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CHICK MANAGEMENT

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INTRODUCTION

Poultry keeping today on the farm is being handled more and more as a business, and as such, business methods in brooding, feeding, housing, and other phases of the industry must be recognized and followed. The general practice of permitting hens to incubate eggs and hatch and brood chicks when and where they please is no longer followed. All of the chicks to be grown in one season are either purchased or hatched in incubators at one or two settings. With the old practice of hen hatched chicks, it was out of the ordinary to have chicks before May, whereas now it is considered undesirable to hatch chicks after May 1.

With the new business chicken, there is also a strong tendency to keep more chickens on each farm. All this means that the problem of proper brooding and feeding has been greatly enlarged. The first three weeks of the life of a chick are recognized as of vital importance. Faulty brooding and feeding at this time will affect the entire life of the chick, and show up noticeably during the first winter of production. Sanitation, feed and the ability to attend to details measure success in brooding. Equipment must be ready and adequate, conditions must be right, and the routine of operation must be accurate, prompt and careful.

NUMBER OF CHICKS NEEDED

It is not possible to make a rule that will tell the number of hens desirable to keep on each farm. The number of hens for a farm depends upon the house room, range on yard conditions, attitude and interest of the farmer in poultry, ability of the farmer to manage poultry and his willingness to give poultry the regular feed, care and attention necessary for success.

A unit of one-hundred and fifty (150) hens is satisfactory to use as a working basis. Equipment to keep and reproduce this unit consists of one 20x20 laying house or "Home For Hens," one 10x12 Portable Brooder House, one 10x12 Summer House or range shelter for growing chicks and one range feed hopper. Fewer than this number of hens will require practically as much in equipment investment and labor to operate and give lower returns on investment and labor. Where more hens are desired and can be handled the unit may be doubled or tripled making 300, 450 or 600 hens as the case may be.

To maintain a flock of one-hundred and fifty (150) hens, it is found necessary in practice to replace about one-half of the flock at the end of the first year with pullets and sixty to seventy-five percent of the flock each succeeding year. Three baby chicks for each pullet needed are considered the proper number with which to start. On this basis three-hundred and fifty

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(350) chicks will keep a one-hundred and fifty (150) hen flock going after the first year.

The 10x12 portable brooder house will accommodate about three-hundred and fifty (350) chicks. To determine the capacity of a brooder house, multiply the number of square feet of floor space by three. The answer will be the largest number of chicks to attempt to brood in the house.

HOUSE EQUIPMENT

Farm brooding is probably best done with the portable colony brooder house. This type of houses possess many desirable features with economy. It is easy to clean, convenient to work in, and can be moved to clean ground as a sanitary precaution. A portable brooder house should not be more than 10x12 feet in size if it is to be moved with a team or tractor. With the portable colony brooder house, it is desirable to have two or possibly three ranges for growing chicks and rotate the chicks on these ranges from year to year. This will always assure clean growing range.

The shed roof type house is recommended for economy and convenience. The front of a 10x12 house should be eight feet high and the back five and one-half feet high. These heights will permit ease of working in the house, and sufficient size for good ventilation. About half of the front should be covered with muslin and glass or a glass substitute. Where glass substitute is used, it must be tacked to frames that are removable from the window openings. This makes it possible to store the frames and preserve the material during the summer after it is no longer needed in the house. Window screen hangers are good to use for attaching frames or glass windows to the brooder house.

The proportions of glass and muslin will vary with the season and outside temperatures. There should be ventilators or windows in the back that can be opened for summer ventilation. All openings should be covered on the inside with inch mesh poultry netting to keep the chicks in, and cats, rats and skunks out. The house may be built with or without a partition according to the ideas of the operator. In building a 10x12 portable colony brooder house on the farm, two men should plan to use about two to three days for the construction work. Building of the house had better be started, not less than three weeks before the date chicks are to occupy it. This will act as insurance against bad weather, allow paint to dry, give time to properly regulate the brooder stove and attend to other details that appear unannounced.

Clean ground for chicks is not always possible. If not, a sun porch should be added to the front side of the house. A sun porch is a floor the same size as the brooder house floor and is made of either one-half inch hardware cloth on a frame placed ten inches or more off the ground or board flooring or concrete. If concrete or board flooring is used the floor should have about two inches of fall away from the house to make washing, scrubbing and disinfecting easier.

The sun porch floor is enclosed on three sides by a twenty-four inch fence of one inch mesh poultry netting and covered with the same sort of fencing supported on suitable frames. The top and sides should have doors for attending to chicks and for cleaning. The top and sides are frequently made in sections that are easy to take down and put away at the close of brooding season. Chicks can be grown for six to eight weeks in the brooder house and on the sun porch in confinement. With care and if not overcrowded, pullets can be raised to maturity in confinement.

Acceptable portable brooder houses have been built with both boxing and batten and studding and siding construction. The boxing and batten is probably the tightest wall and cheapest to build but it requires more careful workmanship to keep square and plumb on account of not having the studding frame to build to. The roof must be good. Felt or paper roofing is permissible but good for not more than three or four years. The V crimped metal roofing costs about the same as two paper roofs but is longer lived and is hail and damage proof. It is used on solid wood sheathing as is the paper roofing.

There needs to be two windows in the back of the house for ventilation.

10x12 SUMMER HOUSE—Top, west end with door open. This door is used for convenience only; center, side view; bottom, east end. End is covered with one inch mesh poultry netting. Door is used as entrance door for chicks.

