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How to Raise the Chicks

Brooding, Feeding, and Management Problems; Baby Chick Troubles and Their Control.

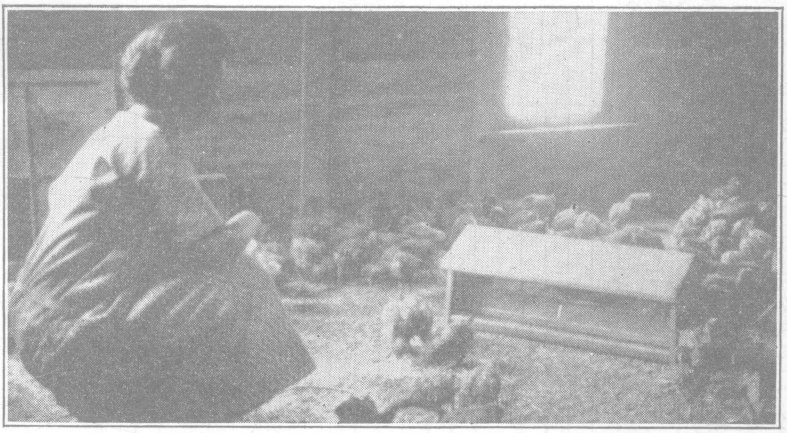

Fig. 1.—It pays to give the chicks careful attention when young.

By

G. S. VICKERS

Poultry Specialist, The Ohio State University

The Ohio State University, Cooperating with the United States Department of Agriculture, Agricultural College Extension Service, H. C. Ramsower, Director, Columbus, Ohio.
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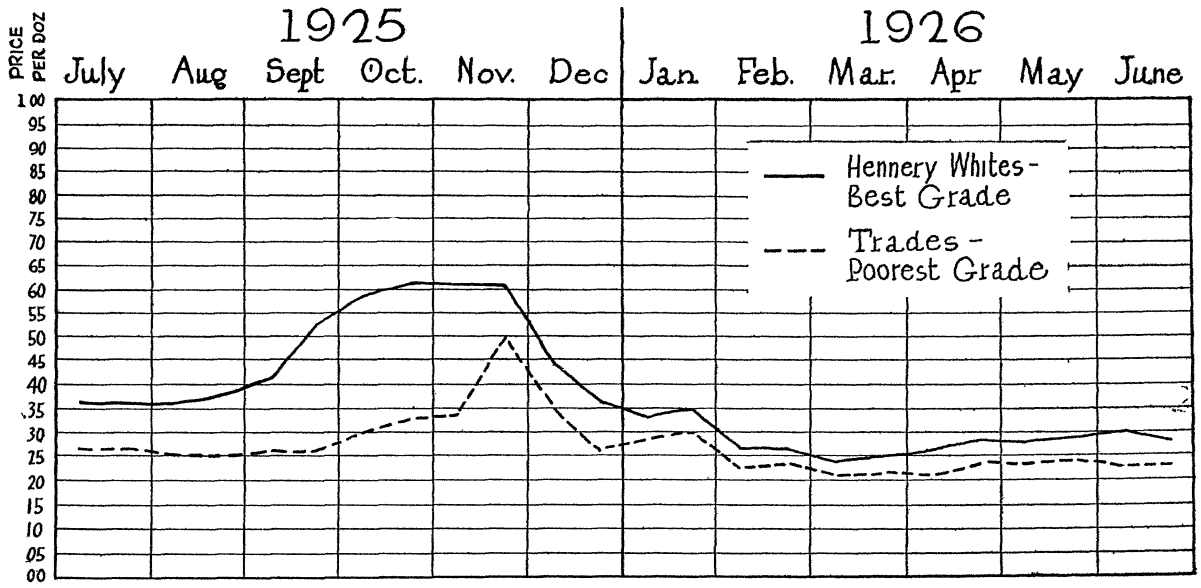

Fig. 2.—Early hatched pullets produce eggs that hit the high market (Chart shows the Ohio Poultry Producers' prices in 15-day pools.)

How to Raise the Chicks

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PROPER brooding of the chicks is a prerequisite to a profitable poultry business. It has been definitely proved that chicks improperly brooded never produce as many eggs and never are as vigorous and healthy as the same quality of chicks properly brooded. Poultrymen cannot safely depend on buying pullets of good quality every fall to replenish their flocks and, therefore, should be able to rear them successfully. It behooves the poultryman to follow a good system of brooding and rearing if he expects to get the maximum results from his mature birds. If optimum results are to be obtained during the brooding period certain practices should be followed. These practices are known as "The Ohio State System of Rearing Chicks."

The Ohio State System

1. Hatch Early:

Early hatched chicks grow better, fewer of them die, the broilers bring more money because of being sold earlier on a higher market, and the pullets mature in time to lay high priced fall and winter eggs.

It is preferable that no chicks be started after May 15, and certainly not later than June 1. The heavy breeds, such as Rocks, Reds, and Wyandottes, should be hatched in March and April; the light breeds, such as Leghorns and Anconas, in late March, throughout April, and the first half of May, if the best results from the mature stock are to be expected in egg production.

All chicks that are to be brooded together should be hatched or secured at the same time, because chicks of different ages never do so well together. Getting all of the chicks at the same time reduces the labor and gets the more tedious part of the brooding over with at one time.

Broiler Chicks.—Each year more real early chicks are being reared to be sold as Easter broilers. The broiler market usually reaches the peak at Easter time, and this necessitates getting the chicks in January if the highest price is to be obtained. These chicks must be reared indoors almost entirely, but with our present

knowledge of feeding this problem is easily solved. The graph on page 11 will give some idea as to when chicks must be secured in order to get the broilers ready for the high markets. Larger broilers are being demanded more and more for the early trade, and most people will need to figure on from 9 to 12 weeks to get the majority of the broilers to marketable size. Later in the season, when larger broilers are demanded, a longer growing period is required.

2. Prepare the Brooder House and Move It to Clean Ground:

The brooding quarters should be thoroughly scrubbed and sprayed with some good disinfectant, or whitewashed. This removes all filth and dirt, and destroys disease germs, lice, and mites. The brooder stove should be overhauled, cleaned, and started a day or so before the chicks are put in, to make sure that it is in good running order.

