are used should be large and roomy. The most satisfactory type of house is one with two rooms, one of which is heated by the hover. It is very important that this heated room should have adequate ventilation. The other room is cooler and is primarily for exercise, but also allows the chicks to get away from the heat during the daytime, if they care to. The Idaho Two-Room Brooder house is well adapted to this system of brooding. In this house, a special method of ventilation is used, ample room allowed for this type of hover and construction principles used that minimize the fuel consumption. The hover should be set up according to the

manufacturer's directions. As with other types of brooders, it is not advisable to overcrowd the hover. Under no condition should more than fifteen hundred chicks be brooded together. Not over one thousand should be kept in a brooder, unless the entire stove room is heated by the hover. The stove room floor should be covered with an inch of sand. The scratch room, in addition to the sand, should have about two inches of litter. When installing the hover, run the stove-pipe straight up thru

LARGE SIZE OIL BURNING HOVER

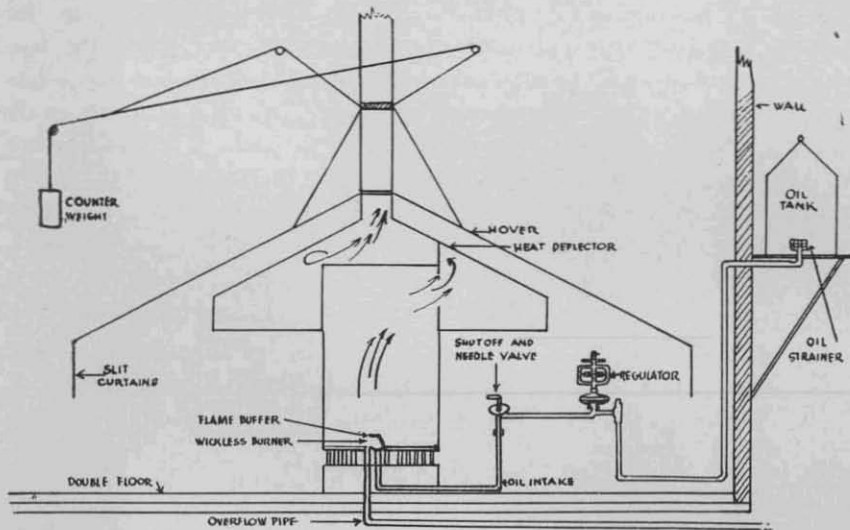


Fig. 3. Diagram Showing the Construction of Large Type Oil-burning Hover.

the roof to sufficient height to insure a good draft. At least once a week, clean the burner of carbon and soot, taking care not to let any more than possible fall where it might block the oil-pipe. The temperature three feet from the stove at chick level should be about 95° when the chicks are placed in the brooder, and the temperature gradually reduced until it is 80° to 85° at five to six weeks. Too much heat will drive the chicks to the corners. If the temperature is too low, the chicks will crowd. The action of the chicks is the best indication as to whether or not the proper temperature is being maintained under the hover.

The Wickless Oil-burning Hover

The small type oil hover is used for brooding 50 to 350 chicks. Its successful management depends upon a thoro knowledge of the operating

instructions of the type purchased. The proper temperature is maintained by automatic regulation of the flow of oil to the burner. Only clean coal oil should be used. Care must be taken to see that the burner is clean and the automatic feed is working properly and smoothly at all times.

The Electric Hover

The use of electrical equipment for brooding is comparatively new. In electrical brooding, the hover does not heat the room and does not create a circulation of air as in the case of stoves. Attention is needed to see that the air is changed within the room, pure air being constantly supplied the brooder. It also is necessary to have a well constructed building. Under some conditions, additional heat is necessary the first week or two. In selecting an electric hover, durability of construction, simplicity of management, effective control and cheapness of operation are a few of the outstanding points to keep in mind.

There is some tendency to overheat the chicks at night if the hover is allowed to hang too low. This is due to the direct radiation of the heat. The chicks should circle close in to the hover at night. Care should be taken not to give heat enough to drive them from the brooder. By raising the hover gradually and noting the action of the chicks, it is possible to get a circulation of air beneath the hover, which forces the heat to the outside and causes the chicks to circle nicely about the hover.

