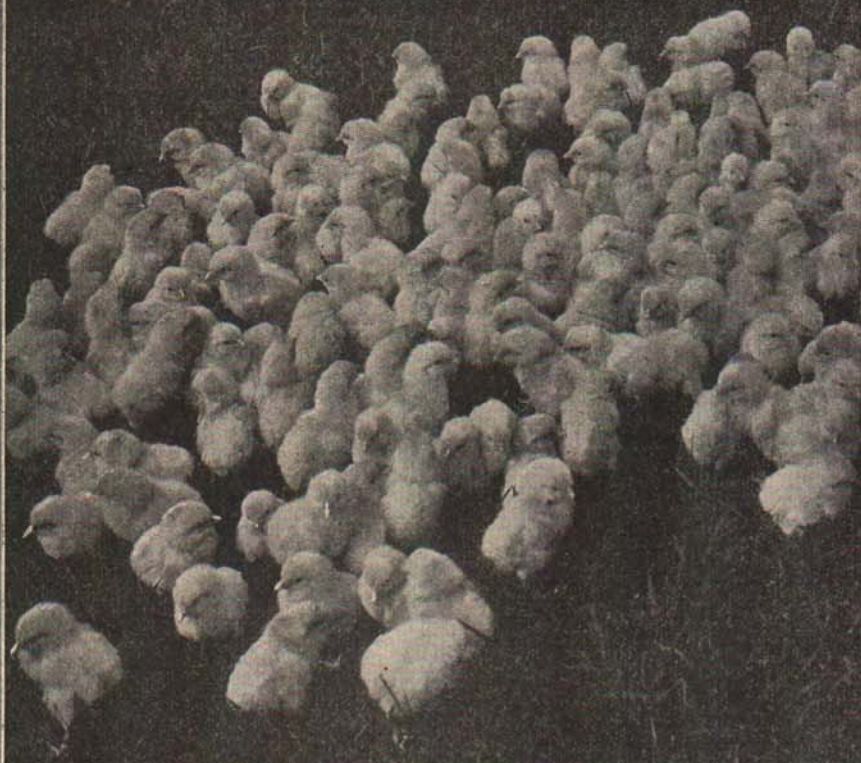
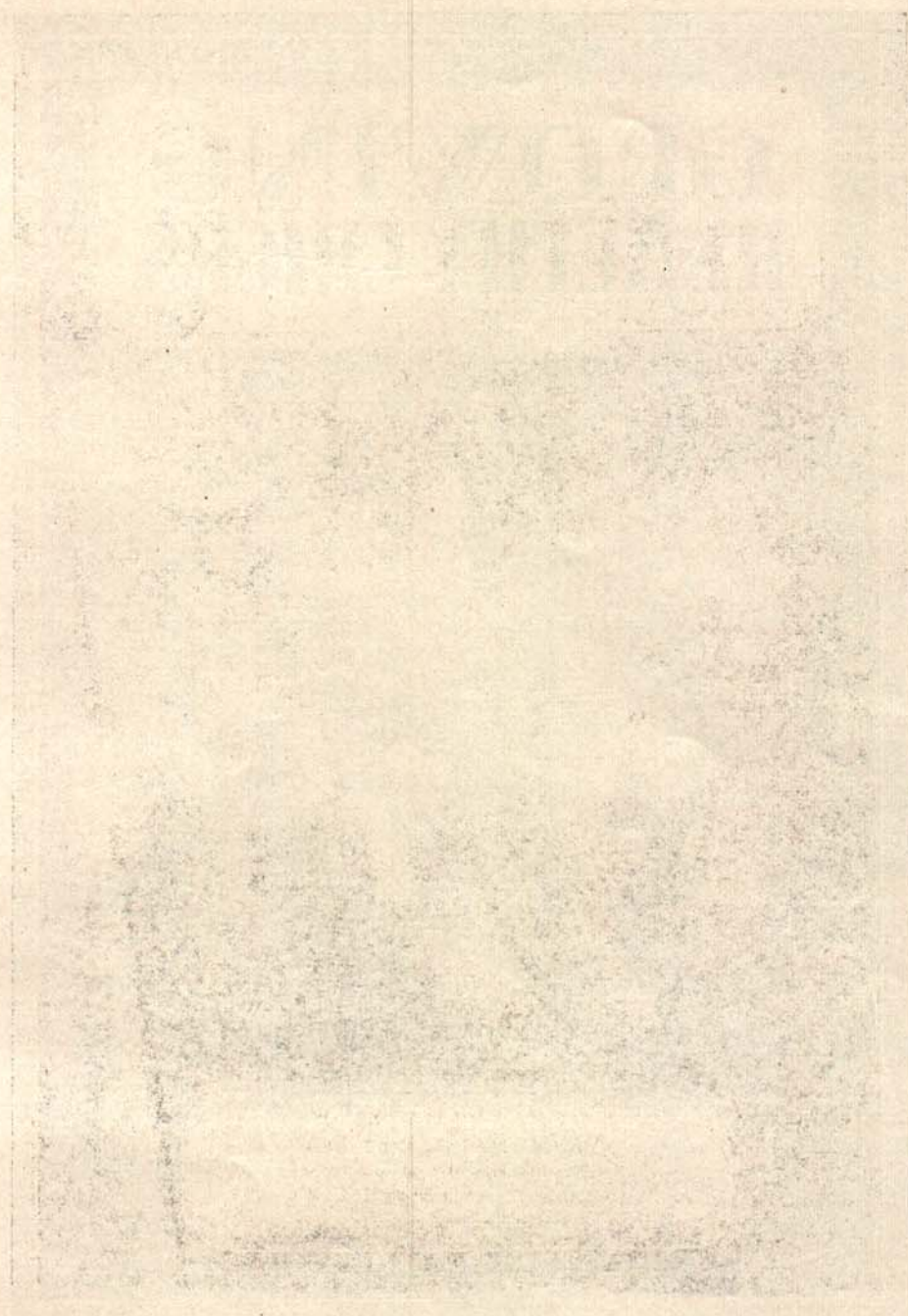