These may be single glass barn sash or solid doors made of 1x12 boards. The wide dimension of the floor joist is nailed to the runners to increase rigidity of the frame for moving, four 2x6 joists are used to increase stiffness of the floor. For battens regular 1x4, number two grade sheeting is used. One piece of 1x12 boxing is used for each twelve inch space on the wall. This leaves wide cracks between the boards which are easily and tightly covered by the 1x4 battens. These cracks made sanitation and cleaning easier. No studs are used in the corners and the studs between front windows and at each side of doors are accurately spaced so as to eliminate door and window frames.

BILL OF MATERIAL FOR 10x12 PORTABLE BROODER HOUSE, BOXING AND BATTEN CONSTRUCTION

Runners	Back
2-4x6-14	4-1x12-18 No. 2 boxing
Floor Joist	5-1x12-18 No. 2 sheeting
2-2x6-20	Roof
2-2x4-20	2 squares of paper roofing, or
Floor	14 pieces 7 ft. V crimped steel
16-1x8-12 Shiplap	roofing 29 gauge
Nails, Ties, Studs and Plates:	Perches
Front	1-2x4-18
3-2x4-16	3-1x2-12
2-2x4-12	Windows
Ends and Partition	4-4 light single barn sash—10x12
3-2x4-20	glass, or 4-glass substitute
Back	frames and 4-muslin frames
1-2x4-18,	Window Sills and Fillers
2-2x4-12	1-2x6-14
Rafters	3-1x2-12
7-2x4-14	Hardware
Sheeting	2 barn door latches
13-1x12-14 No. 2 boxing, or	4 pr. 6" strap hinges
20-1x8-14 Shiplap	2 pr. 3" strap hinges
Boxing and Battens	8 pr. Screen hangers
Front	5 lbs. 16 d nails
3-1x12-16 No. 2 boxing	15 lbs. 8d box nails
1-1x6-16 No. 2 boxing	5 lbs. 6d box nails
4-1x4-16 No. 2 sheeting	18 ft 60" wide 1" square mesh poultry
Ends, Partition and Doors	netting
14-1x12-14 No. 2 boxing	Paint
2-1x6-14 No. 2 boxing	1 gal. ready mixed house paint
10-1x4-14 No. 2 sheeting	

COAL STOVE BROODER

The coal stove brooder has been popular for many years and has developed in recent years, so that it is not now necessary to have hard coal to be successful with it. An ideal coal stove should have a large pot which will preferably be barrel shaped. The flue should be not less than four inch stove pipe. Even with the increased size of fire box and pipe, the capacity of these stoves should not be overtaxed. A 52 inch canopy will accommodate not more than 350 chicks with best results. Care should be taken with the coal stoves to tend the fire early enough in the evening so that it will be in good condition for the night at bed time. Use sand on the floor under the hover of coal stove.

KEROSENE BURNING BROODERS

Several types of kerosene burning brooders are on the market. The chief difference in them being types of the burners. One type is the wick burner where regulation of the temperature is controlled by turning the wick up or down. This is done by the operator, and not by an automatic regulating device. Another type of burner is the asbestos ring or in some instances, a metal ring or vaporizer. The temperature in this type is regulated by a ther-

mostat, which controls the flow of kerosene to the burner. Greater safety exists where the wick type burner is used, for with the ring burners and regulated flow of kerosene, the flame varies and as the room temperature lowers the brooder requires more heat and the flames goes up, often too high and a fire is the result. The wick type burners maintain a constant flame, and the hover temperature is regulated by a ventilating flue and damper operated by a thermostat.

The burner is located under the center of the hover with the kerosene reservoir outside the hover. All kerosene brooders must be set level by the use of an accurate carpenters' level. Kerosene brooders require careful attention, and before attempting to operate one, the complete directions of the manufacturer should be studied well and then followed. It is a safety measure to use only sand under the hover of kerosene brooders. Curtains should be used with great care. Some wick type burners use curtains on the hover. A curtain is seldom used on the ring type burner brooders. It should be remembered that the kerosene burner requires ventilation and fresh air as well as the chicks and without it trouble is sure to come.

Kerosene brooders should not be operated in large rooms without a stove to warm the room if the outside temperature is seventy or below. Smaller rooms may be sufficiently heated by the brooder fire, but if the chicks show discomfort from cold the room should be warmed. Do not attempt to operate kerosene brooders where there is a draught and use only good grade kerosene.

ELECTRIC HOVERS

A modern development in brooding equipment is the electric hover. There are several sorts on the market. In all electric hovers, the matter of ventilation is one which requires close and strict attention. Like oil burners, they will not furnish room heat in the early brooding season; and at any time, this must be carefully watched. Manufacturers' directions of current connectoins and operation should be studied carefully. Their chick capacity must not be over-taxed. The rating of capacity in electric brooders is overstated as in other brooders. Generally speaking, a so-called 500 chick brooder will handle 250 chicks in good shape and possibly can, with careful care be stretched to 350 chicks. A 1000 chick brooder will care for 500 much better than it will 1000. As a general policy, it will pay in all types of brooders to brood about half as many chicks in a brooder as it is rated to accommodate.

GAS BURNERS

There are a number of gas burners available for brooding chicks. A satisfactory way to use gas is in a coal stove. Several manufacturers provide gas burners for their coal stoves. In other cases, a burner can be fitted just under the grate. The fire box should be partially filled with coarse broken brick. The stove or burner must be ventilated.