PREPARATION OF THE BROODER

The brooder house should be moved to new range each year or the ground about it plowed and worked. After the house has been thoroly scraped and cleaned, it is advisable to disinfect it with a 5 per cent solution of stock disinfectant. In case any diseased birds have been in the house previously, spraying is advisable with a full strength solution of two parts stock dip and three parts kerosene. Corner boards are used to prevent chicks smothering each other by crowding against the wall or in the corners. They may extend from about six inches from the wall to six inches up the wall. An excellent covering for the floor is an inch of sand over which is thrown a few inches of litter, such as alfalfa, straw, or clover cut to 4 to 6-inch lengths.

Before starting the brooder, test the thermostat. This can be done by applying to it the heat of a match or by placing it in warm water. The beginner should operate and learn to vary the temperature under the hover from 75° to 100° before placing the chicks under it. To do this, it is necessary to read and follow the operating directions carefully. Dry out the machine and also the sand on the floor before placing the chicks in.

Be sure the temperature is holding uniform. Place a circle of building paper or 1-inch rabbit wire about a foot from the edge of the hover to prevent the chicks going too far from the source of heat.

CARE OF THE CHICKS

Darkening the house keeps the chicks from picking each other's toes or the droppings on the floor. It also helps the chicks to rest. When transferring the chicks, care must be taken not to chill them. It does not pay to put weak or deformed chicks in the brooder house. There is no better time to cull them than before they are put into the brooder. It is preferable to place the chicks under the brooder in the morning. They then will have a better opportunity to find the source of heat. The chicks should be out on the ground as soon as possible. If the weather is not extremely cold and the sun is shining brightly, they can be put out for a few minutes on the third day. Runs with green feed in abundance should be wired off for the chicks. Care must be taken, however, not to let

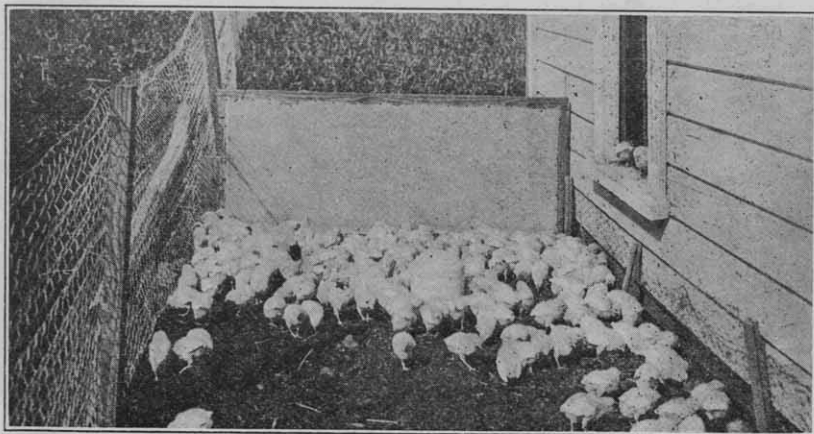


Fig. 4. Get Chicks into the Sunlight Early.

young chicks out into grass that is wet from dew or rain as they easily catch cold. If chicks catch cold or from some other cause "stick up" behind, it is necessary to remove the "patches" or death will result. Weakling chicks should be killed as soon as discovered.

FEEDING AND MANAGEMENT

Starting the Chicks

The basis of right feeding is to feed wholesome, highly digestible feeds regularly with extreme care as to cleanliness and avoid over-feeding.

No feed, except sour skimmilk and chick grit, should be given for 48 to 60 hours after the majority of the chicks have hatched. This delay is

to permit the absorption of the egg yolk that was taken into the body of the chick at hatching time. The first feed should be sour skimmilk. When the flock is small, the beak of each chick as it is placed in the brooder should be dipped into the sour skimmilk. No water is necessary the first 2 weeks if plenty of milk is given.

