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NATURAL AND ARTIFICIAL BROODING OF CHICKENS.

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The proper brooding of chickens is one of the most difficult operations on many poultry farms, especially for the beginner. Many poultry keepers who are able to secure good egg yields and fair hatches make a failure of brooding chickens, either in raising only a small percentage of the chickens hatched or in failing to rear strong, vigorous birds which develop into good breeding stock. Brooding is still in the experimental stage, and no one system has given perfect satisfaction.

Brooding with hens is the simplest and easiest way to raise a few chickens and is the method which is used almost exclusively on the average farm. Artificial brooders are necessary where winter or very early chickens are raised, where only Leghorns or other nonsetting breeds of poultry are kept, or where large numbers of chickens are raised commercially. Successful natural rearing of chickens requires convenient facilities, regular attention, and often tries one's patience, while artificial methods require a larger investment, close attention, and more care, but are more commonly used where large numbers of chickens are raised.

REARING CHICKENS WITH HENS.

Sitting hens should be confined to slightly darkened nests at hatching time and not disturbed unless they step on or pick their chickens when hatching, in which case the chickens should be removed as soon as dry, in a basket lined with flannel or some other warm material, and kept near a fire until all the eggs are hatched; or the eggs may be removed and placed under a quieter hen whose eggs are hatching at the same time. An incubator may also be used to keep the earliest hatched chickens warm, in case they are removed from the nest. If

NOTE.—Practical instructions in both natural and artificial brooding of chickens are contained in this bulletin.

the eggs hatch unevenly, those which are slow in hatching may be placed under other hens, as hens often get restless after a part of the chickens are out, allowing the remaining eggs to become cooled at the very time when steady heat is necessary. Remove the egg shells and any eggs which have not hatched as soon as the hatching is over. Hens should be fed as soon as possible after the eggs are hatched, as feeding tends to keep them quiet; otherwise many hens will leave the nest. In most cases it is best that the hen remain on the nest and brood the chickens for at least 24 hours after the hatching is over.

Hens are often used to raise incubator-hatched chicks and to take the place of the artificial brooder, a practice that is in operation on many poultry farms. A few eggs are put under the hen four or five days before the incubator is to hatch. In the evening following the hatch of the incubator, after the chickens are thoroughly dry, one or two are put under the hen, and if she is found to mother them properly, the next evening as many more are added as she can brood or care for properly. Hens will successfully brood 10 to 15 chickens early in the breeding season, and 18 to 25 in warm weather, depending upon the size of the hen. This method of handling chickens does away with the artificial brooder, and where one has only a small number of chickens to raise it is a very easy manner in which to handle them, and also a good method when it is desired to raise



FIG. 1.—Dusting hen with insect powder before setting, to kill lice.

separately special lots of chicks. It should be borne in mind, in adding chickens to a hen which already has some to brood, that it is best to add those of the same color and age as the ones already with her, as the hen will often pick the later arrivals if they are of a color different from the ones she is already brooding. As a rule this transferring should take place at night, although with a quite docile hen it can be done in the morning.

Powder the hen with a good insect powder before moving her and the chickens to the brood coop. The hen should be dusted every two weeks or as often as necessary until the chickens are weaned. If lice become thick on the chickens, or if they are troubled with "head

lice," a very little grease, such as lard or vaseline, may be applied with the fingers on the head, neck, under the wings, and around the vent. Great care should be taken, however, not to get too much

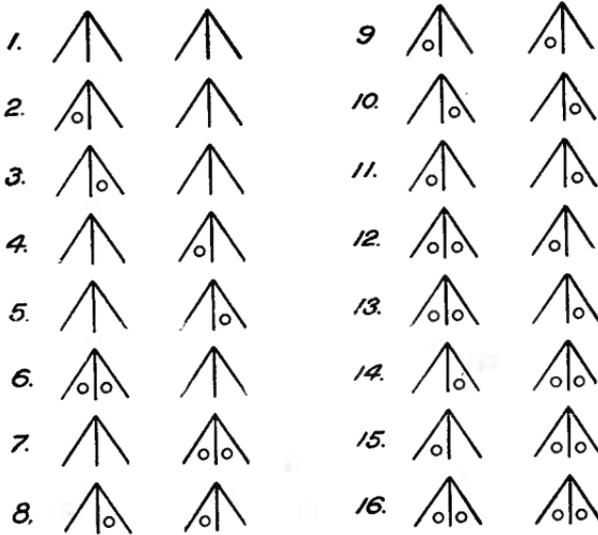


FIG. 2.—Sixteen different methods of marking chicks. If this method is followed the age of the flock can be easily told.

grease on the chickens, as it will stop their growth and in some cases may prove fatal.