In addition to the coal stove gas burners, there are Bunsen type burners that are for use under heat deflectors. Star, ring and crow-foot gas burners are easy to adapt to cone shaped heat deflectors for brooding purposes. Flexible connection is made to the gas burner and the hover is suspended from the ceiling of the brooder house. Temperature is controlled by lowering and raising the hover or by increasing and decreasing the flame. These burners are generally operated at about eighteen inches from the floor. In any gas burning equipment, the pressure must be uniform or a presure regulator used in connection with the burner.

HOT WATER BROODERS

Hot water systems are generally used only in large brooder houses with capacity of two thousand chicks or more. A succesful hot water brooder must have a large capacity boiler to furnish the hot water to the pipes which heat the hovers. Contrary to first impression, hot water brooders are not heated with steam but with water at temperature seldom over 180 degrees. In the past few years, there have been some successful home made hot water systems

of small chick capacity. These have been heated with oil, gas, and coal burning boilers.

Both bottom and top heat has been used with success. Bottom heat hot water brooders have the hot water pipes under the house floor of the hover. The pipes are generally buried in the concrete floor and are not more than four inches above the surface at the boiler end. A normal grade of about one-half inch to ten feet of hover will cause the water to circulate especially if the return pipe has a slightly greater fall. Two 1¼" pipes will heat a hover 24" wide. The length of house heated will depend on the boiler or heater. An ordinary double coil gas water heater will heat as much as a sixty foot hot water brooder either top or bottom heat.

Top heat hot water brooders have the pipes over the chicks, rather than under the floor. At the end of the system the pipes should be not less than six inches above the floor. The fall and size of pipe for top heat does not vary from that for bottom heat. In any hot water brooding system an open expansion tank and reservoir is necessary. The expansion tank can be located at either end of the system.

A hot water heated hover two feet deep and six feet long with a room six feet wide and ten feet deep will accommodate two hundred chicks. Two sections this size are ideal for a three-hundred and fifty chick unit. A simple hot water hover is made by the use of a 1x12 board for a back and two 1x12 boards for the top and 1x12 boards for each end. One of the top boards should be stationary and the other hinged to it. Ventilation is controlled by raising the hinged top board. An outing flannel curtain is good for the front but should come to not less than one inch from the floor. Hover temperature is controlled by the water temperature and by the hinged top board. It is recommended that persons not familiar with the general principles of hot water heating and the action of hot water and hot water boilers do not attempt to build a hot water brooding system.

BATTERY BROODING

The latest or more correctly one of the oldest kinds of brooders on the market is the battery or shelf brooder. About twenty years ago this same type brooder was on the market but the leg weakness problem could not be overcome at that time and the brooder was condemned. Since then the discovery of vitamins has made control of leg weakness possible and it has been found that it is not caused by confinement in brooders but by lack of vitamins that can be supplied by cod liver oil, green feed, yellow carrots, yellow corn and violet ray electric lamps. The battery brooders are so called because they are usually built in batteries of about six brooders, one above the other.

One battery brooder section 30"x36" will care for one-hundred chicks until they are three weeks old. This is made possible by the strict sanitation, from the use of hardware cloth floors and outside feed and water troughs so there is no possible chance for the chicks to spread contamination of any sort. Battery brooders are made in electrically and hot water heated styles as well as those depending on room heat entirely.

Electricity is used in regular ring or bar heating elements and carbon or even Mazda lamps for heating. The best types of electric battery brooders have thermostat controlled heat units and droppings pans below the hardware cloth floor that can be removed easily and without disturbing the chicks. Hot water battery brooders are made in larger groups of units and heated from one coal or gas burning water heater. The battery brooders with heating units can be operated in almost any room but the sort without heat must be operated in a carefully heated and ventilated room. Some makes of these brooders are of a size and so arranged that by a process of thinning out and moving, the chicks can be raised to broiler size in the battery brooder. The present prices of heated battery brooders range from about eight to ten cents per chick capacity for the electric and less for the hot water types as the capacity increases.

STARTING THE BROODER

Have whatever kind of brooder is to be used in operation at least two

days before the chicks are to be placed in it. It should be remembered definitely that the brooder is the chicks' mother except for the time the person tending it is present. Put sand on the floor under the hover soon after the fire is started, so the sand will be thoroughly dry when the chicks are put on it. Any sand that is suitable for making concrete is suitable for chicks. It must be clean and rather coarse. Do not use blow or drift sand.

Cover the floor outside the rim of the brooder with about an inch of chopped alfalfa hay or cut straw. If straw is used, it must be clean and free from mold or dampness and should be bright. A tight floor covered with a thin layer of sand and straw is better than a poor floor covered with a thick layer. Clean the floor when straw or alfalfa becomes dusty or dirty. Never leave litter on the floor after it has been wet.

Temperatures of the brooder should be 100 degrees with the bulb of the thermometer at the edge of the hover and about two inches above the floor. This temperature should be maintained for the first week. After this time, the temperature should be lowered at the rate of about five degrees per week. The best indication of temperature conditions is the chicks. If the chicks crowd the stove, the temperature is low or there is a floor draught that chills them. If they hold away from the stove outside the edge of the hover, the temperature is too high. The temperature should be such that the chicks will be under the outer edge of the hover and not packed into a tight circle. Crowding into corners of the room away from the stove may be caused by either over or under heating. In either case, trouble will follow such crowding as it is the beginning of a habit that is most difficult to control or break.

