FARM POULTRY MANAGEMENT

I.—FARM FLOCK MANAGEMENT.
II.—PULLET PRODUCTION.
III.—YOUNG POULTRYMAN'S FLOCK.

4-H CLUB CIRCULAR 56

COLUMBIA, MO. (Reprinted, February, 1939) **FEBRUARY, 1938**

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE AND THE UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING
J. W. BURCH, Director, Agricultural Extension Service
Distributed in furtherance of the Acts of Congress of May 8, and June 30, 1914

CONTENTS

The Leader's Guide for 4-H Poultry Clubs is to be used with this Club Circular.

Farm Poultry Management*

INTRODUCTION.

The 4-H club work in managing the farm poultry flock is intended to provide rural boys and girls with the opportunity of obtaining a satisfactory financial experience and to teach them practical production methods upon which financial success depends. In addition, this work is intended to develop leadership and interest in farm problems and to provide healthful recreational activities.

Poultry I.—Farm Flock Management.

In Project I—Farm Flock Management—individual ownership of the chickens by the club member is not required. The home flock under existing conditions, as found on the individual farm, may be used. It is recommended, however, that some agreement between club members and parents be reached on an individual basis to provide for a division of net profits. Unless this is done, the club member's financial experience merely becomes an uninteresting and less valuable bookkeeping activity which is less likely to find the club member entering into the work with the enthusiasm that will result in a well-rounded experience having immeasurable value in adult life.

Poultry II—4-H Pullet Production and Poultry III—Young Poultryman's Flock.

Projects II and III (pages 34 and 35) deal with advanced learning and production problems after success in the first project has been attained. Ownership of the poultry is required.

POULTRY I—FARM FLOCK MANAGEMENT.

1. Size of Flocks—and Records

The number of mature chickens in the flock is of real importance. Poultry raisers are no longer satisfied to receive eggs during the spring and summer months but must be equipped to manage their flocks and secure eggs throughout the entire year in order to make money. This means that good, but not necessarily expensive equipment must be available. Much of it may be made on the farm, but since some expense is to be expected the number of birds to be kept should be carefully considered.

*Prepared by C. E. Rohde, Extension Specialist in Poultry, in collaboration with T. T. Martin and E. T. Itschner, State Club Agents.

The farm flock should either be large enough to be a real source of profit or it should be reduced to the number of chickens required to supply all of the eggs and poultry needed for family use. From 250 to 300 hens and pullets are recommended as the smallest number of chickens to be kept by farmers expecting to sell market eggs as one of the important money crops. From 25 to 50 hens are recommended for flocks intended to supply no products for market, but furnish all the eggs and poultry needed for home use.

Flocks that are between these two sizes frequently are not a fully appreciated source of income and do not receive the attention necessary to make them profitable. Surplus eggs, above family needs, particularly during the summer months do not receive the necessary care to preserve their quality and must be sold for less. The price may be lower than their production cost. Eggs of poor quality also discourage housewives from buying and using eggs.

Equipment such as laying houses, brooder houses, summer range shelters and brooder stoves also cost more for each hen kept because the cost of this equipment remains about the same whether it is used to full capacity, or for only a much smaller number. Very often the owners of these "in-between-sized" flocks do not have this equipment and do a much less efficient job of raising pullets and managing their laying flocks. Lower priced eggs, higher death losses, poor production, and other items of cost under these conditions frequently cause the flock to lose money which must be made up from other sources of income on the farm.

Poultry raising can no longer succeed by hit and miss methods. It has become a specialized industry which is not difficult to learn. Club members may learn proper methods of management, feeding, sanitation and disease control and secure a net income from their flocks. It is well to keep in mind, however, that a profitable sized unit is important for market production or family use. Raisers of poultry should decide which sized flock fits into their farming program to the best advantage.

If producing market eggs and poultry is of minor importance the smaller flock will prove more satisfactory because of reduced hazards from disease, lower equipment and investment costs and small labor requirements.

If poultry income is intended to be one of the important ones on the farm a flock of 250 heavy breed birds or 300 of the light breeds, as a minimum number, will prove more profitable than a lesser number. The owner will receive greater returns on his investment and for his labor. He will be justified in planning his

other farm operations, the kind and amount of grains to be grown to provide feed and to provide time for necessary attention to details upon which success depends.

Records are important. Every producer of market products should know the average number of eggs produced per hen every month and year, the cost of production, the per cent of the flock lost from disease, costs of producing pullets for replacement and the percentage of income from eggs and poultry meat.