# GROWING HEALTHY CHICKS



MICHIGAN STATE COLLEGE  
Of Agriculture and Applied Science  
EXTENSION DIVISION  
R. J. BALDWIN, Director

Printed and distributed in furtherance of the purposes of cooperative agricultural extension work provided for in the Act of Congress, May 8, 1914, Michigan State College and the U. S. Department of Agriculture cooperating.



## GROWING HEALTHY CHICKS

J. A. HANNAH

There is probably no farm practice that has changed more during the past few years than has the method of brooding chickens. At least 80 per cent of the chickens reared annually in Michigan are now artificially brooded.

Artificial brooding, with the grouping together of large numbers of chickens on limited range, has brought about new management problems. The shipping of chicks, breeding stock, and hatching eggs back and forth across the nation has resulted in the dissemination of poultry diseases to the extent that we now have some poultry diseases on practically every farm. The presence of disease on the farm makes new practices necessary.

During the past few years, a flock of good hens on the average Michigan farm has returned a greater farm profit than most other farm enterprises, when the amount of money invested and the amount of labor required is taken into consideration. Egg prices have continuously remained at a level above the cost of production. For a poultry flock to be profitable, it must be well bred, well fed, well housed, kept free from disease, and the layers must be replaced with well grown pullets.

More poultrymen become discouraged over their inability to raise healthy chickens than from any other cause. The production of excellent pullets requires some information, common sense, and much hard work.

### PREPARATION FOR CHICKS

#### Clean Range

A clean range is required for successful brooding. This range must be one on which no chickens, turkeys, or other poultry have ranged for at least two immediately preceding seasons. Poultry disease organisms live in the soil from one season to the next and it is practically impossible to rid infected soil of these organisms. Plowing, the application of lime or other disinfectants, or cropping and cultivating may kill part of the disease organisms, but time only will kill them all.

A clean range is most important on farms where coccidiosis, range paralysis, pullorum disease, intestinal worms, tuberculosis, or other disease has been present. The organisms which cause these diseases live over in the soil, and diseases are almost certain to infect chicks which are raised on contaminated range. Select a clean range that is well drained and that is growing a good grass sod or alfalfa.

### Clean Brooder House

Disease organisms also frequently live in the brooder houses from one season to the next. It must be remembered that these organisms are microscopic, and millions of them may be harbored in a single crack or under a single bit of dirt.

The brooder house should be moved to a clean range each season and must be so constructed that it can be easily cleaned. The house should be cleaned before moving to the new range, so any refuse from the house is left at the old site. Few people know how to clean a brooder house or poultry building. The word clean has only one meaning and that is 100 per cent clean.

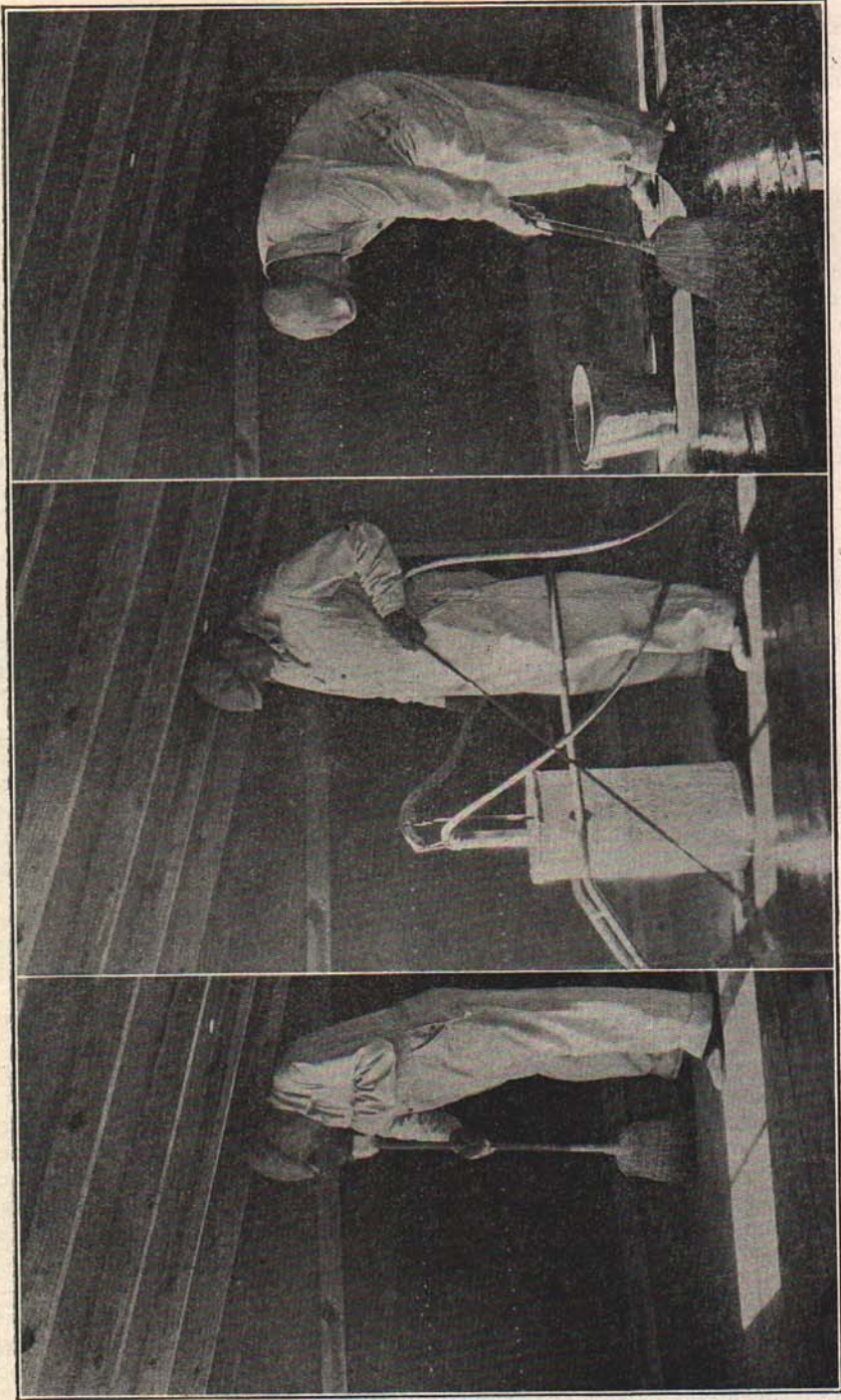
The use of a broom and a little disinfectant does not clean a brooder house. The building must be swept clean; scrubbed, using plenty of