To train the chicks where the stove is and where the limits of the brooder heat is, a guard made of hardware cloth or one inch mesh poultry netting doubled should be ready before the chicks are taken to the brooder. This guard should be about twelve inches high and long enough to make a circle around the brooder and touching or nearly touching the walls of the room. When the chicks are first put in the brooder, this circle should be only a trifle larger than the hover. The wire may be covered with burlap or muslin to shut off floor draughts where they exist. Floor draughts can be detected by vacant sections in the circle of chicks under the hover, for in some cases, the chicks will all crowd to one side of the hover. To cut off violent floor draughts, it is well to hinge together two or more pieces of twelve inch boards about thirty inches long. These can be placed so as to protect the chicks from floor draughts or air currents that cannot be controlled or eliminated otherwise. Valley tin has been suggested as suitable to use for the guard ring around the brooder stove.

The use of hardware cloth floors in the brooder house is advisable where the most rigid sanitation is desired. The brooder house is built as usual and frames made to fit the floor of the brooder house on to which the hardware cloth is nailed. These frames should be in several sections for each room to make removal for cleaning easy. One inch material is not suitable to use for these frames because it will not support weight on the hardware cloth without allowing it to sag and touch the floor under it which destroys its sanitary value. Two by four inch dimension lumber should be used. To reduce the two inch exposed top of the frame the top inside edge of the frame should be beveled to leave about five-eighths of an inch nailing surface on the top outside edge. Place the brooder stove, feed hoppers and water fountains on top of the hardware cloth covered frames which should be made to cover the entire floor without leaving cracks or openings for the chicks to come in contact with the bare floor and droppings. One-half inch mesh hardware cloth is a good size to use. The attendant must take care and walk only on the wood frame work and not step on the wire.

THE CHICKS TO START WITH

More than 75% of the baby chicks hatched each year are hatched on the farms either with small incubators or by hens, according to statistics released by incubator manufacturers and hatchery operators. The requirements of

flock management, egg selection and incubator operation are as important for the farm operator as for the hatcherymen with a mammoth incubator.

There is a certain and positive demand on the commercial market for eggs that weigh two ounces each and for healthy vigorous and well developed poultry. Selection of eggs that weigh twenty-four ounces per dozen and are produced by only the most vigorous and productive hens will gradually improve the eggs and poultry produced on farms toward these standards. The selection is essential regardless of where or how chicks are hatched.

Hatcheries selling baby chicks to farmers secure eggs and hatch chicks under a wide variety of conditions and can be classified into four general groups.

1. The hatchery that puts no individual egg into its incubators that weigh less than twenty-three ounces to the dozen and all eggs average twenty-four ounces per dozen. These hatcheries generally closely supervise and cull the flocks from which they secure eggs. Many of the flocks have breeding stock of known trapnest production and are of high standard quality. Chicks from these high standard hatcheries should weigh a minimum of eight pounds per one-hundred net, that is without the box. The methods of feeding, culling and management followed on farms furnishing eggs to this class of hatcheries are under the advice of competent poultrymen and are designed to produce the strongest possible chicks from the best possible breeding stock. These conditions are also found on a number of poultry farm hatcheries that produce from their own breeders all the eggs that go into their incubators.

2. The second-class of hatcheries are those that supervise their flocks without strict organization and definite standards. The chief difference between this and the first group is that this group uses eggs as they come from the flock, is not so particular as to the quality of the breeding stock, and does not insist on the best feed and management possible to give the flocks.

3. The third group of hatcheries are those that advertise for eggs and take them without examination or supervision of the flocks producing them. Chicks from these hatcheries cannot be uniform and may or may not be from vigorous breeders or breeders of even fair quality. Egg size is not considered because the eggs are purchased at a low figure and all that are purchased are incubated.

4. This group of hatcheries secure some if not all of their eggs from produce dealers. Here is an example of the very one to profit most by an improved quality of eggs and poultry helping to produce eggs and poultry of an unknown quality: Mr. A. Farmer will bring in a case of eggs to the dealer and is asked what kind of chickens he has. He tells the dealer they are White Plymouth Rocks and at once the dealer sets the eggs aside and sells them to the hatchery. The farmer did not tell that he had a couple of Rose Comb Mongrel roosters or perhaps a number of scrubby and undersized roosters that will have a positive effect on the chicks and the kind of hens they will develop into.

By this rough classification of hatcheries without many of the fine points of difference, it is possible to see the necessity of being most inquisitive before an order for chicks is made. Buy at home or near home is possibly good advice to baby chick purchasers. If your local hatcheryman cannot fill your order perhaps he can direct you to a nearby hatchery producing good chicks.

Do not shop for cheap chicks and be careful about purchasing chicks that are sold on a commission or brokerage basis unless positive identification of the hatchery is made by the dealer. A hatchery selling chicks for as low as eleven cents each cannot pay operating expenses unless the chicks are produced from flocks and eggs of questionable quality. There are no profits to the purchaser or producer of poor quality baby chicks.

NUMBER OF CHICKS TO BUY

Under no conditions or circumstances should more chicks be purchased than there are ample brooding facilities to handle. If a brooder house large enough to care for 350 chicks is available do not attempt to put 500 chicks in it.