Without this easily obtained information it is impossible to secure a true idea of the poultry enterprise. These facts point out the weak places in the program. They make improvements and increased income possible.

Few business men hope or try to succeed without accurate records. Poultry raisers and 4-H club poultry members are truly businessmen and should keep accurate records. These may help decide the question of whether or not poultry numbers on their farms should remain the same or be increased or reduced.

2. Principles of Feeding Poultry.

Poultry, unlike some other types of livestock, cannot return a profit unless liberal supplies of necessary feeds are provided from hatching time until the birds are sold for meat purposes at the end of their period of most profitable growth or egg production.

Laying hens which receive all of the proper kinds of feed needed for profitable egg production use approximately 60% of this total amount to maintain their bodies. The remaining 40% of the feed consumed is used in the production of eggs. However, if the amount of all feeds provided is less than is required or if these feeds are improperly balanced the hen automatically makes use of the amounts needed for her body before producing any eggs. Consequently, liberal feeding of a complete ration must be practiced before economical egg production may be secured. If lesser amounts of feed are provided fewer eggs will be received because a smaller amount of raw materials will be available from which the hens may manufacture them.

Chicks grow rapidly, if properly fed, but cannot make the greatest growth without unlimited amounts of proper feeds. The age at which pullets mature and start to lay is principally determined by breeding. It is common knowledge that Leghorns mature in about five months and birds of the heavy breeds in about six months.

Liberal feeding is most important during this period because the poultry raiser is engaged in building an egg machine. The material

or feed to build the machines must be supplied to produce a profitable flock.

Types of feed.—There are five general types of feed which must be included in the ration, in addition to plentiful supplies of clean, fresh water. These are listed as:

1. Energy producing feeds which include: corn, wheat, grain sorghums, and barley.

2. Portein feeds which include: meat and bone meal, super-meat scrap, dried skim milk, dried butter milk, liquid skim milk, and soybean oil meal. Twenty per cent of the laying mash ration, by weight and chemical analysis, should be composed of these feeds.

3. Vitamins have become increasingly important as more knowledge of the effect upon feeding results has become available.

(1). Vitamin A is found in yellow corn, alfalfa meal, bright green legume hays, fresh cod liver oil and in green feed. It is necessary for the health of the flock and for a high rate of laying and good hatchability of eggs.

(2). Vitamin D is found in direct sunlight which has not been filtered through ordinary window glass or through most glass substitutes. It is also present in fish oils. Vitamin D is necessary for the health of the flock, for high egg production, bone and egg shell formation and hatchability.

(3). Vitamin G is necessary for high hatchability and maximum egg production. Two common sources of this vitamin are milk and green feed.

4. Minerals are quite generally and generously supplied in other feeds. Expensive mixtures of numerous types of chemicals to supply minerals are not necessary and represent useless expense. It is necessary, however, to supply ordinary salt in the feed and to provide oyster shell or finely ground limestone.

5. Green feed is desirable in producing hatching eggs but when other substitutes are provided containing vitamins A and G there is little to be gained by its use in the production of market eggs.

A good laying mash is a necessary part of a good feeding program throughout the year. Mash is fed in a finely ground form so the hen can eat larger quantities and digest it more easily. Mash also serves as a means of including protein, and vitamin carrying ingredients in the ration in proper amounts.

The laying mash and the entire ration must not contain too much bulky feed. Chickens digest concentrated feeds readily. While some bulk is desirable, too much material of this nature prevents the hen from consuming enough of the other feeds to produce at

the most profitable rate. Wheat bran or ground oats are used to provide necessary bulk and certain other valuable nutrients. The amounts to be used are limited.

The grain ration should consist of ½ to ⅔ of the total ration. It should be composed of the grains listed as energy producing feeds. A mixture of these grains may be used or a single grain may be fed. At least ⅓ yellow corn is desirable in the grain mixture. Without yellow corn, it is necessary to provide green feed or alfalfa meal in the mash, or legume hays. It is possible to provide a complete ration without yellow corn when it is more economical or necessary to do so. Oats may be included in the grain ration in an amount which does not exceed ⅓ of the total grain supply.

Any changes in laying mash rations, grain feeds, or methods of feeding should be made gradually over a period of a week or ten days. Sudden changes of any kind result in reduced feed consumption causing lowered production or temporarily retarded growth.