Feeding Milk

In feeding milk, extreme care must be taken to maintain a clean fountain. A filthy, unsanitary fountain is conducive to digestive disturbances. A thoro washing at each filling is advisable. If the fountain is placed on a board there will be less dirt and litter scratched into it. An effort should be made to have the milk uniformly sour. A change from sweet milk to sour milk or vice versa has a tendency to produce digestive disorders. The sour milk is best just before the curd and whey separate. Clean milk cans are the best containers for milk during the souring



Fig. 5. Milk Fountains and Feed Boards should be Thoroly Washed, preferably with Warm Water, at least twice a day.

process. If skimmilk is not available, semi-solid buttermilk or buttermilk curd may be used. They should be diluted by mixing one part to seven parts of warm water. Altho it is the usual practice to feed them dry, dried buttermilk or skimmilk powder may be used at the rate of 1 part by weight to 10 parts of warm water. It will help in souring to leave one-fourth of the milk can full of the sour milk as a starter and add the sweet skimmilk or milk mixtures to it. If kept in a warm place, the souring usually will take place over night.

Additional First Feeds

When the chicks are placed in the brooder, a little grit can be given in addition to the sour skimmilk. It may be scattered on tin plates or feed boards. This grit prepares the gizzard for its grinding processes. If the chicks are placed in the brooder, twenty-four hours after they hatch, a day to a day and a half should elapse before the first feed is given.

At this time, as well as during the first two weeks, it is best to feed five times a day. A good schedule to go by is as follows:

1st feed at 5:30-6:00 A. M.

2nd feed at 9:00 A. M.

3rd feed at 12:00 Noon.

4th feed at 3:00 P. M.

5th feed at 5:30-6:00 P. M.

In planning a feeding schedule, the earlier in the morning and the later in the evening the feeds can be given, the more satisfactory the results will be. Chicks kept a little hungry during the day may be given all they will eat at night. Chicks will normally get all they want to eat in 10-15 minutes at each feeding during the day. During the first week tin pie plates or feed boards that can be thoroly cleaned after each feeding should be used. After the first week, the scratch feed may be thrown in the litter to induce exercise.

Chick Scratch Feed

A scratch feed of three parts by weight of fine cracked wheat, two parts fine cracked, yellow corn and one part of cracked oat groats, or a good grade of commercial chick feed, may be used from the start. A small handful of feed per hundred chicks is about the right amount for the first few days. The action of the chicks, however, is the best guide to the amount to feed. The feeding of the finely cracked grains is continued during the first two weeks.

Cod Liver Oil

During the early brooding season, it is sometimes impossible to get the chicks out on the ground and into the direct sunlight by the fourth day. Investigators have found recently that under these conditions, the chicks do not get sufficient of vitamin D, or the antirachitic factor. The window glass of the brooder house absorbs the ultra-violet rays of the sunlight, the factor now believed to be of such great importance to the health of the chicks. Cod liver oil is an excellent source of this newly discovered vitamin. When 1 pint is mixed with 100 pounds of scratch feed and allowed to stand over night, the resulting mixture will contain ample of this accessory food factor to prevent leg weakness in the growing chicks.

New mixtures should be made up every ten days or two weeks as the vitamin content of the cod liver oil is thought to be weakened by exposure longer than this period. The mixture is preferably fed on plates or boards rather than in the litter. Chicks getting plenty of sunlight and green feed do not normally need to be fed cod liver oil.

Dry Mash Feeding

No mash is fed during the first week the chicks are in the brooder. The morning of the eighth day after the chicks are placed in the brooder, a home-mixed, or a reliable commercial mash mixture, should be placed in a chick mash hopper and placed before the chicks from 10:00-10:30 A. M. only. One-half hour the first day is sufficient. The mash feeding should be increased according to the following schedule:

Schedule for Dry Mash Feeding

8th day	10:00-10:30 A. M.
9th day	10:00-10:30 A. M. and 1:00-1:30 P. M.
10th day	10:00-11:00 A. M. and 1:00-1:30 P. M.
11th day	10:00-11:00 A. M. and 1:00-2:00 P. M.
12th day	10:00-11:30 A. M. and 1:00-2:30 P. M.
13th day	10:00-12:00 A. M. and 1:00-3:00 P. M.
14th day	10:00-12:30 A. M. and 1:00-3:30 P. M.
15th day—6 weeks old	10:00 A. M. to 4:00 P. M.