One or two things will likely happen. There will be enough loss to reduce the number of chicks or, if loss does not occur, the chicks will not be the strong, sturdy chicks they could be if not crowded. Exceptions do happen to this recommendation but it seldom happens twice to the same person.

A few years ago six chicks were required to produce one pullet. Four chicks are recommended by many now. Three chicks have been found to be enough if from high quality breeding stock and in the hands of careful and experienced poultry keepers. On the six chick basis it will require 450 chicks to produce 75 good pullets ready for laying. On the four chick basis 300 chicks will be needed and on the three chick basis 225 chicks will be enough. The three chick scale should not be attempted before the poultryman is certain that it is possible for him.

STARTING THE CHICKS

Whether the chicks are started in the brooder house under a hover or in a battery brooder, they are ready to feed when 48 hours old. Recent experimental results indicate that nothing is to be gained by holding chicks longer than this before feeding. It is not advised to put the chicks in the brooder before feeding time. If home hatched chicks keep them in the incubator or a darkened but warm and ventilated box until time for the first feeding. The struggle the chick has had getting out of the shell has taxed its strength and an undisturbed rest of 48 hours is desirable. To hold them longer than this is liable to create an appetite for toe picking or cannibalism. Nature has provided for a rest period by bringing the chick into the world with a supply of egg yolk for food during the early part of its life. Chicks should not be handled or unduly exposed after hatching until fully fluffed and dry.

The desirable time to put chicks in the brooder is in the afternoon. They will exercise a bit, drink some water or milk, have one feeding or possibly two depending on the time. Next morning they will be hungry and must have early attention with clean drink and feed. Early means when the first chicks begin to stir and before they get restless. Two or three hours after daylight is not early. The chicks will be just as hungry and will require early attention every morning thereafter.

Chicks started in battery brooders should have not less than ten square inches of floor space for each chick. It is advised to transfer chicks out of battery brooder house when they are three to four weeks old. It is possible to carry them in battery brooders longer than this if the battery is not overcrowded and the feed is fortified with cod liver oil and green feed.

If chicks are started on a floor with sand, straw or litter the house must be cleaned at least once each week. Chicks can be successfully started in a brooder house. A one-half inch hardware cloth floor may be used as it is in the battery brooder. The hardware cloth is firmly stapled to frames made in sections to fit the floor. Hardware cloth is not essential where clean ground is used and if thorough sanitation is practiced.

Wire or hardware cloth floors are valuable in control of coccidiosis and other chick diseases. Coccidiosis is identified by bloody droppings and immediately when they are noticed at any time from chicks, the entire brooding equipment must be cleaned and disinfected at once and daily until the outbreak of coccidiosis is under control. Put the chicks immediately on a mash of twenty pounds dried milk, forty pounds yellow cornmeal, ten pounds bran, ten pounds shorts and twenty pounds kafir or barley meal. Feed them nothing else for ten to fourteen days. Give them only clean pure water to drink. Chicks must have six feet of mash hopper feeding space for one-hundred chicks. The feed boards for starting chicks should be three square feet for one-hundred chicks. If all mash is used, the mash hopper space must be doubled. If grain and mash are used, the grain may be scattered on the floor but it is best to put it in a feed hopper the same size as the mash hopper.

FEEDING THE CHICKS

A method of starting baby chicks that has been used with success in brooder houses for a number of years is known as the Oklahoma A. and M. College Way of Feeding Chicks:

1. Chicks are fed when they are 48 hours old.
2. First feed: (a) Clean fresh water to drink.
(b) Bran and raw egg mixed to crumbly mash.
One large egg to four ounces of bran makes enough mash to give 125 to 150 chicks one feed. Clean boards with lath nailed around edges are used. Thirty-five chicks are allowed one square foot of feed board. Four to six feedings per day are given depending upon appetite and activity of chicks.
3. Third or fourth day the chicks get fine cut green feed and get edible green feed every other day thereafter.
4. Fourth day, dry mash in pans or boxes is placed before the chicks for an hour or longer. Boxes are made by nailing 1x4 sides around a 1x6 bottom. Seventy-five to one-hundred chicks have a box six inches wide and thirty inches long.
 - (a) Dry mash:

27 lbs. bran	3 lbs. meat scrap
27 lbs. shorts	3 lbs. dried milk
27 lbs. yellow cornmeal	3 lbs. cottonseed meal
7 lbs. alfalfa leaf meal	3 lbs. mineral mixture
 - (b) The mineral mixture:

3 lbs. fine bonemeal
1 lb. calcium carbonate or high grade pulverized limestone
1 lb. salt.
5. Oat grats, coarse cracked wheat, medium cracked yellow corn, coarse cracked or small kafir or a mixture of them, is scattered, at the rate of about one ounce to 200 chicks, on egg and bran mash beginning of fourth day.
6. Amount of grain is gradually increased and egg and bran mash decreased until two feeds of grain per day are being given by end of second week and bran and egg mash has been discontinued.
7. By end of second week the chicks have:
 - (a) Dry mash before them all the time
 - (b) Grain in hoppers the same as used for the mash
 - (c) Fresh clean water to drink
 - (d) All the fine cut green feed they will eat every day
8. The chicks are forced into the yards and sunshine as early as possible, by end of fourth day if weather permits. If cold or cloudy weather keeps chicks in house for more than three days after they are two weeks old, one pint of cod liver oil is added to each 100 lbs. of dry mash while they are confined to house.
9. After six weeks about one-third of the grain is whole oats and two-thirds a mixture of all or any number of cubed yellow corn, kafir, milo or wheat.
10. Supplemental to feeding, each chick has a minimum of four square inches of floor space under the hover and 36 square inches of floor space in the brooder house. About $\frac{1}{2}$ of the brooder floor including that under the hover is covered with clean, dry, coarse sand. The other half of the floor is covered with fine chopped alfalfa hay. The hover has a temperature of 97 to 100 degrees one inch from the floor and there is a maximum of fresh air and light allowed in the brooder house.
11. This is one successful method of feeding chicks.
An all mash feed is satisfactory to use for chicks and is given to them as soon as they are placed in the battery brooder or under the hover. The chick mash should have not less than sixteen percent protein, guaranteed on the feed sack tag, and should not be more than nineteen percent protein. The guarantee for fiber should be not less than five percent and need not be more than seven and one-half percent. There should be bran, yellow cornmeal, alfalfa meal dried milk, meat scrap, bonemeal, salt and vegetable meal protein, preferably cottonseed meal in a good chick mash. Cod liver oil is not essential in

Oklahoma unless the chicks are in strict confinement and not allowed to be in outside sunshine for a period of longer than one week. This does not happen in Oklahoma during chick season. Charcoal is of no use or value in a chick mash.

For chick grain, equal parts of medium cubed yellow corn and kafir is good until the chicks are six to eight weeks old when it is desirable to make one-third of the mixture whole oats. Feed the grain in hoppers of equal size as the mash hoppers, beginning the second day the chicks are in the brooder. For the first two or three days the grain hoppers are opened twice daily for short feedings. The fourth or fifth day the chicks are in the brooder the grain hoppers may be left open all of the time just the same as the mash hoppers. Be sure that the chicks have water or milk to drink at the same time they get their first feed. Milk to drink is not as enthusiastically recommended now as in the past on account of better sanitation and fewer flies without milk to drink than with it. Water is all that is needed with a complete chick mash which should contain dry milk, vegetable protein and minerals needed for the best growth of the chicks.

The rate of growth and consumption of feed per chick by weeks is reported by Connecticut Experiment Station to be:

For Leghorns

SEX	Normal Weight Pounds	Age Weeks	Feed Consumed per Bird Since Hatching—Pounds
Cockerels and Pullets	1	8	5.5
Pullets	2	14	9.8
Pullets	2½	17	13.6
Pullets	3	21	19.4

For Rhode Island Reds

Cockerels and Pullets	1	7	3.0
Cockerels and Pullets	2	11	7.2
Pullets	3	16	13.6
Pullets	4	22	23.7

An all mash ration for chicks is satisfactory for the first six or possibly eight weeks. All mash fed should contain the same ingredients as chick mash and one additional ground grain. The protein guarantee on all mash for chicks should be not less than fourteen percent nor more than eighteen percent. The fiber guarantee for chick all mash must not be less than three percent and need not be more than five percent.

A satisfactory all mash chick ration that has given good results for the first six weeks is:

27 pounds yellow cornmeal	3 pounds dried milk
27 pounds bran	3 pounds cottonseed meal
27 pounds shorts	¾ pound salt
8 pounds alfalfa meal	¾ pound pulverized limestone or oyster shell
3 pounds meat scrap	1½ pounds bonemeal

After six weeks add fifty pounds of yellow cornmeal and fifty pounds of kafir meal to each one-hundred pounds of the chick all mash starter, this is a satisfactory all mash growing feed till the chicks are in production.

GET THE CHICKS OUTSIDE

Get the chicks out into the sunshine early. The saying used to be, get them out on the ground early, but it is definitely known that chicks can be successfully grown and never touch ground. In some sections where soil contamination is a problem, the only yard the chicks know is a concrete court.

10x12 PORTABLE BROODER HOUSE—Top, front view, showing two window frames removed and one chick door open; center, east end; bottom, back, showing one of the ventilation doors open.

It is not the ground that counts, but it is where the chicks will get sunshine. Sunshine through muslin or glass substitute is some better than sunshine through ordinary glass, but direct sunshine is best of all. For early season chicks, it is essential that they be protected from wind so that they will take advantage of the sunshine. Oklahoma farmers need not feed cod liver oil if advantage is taken of the sunshine and the opportunity to grow green feed.

Chicks on clean fresh range will pick up some green feed but seldom will there be enough to fill the demands of the growing chick. Without all the green feed the chicks need, a condition resembling roup develops. The condition does not develop rapidly and it takes a large part of the growing season to be noticeable. When it is noticed, little can be done to correct the damage done. The pullets will be thin, have watery eyes and nose, and a general lack of luster of feathers, head and eyes. The mouth and throat will have a coating of white mucus with distinct but small pinhead white spots in it. This trouble is caused by lack of vitamin A in the chick ration. Comparatively few feeds used for poultry have Vitamin A and those that do must be used if good pullets are to be raised.

In many sections of Oklahoma most pasture and wild green feeds dry up in July and August. There is a particular necessity for chick green feed then. Since green feeds are the cheapest source of Vitamin A special plantings should be made for the chicks.