Recommended Laying Ration.—A laying ration recommended by the Missouri College of Agriculture consists of:

100-lb. Mix	*750-lb. Mix*
27 lbs. Ground Yellow Corn	200 lbs.
22 lbs. Wheat Bran	165 lbs.
5 lbs. Alfalfa Meal*	35 lbs.
26 lbs. Shorts	200 lbs.
20 lbs. Meat Scrap	150 lbs.
1 lb. Salt	7 lbs.
1 lb. Cod Liver Oil**	7½ pints

*A five per cent increase in alfalfa meal is necessary if one of the substitute grains for yellow corn is used. When the alfalfa meal is increased the bran in the ration should be correspondingly reduced.

**Cod liver oil is only necessary during the winter months beginning in November and ending April first.

3. Winter Feeding and Management.

Pullet flocks should be comfortably housed in permanent laying quarters by the last of September. If housing is delayed beyond this date, weather conditions are generally less favorable. If the onset of laying has occurred, the changes in surroundings when moved at a later date is very likely to disrupt laying and a partial molt may result. Early hatched pullets should be housed at an earlier date by the time five eggs are received daily from 100 birds or when production reaches five per cent.

Before the pullets are housed the building should be thoroughly cleaned and disinfected. All movable equipment should be removed, cleaned, scraped, and sprayed. All litter, droppings, dust and other filth should be completely removed and the house and equipment

sprayed and scrubbed with a solution made of 1 can of ordinary lye dissolved in 12 gallons of cold water.

The pullets should be housed separately from older birds. This may be accomplished in one house by means of a temporary wire partition. If pullets are allowed to mingle with older hens, the possibilities of disease spreading from old hens, that may be disease carriers, to the pullets is greater and consequently results in higher mortality. Older birds also chase pullets from feeders and prevent maximum feed consumption and egg production.

Overcrowding laying houses causes increased trouble with diseases, lowered egg production and high costs. Three square feet of floor space per bird should be allowed for chickens of the light breeds and four square feet for those of the heavy breeds. Thus a house 20x20 will adequately accommodate 125 or 130 Leghorns or 100 White Rocks or other heavy breed varieties.

Adequate roosting space at the rate of 6 to 8 inches per bird must be provided. Crowding on the roosts frequently results in colds which develop into roup, causing serious death losses and lowered production.

Plenty of feeder space is essential. Two five foot mash hoppers feeding from both sides, or the equivalent of one linear foot for five hens, or 20 feet per hundred hens is recommended.

One twelve quart bucket to supply clean, fresh water is necessary for each 100 birds. The drinking vessels should be thoroughly cleaned and scrubbed each day. In washing it is desirable to use some good disinfectant such as is used in sterilizing milk utensils.

Hens in molt should have constant access to good laying mash and should receive the same care which is normally given during heavy production.

Pullets frequently molt after laying profitably for two or three months. This may be due to a loss in body weight which sometimes results from heavy production and improper feeding. Every effort should be made to increase body weight of pullet flocks after housing by allowing the onset of laying to occur naturally and by providing liberal quantities of grain.

Feeding Grain.—Pullets of the light breeds should receive a constant supply of grain fed in open hoppers. They will consume no more than is needed, lay equally well and each pullet will have an opportunity to consume the amount of grain needed to maintain body weight. When grain is fed in this manner additional hopper space, equal to that recommended for laying mash, should be provided.

Heavy breed pullets frequently consume too much if grain is self fed. It is best to feed grain to the heavier breeds twice daily. One-third of the total amount should be fed in the morning and two-thirds at night before roosting time. One hundred pullets will consume about 15 pounds of grain and 7½ pounds of mash each day during the winter months. High producing flocks consume slightly more of both feeds.

In any event grain should never be fed on the bare ground or scattered in the litter. It may be fed in long V-shaped troughs or hoppers and additional feeding space supplied by spreading it upon the mash in the hoppers. As many diseases are spread through poultry droppings, scattering grain increases disease hazards from this source and is decidedly unsanitary.

Feeding Wet Mash.—In heavy producing flocks, particularly of the light breeds, it is frequently desirable to feed a wet fattening mash at noon each day in order to insure maintenance of adequate body weight.

Noon feeding of any wet mash is recommended because the purpose of this special preparation of feed is to secure increased feed consumption of a particular kind. If fed earlier in the day it tends to merely replace other types of feed which would otherwise be eaten.