The brood coop should be cleaned at least once a week and kept free from mites. If mites are found in the coop, it should be thoroughly cleaned and sprayed with kerosene oil or crude petroleum. From 1 to 2 inches of sand or dry dirt or a thin layer of straw or fine hay should be spread on the floor of the coop. Brood coops should be moved weekly to fresh ground, preferably where there is new grass. Shade is very essential in rearing chickens, especially during warm weather; therefore, the coops should be placed in the shade whenever possible. A corn-field makes fine range for young chickens, as they secure many bugs and worms and have fresh ground to run on most of the time, due to the cultivation of the ground, and have abundant shade at the same time.



FIG. 3.—Hen and chicks allowed free range. Large losses are sustained where this method of growing chicks is pursued.

Toe punch or mark all the chickens before they are transferred to the brooder or brood coop, so that their age and breeding can be

readily determined after they are matured. Farmers frequently keep old hens on their farms and kill the younger hens and pullets, because they are unable to distinguish between them after the pullets have matured. The accompanying diagram (fig. 2) shows 16 different methods of marking chickens.

BROOD COOPS.

Chickens hatched during the winter should be brooded in a poultry house or shed while the outside weather conditions are unfavorable; after the weather becomes settled, they should be reared in brood coops out of doors. Brood coops should be made so that they can be closed at night, to keep out cats, rats, and other animals, and enough



FIG. 4.—Hens confined to the brood coops. There is a wire door back of the boarded front of this coop which can be slid forward. This arrangement furnishes the hen and chicks plenty of ventilation and fresh air at night and prevents any animals from entering the coop.

ventilation should be allowed so that the hen and chicks will have plenty of fresh air. A good coop is illustrated in figure 4. This coop is used at the Government poultry farm at Beltsville, Md. Full details and specifications for building it are given in Farmers' Bulletin 574, "Poultry-House Construction," page 13.

The hen should be confined in the coop until the chicks are weaned, while the chickens are allowed free range after they are a few days old. Where hens are allowed free range and have to forage for feed for themselves and chicks, they often take them through wet grass, where the chicks may become chilled and die. Most of the feed the chicks secure in this manner goes to keep up the heat of the body, whereas feed eaten by those that are with a hen that is confined pro-

duces more rapid growth, as the chicks do not have so much exercise. Then, too, in most broods there are one or two chicks that are weaker than the others, and if the hen is allowed free range the weaker ones often get behind and out of hearing of the mother's cluck and call. In most cases this results in the loss and death of these chicks, due to becoming chilled. If the hen is confined the weaklings can always find shelter and heat under her, and after a few days may develop into strong, healthy chicks.

The loss in young chicks due to allowing the hen free range is undoubtedly large. Chickens frequently have to be caught and put into their coops during sudden storms, as they are apt to huddle in some hole or corner where they get chilled or drowned. They must

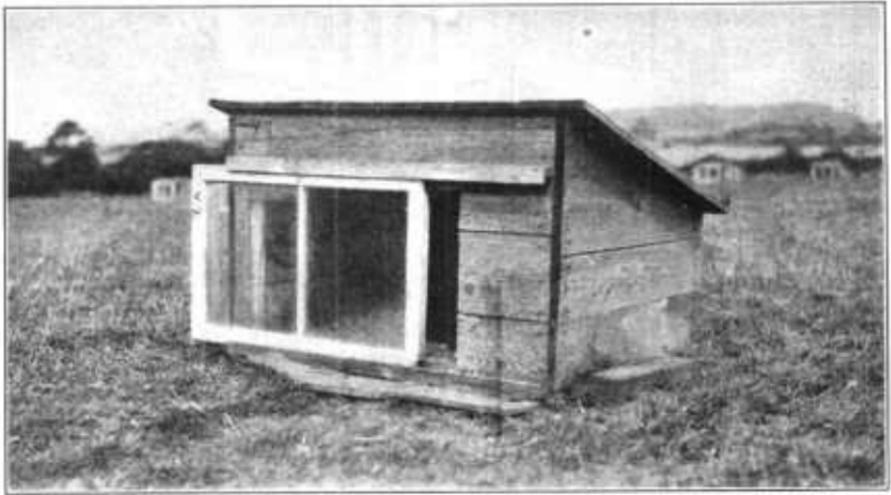


FIG. 5.—Brood coop with window sash used for door. When this door is closed it does not allow enough ventilation for the hen and chicks.

be kept growing constantly if the best results are to be obtained, as they never entirely recover from checks in their growth even for a short period. Hens are usually left with their young chicks as long as they will brood them, while some hens frequently commence to lay before the chickens are weaned.