The floor may be covered with from ½ to 1 inch of coarse sand. On top of this sand some litter of finely cut straw, alfalfa, or clover leaves should be placed. Many omit the sand, using the litter only. Care should be taken that the litter is not moldy, or serious losses will result.

The treatment of baby chick diseases is not satisfactory nor successful, in most cases. Prevention of disease, rather than cure, should be the aim. For this reason the brooder house should be moved to clean ground where there is a good sod of clover, alfalfa, or bluegrass, and where chickens were not raised the previous year. If this is impossible, the bare spots should be limed, turned over, and sowed to some crop. The question of disease-free and worm-free ground on which to rear young stock is one of the most important problems the poultryman has to meet.

Where real early chicks are to be raised that will be indoors most of the time, it is not necessary to move the brooder house to clean ground until birds are ready to go outdoors, although there is always the possibility of carrying disease in the houses if they are on contaminated soil. A good plan is to start the chicks in clean and disease-free environment and keep them in such environment.

3. Provide Sufficient Brooder-house Space and Good Heating Device:

Overcrowding is responsible for many losses in the form of crowding, toe picking, tail picking, etc. The usual rule is to provide at least 1 square foot of floor space for each 4 chicks. This means that a 10- by 12-foot house will accommodate about 480 to 500 chicks; if the number is restricted to 400, however, the chicks

will develop better. For 500 chicks a 12- by 12-foot or a 12- by 14-foot house would be more suitable.

Where considerable early brooding is done, and the chicks cannot be gotten out on the ground, some people provide one room for the stove and another room, usually called a cool room, for the chicks to run in during the day. Where long brooder houses are used the same amount of space is needed.

A stove of sufficient size comfortably to handle the number of chicks being brooded should be provided. Most stoves are overrated as to capacity, and consequently in buying new stoves it is advisable to get the larger sizes. This is especially necessary when

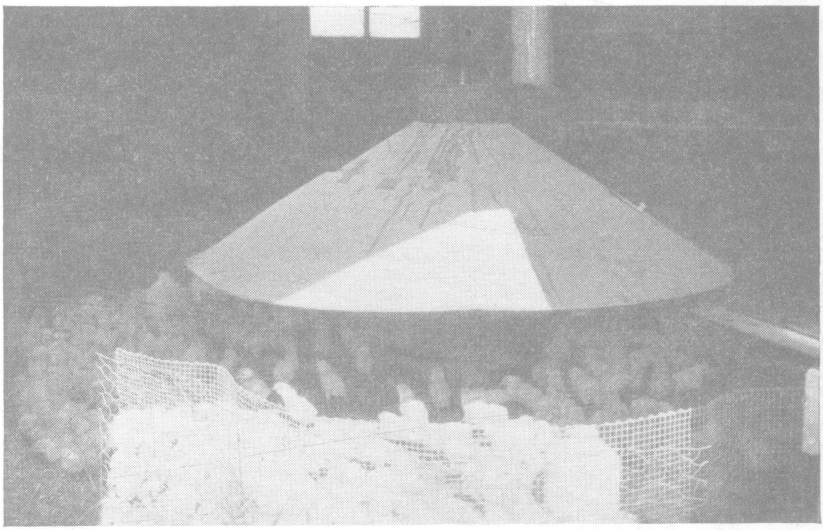

Fig. 3.—Wire netting will keep the chicks near the source of heat.

early brooding is done, when the weather is very cold and the nights are long. The larger sizes carry more fuel and hold fires better through the night in the case of coal stoves.

If oil stoves are to be used for early brooding, be absolutely certain that you get one that you know will generate sufficient heat to prevent chicks from chilling during zero weather or colder. A very large percent of the oil stoves will not do this in the ordinary brooder houses, hence the necessity for caution when buying.

4. Do Not Feed Chicks Too Soon and Be Careful in Management:

It is safer to give nothing to eat or drink for at least 36 to 48 hours after the hatch is completed. Many people prefer to wait 72 hours. If the chicks are hatched at home, it is a good plan to

leave them in the incubator until time to feed. If chicks are purchased it is all right to leave them in the chick boxes until feeding time. Care should be taken to see that they are not set next to a stove or radiator where they will overheat and smother. Neither should they be set in a draft where they will chill.

In removing the chicks to the brooder house see that they do not get chilled. When the chicks are put in the house the temperature should be about 100 degrees Fahrenheit, 1 foot from the stove, and about 2 inches above the floor. The corners should be filled with wire or straw or otherwise blocked or rounded off to prevent crowding in these corners. If the temperature is high enough close to the stove and the house is of sufficient size the chicks will find the temperature most suited to them.

If the weather is cold and the winds strong, trouble may be experienced in keeping the chicks warm unless they are confined in a ½-inch-mesh wire netting enclosure arranged about 2 or 3 feet around the outside of the hover, and thereby confined to the warmest place in the house. Roofing paper is also used to some extent. Care must be taken to see that this enclosure is removed or enlarged if the weather moderates and it becomes too hot in the enclosure.

The temperature of the house should be regulated according to the actions of the chicks. Remember the chicks are on the floor and the temperature must be right on the floor and not 5 feet above the floor. If it is warm enough at all times close to the stove and there is room for them to get away when it is too hot there is no need for worry. The chicks will find the places of proper temperature, except in cases of crowding, which should be prevented.

Ordinarily, the temperature can be reduced about 5 degrees a week, and after 8 or 9 weeks no artificial heat will be needed except during cold nights. This rule does not apply to early broiler chicks, which will probably need heat until they are sold.

5. Feed a Complete, Well Balanced, Wholesome Ration—The Ohio Ration:

We have learned from experience and by experiment that chicks must have a well balanced and complete ration if satisfactory growth and the best results from the mature stock are to be secured. This means that in addition to the proper amounts of carbohydrates, fats, and proteins, a complete ration must contain the proper amounts of minerals and vitamins.

Vast numbers of chicks die, or are permanently injured, every year in Ohio because of faulty nutrition. This is particularly true

when chicks are brooded early and must be confined indoors. A pullet once stunted, because of improper feed, will never produce as well as she might if properly fed. Since poultry profits depend largely on the egg production, the importance of proper feeding cannot be over-emphasized.