Yellow corn is the only grain used for poultry that has a relatively large amount of Vitamin A. Black hull white and hegari kafir have a small amount. Wheat bran has a small amount. Cod liver oil, whole milk, eggs, tomatoes and orange juice contain large amounts of vitamin A. Skimmed milk, dried buttermilk or dried skim milk have small amounts but not enough to do the job for chickens without help. The feeding of yellow corn helps but is not enough and perhaps as many chicks are raised in Oklahoma without yellow corn as with it.

Each fall and winter when pullets should be ready to lay, hundreds of letters come to the A. and M. Poultry Department describing pullets that have been raised without enough Vitamin A which is the same as without enough green feed. It is not possible to over emphasize the necessity of green feed for growing pullets. Free range is not the same as green feed. Most free range from July on does not have green feed that growing pullets can use. Tall growing grain or sudan grass is of little benefit for the pullets cannot pick it off. The tall green grass must be chopped or cut into short lengths so the pullets can pick it up and swallow it. Chickens have no way of cutting, chopping or chewing tall, tough green feed but can use it if cut in $\frac{1}{4}$ to $\frac{1}{2}$ inch lengths.

PLANT GREEN FEED

For the one-hundred and fifty hen unit plant, a three-hundred foot row or its equivalent of Lucullus Swiss Chard for summer green feed for the chicks and hens. Break off enough large outside leaves to weigh ten pounds for the hens and from one to about twelve pounds each day for the chicks as they grow larger. Chop into $\frac{1}{4}$ to $\frac{1}{2}$ inch lengths and feed in a clean box trough. Two feedings each day will increase the amount the chickens will eat. When the chard is struggling with dry weather use sudan grass to relieve it. At any time the sudan grass is getting too tall, use it and give the chard a growing period.

Plant a 200 foot row or its equivalent of sudan grass for summer green feed for chicks and hens. Cut and chop when it is between 24 and 36 inches tall. Use sudan to give Swiss chard an opportunity to grow larger. Two to three feet of the two should be enough to feed hens and chicks for one day.

Plant a 200 foot row or its equivalent of Danvers half long yellow carrots for winter feed. Grind them in household food chopper for feeding. Use in November, December, January and February.

Alfalfa, sweet clover, green cabbage leaves, rape or other greens are good in season but it is not enough to depend on what happens to be handy. Guarantee green feed for the chicks by planting chard, sudan, carrots or other greens especially for that purpose.

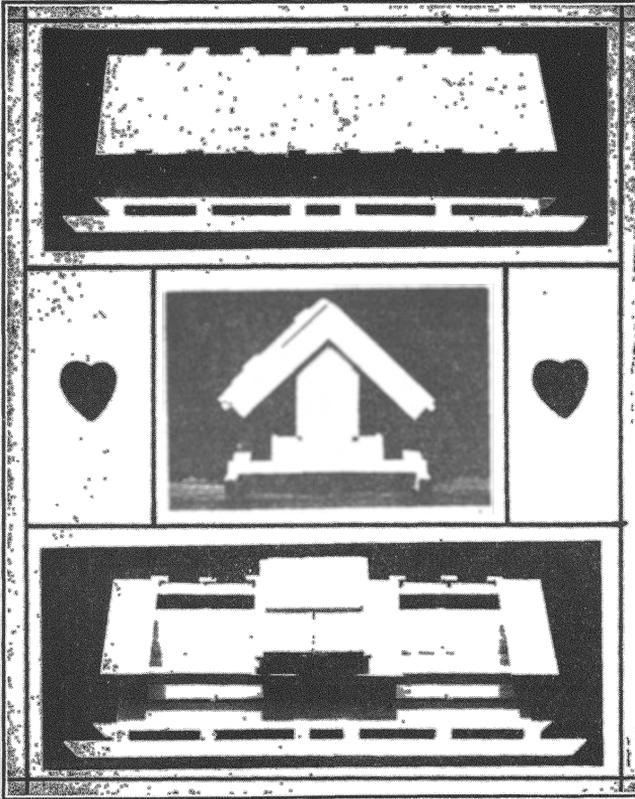
SEPARATE AND SELL THE COCKERELS

Cockerels should be separated from the pullets soon after sex difference is noticed. With one one-hundred and fifty hen unit it will be impossible, without some temporary shelter for the cockerels. Keep them on the same feed as the pullets. No special fattening feed is desirable. The cockerels only need to grow as rapidly as possible in order to be good market broilers or fryers when ten to twelve weeks old.

It is possible to keep pullets and cockerels together until the cockerels are ready for market. It is not profitable to carry the cockerels much longer than twelve weeks. Their value goes down and the cost of feeding them increases rapidly.

SUMMER HOUSE

Where more than one, one-hundred and fifty hen unit is on the farm, a summer growing house is desirable for the pullets. This is a 10x12 gable roof shed with inch mesh poultry netting or fox wire floor and sides. Fox wire is similar to poultry netting but made from heavier gage wire. The floor is 12 or 14 inches above the ground so the droppings will be out of reach of the pullets. At frequent intervals the house can be pulled aside and the drop-



OUTDOOR RANGE FEEDER—Top, side view; center, end view; bottom, side view with doors removed for filling feeder.

pings hauled away. The house is then pulled back over the same spot or moved to an entirely new, clean range.

With one, one-hundred and fifty hen unit the brooder house is convertible into a pullet house by installing perches and opening back and front windows.