Several styles of coops are shown in figures 5 to 8, inclusive, the undesirable features of which are pointed out.

ARTIFICIAL BROODING.

The artificial method of brooding chickens consists in supplying artificially as nearly as possible the heat furnished by the hen under natural conditions. The temperature of a hen is about 106° F.,¹ but as hens seldom sit closely on chickens the latter do not receive

¹ See Farmers' Bulletin 585, "Natural and artificial incubation of hens' eggs."

this degree of heat. Hens adapt their methods of brooding to conditions such as temperature, size of the chickens, wet weather, etc., and the operator of a brooder must meet these conditions as well as



FIG. 6.—Brood coop having glass about half way across the front. This could be improved by having a wire door pass back of the slatted portion of the front.

he can. This lack of adjustability to changes is one of the weakest points in our present brooders and brooder systems. Some of the most important faults in the management of brooders are over-



FIG. 7.—V-shaped brood coop. This coop is not provided with any arrangement for closing at night as a protection against enemies of the hen and chickens.

crowding and lack of ventilation, while the chickens fail to get sufficient exercise. The brooder should supply the proper temperature, be readily adapted to changes in weather conditions, and be easy to clean and well ventilated.

Chickens are usually left in the incubator from 24 to 36 hours after hatching, without feeding,¹ before they are removed to the brooder, which should have been in operation for a day or two at the proper temperature for receiving the chickens. A beginner should try his brooding system carefully before he uses it. After placing the chickens in the brooder they can be given feed and water. Subsequent loss in chickens is frequently due to chilling received while taking them from the incubator to the brooder. They should be moved in a covered basket or receptacle in cool or cold weather.

HOVERS, BROODERS, AND BROODING SYSTEMS.

There are a large number of hovers, brooders, and brooding sys-

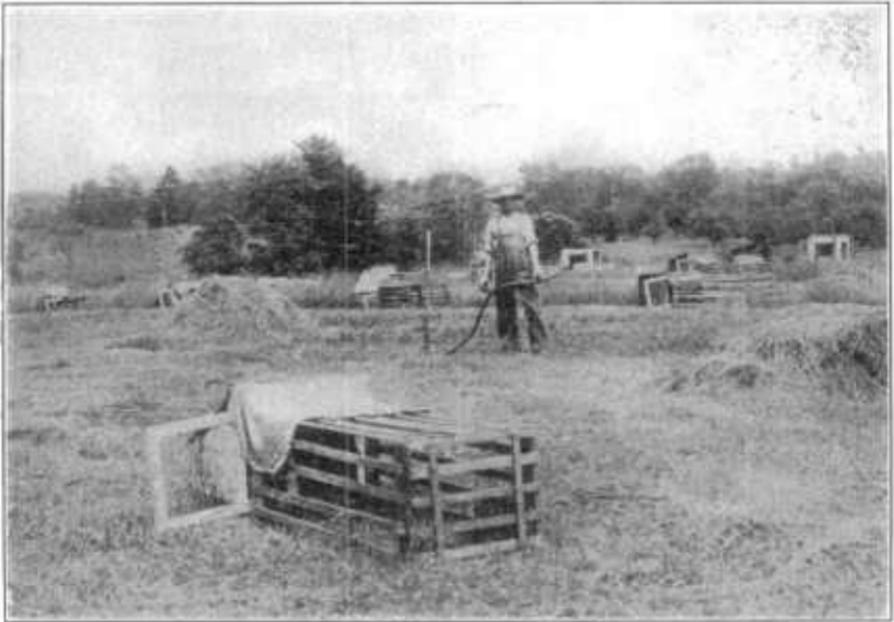


FIG. 8.—Brood coop with small run for hen, showing wire door which can be closed at night. The burlap covering on top of the coop and frame is to protect the hen from the sun and rain.

tems used throughout the country, some with success, although many are discarded as failures, while each year brings some modification or change. One poultryman uses a system successfully, while his neighbor may make a failure of the same system but does well with another. More difference of opinion exists as to the value of brooding systems than in any other part of poultry rearing, which shows that no system is ideal for all conditions or all people, but that success depends largely on individual handling and care. Many failures in brooding are due to weak chickens, which may be traced to faulty incubation or weakness in the breeding stock. Successful rearing of chickens depends primarily upon having healthy, vigorous breeding stock.