The Ohio Ration and Instructions for Feeding

Scratch Grain

FIRST SIX WEEKS

Fine cracked corn	200 lbs.
Cracked wheat	100 lbs.
Pinhead or rolled oats	100 lbs.

SIX WEEKS TO MATURITY

Cracked yellow corn	300 lbs.
Whole wheat	100 lbs.

Pearl Grit or Fine Oyster Shells

Should be available in hoppers at all times.

Liquid Milk

Available at all times. Nothing but milk if sufficient quantities are available.

Green Feed

Liberal amounts every day.

Mash

FIRST WEEK

Bran or standard middlings.

SECOND WEEK TO MATURITY

Yellow cornmeal	200 lbs.
Bran	100 lbs.
Standard middlings	100 lbs.
Granulated bone	25 lbs.
Salt	5 lbs.

When all milk and no water is given to drink, use no meat scraps.

When water and milk are both given, meat scraps or good tankage, 50 lbs.

When no milk is given, meat scraps or good tankage..... 100 lbs.

When powdered milk or semi-solid is used, use in the proportions of:

Powdered milk (or semi-solid)	25 lbs.
Meat scraps or good tankage	75 lbs.

Scratch Grain.—For the first few days the grain should be fed four or five times daily. After the first few days the number of feedings of grain can be reduced. Many people mix the grain and mash in equal parts and hopper-feed them together. As soon as the chicks are on range the grain as well as the mash can be hopper-fed (see Fig 4). If the grain is not hopper-fed after the first few weeks it should be fed twice daily.

Mash.—Bran or middlings should be available during the first week at all times in shallow pans or hoppers. If the chicks have been shipped a long distance or have been held an unusually long time before feeding it may be advisable the first day to see that they do not overeat. After the first day or so there is little danger from this trouble. After the first week the mash, as given above, should be available at all times. The change should be made gradually. Always be sure that there is plenty of hopper space so that all the birds get an opportunity to eat all they desire. Unless there is plenty of hopper space there are apt to be more runts.

Cod Liver Oil in the Mash.—Where the chicks must be confined over 2 weeks indoors, cod liver oil should be added to the mash. To each 100 pounds of feed add 1 quart of cod liver oil. Mix the oil in a small amount of feed and then mix this small amount with the larger amount which is to be fed. It is always safer to use a better grade of oil unless the cost is prohibitive. The cost of the better grades of oil usually is only slightly higher. As soon as the chicks can be outdoors in the sunshine the cod liver oil can be discontinued.

Where early broiler chicks are reared, cod liver oil should be fed after the first week until 2 weeks before the broilers are marketed, when it should be discontinued to prevent flavoring the meat. Purdue University found that the flavor was not discernible after 2 weeks' feeding without the oil.

Cod liver oil is fed mainly to prevent leg weakness, but may help to prevent other nutritional disturbances. Where infertile or 7-day dead germ eggs from the incubator are available they will take the place of the cod liver oil. In order to prevent any possibility of disease transmission to the chicks it is safer to boil the eggs before feeding. They can then be fed whole or mixed in the mash. At first about 1 egg is needed for each 25 or 30 chicks. As they get larger more egg is needed and the amount should be increased accordingly.

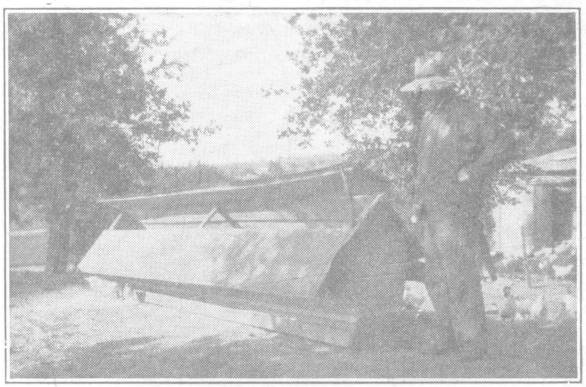

Fig. 4.—Hopper feeding saves time and labor and is a satisfactory and economical system of feeding.

Milk.—Practical poultrymen and investigators are agreed that milk is one of the necessary constituents of a ration if the best results are to be obtained. Experiments have shown that milk protein is the best protein yet discovered. Milk not only results in better growth but it reduces the mortality. It should be fed at least for the first 8 weeks, or until the broilers are sold, and it is preferable that it be fed all summer.

Skimmilk and buttermilk are equally good. They are the forms available to most farmers, and where available are by far the cheapest forms of milk. If sufficient milk is available, nothing

else should be given to drink (see Instructions for Feeding, page 7). Milk should be the first thing that the chicks receive when put in the brooder. Milk is a safe feed in that it is hardly possible to feed too much of it when given in liquid form. Most people prefer to feed the milk sour, but equally good results can be secured with sweet milk. During warm weather the milk becomes sour, anyhow, and it is probably better to feed it sour during the summer.

When skimmilk or buttermilk is not available, some semisolid buttermilk should be given, or some powdered milk should be used in the mash (see Instructions on Feeding, page 7). When semisolid is fed, the most efficient method is to reduce the meat scraps

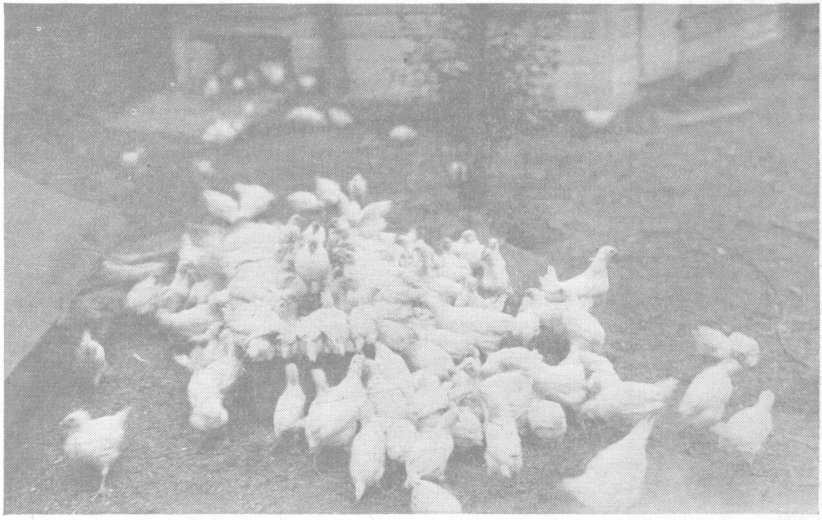

Fig. 5.—Milk "cafeteria" on range.

in the mash. When semisolid is mixed with water, use one part of the semisolid to five or six parts of water.