The following mixture has been successfully used in growing experimental stock at Moscow:

Growing Mash

40 lbs. wheat bran,
20 lbs. fine ground, yellow corn,
10 lbs. sifted ground oats,
10 lbs. flour middlings,
7.5 lbs. meatscrap,
7.5 lbs. peameal,
2.0 lbs. charcoal,
2.0 lbs. bonemeal,
1.0 lbs. common salt.

When it is impossible to get the ingredients locally, it is preferable to send away and have the ingredients mixed in this proportion rather than substitute feeds not as suitable. It is sometimes good economy to purchase and feed a reliable ready mixed commercial growing mash.

The wheat bran is valuable in the mash because of its high ash content and its desirable laxative effect and because its flaky condition opens up

the other mash ingredients, such as cornmeal, flour middlings, and sifted ground oats, that have a tendency to pack. Wheat bran with large flakes is desirable.

The yellow fine ground corn contains some maize proteins, a high percentage of energy and heat producing carbohydrates and fates and also some vitamin A. White corn does not contain this vitamin in any appreciable amount. Ground whole corn is preferable to the meal obtained from cracking corn.

Oats ground fine with the hulls removed by sifting or ground oat groats add variety to the mash as well as an additional source of highly digestible proteins, carbohydrates and fats.

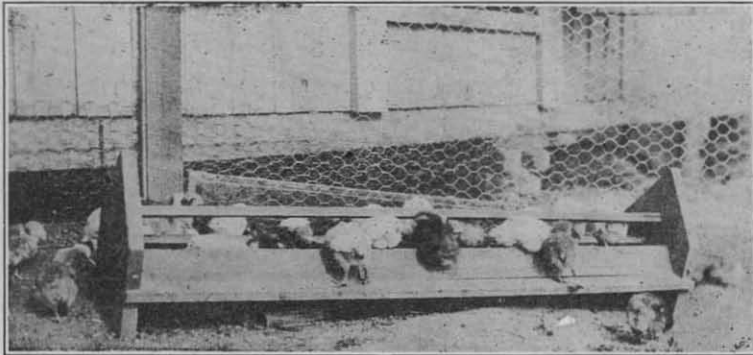


Fig. 6. Feeding the Growing Mash.

Flour middlings are rich in protein, especially gluten. They have more flour and are more valuable than standard middlings or shorts.

Meatscrap is a source of animal proteins in addition to those contained in sour skim milk. The small amount used adds palatability to the mash and tends to increase its consumption. In case chicks make too rapid growth the amount of meatscrap may be reduced. Only the highest quality meatscrap should be used. The finely ground grade is probably better than that containing the larger parts.

Peameal is used as a source of vegetable proteins. When milk is used with peameal the efficiency of the vegetable proteins is materially increased. Without the milk, the peameal would not have a place in the ration. In making peameal or pea flour, the peas should be ground as fine as possible.

Charcoal aids digestion. The chick or medium size is satisfactory.

Bonemeal is used as an additional source of ash and protein.

A small amount of *salt* in the mash makes it more palatable and adds certain minerals.

Possible Changes in the Growing Mash

In case it is desired that dried buttermilk be used in the dry mash in place of liquid milk, it may be used to make up 15 per cent of the mixture and replace the meatscrap and peameal.

Later Feeding

Starting the fourth week, medium cracked wheat and yellow corn may be mixed in equal proportions with the fine cracked grains to gradually replace them. Scratch feed should be thrown out three times a day, preferably about 6:00 A. M., 12:00 Noon, and 5:30 to 6:00 P. M. The dry mash should be before the chicks from 10:00 A. M. to 4:00 P. M. at this time. Clean, cool water in the fountains should be before the chicks in addition to the milk from now thruout the growing period. In case the chicks are not getting plenty of green feed, fresh green lawn clippings, especially if white clover predominates, alfalfa leaves, clover leaves, green clippings from sprouted oats, as well as cabbage and lettuce leaves, are excellent to give to the growing chicks. Sharp granite grit of chick size should be available in hoppers at all times. At 8 weeks of age, the medium size grit may be substituted for the chick or small size.

At 6 weeks of age, the scratch ration should be changed to two parts of whole wheat and one part of coarse cracked corn. The dry mash may be kept before the growing chickens at all times after they are six weeks of age.