Fig. 1.—Michigan type colony brooder houses in use on good alfalfa range. Plans and Bill of Materials for this type house can be found in Extension Bulletin No. 68.

soap and much water; and thoroughly disinfected with a good disinfectant. Scrubbing is more important than the use of a disinfectant. If the scrubbing is sufficiently thorough, a disinfectant solution may not be necessary. Obtain a disinfectant that will kill all disease organisms. Many of the common commercial disinfectants on the market will not kill coccidial organisms. Iodine suspensoid is one of the most efficient disinfectants obtainable. If properly applied, it will kill all disease organisms present in the brooder house.

When using a disinfectant for any purpose, use it as recommended by the manufacturers. This is most important. Disinfecting solutions used at a greater strength than recommended do not insure a better disinfection. Many disinfectants are most efficient at only one dilution and are less efficient when used at a greater strength than the one recommended.



Steps in cleaning the brooder house.

### **Clean Equipment**

The feeders, mash hoppers, and other equipment used in the brooder house should be cleaned just as thoroughly as the brooder house itself.

## **BROODER STOVES**

Portable brooder houses must necessarily be small, and they are usually one-room buildings. Stoves to be used in one-room houses should be equipped with hovers or canopies. Stoves without hovers work very well in two-room brooder houses but do not prove satisfactory in one-room buildings, except during the season when the chicks can be turned outside at a very early age. It is never desirable to place more than 350 or 400 chicks about one stove. The average portable colony house 10 x 12 or 12 x 14 feet requires a brooder stove with a hover or a canopy 50 to 52 inches in diameter. Plans, bill of materials, and other information on brooder house construction can be found in Bulletin 68.

### **Coal Stoves**

Coal stoves are usually recommended because there is less of a fire hazard associated with them than is the case with oil burners. Select a coal stove that is substantially built, that has a good sized chimney or smoke outlet, and that will hold considerable coal. Many makes of coal burning stoves give satisfactory results.

### **Oil Burning Stoves**

Some makes of oil burning stoves give satisfactory results. In selecting a stove of this type, it must be remembered that there is a greater danger from fire than with coal burners, and every precaution should be taken to minimize the fire hazard. Oil stoves have the advantage over coal burners that, in warm weather, the fire can be turned out in the morning and started again in the evening, using fuel only when heat is necessary. With a coal burner, it is necessary to keep the fire going through the day since it takes several hours to get a coal fire burning properly.

### **Electric Brooders**

Great improvements have been made in types of electric brooders. It is probable that, in a few years, there will be developed electric brooders which will give satisfactory results on the average farm. The electric brooders now developed do not give the best results unless they are used in a well insulated building or with some auxiliary heat. They are rather expensive in operation but are entirely automatic and eliminate some of the worries of chick brooding.

### **Setting Up the Stove**

In setting up the brooder stove, do not be careless about fire precautions. Have an asbestos pad or a sand box underneath the stove. Place the stove so the ashes can be easily removed and so the ash door under the hover can be easily seen.

Regulate the stove to a temperature of approximately 90 degrees at a level of one inch above the floor under the outside rim of the hover. Proper chick brooding requires sufficient heat under the hover and a cool brooding room. More chicks are injured by too much heat than are hurt by too little. Keep the brooder room just as cool as possible with the temperature under the hover warm enough so the chicks can keep warm if they wish to. Ideal conditions require a temperature of 85 to 90 degrees under the outside edge of the hover and a room temperature of not over 70 degrees. These temperatures can gradually be reduced as the chicks get older. It is important that the chicks



Fig. 3.—Proper location of thermometer. A temperature of 90° under edge of hover and a room temperature not to exceed 70° is ideal.

be kept cool and that all feeders and waterers be placed away from the stove so that the chicks are encouraged to stay in the cool part of the brooding room. In brooding chicks, a good rule is to keep them just as cool as possible and yet comfortable. If the young chicks crowd around the stove, the temperature is too low and if they settle down at night way beyond the edge of the canopy, it is probably too high. Watch the chicks.