¹ See Farmers' Bulletin 585. "Natural and artificial incubation of hens' eggs."

Brooding systems may be classified as follows, according to their capacity: Individual brooders or hovers holding from 25 to 100 chickens; coal, gasoline, and engine or distillate oil stove brooders, with a capacity varying from 200 to 1,200 chicks; and hot-water pipe systems, the capacity of which is unlimited. The beginner, if possible, should thoroughly investigate the brooding equipment used on successful poultry farms which have been in operation for some years.

INDIVIDUAL HOVERS AND BROODERS.

The small individual hovers and brooders are heated with either hot air or hot water, with kerosene oil as the source of heat. Hovers



FIG. 9.—Artificial brooding of chicks, showing arrangement of outdoor brooders.

are used entirely inside, either in brooder houses or in small colony houses, while brooders are made for both indoor and outdoor use. Outdoor brooders are used with success and work very satisfactorily under most weather conditions. (See fig. 9.) The capacity of brooders and hovers is often overestimated, and one-half to two-thirds of the number of chickens commonly advised will do much better than a larger number. The danger from fire, due frequently to carelessness and lack of attention, is considerable in cheap brooders and hovers, while there is some risk in the best grades, although proper care will reduce this to a minimum. Individual hovers in

colony houses or several in one large house are giving quite general satisfaction on small poultry farms, while the pipe system of brooding is commonly used in large commercial poultry plants and where extensive winter brooding is done. When a lamp is used as the source of heat, care should be taken to keep the wick and burner properly cleaned. Brooder lamps and stoves should be inspected several times a day. Do not fill the brooder lamp quite full of oil, as the heat from the lighted wick will expand the oil in the bowl and may cause it to overflow and catch fire.

Gasoline brooders, brooder stoves burning engine-distillate oil, and a separate individual hover heated by a coal fire are coming into more general use, each with a capacity varying from 200 to 1,500 chickens. These large individual brooders are used in colony houses, and when the chickens are weaned the colony house is used as a growing coop, which requires a smaller investment than the long, piped brooder house, and allows one to rear the chicks on range to good advantage. Brooder stoves with a capacity of from 500 to 1,500 chickens, heated by distillate oil, are used quite extensively in some sections of the country. These stoves are usually seen in houses which are about 18 feet square, but are occasionally found in long brooder houses. Most of them are equipped with a wafer regulator that controls the flow of oil which is fed automatically from a tank or barrel outside the house, or several stoves may be connected with the same supply tank. This system provides good ventilation, sufficient heat to keep the chickens from crowding, and requires a minimum of care.

Until one has had considerable experience it is best not to brood over 1,000 chickens in one flock, and a much smaller number would probably do better.

Individual hovers with a capacity of from 200 to 1,000 chickens have recently been placed on the market and appear to be giving satisfaction. Each hover is heated by a separate self-feeding coal stove which is adapted for use in a colony brooder house. The value of this brooder would appear to depend greatly on the efficiency of the heater and the time required to care for the stove.

HOT-WATER PIPE BROODERS.

This system consists of long brooder houses heated with hot water, coal being used for fuel almost exclusively. Many of the latest mammoth brooders are giving good success, and in these cases the labor of brooding a large number of chickens is less than where small individual brooders or hovers are used. These brooders are suitable for large poultry farms or for farms where most of the chickens are raised during the winter and early spring.

METHOD OF HEATING.

Brooders are heated either by overhead or bottom heat or by a combination of these two methods. Too much bottom heat does not give good results, while either the overhead or the combination methods are used successfully. Many pipe systems have a hover or cover over a section of the pipes in each pen, while others are used without them, and each appears to give good results with different operators. A piece of wool felt or cotton flannel is often used for this purpose. Gas and electricity are also used for heating brooders and hovers with good success, and where available they supply one of the steadiest and most convenient sources of heat. A brooder built along the style of the oil brooder stoves with gas or electricity as the source of heat should prove very satisfactory. Heaters for the mammoth brooders or hot-water pipe systems are usually equipped with automatic regulators, which are operated either by expansion of water or electric contact. Both types of regulators have given good satisfaction. A reliable regulator is very essential to success with any of these systems.