Weaning the Chicks

The outside weather conditions, the breed of the chicks, and their size will determine to a great extent the time of weaning and the rate at which the heat should be reduced. About the fourth week of brooding, the chicks require about 85° of temperature under the hover. If the weather is damp and cold at this time, no reduction is advisable. If the weather is warm, however, the hover may be raised 6 inches or a foot during the middle of the day and the temperature at night can be lowered about 5° each week. Too often operators do not pay any attention to the lowering of the hover temperature with the result that the chicks are forced from the hover and crowd in the corners. More care must be taken in weaning the more active breeds such as the Leghorns as they crowd badly when chilled. Even after the fire has been discontinued, the hover should be kept in place for use on cold nights or in damp weather. As a general rule, chicks that are eight to ten weeks old do not require artificial heat. They should be without heat ten days or two weeks before they are moved to the developing range houses. About this time, the sexes should

be separated and all pullets and cockerels that show poor health, lack of vigor, slow maturity and any standard disqualifications should be disposed of. It is poor policy to take up range with young pullets or cockerels that have little hopes of making profitable producers or breeders. Cockerels to be kept as breeders should be selected and given free range. The feeding and management advised is similar to that of the pullets. Some of the breeders may be culled out every few weeks so that by fall only the select males will be left. A bright sunny morning is desirable for moving chicks to range houses. The chicks will return to their range houses better if they are confined, fed, and watered in their new sur-



Fig. 7. Green Range for the Growing Chicks.

roundings for a day or two. Once on range, it is not advisable to change pullets from one house to another, as it usually cuts down their appetite and slows down their development.

MANAGEMENT OF GROWING PULLETS

Growing pullets need free range on uncontaminated ground to give them the vitality and stamina necessary to withstand forced feeding at maturity. Alfalfa or clover pastures are the best, altho corn or grain fields or orchards with an abundance of green and succulent feeds and lots of insects and bugs are also fine. If a good shade is not available, it should be supplied by artificial means, either by stretching canvas or sacks over frames a few feet from the ground or by constructing shelters of branches. Corn or sunflowers in small patches afford desirable shade as well as a valuable source of green feed.

It is hardly possible to overestimate the value of giving unlimited sour skimmilk, buttermilk or some similar milk by-product during the growing period. Liberal feedings of scratch feed should be given three times a

day and the growing mash should be available at all times in the self-feeding hoppers. In general, chickens should be hungry at each feeding and be kept growing continuously. Changes in rations should be made only when absolutely necessary and then very gradually.

Thoro spraying with two parts of kerosene and one part stock disinfectant will keep down mites. If lice become prevalent on the growing pullets, it may be necessary to dust the entire flock with sodium flouride.

Leghorn pullets should weigh 3 to 3½ pounds and start to lay at an average age of 180 days or 6 months. The weight of the Rhode Island Reds should be 5 to 5½ pounds and it will take about one month longer for them to mature. It takes about 7½ months for Plymouth Rocks to mature. Their weight at laying should be 5½ to 6 pounds. If the pullets are to be forced by artificial illumination, it is desirable to have them reach body maturity as indicated by the above weights. Small eggs and low annual production results when egg production starts before the pullets are mature. The poultryman must judge for himself whether his pullets are so backward as to need forcing or so far advanced sexually compared to their bodily maturity as to be in need of checking. When possible, slow maturing or late hatched pullets should be placed in a separate place. Increasing the proportion of scratch feed to dry mash and increasing the cornmeal content and reducing the meatscrap in the dry mash will put weight on such pullets and hold back their production.

Just before the pullets start laying, they should be moved from the range into their permanent laying quarters. It is at this time that a thoro cleaning and disinfecting of the laying house is an excellent investment. When moving the pullets into winter quarters, each pullet should be gone over carefully. It is advisable to keep only the fully developed ones with broad backs, deep bodies, well-developed heads and bright full eyes. Runty, small-sized birds, or those having deformities or disease, should be culled. The pullets should be housed separate from the hens.