### CHICKS

According to the 1930 census, 71 per cent of all Michigan chicks in 1929 were purchased from hatcheries. It is probable that this percentage will increase. Better chicks can be purchased from hatcheries than are produced on the average farm. Commercial hatcheries are able to

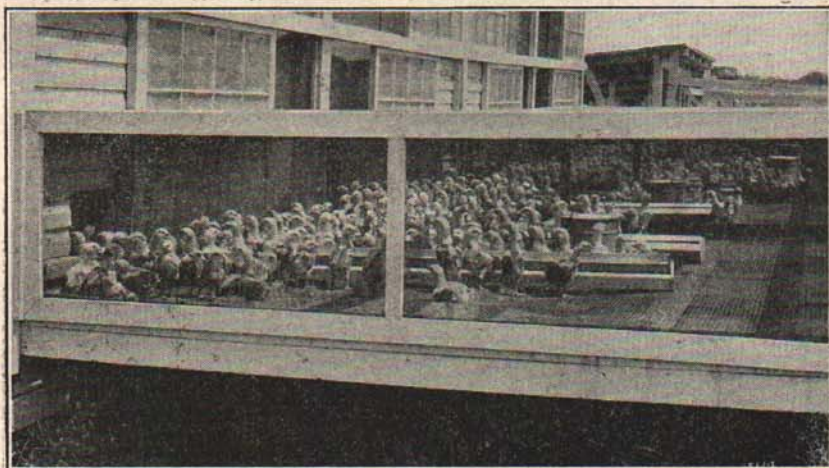


Fig. 4.—Wire sun porches being used in front of permanent brooder houses.

produce good quality chicks through the purchase of good males, proper selection of eggs, proper incubation, etc.

In selecting chicks or in selecting sources of chicks, price should not be the first consideration. If the chicks are to be raised for laying purposes, it must be remembered that ability to lay is an inherited characteristic. A profitable flock must lay 150 or more eggs per bird and it is not impossible for good farm flocks to make average egg records of 200 or more eggs per bird. To make even a satisfactory record, it is necessary that the parent stock be bred for egg production. The great improvement that has taken place in average egg production during the past few years is largely due to improved breeding. High record hens and high record flocks are invariably the progeny of high record parents. Chicks coming from ordinary farm flocks that lack high production characteristics are not likely to lay more eggs than their ancestors laid.



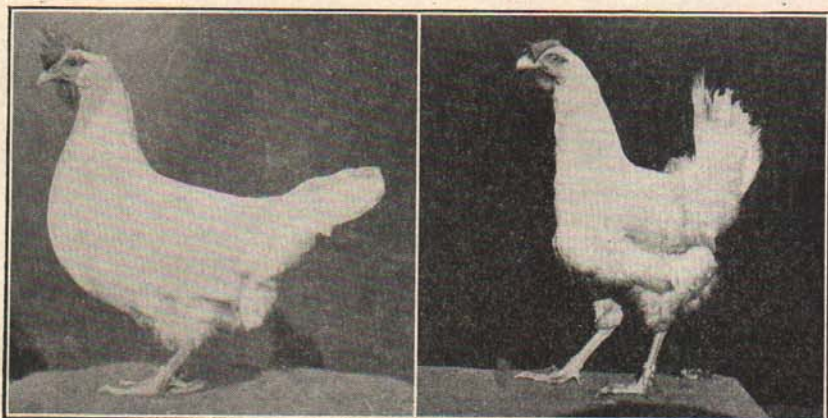


Fig. 5.—Breeding made the difference. The hen at the left laid 294 eggs and the one at the right laid 108 eggs under similar conditions, and management.

The importance of this egg breeding factor cannot be over-emphasized. Profit or loss depends almost entirely upon the egg breeding of the chicks purchased. A difference of only a few cents per chick may mean the difference between profit and loss. The poorly bred chick and the well bred one look alike when they are hatched and they may look much alike when they are matured; but the well bred pullet may lay 200 or more eggs per year and the poorly bred one, with the same care and the same attention, may lay only 100. There may be a difference of 10 dozen or more eggs in the annual production of the two pullets. At an average sale price of 25 cents per dozen, this means a difference of \$2.50 per bird in gross income and the original difference was only a few cents in the original cost of the chicks.

Farmers should remember that hatchery operators are primarily business men and are producing chicks with the idea of making a profit.



Fig. 6.—Brooding equipment on large commercial poultry farm.

Chicks that are sold at cheap prices are invariably cheap chicks. A hatcheryman cannot invest much in breeding males, blood-testing, selection of eggs, and in the other expensive operations that are necessary to produce good chicks and then sell these chicks at a low price. Carefully kept cost records on hatchery production indicate to us that it costs a good hatchery operator at least nine cents or more per chick to produce good quality chicks.

In determining the number of chicks to be purchased or hatched, it is best to figure on starting at least three chicks for every good pullet desired.

Pullorum disease is the only disease of any practical importance that may be contracted by the chick through the egg from which it hatches. Pullorum disease is a new name for bacillary white diarrhea. Continued testing and the removal of carriers of this disease from the laying flock cuts down the likelihood of a serious outbreak in the chicks. In selecting chicks, inquire about the disease history of the flock from which the chicks come, particularly with reference to pullorum disease. Further information on chick disease can be found in Bulletin 53.

### **Broilers**

If chicks are to be raised for broilers, they should be so bred that by nature they will produce good marketable broilers at an early age. Broiler producers usually prefer Barred Rocks, White Rocks, Wyandottes, Rhode Island Reds, or Orpingtons.