Green Feed.—An abundance of green feed should be given at all times. It contains the vitamins which are necessary to secure the best growth, it helps to keep the digestive system in good order, and is an important factor in the prevention of nutritional troubles such as canker, colds, and nutritional roup.

Clover, alfalfa, bluegrass, dandelions, rape, lawn clippings, etc., make excellent green feeds. Of the root crops, carrots and yellow beets seem to be best from a vitamin standpoint. Where succulent green feeds are not available the leaves of clover, alfalfa, or soybean hay should be fed.

As soon as the chicks can be outdoors, they should have a good range of bluegrass, clover, or alfalfa (see Fig. 7). Nothing aids more in developing strong, vigorous pullets than a good range free from disease.

The All-mash Method of Feeding

The Ohio Experiment Station and some other stations now recommend the feeding of chicks on an all-mash diet. In doing this the grain part of the ration is ground and mixed in the mash. The ingredients should be the same as when both grain and mash are fed. If the all-mash method is preferred, take a certain amount of the grain mixture as given, grind it, and mix with it an equal amount of the mash mixture as given, and feed it all in the mash hopper. Leave this mash in hoppers available at all times.

The all-mash formula as recommended by the Ohio Experiment Station is as follows:

Ground yellow corn	70 lbs.
Winter wheat middlings	20 lbs.
Meat scraps (50 per cent protein)	5 lbs.
Raw bone meal (chick size)	4 lbs.
Salt	1 lb.

Skimmilk (sweet or sour) or buttermilk is given to drink instead of water during the first 10 or 12 weeks.

6. Get Chicks Outdoors as Soon as Weather Permits:

Although we have learned how to grow chicks indoors, this method is not nearly so economical, and probably will not result in as strong birds as when they are allowed outdoors on good range. When indoors, expensive additions must be made to the diet to correct for the lack of sunshine. Provided the weather permits, they should be outdoors, for at least part of the day, after the first week or 10 days. Because of bad weather it is often necessary to confine early chicks much longer.

Getting them out in the direct rays of the sun will prevent leg weakness. For the first few days and until they learn to know where the source of heat is they should be confined to a small yard. After they know enough to go indoors to the source of heat they should be allowed free range. While they are still young they should be confined in the mornings until the grass is dried off.

7. Rear Young Stock Away from Old Stock:

The chicks should be moved far enough away from the old birds that they will not mix and range on the same ground. If this is impossible they should be yarded separately. The former

is much more desirable. If running on the same range the old birds may be a source of infection for such diseases as coccidiosis, tuberculosis, cholera, and many others.

One of the most prevalent troubles in young stock is intestinal worm infestation. Comparatively few old flocks are absolutely free from worms. This means that if the old and young range together the young birds are quite apt to become infested. Since worm infestation decreases the vitality of the pullets, and since the treatments never work 100 per cent effectively and nearly always give the birds a setback when administered, the best policy is prevention.

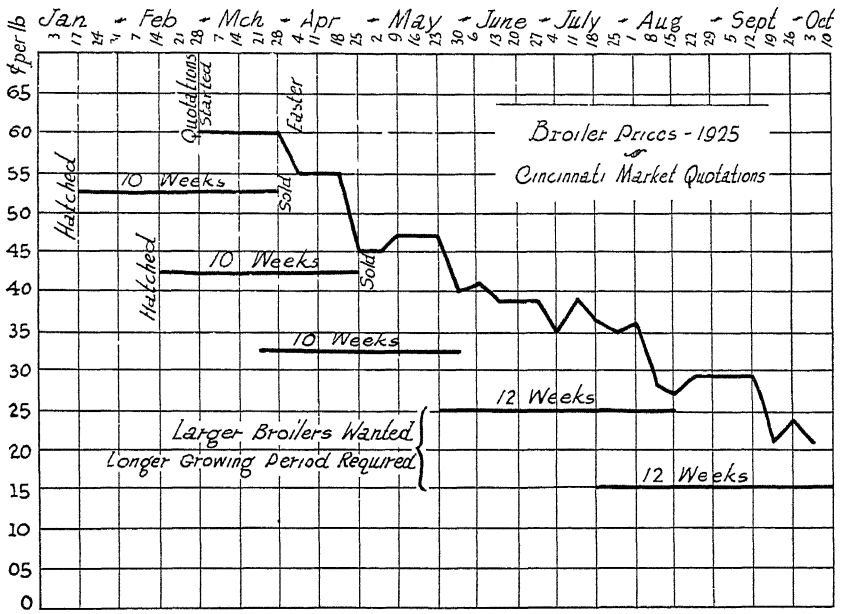

Fig. 6.—The price line in this chart shows when the most money is made on broilers.

When the young and old stock run together the young never get their share of the feed, and consequently there are apt to be more runts. Since the pullet crop will be the money makers the following year, they should be given every opportunity for a normal and healthy development.

8. Separate the Cockerels from the Pullets as Soon as Possible:

The cockerels should be separated from the pullets as soon as possible, and certainly not later than at 8 to 10 weeks of age. Many of the cockerels will be large enough to be sold as broilers at this time. The remainder should be put by themselves and grown to broiler size as soon as possible, because, as will be noted, the broiler prices go down as the season progresses. This separa-

tion comes at a time when the brooding quarters are becoming crowded, anyhow. If a large percentage of the chicks are raised, something must be done to relieve the crowded conditions.

If breeding cockerels are to be saved, about twice as many as will be needed should be selected at this time so as to allow for a second selection in the fall when they are mature. Select the quick developing birds which have bright eyes, broad backs, deep bodies, and relatively short legs. Don't select the slow maturing, dull eyed, long necked, narrow backed, long legged birds for breeders. These few selected breeders may be allowed to run with the pullets.