FATTENING THE FRYERS

When the cockerels are separated from the pullets, the most promising, vigorous and quick-maturing cockerels that are wanted for breeding purposes may be placed in a separate yard or range to receive the same management as the pullets. As a general rule, all other cockerels should be sold as soon as they attain a size for which the market will pay a reasonable price. It is often possible to increase the weight of these market cockerels by 30 to 40 per cent by fattening in either small pens or in fattening crates. In addition, the quality is improved.

In pen fattening, the cockerels are kept for 10 days or 2 weeks in a well-ventilated, dry pen that does not allow too much moving about and

is sufficiently dark that it has a tendency to quiet them. Somewhat better results are obtained by using a fattening crate. If extensive fattening practice is going to be carried on, it probably will pay to get a galvanized wire battery. The fattening crate should be placed in a darkened, well-ventilated room.

The same ration may be used for both pen and crate fattening. A satisfactory ration is made of the following parts by weight:

- 60 parts yellow cornmeal,
- 20 parts white flour middlings.

This feed is mixed to a fairly thick consistency with sour skimmilk or buttermilk. If these are not available, semi-solid buttermilk, or buttermilk curd diluted one part by weight to seven parts of water, or, dried buttermilk or skimmilk powder, diluted one part to ten parts of water,

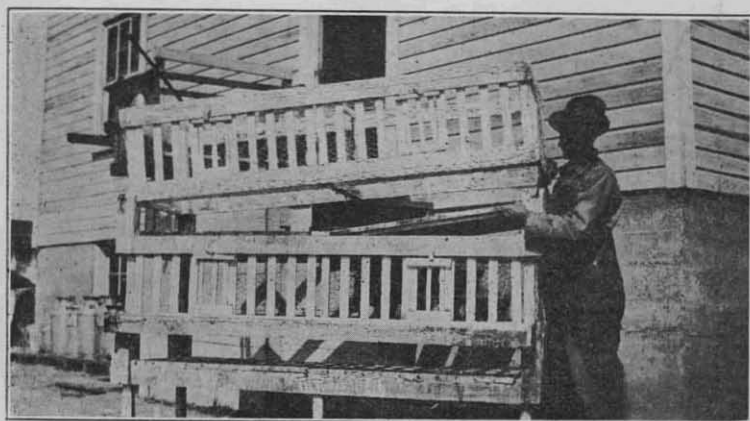


Fig. 8. A Home-made Fattening Crate

may be used. This ration is fed over a period of 10 days to two weeks giving three feedings a day. Before the first feed, the cockerels should be fasted 12 hours. The feeds the first day should last only a few minutes. The length of the feeding period then can be gradually increased to 20 minutes in length. After the feed has been before the cockerels 20 minutes, the troughs should be removed and thoroly cleaned.

BROODER VICES AND COMMON DISEASES OF GROWING STOCK

It is necessary to use land for growing the young stock that has not had poultry on it recently, or has been completely freshened by plowing and cultivation, to insure healthy birds. It is excellent practice during the growing season to spade up around the brooder house and fill in any puddles in which water might stand and become stale. Cleanliness in

feeding and the constant use of reliable disinfectants also are good precautions.

Toe Picking

Toe picking by baby chicks is a vice that may prove serious. During the first 60 hours in the brooder, chicks are often a little hungry and start picking at each other's toes until bleeding results. Many crippled and dead chicks often result. Darkening the brooder house during the first few days is a satisfactory preventative. The immediate removal of injured chicks also is advisable.

Leg Weakness

In this trouble the chicks lose the use of their legs and feet and their toes curl up. Until recently it was the general opinion that leg weakness was caused by overheating or leaving the chicks too long on board floors. Recent investigations, however, indicate that a lack of certain vitamins is the cause. The condition especially appears during the second and third weeks of a chick's life but chicks three months old may have it. Stunted chicks should be killed. The prevention and cure of this trouble is to have the chicks out on the ground by the third day after being placed in the brooder or, if weather does not permit, to give pure raw cod liver oil at the rate of 1 pint to 100 pounds of scratch or mash. Chicks should be out at least by the seventh day. As long as it is dry and the sun is shining, the cold is not an excuse for keeping the chicks in if they have access to a warm place when they get chilly. If there is snow on the ground, it may be shoveled back. A piece of green sod often works wonders as a means of inducing exercise and also adds green stuff and minerals to the diet.