FIRELESS BROODERS.

Cold or fireless brooders are used in a small way by many people with success, and can be either purchased or built. As their construction is very simple, many people prefer to build rather than to buy them. The body heat of the chickens is the source of warmth in this system, which requires that several chickens be placed in a small receptacle to generate and retain the heat. Small fireless hovers with adjustable quilts or covers are used in both indoor and outdoor brooders and in colony houses. A box 18 inches square and 8 inches deep makes a good hover of this type. The number and position of the quilts used over the chickens in this box are regulated according to the weather and the number of the chickens in the brooder. In very cold weather the quilts should sag so as to rest on the backs of the newly hatched chickens and there should be little or no empty space in the hover, while in warmer weather or with older chickens the quilts or covers are raised or part of them removed. From 12 to 40 chicks are usually placed in a fireless brooder, 25 being the average number, while small lots do better than larger ones under this method. The litter in these brooders must be changed frequently, and the chickens must be watched carefully and closely to see that they are comfortable and do not sweat. Fireless brooders may be used in connection with heated brooders, using the latter for 7 to 10 days and reducing the heat, which should be governed by the season of the year and outdoor temperatures, before transferring the chickens to the fireless brooder. When first placed in the

fireless brooders the chickens may have to be put under the hovers frequently, until they learn where to get warm. Good results are also obtained with these brooders when used in a heated room.

CORRECT TEMPERATURES FOR BROODING.

The best temperature at which to keep a brooder or hover depends upon the position of the thermometer, the style of the hover, the age of the chickens, and the weather conditions. Aim to keep the chickens comfortable. As the operator learns by the actions of the chickens the amount of heat they require, he can discard the thermometer if he desires. When too cold they will crowd together and try to get nearer the heat. If it is found in the morning that the droppings are well scattered under the hover it is an indication that the chickens have had enough heat. If the chickens are comfortable at night they will be spread out under the hover with the heads of some protruding from under the hover cloth. Too much heat will cause them to pant and gasp and sit around with their mouths open.

It is impossible to state for each case at what temperature the brooders should be kept to raise young chickens; however, it will run from 90° up to 100° in some cases, as some broods of chickens seem to require more heat than others, an average being 93° to 95° for the first week or 10 days, when the temperature is gradually reduced to 85° for the following 10 days, and then lowered to 70° or 75° for as long as the chickens need heat. This depends somewhat on the season of the year and the number of the chickens, as it can be readily seen that the heat generated by 50 chickens would raise the temperature under the hover to a higher degree than the heat given off by a lesser number, consequently the amount of heat furnished by the lamp or stove will have to be regulated accordingly. As the chickens grow larger and need less heat, the lamps may be used only at night, and later only on cold nights. The heat is usually cut off at the end of 4 or 5 weeks in March or April in the vicinity of Washington, D. C., while winter chickens have heat for 8 or 10 weeks, or until they are well feathered. Care should be taken to prevent chilling or overheating the chickens, which weakens them and may result in bowel trouble.

Chickens need a cool place for scratching and exercising in addition to heat. Indoor brooders and hovers can be used successfully in unheated brooder houses except during the coldest weather in most sections of the country. Outdoor brooders usually have a cool compartment for exercising, where the chickens are fed in cold, stormy weather. If winter chickens are being raised, it is advisable to heat the brooder house to a temperature of 60° to 70°, regardless of the temperature of the hover, which often requires placing brooder pipes

around the outside walls of the brooder house. The need of this heat depends entirely upon the brooding system and the weather conditions; but it is absolutely necessary that the heat be kept at the desired temperature under the hover. Brooders and hovers should have from one-half to 2 inches of sand, dry dirt, cut clover, or chaff spread over the floor and in the brooder-house pen. The hovers should be cleaned frequently, as cleanliness is very essential in raising chickens successfully.