When purchasing baby chicks, adequate inquiry should be made not only into the quality of the parentage of the chicks being purchased but some attention should be made to the integrity of the seller. It is unfortunate that there are some dealers in chicks that are not entirely reliable, and annually many thousands of dollars are spent for chicks that are not of the quality they are represented to be. Chicks, hatching eggs, or poultry breeding stock which are Accredited or Certified or which are produced under Record of Performance supervision, are usually dependable. When purchasing from a poultryman who has had his flock, hatchery, and advertising inspected and approved by some recognized unbiased state agency, one has an added assurance of the quality of the stock and of the reliability of the seller.

Chicks that are poorly incubated are difficult to raise; and all chicks, whether hatched at home or purchased, should be closely and rigorously culled before being placed in the brooder house. Deformed, small, and weak chicks should be killed. Poor chicks are a continual liability and they probably will never return a penny of profit if they live.

## **FEED AND FEEDING**

### **Rations**

Commercial poultry feeds, as manufactured and sold by reliable concerns, are dependable. These firms are careful about the quality of the feeds manufactured and sold. If one decides to feed a commercial ration, one sold by some reliable concern should be selected and given a fair trial by using it for a considerable period of time. The business of manufacturing and selling feeds is extremely competitive and competition requires that commercial concerns put out good feeds.

### Open Formula Feeding

Much time and money have been spent by the agricultural experiment stations and by the United States Department of Agriculture in work on poultry rations in an effort to determine simple and satisfactory rations for growing chicks. An all-mash starting ration is desirable. As a result of considerable work at the Michigan Experiment Station and in field tests and demonstrations, the following all-mash chick starting ration, called "Spartan Chick Starter," is recommended for Michigan:

- 36 lbs. yellow corn meal (ground coarsely)
- 20 lbs. bran
- 20 lbs. ground oat groats or ground oatmeal
- 10 lbs. dried milk
- 5 lbs. meatscrap (50% protein)
- 5 lbs. alfalfa leaf meal
- 2 lbs. steamed bonemeal
- 1 lb. salt
- 1 lb. cod liver oil

This mash should be placed before the chicks as soon as they are taken from the boxes or from the incubator. Chicks will not eat too much or too early.

### Feeding for the First Few Weeks

The brooder house floor should be covered with sand, peat litter, straw, alfalfa hay cut in short lengths, or with good clean chaff that is free from mould. Fill water dishes with water or liquid milk and feed hoppers with mash. Mash is kept before the chickens continuously from the first feed until they reach the laying house. For the first days or until the chicks learn to eat, the mash can be fed in shallow pans,

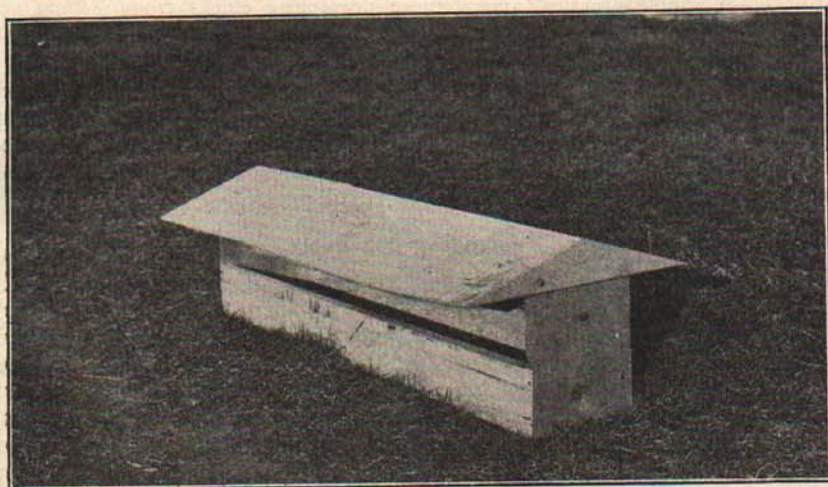


Fig. 7.—A satisfactory home-made outdoor mash hopper.

on newspapers, or in inverted chick box covers. The regular box cover turned bottom side up and lined with paper is a satisfactory feed container the first few days. These covers should be cleaned two or three times each day, relined with paper, and filled with fresh mash.

Most poultrymen make the mistake of not providing an adequate number of hoppers and water dishes for their chicks. Seventy-five to 100 inches of feeding space should be provided for each 100 chicks at the start, and, as they get older, much more space is necessary. Sufficient hopper feeding space should always be available so that practically all of the chicks can eat at one time. Insufficient feeding space contributes to uneven growth as the less vigorous chicks are crowded away from the feeders and do not eat as they should.

### Milk Feeding

Ten per cent of dried milk is included in the Spartan Starting and Growing ration. Where liquid milk is available and is kept before the chicks continuously, the amount of dried milk can be cut down from 10 per cent to 5 per cent of the ration. When liquid milk is being fed,

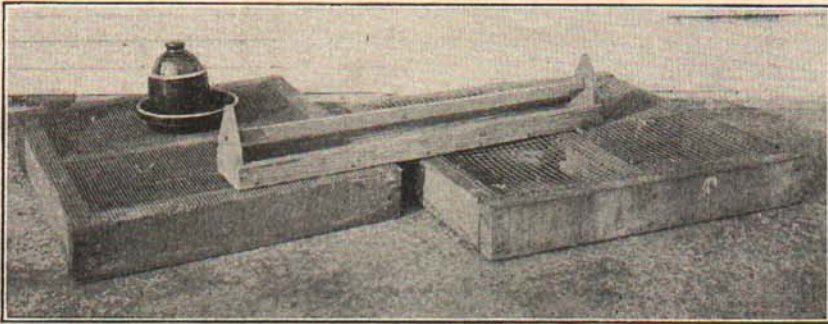


Fig. 8.—A simple practical arrangement preventing chicks from picking up sporulated coccidia that may be found in wet litter about drinking vessels.

every possible effort should be expended to discourage flies. Milk is an excellent feed, fed either sour or sweet or as buttermilk, but the flies that congregate about the milk dishes may be intermediary hosts for tapeworms. The elimination of house flies would prevent a very large percentage of the tapeworm infestations.