Fattening the Cockerels.—If the cockerels are to be sold retail, or are to be shipped only a short distance to large markets, they should be milk fattened. Some local buyers prefer not to have the broilers milk fattened which they purchase. Milk fattening results in (a) adding weight faster than on the range, (b) meat of better quality, (c) quicker separation of cockerels and pullets, which means better pullets, and (d) in some places, better prices for the broilers.

Ration No. 1		Ration No. 2	
Yellow cornmeal	7 lbs.	Yellow cornmeal	3 lbs.
Standard middlings	3 lbs.	Ground wheat	1 lb.
Bran	1 lb.	Ground oats	1 lb.

Ration No. 3

Yellow cornmeal	3 lbs.
Standard middlings	1 lb.

With one of the above mixtures use skimmilk or buttermilk to mix a sloppy feed of the consistency of batter, which will pour readily from a bucket. If semi-solid buttermilk is used mix 1½ pounds to a gallon of water and mix as above. If it is desired to fatten the birds in a very short time add 10 percent meat scraps, tankage, or soybean meal to the mash mixture used.

How to Feed.—For the first two days feed only what the birds will consume in 10 minutes twice daily. Remember, success in fattening depends on keeping the birds hungry. Overfeeding the first few days may spoil the appetites and result in losses rather than gains in weight.

After the second day give all the birds will consume in 20 to 30 minutes twice or three times daily. Remove the feed left over after each feeding. Give nothing to drink unless the place where the fattening is done is very warm. There is plenty of liquid in the sloppy feed if mixed to the proper consistency.

If the birds are thin when shut up they should be fattened for

14 to 16 days. If in good flesh when shut up, 7 or 8 days will be sufficient. If the birds are very fat when taken off the range there is little use in trying to fatten them.

Fattening batteries are the most desirable for this work, either commercial or home made being satisfactory. If used, the birds should be kept in a cool place. If batteries are not available any room may be used provided it can be darkened when necessary.

9. Have the Pullets Fat in the Fall:

On most farms pullets constitute more than half of the flock. The profits from these pullets will depend largely on how many

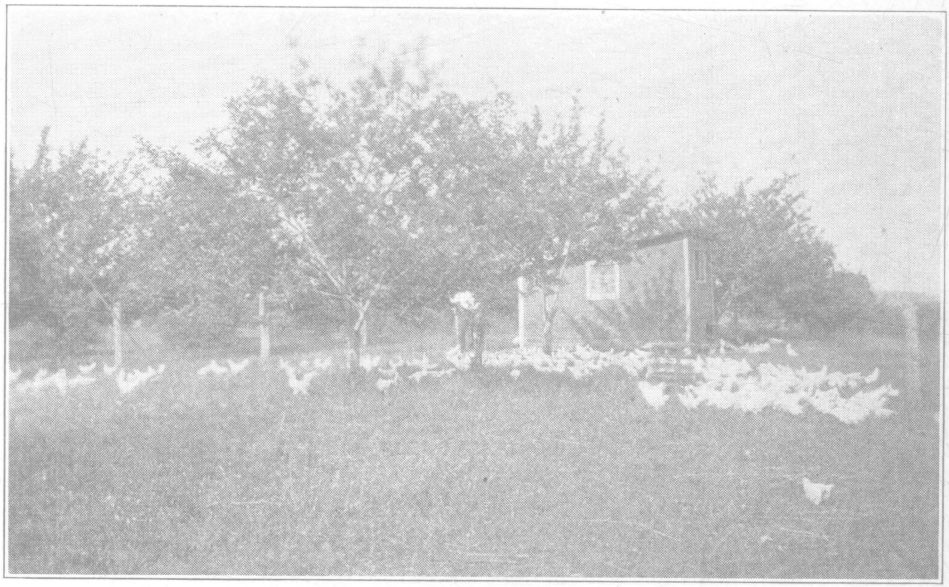

Fig. 7.—A good range and shade for growing stock insures healthy layers.

eggs they produce. The condition they are in at the beginning of the production year will determine in a large measure how many eggs they produce during the year, and particularly during the fall and winter months when eggs are high in price.

Pullets, therefore, should be in the best possible condition when they start laying in the fall. It is practically impossible to get pullets too fat in the fall prior to the laying season. This fat will be taken off during a winter of heavy production. When pullets begin to reach maturity, as indicated by comb development, every effort should be made to get them in good flesh. It may be necessary to feed very heavily on corn for a time in order to put on this body weight. The other feeds should not be removed because corn

is not a complete feed and if nothing is fed but corn some of the undeveloped birds will cease development and will be late in coming in production. However, heavy feeding of corn will cause body weight to be put on, and if other feeds are still available enough will be consumed for proper growth, although in smaller quantities than during the summer.

If the all-mash method has been used it may be necessary and desirable to feed corn for two to four weeks in the fall to get the pullets fat and to the proper weight.

Remember that body weight and fat are simply indications of reserve, and if a heavy season's production is expected the birds must be in condition to stand the long pull of a year of constant production.

10. House the Pullets When They Begin to Lay, and Not Later Than October 1

Moving pullets after they have started to produce nearly always results in a set-back and a cessation of production. In order to prevent this the pullets should be moved to their permanent winter quarters as soon as the first pullet eggs are secured. If they are allowed on the range until later, eggs become higher in price, and a loss in production at this time means decreased profits; instead of discouraging production at this time it should be encouraged. It may be necessary on this basis to house the pullets as early as August if the chicks were hatched early. Regardless of when they were hatched, however, they should be housed when production starts.

All pullets should be housed by October 1, regardless of when they will come in production. After early October there are very often cold rains and winds, and roosting outdoors may result in colds and roup. Pullets not ready to lay by October 1 should be housed and fed to bring them in production as soon as possible. Remember that eggs usually reach the highest price in late October and early November; if pullets are not started by early October they will not produce many of these high-priced eggs.