Bill of Material for Summer House

Runners	Rafters	Battens and door braces
2-4x4-14	3-2x4-14	18-1x4-16
Cross Braces	Purlins	Ridge boards
6-2x4-10	3-2x4-12	2-1x6-14
Side Braces	Perches	2 pair 6" strap hinges
4-2x4-12	10-1x4-10	48 feet-24"x1" mesh poultry
Perch supports	Roof and end	netting
4-2x4-12	14-1x12-16	40 feet-48"x1" mesh poultry
		netting

RANGE FEED HOPPER

One range feed hopper nine feet long on skids is desirable for each one-hundred and fifty hen unit. This hopper is divided into four sections. Two sections used for mash and two for grain. There are two doors on the top. The design of this hopper is such that chicks can eat any time during the day and be in the shade. The roof is 12" boxing with 1x4 inch battens which is perfectly rain proof.

Bill of Material for Range Feed Hopper

Runners	Top or roof
2-2x4-10	4-1x12-14
Floor and bottom joist	Ends of trough and partitions
2x4-12	3-1x6-18
Large rafters and purlins	Battens for top, jump boards,
4-2x4-12	Door braces
Bottom and sides	6-1x4-16
3-1x12-18	Top rim for feed trough
Ends, partitions and part of top	1-1x2-18
2-1x12-16	

CONVENIENCES AND APPLIANCES

A satisfactory water fountain is so arranged that the chicks can get plenty of water to drink, but not drown and not be able to fill the fountain with dirt and litter by scratching. For baby chicks a star or other fountain that screws on a glass fruit jar is satisfactory. It is best to set it for the first week on a one inch block four inches square. Four nails, one at the inside angle between each star point will hold the jar in place and put it high enough to keep clean. After a week or ten days, the block should be a 2x4 or 2x6. It is desirable to have two sets of jars so that one can be washed and ready for use when the dirty one is removed each morning. One jar fountain will water not more than thirty chicks.

For older chicks an open and larger pan or crock is desirable. A wood or wire is arranged around it so the chicks can put their heads through to drink but not get into the water with their feet. On the range a shelter with raised and slatted floor is desirable for the water pan. At all times the arrangements should be such that puddles of water are not allowed to stand where the chicks can wade and drink in them.

If shade is available to protect a barrel it is a labor saved to haul water to the chick range. A drip valve or float valve with overflow pipe in the water pan assures water for the pullets all the time if there is water in the barrel.

Perches should be available to the chicks by the time they are three weeks old. They will begin to form the habit of getting on perches then if available, otherwise, they will likely begin to form the habit of roosting on the floor. Watch the chicks hop on the perches during the day and enjoy life. Crooked breast bones are not likely to be caused by early perching if the chicks are properly fed. One by two inch strips nailed to a frame covered with one

inch mesh poultry netting make splendid chick perches. The top should not be over twelve inches high, and the bottom may be only two or three inches from the floor on a sloping set of perches four feet square. The bottom one or two perches might even be under the edge of the hover to good advantage.

It is frequently necessary to visit the chicks after dark. On such visits it is best not to throw a direct light on the chicks as they will crowd away from it and not move back to their original positions when the light is taken away. If a flashlight is used, throw the ray or beam on the ceiling or walls and work by the reflected light. If a permanent electric light is used, arrange a reflector that will keep the direct light off the chicks. With a lamp or lantern a reflector can be attached that will throw the light away from the chicks in a satisfactory manner.

Keep the chicks growing by keeping them happy, contented, and full of feed. As soon as they are in the brooder, begin the task of providing green feed and shade for them during the coming summer. If trees are not available, alternate rows of sunflower, sudan grass and corn or kafir should be planted. These will provide shade during the summer. Keep the mash boxes and water crocks in the shade so the chicks will eat more during the day. Green swiss chard and sudan are fine for summer. Any green must be cut and chopped into quarter inch lengths and fed by hand if best results are to be obtained.

COST OF BROODING

The biggest cost of brooding chicks is mortality. Anything done to lower the loss of chicks will reduce the cost of brooding. Investment in good and sufficient equipment will, time after time, be repaid by increased number of chicks raised. The pullets raised out of chicks properly brooded will be able to repay in numbers and quality many times over the cost of good brooder equipment.

FEED FOR GROWING PULLETS

Ten weeks and older pullets should not have as much protein as baby chicks. The high protein feeds develop the reproductive organs more rapidly than the body grows. Pullets, to lay well and remain strong and healthy, must be full grown physically before the first eggs are laid. This requires a fine attention to the balance between sexual and physical development.

The baby chick mash suggested in the A. and M. Way to Feed Chicks can be used by adding twenty-seven pounds of pulverized oats or barley. With this modified mash, grain should be fed with about equal amounts of the mash. Splendid results have been had with the range feed hopper by using half of it for grain and half for mash. The pullets will eat about equal amounts of each.

Grain mixtures are not especially important. Almost any combination is good if the mash used with it is right. As much as one-third of the grain can be whole oats. Yellow corn, hen size steel cut, should make up one-fourth of the grain. Kafir, wheat, milo, barley or feterita can be used to complete the grain mixture.

The poorest way to feed grain to growing chicks is to scatter it on the ground or to feed sorghums in the head. Hopper or trough feeding is the best method to use with growing chicks.

Keep the pullets on a growing mash and grain until they are in good production if that is before October first. After October first they can be rushed just a little to get them into fall production. Heavy breed chicks hatched before March 20, and light breed chicks hatched before April 20, should if these directions have been followed properly, be in good production on or before the first of October. Keep the pullets growing. Feed fresh green feed every day.