### Growing Mash

There are many growing mashes that give satisfactory results. The Spartan Starter may be fed from the first hour to the laying house but the growing mash may be improved by substituting 20 pounds bran in place of 20 pounds flour middlings. If a lower protein feed is desired, a further change may be made by cutting down the dried milk content to 5 pounds and increasing the corn content to 41 pounds. The chicks should be changed from the starter to the grower at about eight weeks of age. Along with the growing mash, scratch grain should be fed. A satisfactory scratch grain consists of 50 pounds cracked yellow corn and 50 pounds wheat.

The idea that chicks should be started fast and then matured slowly may be sound. Results indicate that a ration carrying no more protein than the Spartan Starter may be fed as a growing ration with good results when scratch grain is fed along with it. Results to date indicate that, all things considered, the Spartan Starter fed from the first hour to the laying house, is as satisfactory as any other formula that has been used at Michigan State College. This simplifies the feeding system by utilizing the same feed from the beginning to the end of the growth period. It is probable that, within the next few years, a single mash formula will be developed that will be fed as a starter, growing ration, and laying mash.

#### **Green Feed**

Succulent green feed is desirable. Chicks should be raised on good pasture. Alfalfa, June grass, or other well established grass pastures are very satisfactory. If the chickens are not ranging where they can secure succulent green feed at will, it should be provided for them daily. Cut green alfalfa, lettuce, cabbage, Swiss chard, or other similar green feeds give satisfactory results.

#### **Cod Liver Oil**

It is a good practice to incorporate 1 per cent of cod liver oil in the starting and growing ration. Early in the season, if the chicks are not getting out in the sunshine, they need cod liver oil. Later, if the chicks are getting direct sunshine, they may get along without it but it is relatively inexpensive and 1 per cent of cod liver oil should be used in the starting, growing and laying mash.

#### **Other Formulas**

There are many other feed formulas that will give satisfactory results. Practically every experiment station has its own formula that proves satisfactory. Many poultrymen have variations from these formulas that they prefer for one reason or another. The rations that are included in this bulletin give satisfactory results in Michigan. They have been tried at the Experiment Station at East Lansing and Michigan poultrymen have used these rations with satisfactory results. There is probably no single ration that is perfect. These formulas are believed to be superior to most others and are recommended.

#### **Perches**

It is important that chicks be taught to perch as early as possible. It is desirable to provide low perches as soon as the chicks show any perching inclination. Leghorns will start to perch when two weeks old. Rocks and Reds will usually not take to perches until four to six weeks old. As soon as all chicks have learned to perch at night, the brooder stove can be removed. If the stove is removed before the chicks are perching, they are apt to crowd into the corners and to smother those on the bottom of the pile.

#### **Night Lights**

Many poultrymen are successfully using all-night lights on their chicks. A 25 watt bulb is placed in the brooder house and kept burning all night. This practice practically eliminates mortality from crowd-

ing. A dim light through the night not only keeps the chicks from crowding but seems to slightly stimulate growth. A few chicks will be found at the feed hoppers at all times. Chicks eat, return to the hover, and eat again in a few hours. Where electricity is available, the use of lights the first few weeks is desirable.

A question often asked by poultry keepers is, "How much feed is required for a chick to a certain age, and what should the chick weigh?" The table which follows is of interest in this connection:

**Feed Consumption (Including Milk Solids) and Weight of Birds by Week.\***

Weeks of Age	White Leghorns		Rhode Island Reds	
	Feed Per Bird, Lbs.	Weight Per Bird, Lbs.	Feed Per Bird, Lbs.	Weight Per Bird, Lbs.
0		.08		.08
1	.09	.11	.10	.11
2	.28	.18	.29	.16
3	.57	.26	.56	.26
4	.94	.38	.95	.36
5	1.42	.50	1.48	.53
6	1.96	.69	2.18	.73
7	2.71	.90	2.96	.96
8	3.51	1.09†	3.94	1.22
9	4.41	1.22	4.95	1.52
10	5.40	1.41	6.02	1.80
11	6.45	1.56	7.15	2.01
12	7.53	1.80	8.39	2.29‡
13	8.64	1.93	9.62	2.39
14	9.74	2.06	10.83	2.56
15	10.93	2.20	12.14	2.76
16	12.11	2.36	12.58	2.90
17	13.54	2.49	15.17	3.13
18	14.93	2.63	16.82	3.26
19	16.38	2.72	18.38	3.43
20	17.91	2.90	20.12	3.68
21	19.39	3.05	21.89	3.85
22	20.83	3.12	23.68	4.00
23	22.29	3.22	25.41	4.16
24	23.84	3.28	27.24	4.29

\*The data were compiled from Storrs Agricultural Experiment Station Bulletin No. 96, being the averages of three experiments with a total of 1,028 White Leghorns and 865 Rhode Island Red chicks. Birds had skimmilk to drink and no water during the first 10 weeks, after which both milk and water were supplied. An outdoor range was provided.

†Leghorn cockerels were removed at the end of the eighth week.

‡Rhode Island Red cockerels were removed at the end of the twelfth week.