It is not necessary or desirable to confine the pullets to the house all fall and winter after they are housed. It is wise to confine them for a couple of weeks until they learn to know where they belong, then they may be allowed to range. Many people confine them until noon and allow them to range after noon. If the pullets are reared close to the laying quarters and roost in trees during the summer it may be necessary to confine them a little longer, and clip one wing when they are let out in order to prevent them from going back to the trees at night.

When Should Pullets Come Into Production?

The question of when is the best time for pullets to start laying is always a fit subject for discussion. In the past, we have always hesitated in hatching chicks early, because the pullets came into production early and often molted in the fall when eggs were high in price. Little actual data has been available on this point, and our conclusions were based on what we thought and not on what we knew.

Figures kept on over 1000 White Leghorns over a period of 7 years at the University of Missouri show that the time the first egg is produced, prior to December, has relatively little effect on the number of eggs produced during the production year, from November 1 to October 31, and that there is little difference in the profits for this period. However, after December, the later the pullets come into production the fewer eggs they produce, and the smaller profits they return.

Considering the value of the eggs produced prior to November 1, and the fact that the earlier chick broilers are worth more, it is evident from these figures that pullets coming into production in July, August, and September are not handicapped, and will return just as large profits as pullets coming into production later. From this evidence it would appear that the wisest policy to pursue is to allow pullets to come into production whenever they are of proper size and in good flesh, except that it is desirable that they be in production not later than November.

If pullets are being primed for a contest of some sort, or good records are desired when trapnesting, they should be handled so as to come into production in October and early November.

January Chicks and July Layers.—Quite a few poultrymen, who are properly equipped, are getting early January chicks, marketing the broilers at Easter on the highest broiler market, and keeping the pullets, which come in production during late June and July.

The reason for this is that those who have a good egg outlet during the summer and fall are unable to supply the demand because the old hens are going out of production. These early pullets start in production just at the time when the hens are going out, and furnish a good supply of eggs after July, when prices are advancing. These pullets should be in full production during September and October, when eggs are very high in price. Because of the need for space some sell these pullets at Christmas time and prepare the place for some more January chicks.

Baby Chick Troubles and Their Control

ACCURATE figures on the brooding operations of about 300 farmers and poultrymen in Ohio one spring showed that they lost 20.3 percent of the chicks started. These men were above the average as poultrymen, and undoubtedly the losses on the average farm far exceed the figures given. These losses each year in Ohio cost the farmers and poultrymen large sums of money. Much of this loss might be prevented by proper precautions and care. Some of the causes of these losses will be discussed here.

Weak Chicks

A great many chicks are weak when hatched because of poor care of the breeding stock. *There is no cure for "weak" chicks!* This is a condition that should have been handled prior to the hatching season. The only thing that can be done is to give the weak birds good care and proper feed.

Breeding stock should be selected and properly cared for. The losses in weak chicks will be large and many will live that should be culled out later on.

Diarrhea

There are two kinds of diarrhea, and this fact causes much confusion in the poultry business. The two kinds are: Diarrhea caused by a bacillus and known as bacillary white diarrhea, and ordinary diarrhea, which may arise from a variety of causes.

Bacillary White Diarrhea

This is an infectious disease caused by a microscopic organism known as "Bacterium pullorum." It is transmitted from the infected hen to the chick through the egg. It is also claimed that chicks free from the disease will contract it by running with infected chicks. There is no way of definitely diagnosing the disease except by a laboratory examination.

Control.—There is no cure for the disease. The only control is to have the flock blood-tested and the infected hens removed. The only method in Ohio of getting this done is through the local veterinarians. Disinfectants are often used in the drinking water but with questionable results.

Ordinary Diarrhea

This trouble is very often mistaken for bacillary white diarrhea; it is difficult to distinguish them. This form of diarrhea

may be caused by chilling, overheating, improper feeding, spoiled feed, etc., as described below:

Overheating and Chilling.—If the brooder stove becomes so hot that it is impossible for the chicks to get where it is cool they will become overheated. This results in throwing them off feed, causing digestive troubles, diarrhea, and often a "pasted up" condition. If the fire gets low or goes out and the chicks get chilled, or if the brooder stove is unable to generate sufficient heat in cold weather and the chicks are unable to keep warm, trouble will result. The symptoms will be similar to those in overheating; in addition pneumonia may develop, which is an inflammation and congestion of the lungs. With this condition chicks often gasp for breath and soon die.

Control.—There is very little that can be done for these chicks. A physic should be given such as Epsom salts, at the rate of ¾ to 1 pound to 4 gallons of water or milk, kept before them until noon, when fresh water or milk should be given. Feed and care for them in the best manner.

Improper Feeding and Spoiled Feed.—Feeding too soon in some cases may result in digestive disorders. The yolk is absorbed into the body just before the chick is hatched and serves as food for the first couple of days. The chicks need nothing to eat or drink during this period.

Moldy or musty feed is responsible for a great deal of trouble. It is often difficult to detect this condition in the feed before it is fed. Chicks eating such feed are poisoned quickly, and heavy losses result. They often stagger around, have a severe diarrhea, and show every evidence of having been poisoned.

Control.—When this condition is first noticed the feed should be taken away from them and fresh feed from a new source given. Give Epsom salts for a day or so as described under "Overheating and Chilling." Do not use the old batch of feed again after the chicks have recovered. Many people do this and have another case of poisoning. Don't condemn certain commercial feeds because one sack happened to be moldy. The best possible feed might get moldy under certain conditions.

Crowding

Crowding is responsible for many losses. Once started it easily develops into a habit which is very difficult to break. Use precautions and do not let it get to the "habit" stage.

Crowding is caused by one of the following factors:

1. **Chilling.**—If the brooder house is not warm enough, chicks will naturally huddle together to keep as warm as possible. If it is cold, many may be tramped to death.

2. **Overheating.**—If the chicks are too hot they will naturally crowd in the corners trying to get away from the heat.

3. **Fright.**—Sudden noises, running around the brooder houses, slamming doors, dogs running around, etc., all cause fright and the chicks naturally huddle together for protection. After a few times of being frightened at night the crowding habit is established.