Diarrhoea

There are many forms of diarrhoea in young chickens. The symptoms of these different forms are quite similar. In general, the chicks become stuck up behind, have looseness of the bowels, become emaciated, droop their wings and lose their appetite. Some of the causes are feeding too quickly after hatching, overfeeding, chilling, overheating, moldy feed and damp or filthy litter. The remedy is in proper management. In addition, diarrhoea is one of the symptoms of two diseases, Bacillary White Diarrhoea and Coccidiösis.

Bacillary White Diarrhoea

Bacillary White Diarrhoea is caused by Bacterium Pullorum, a germ that is in the blood of the chick. In some sections of the United States, it causes enormous losses. When not controlled, it will cause a loss of 60 to 90 per cent of the chicks hatched. The main loss is during the

first two weeks. The disease has a well defined cycle. The organism passes from the infected ovary of the hen thru the egg to the chicks and back to the ovary of the pullet that has survived the disease as a chick. The chicks have characteristic symptoms. They huddle together with drooped wings, eyes closed most of the time, little or no appetite and the majority of them will be "patched up behind", due to the white or light brown discharge from the bowels. The yolk is usually unabsorbed and the intestines empty. It is impossible to cure sick chicks or diseased breeding stock. The only satisfactory way to control the disease is to detect the carriers by the macroscopic agglutination test and eliminate them from the flock. The feeding of sour skim milk or buttermilk, constant attention to sanitation and the rigid culling of runty chicks will aid the chicks to resist infection.

Coccidiosis

The symptoms of coccidiosis are quite similar to those of Bacillary White Diarrhoea. The disease makes its appearance when the chicks are three to twelve weeks of age. Chicks that have coccidiosis lose the yellow color in their feet and shanks, show a bloody discharge and the mortality is quite heavy. On postmortem examination, the ceca or blind guts are found to contain a hard core of bloody or cheesy matter. The liver sometimes has white sunken areas of dead tissues. Special care should be taken to avoid overfeeding especially of growing mash. Every precaution should be taken to keep drinking utensils and feed containers clean and free from contamination. As contaminated ground is the source of infection, the young stock should be moved to new land. Unlimited sour skim milk is a good preventative. Some poudrymen give Epsom salts in the drinking water at the rate of one tablespoonful per 75 chicks.

Intestinal Worms

Growing chicks are often infested with intestinal worms especially if new land is not used for the young stock every year or two. There are two common kinds of intestinal worms, the large round, light yellow worms that are from 1-2 inches in length and the flat segmented tapeworms from 1½-3 inches long. The best way to prevent infestation of intestinal worms is to keep the chickens on clean, uncontaminated ground. To treat the infested flock for round worms, steep 1 pound of finely chopped tobacco stems, for each 100 half-grown chicks, for 2 hours in enough water to keep the mass covered. The liquid and stems are then mixed with about 5 pounds of ground feed per 100 chicks. Fast the chicks for 12 hours and give the mixture in the afternoon. One and one-half hours later give about 1 ounce per bird of ground feed mixed with

a solution of one-half pound per 100 chicks of Epsom salts. The dosage for birds of different ages is regulated by the amounts of feed consumed. To treat fowls for tapeworms, fast them 12 hours, then give one-half pint turpentine per 500 fowls in 15 quarts of wheat. Fast the birds for 12 hours before feeding. Repeat the treatment in 2 days, 10 days and 14 days.

SUMMARY

Start with well-hatched chicks from healthy, vigorous breeders.

Give the chicks a warm, well-ventilated hover.

Do not overcrowd the hover.

Provide space about hover for a cooler temperature.

Darken windows of brooder house during early brooding period.

Regulate amount of heat to meet needs of chicks according to the weather conditions and age of chicks.

Do not feed for at least 48 hours after chicks are hatched.

Feed baby chicks often and a little at a time.

Keep chicks hungry except after last feed at night.

Give sour skimmilk in unlimited quantities without water during the first two weeks.

Separate the sexes as soon as possible.

Give the growing stock plenty of good green range and shade.

Have the pullets in laying quarters before cold weather.