## SUMMER RANGE

The summer range is very important. As previously mentioned, the chick range and the growing range should be good green pastures of alfalfa or grass. Summer ranges should not be over-crowded and the brooder houses or summer shelters should be scattered so that the growing chickens do not congregate in large numbers. Best results are obtained when not more than 200 birds are grown in a group. The cockerels and pullets should be separated early. One should dispose of the males as soon as they are marketable and the attention and room can then be devoted to the pullets that are to be retained as layers.

Where permanent brooder houses are being used, or where inadequate portable houses are available, summer shelters, as shown in the



Fig. 9.—A corn field provides good shade for growing birds.

illustration, prove very practical and satisfactory. These shelters are inexpensive and are preferable to brooder houses during hot weather. Plans and specifications for this type of shelter may be obtained without cost from the Michigan State College Poultry Department.

### Shade

Ample shade is essential, and, if the brooder house or colony houses or summer shelters can be moved near a clump of trees, the trees not only provide shade but also make excellent roosting quarters for grow-

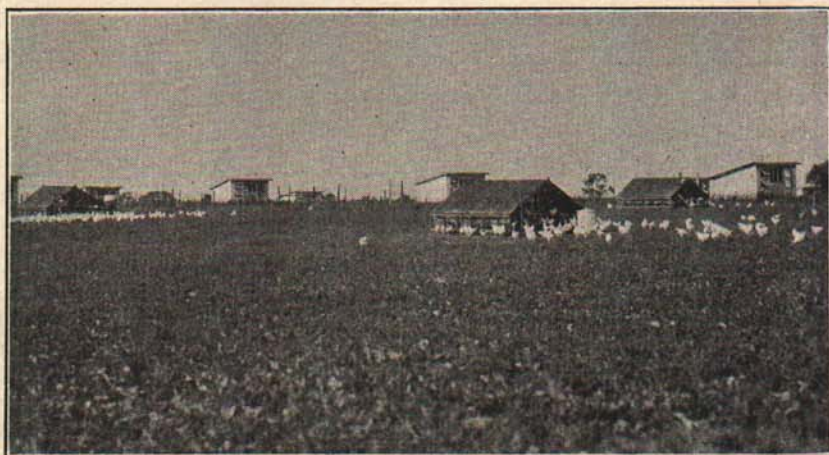


Fig. 10.—Range shelters in use. Plan and bill of materials for Michigan type range shelter can be obtained from Poultry Dept., Michigan State College.

ing pullets. If natural shade is not available, artificial shade may be made for the birds. One type of artificial shade is shown in Fig. 11. Adequate hopper space and waterers must be provided outside of the shelters. Growing pullets or cockerels require about the same amount of hopper space as do adult birds, or about 10 feet of feeding space per 100 birds.

### Housing

When Leghorn pullets are five months old, they can be placed in winter quarters, see Bulletin No. 48. Rocks, Reds, or other heavy varieties should be housed by the time they are six months of age. As soon as the birds are placed in the laying house, they should be fed a regular laying ration, Bulletin 51, "Feeding For Eggs."



Fig. 11.—Artificial shade in use.

### BATTERY BROODING

Battery brooding is being widely used in some sections of the country for starting chicks. Batteries adapt themselves very well for use on large commercial poultry farms. Chicks can be started better for three weeks in batteries than in brooder houses. Mortality is somewhat less. Less labor is required to take care of them and the dissemination of disease is likely to be less in batteries than where chicks are started on a floor. Where the chicks are to be grown for breeding purposes or for layers or for breeding cockerels, it is desirable to remove the chicks from the batteries by the end of the third week and to place them in brooder houses.



On large commercial establishments, where many chickens are being raised, long continuous brooder houses with concrete floors and concrete yards or sun porches prove satisfactory. The chicks are taken from the batteries at the end of the third week, placed in these long houses that have previously been disinfected, and are raised there until the pullets no longer need heat. The pullets are then removed and placed in summer shelters on clean, new range and grown to maturity. The cockerels remain in the permanent brooder house until marketable for broiler purposes.

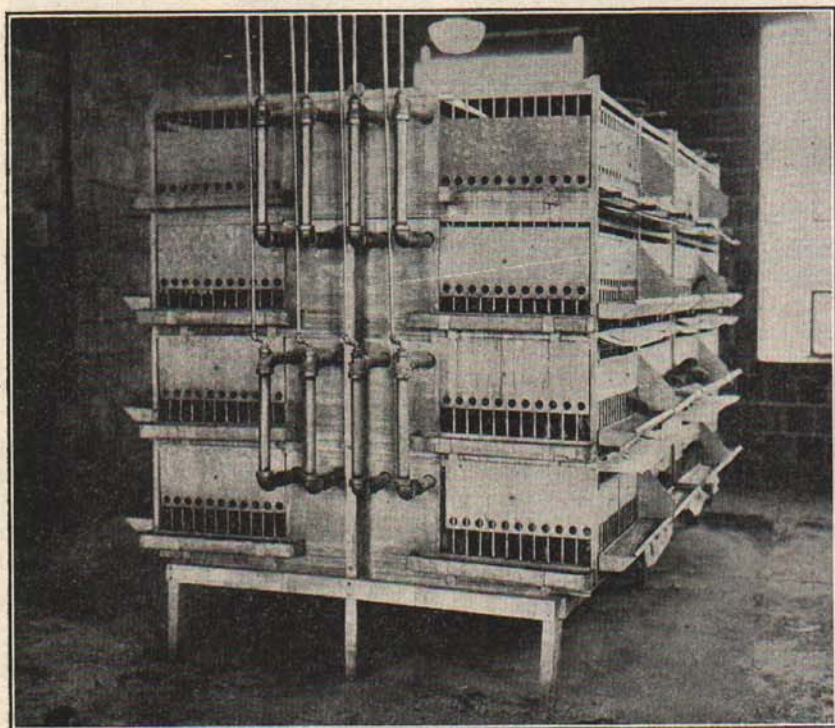


Fig. 12.—One type of battery brooder.