Suggestions for Prevention:

1. Be sure the brooder house is not overcrowded. Be sure that there is sufficient heating capacity to handle the number being brooded together. There is only a limited area around a stove where the chicks will be comfortable. They all want to get in this area, and if the space is not large enough trouble will result

2. Don't shake the fire too much just before going to bed. See that there is a good bed of coals. Don't start a fresh fire at night and then go away and leave it. Burn only good grades of coal or oil. The fuel bills are small items. It is a good idea to have a check in the stove pipe to hold the fire in check in windy weather.

3. If early chicks are reared, it might be desirable, especially if the weather were cold and windy, to confine the chicks near the source of heat by placing a piece of fine mesh wire or roofing paper around the outside of the hover. This should be at least 2 feet from the edge of the hover. Remove this or enlarge the circle as the chicks get older or as the weather moderates.

4. Keep all corners filled or blocked with straw, boards, wire, etc.

5. If the birds crowd at dusk it may be necessary to be on hand until it is dark and they are spread out for the night. In some cases the windows may have to be covered in order to darken the house and in order to prevent shadows on the floor caused by moving branches or trees. Some people leave a 10-watt electric light bulb burning all night to help prevent crowding.

6. Never run suddenly up to the brooder house while the chicks are in and make any sudden noises. Do not allow the children or pets, such as cats and dogs, to unnecessarily frighten the chicks.

7. Late in the spring, after fires have been allowed to go out, it may be necessary to start a fire during cold nights.

8. Get the chicks roosting at the earliest possible moment. After chicks once get to roosting there is little danger from crowding. Place the roosts close to the floor at first and as the chicks get older gradually raise them. It may be necessary to use wire netting under the roosts to prevent crowding in the corners under the roosts.

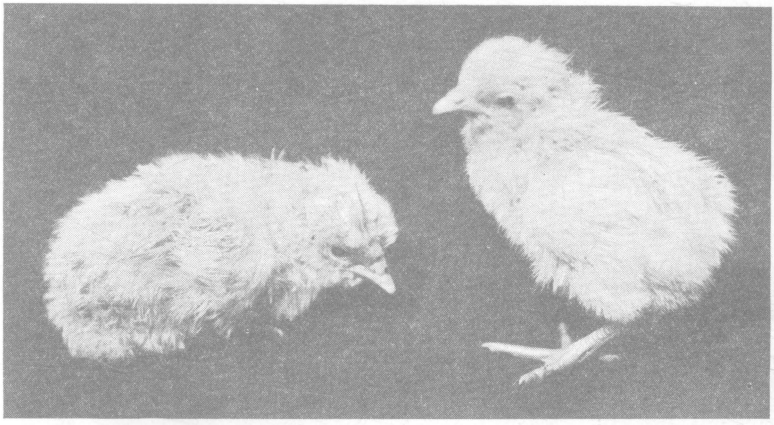

Fig. 8.—Poor care of the breeding stock is mainly responsible for chicks like these.

Leg Weakness

Leg weakness may be caused by a number of different factors acting alone or in combination. Foremost among these is improper diet, resulting in a lack of proper mineral assimilation. This condition is indicated by soft and malformed bones and bone joints, which are unable to support the body of the chick, and hence is called "leg weakness."

Suggestions for Prevention:

The cause of improper mineral assimilation is a lack of direct sunlight shining directly on the body of the chick, or a lack of a substitute for sunshine, which is known as Vitamin D. Sun shining through window glass does not retain sufficient potency to prevent leg weakness. Some of the glass substitutes will allow sun to pass through them and still retain sufficient potency to prevent leg weakness. It is, therefore, advisable to get the chicks

outdoors in the sunshine as quickly as possible in order to prevent this trouble.

When the weather is such that the chicks cannot be allowed out within two weeks, other preventive measures should be taken. The following substitutes can be used:

1. Cod Liver Oil.—To each 100 pounds of mash add 1 quart of cod liver oil. This is 2 percent by weight. As soon as the chicks are outdoors the oil can be discontinued.

2. Eggs.—The feeding of eggs will prevent leg weakness, the yolk being the valuable part. Infertile or 7-day dead germ eggs from the incubator can be used. It is safer to boil these eggs before they are fed in order to kill any germs that might be present. At the start 1 egg should be given per day to each 25 or 30 chicks. As they get older the amount of egg fed should be proportionately increased. These eggs can be chopped up and fed in the mash.

3. Glass Substitute Sun Parlor.—A sun parlor can be made, with the top covered with one of the good glass substitutes. It is doubtful if sufficient sunlight would be obtained through the windows alone, even if the glass substitute were used instead of glass.

Cannibalism

This trouble is largely habit, but occasionally may be due to faulty diet. It occurs more when chicks are confined to the house for long periods or when they have been out and then must be confined. Injuries sometimes cause the trouble; the chicks once get a taste of blood and crave more. Often when standing in the sun the toe nails shine and attract the chicks and they pick the toes. Growing feathers, in which the blood can be seen at the base of the quills, often cause picking. Lack of any form of exercise or of anything else to do may result in this trouble getting started.

Suggestions for Prevention:

The parts most generally picked are the toes, tails, and wings. When chicks once get a taste of fresh blood it is difficult to stop them. Since this trouble is largely habit take the following precautions:

1. Don't crowd the chicks in the brooder house. See that they have sufficient room.
2. Provide a complete ration, so that the trouble will not be started because of improper feed.
3. Keep the chicks busy. Hang up green feed or something for them to pick. If the trouble starts, hang up some fresh meat.

4. Get the chicks outdoors as soon as possible so they can range rather than fight.
5. Separate the picked ones, paint the injured parts with tar, or some other sticky, distasteful material, and preferably keep the injured ones by themselves until recovered.

Coccidiosis

Coccidiosis causes the death of thousands of chicks in Ohio every spring and summer. It occurs mostly between the ages of 2 and 10 weeks. It is caused by the presence of large numbers of minute coccidia in the intestines, which poison the chick. The disease is highly infectious.

Symptoms and Diagnosis.—Microscopic examination is the only positive method of diagnosis. However, infected chicks usually are very thin, emaciated, and droopy. The wings droop or sag, and in many cases the droppings are bloody. On post mortem the caeca, or blind guts, are usually full of hard, white, cheesy material, sometimes containing blood.