When chickens are first put into the brooder they should be confined under or around the hover by placing a board or wire frame a few inches outside (this would not apply to the small outdoor colony brooders). The fence or guard should be moved gradually farther away from the hover and discarded entirely when the chickens are 3 or 4 days old or when they have learned to return to the source of heat. Young chickens should be closely watched to see that they do not huddle together or get chilled. They should be allowed to run on the ground whenever the weather is favorable, as they do much better than when kept continuously on cement or board floors. Weak chickens should usually be killed as soon as noticed, as they rarely make good stock, while they may become carriers of disease. Brooders should be disinfected at least once a year, and more frequently if the chickens brooded in them have had any disease.

FEEDING YOUNG CHICKENS.

Young chickens should be fed from three to five times daily, depending upon one's experience in feeding. Undoubtedly chickens can be grown faster by feeding five times daily than by feeding three times daily, but it should be borne in mind that more harm can be done to the young chickens by overfeeding than by underfeeding, and at no time should they be fed more than barely to satisfy their appetites and to keep them exercising, except at the evening or last meal, when they should be given all they will eat. Greater care must be exercised not to overfeed young chicks that are confined than those that have free range, as leg weakness is apt to result in those confined.

The young chicks may be fed any time after they are 36 to 48 hours old, whether they are with a hen or in a brooder. The first feed may contain either hard-boiled eggs, johnnycake, stale bread, pinhead oatmeal, or rolled oats, which feeds or combinations may be used with good results. Mashies mixed with milk are of considerable value in giving the chickens a good start in life, but the mixtures should be fed in a crumbly mass and not in a sloppy condition. After the chickens are two months old they may be fed four times daily, and after three months old three times daily, with good results. Johnny-

cake composed of the following ingredients in the proportions named is a very good feed for young chicks: One dozen infertile eggs or 1 pound of sifted beef scrap to 10 pounds of corn meal; add enough milk to make a pasty mash, and 1 tablespoonful of baking soda. Dry bread crumbs may be mixed with hard-boiled eggs, making about one-fourth of the mixture eggs, or rolled oats may be used in place of the bread crumbs. Feed the bread crumbs, rolled oats, or johnnycake mixtures five times daily for the first week, then gradually substitute for one or two feeds of the mixture finely cracked grains of equal parts by weight of cracked wheat, finely cracked corn, and pinhead oatmeal or hulled oats, to which about 5 per cent of



FIG. 10.—Frame covered with wire netting to protect feed of young chicks from the older fowls.

cracked peas or broken rice and 2 per cent of charcoal, millet or rape seed may be added. A commercial chick feed may be substituted if desired. The above ration can be fed until the chicks are two weeks old, when they should be placed on grain and a dry or wet mash mixture.

After the chicks are 10 days old a good growing mash, composed of 2 parts by weight of bran, 2 parts middlings, 1 part cornmeal, 1 part low-grade wheat flour or red-dog flour, and 10 per cent sifted beef scrap, may be placed in a hopper and left before them at all times. The mash may be fed either wet or dry; if wet, only enough moisture (either milk or water) should be added to make the feed

crumbly, but in no sense sloppy. When this growing mash or mixture is not used a hopper containing bran should be accessible to the chickens at all times.

When one has only a few chickens it is less trouble to purchase the prepared chick feeds, but where a considerable number are reared it is sometimes cheaper to buy the finely cracked grains and mix them together. Many chick feeds contain a large quantity of grit and may contain grains of poor quality, so that they should be carefully examined and the quality guaranteed before they are purchased.

As soon as the chickens will eat the whole wheat, cracked corn, and other grains, the small-sized chick feed can be eliminated. In addition to the above feeds the chickens' growth can be hastened if they are given sour milk, skim milk, or buttermilk to drink. Growing chickens kept on a good range may be given all their feed in a hopper, mixing 2 parts by weight of cracked corn with 1 part of wheat, or equal parts of cracked corn, wheat, and oats in one hopper and the dry mash for chickens in another. The beef scrap may be left out of the dry mash and fed in a separate hopper, so that the chickens can eat all of this feed they desire. If the beef scrap is to be fed separately it is advisable to wait until the chicks are 10 days old, although many poultrymen put the beef scrap before the young chickens at the start without bad results. Chickens confined to small yards should always be supplied with green feed, such as lettuce, sprouted oats, alfalfa, or clover, but the best place to raise chickens successfully is on a good range where no extra green feed is required. Fine charcoal, grit, and oyster shell should be kept before the chickens at all times, and cracked or ground bone may be fed where the chickens are kept in small bare yards, but the latter feed is not necessary for chickens that have a good range.