### Raising Broilers in Batteries

There is considerable interest in raising broilers in batteries. A few individuals succeed in this practice. It is probable that, when the problems encountered are better understood, this system may prove practical. The chickens have a tendency to fail to feather properly and considerable trouble is usually experienced in feather eating and cannibalism. In many poultry varieties, much difficulty is encountered with slipped tendons or what is known as "hock" disease. All of these difficulties are only partially understood.

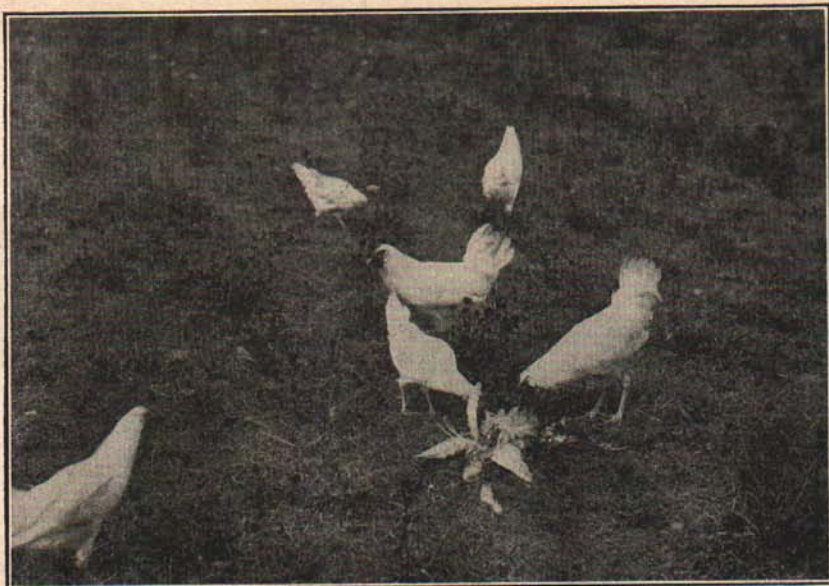


Fig. 13.—Dead birds make poor chicken feed, may spread disease, or cause limberneck and other difficulties. Remove at once and burn or bury all dead birds.

### Confinement Rearing

Chickens can be successfully raised in confinement. It is important, where chickens are being raised in very restricted quarters, that they have plenty of room and that adequate feeding facilities be available for them. The feeding rations must include everything necessary to

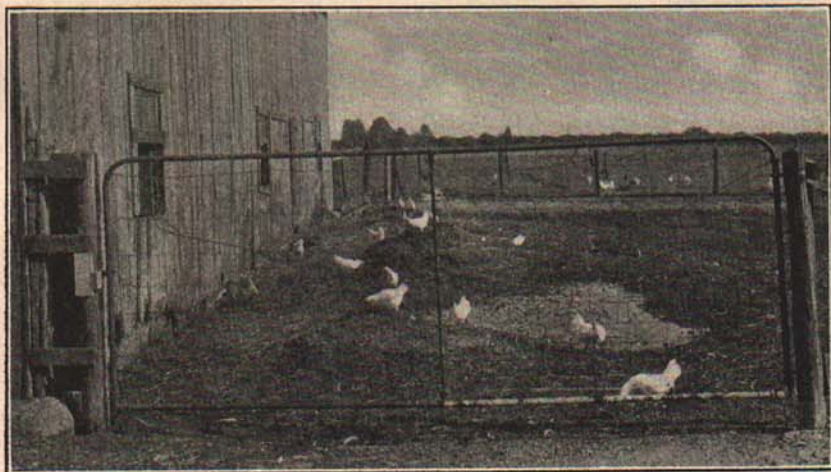


Fig. 14.—A familiar scene on too many Michigan farms. Good healthy pullets cannot be raised in the barnyard.

insure good growth. The Spartan Starter will grow chickens satisfactorily in confinement where cod liver oil is incorporated in the mash as suggested. It is desirable to have small outside pens large enough so the birds can get outside in the sunshine. These may be of concrete, of wire screen or board floors. Wire screen, usually one-half inch gravel screen, above concrete floors is very practical. This arrangement keeps the birds from walking in their droppings, and the concrete under the wire can be easily cleaned.

## SUMMARY

### PREPARATION FOR CHICKS

1. Clean Range.
2. Clean and disinfected house.
3. Clean and disinfected equipment.
4. Adequate equipment.

### BROODER STOVE

1. Large smoke outlet.
2. Coal capacity for 25 pounds or more.
3. Damper in stove pipe.

### FEEDERS

1. Provide 100 inches feeding space per 100 chicks to start with.

### SELECTION OF CHICKS

1. Egg breeding most important.
2. Cheap chicks poor investment.
3. Hatchery chicks are desirable.
4. Good hatcheries produce better chicks than most farmers.

### FEEDS AND FEEDING

1. Feed a good commercial starter or the Spartan Starter.
2. Feed chicks as soon as they will eat.
3. Include scratch grain after 6 weeks of age.
4. Keep mash before birds constantly.

### SUMMER RANGE

1. Clean range covered with alfalfa or good grass sod.
2. Adequate shade.

Clean range	}	result	}	Well grown pullets
Clean house				
Well bred chicks				
Good feed				
Freedom from disease				
Good management				Profitable laying flocks