Treatment.—The disease can be prevented to a large extent by rearing the chicks on fresh ground each year where there is a good sod. The milk treatment is the most satisfactory, and very good results were obtained by the California Experiment Station with this treatment.

Liquid Milk.—Give nothing to drink but milk, either sweet or sour, skimmilk or buttermilk. Feed no mash. Feed grain twice daily.

Powdered Milk.—Where liquid milk is not available the California Experiment Station recommends a 40 percent dry milk mash as follows:

Powdered skimmilk	40 lbs.
Wheat bran	10 lbs.
Yellow cornmeal	30 lbs.
Ground oats or barley	20 lbs.

Keep this mash available at all times. Feed grain twice daily but in limited quantities so that only half as much grain as mash is given. After indications of the disease have disappeared return to the regular system of feeding.

Sanitation.—Clean the brooder houses daily as long as the trouble is present. Move to fresh yards, but if this is impossible turn the ground over as often as possible.

Sore Eyes

There is one form of eye trouble very similar to roup in mature birds. The eyes become swollen and contain large lumps of white, cheesy material. This trouble is known as nutritional roup and is caused by a lack of vitamin A, which is secured in green feed. To correct the trouble, feed liberally of green feed and yellow corn. Remove the canker and wash the eyes with some good disinfectant.

Another eye trouble occurs, apparently in the form of an epidemic, in which the eyelids become stuck together. No one seems to know the exact cause. It is possible that dusty litter may cause it in some cases. Use clean litter and wash the head and eyes with a 2 percent boric acid solution.

Gapes

Gapes are caused by small worms which attach themselves to the lining of the windpipe. They cause the birds to gasp for breath and eventually cause strangulation by closing the air passages. These parasites are contracted from infested ground.

Prevent the trouble by rearing chicks on ground free from infestation. The worms are sometimes removed by means of a feather but the treatment is not satisfactory.

Intestinal Worms

Worm infestation in Ohio flocks is very common. Intestinal worms prevent a normal development and are the cause of a great many stunted and runty pullets. More trouble is experienced each year.

Symptoms and Diagnosis.—The infested birds become thin and emaciated, and walk with an abnormal and stilted gait. In bad infestations of tape worms the birds appear to have nervous disorders indicated by peculiar twisting of the neck and going down on the legs. Worms may at times be noticed on the dropping boards. The only sure way of diagnosing the trouble is to kill a bird, slit the intestines open from the gizzard to the caeca or blind guts, and if worms are present they can be seen. There are two main types, the round worm and tapeworm.

Round Worms

Large round worms.—From 1½ to 4 inches in length and about as large around as the lead in a pencil. Found in the small intestines.

Small round worms.—About ½ inch in length and as large around as a hair. Found only in the caeca.

Tapeworms

Long tapeworms.—Flat, segmented, whitish or grayish worms, varying in length from ¼ inch to several inches. Found in the small intestines.

Small or nodular tapeworms.—Found imbedded in the walls of the intestines and appearing as nodules. Often necessary to wash the intestines for these to be seen.

Treatment for Roundworms:

Nicotine Sulfate.—Where infestation is heavy, individual treatment is the most satisfactory. Give each bird a nicotine sulfate capsule. Place the capsule as far back in the mouth as possible and make sure it is swallowed. The capsule should be followed down into the crop by running the fingers down the outside of the neck. Trouble may result if the capsules are allowed to dissolve in the mouth. The county agricultural agent can tell you where to get capsules if your local people do not carry them in stock.

Tobacco Dust.—Where infestation is not heavy keep 2 percent tobacco dust in the dry mash off and on all summer. Leave it in for a month and then discontinue for a month, etc.

Iodine.—A new treatment has just been given out by the Michigan State College, East Lansing, Mich., known as the iodine treatment. This can be given in a liquid form.

Treatment for Tapeworms:

Kamala Treatment.—Individual treatment is by far the most satisfactory. The United States Department of Agriculture and the Veterinary Department of the University of Wisconsin both recommend the kamala treatment. Wisconsin recommends that the kamala be given in ½-gram capsules and at the following rate:

Birds weighing ½ to 1 lb.....	½ gram
Birds weighing 1 to 2 lbs.....	1 gram
Birds weighing 2 lbs and over.....	1½ grams

Wisconsin says this treatment can also be given as a flock treatment. First separate the birds according to weight. Compute the amount of kamala that will be needed for the different weight groups according to the following table:

Birds weighing ½ to 1 lb.....	¾ gram
Birds weighing 1 to 3 lbs.....	1 gram
Birds weighing 3 lbs. and over.....	2 grams

Mix the required amount of kamala in a mash and feed after the birds have fasted from 18 to 24 hours. Use only enough mash that will be consumed readily at one feeding. If infestation is bad, the treatment may have to be repeated.

The kamala treatment is almost certain to give the birds a severe setback and this should be taken into consideration when the treatment is given. Kamala can be obtained from your local druggists.

Iodine Treatment.—The iodine treatment recommended for roundworms is said to be very effective for tapeworms and to cause no ill effects.

The dropping boards should be cleared daily during these treatments.

Poisoning

Poisoning is caused by eating spoiled or decayed feed or other material. The symptoms are diarrhea, droopy condition, nervous disorders, and in bad cases, instant death.

Control.—Change the feed immediately. Give Epsom salts at the rate of 1 pound to 4 gallons of water for half a day. Continue this for a few days. Look over the range to see that there are no dead chicks, rats, etc., which they might be eating. Do not give the same feed again which they were getting when they became sick.

Lice

Lice can be prevented by thoroughly cleaning and disinfecting the brooding quarters before chicks are put in. If found on little chicks, grease the head with lard or vaseline. After a few weeks they can be dusted with sodium fluoride.

All pullets should be dusted with sodium fluoride or greased with blue ointment when housed. If dusted, shake the powder in the fluff under the vent; if badly infested, dust on the back, neck, and breast also. If ointment is used smear a piece about the size of the end of the little finger on the skin just below the vent.

Mites

Mites can be prevented by thoroughly disinfecting the brooding quarters before chicks are put in. If found after the chicks are put in the brooding quarters, spray and disinfect often with good coal tar disinfectant.