Fattening mash may be composed of 6 parts ground yellow corn, 3 parts of shorts, and 1 part dried milk. In feeding it should be moistened with water to form a crumbly mash. Liquid milk may be substituted for dried milk and water eliminated in mixing. The mash should not be sloppy but just enough milk or water added to cause the particles to cling together like bread crumbs.

Temporary and sometimes permanent drops in egg production that usually accompany extremely cold weather may be partly explained by lowered consumption of laying mash and water. Additional attention to the flock during these periods is desirable. The drinking water should be warmed frequently to maintain normal consumption. Warm wet laying mash may be fed at noon as a means of holding up the amount of mash consumed. This additional attention pays by keeping the hens comfortable and the supply of eggs more constant.

The feeding of wet laying mash should be held as a reserve practice for use when cold weather arrives. It may be continued during the winter months, but should also be gradually reduced and discontinued by late March or early April. At that season production

naturally reaches its peak and continued use of this forcing practice is unnecessary and may prove harmful.

Tonics and Conditioners.—The practice of providing tonics, conditioners for the laying flock during the winter months or at any other time is expensive and valueless. Healthy chickens properly fed require none of these and treatment of sick chickens is seldom profitable.

Periodic worm treatments and laxatives are to be avoided. If pullets are actually infested with worms they should be treated for the type of worms with which they are infested and not for all types

Fig. 1.—Chickens raised under sanitary conditions do not need tonics and conditioners.

of worms. This should be done before they are placed in permanent laying quarters. Hens should be treated during the period of most general molt. The practice of indiscriminate worming of all birds, without knowledge of the type of worm infestation, is to be discouraged.

A good ration, including a complete laying mash made according to the principles and formulas given on page 7 plus grain, oyster shell and a plentiful supply of clean fresh water are the best assurances for satisfactory production. This type of feeding program combined with comfortable housing and attention to the management details outlined here may be depended upon to produce satisfactory and profitable results.

4. Comfortable Housing.

A comfortable poultry house is necessary to secure profitable egg production during the summer months as well as during the winter. It is also essential to maintain a healthy flock.

A comfortable poultry house need not be expensive, but it should have certain important characteristics which can be obtained on any farm.

A good poultry house should be dry, well lighted and ventilated, and reasonably warm. The walls must be tightly constructed to prevent drafts that cause colds and roup to develop. Old houses may be repaired to provide tight walls by a number of different methods. Straw or similar material may be packed between the studs and held in place by old fencing. Card board cartons or roofing paper may be used. Any of these temporary methods are successful since the most important thing is that of keeping the hens comfortable at low cost. New houses or ones that have good material in them should, of course, be built or repaired with the comfort of the hens in mind.

A damp house is always uncomfortable. Moisture may come from the floor, or collect on the roof and sides of the building due to improper roof construction or poor ventilation.

Floors for the Laying House.—Concrete floors are best in laying houses. A new type thin section floor is now being used which costs less than a board floor. It also costs less than a dirt floor when the expense of more frequent changing of litter and greater losses from disease are considered. Perhaps your club leader or some other successful poultry raiser in your community will show you how they are built.

Dirt floors are unsanitary, usually draw moisture, and cannot be disinfected. Some dirt floors may be improved by spreading a six inch layer of crushed rock, cinders or gravel in the house. This prevents the ground moisture from coming up in the house. Water rises just like oil rises in the wick of a lamp.

Insulation in the Laying House.—Metal roofs are satisfactory for poultry houses if properly insulated. Unless this is done, however, moisture collects on the inside surface and causes a damp, as well as a cold, uncomfortable house.

The ceiling should be no higher than is necessary to provide head room for the caretaker (usually 6½ to 7 feet). Houses with high ceilings are cold. A large part of the heat loss during winter months occurs through the roof and the largest amount of heat penetrates through the roof in summer. For these reasons a straw

loft is desirable to reduce ceiling height. It aids in keeping the house dry and makes it warmer in winter and cooler in summer. If the height of the roof permits the loft should consist of 10 to 12 inches of settled straw which may be supported by poultry netting or old woven wire fencing or by some other simple method. If part or all of the roof is too low for such a loft, straw should be packed between the rafters as a means of securing insulation in the lower portions and the loft installed where height permits.

Ventilation.—Improper ventilation is usually the result of too small an amount of fresh air. This causes the air in the house to become damp. The moisture collects on the walls of the building and on the floor. This dampness combined with the need for more fresh air produces an unhealthful condition that lowers egg production and makes disease outbreaks almost certain.

The best means of ventilation is accomplished through an open front which is usually 30 inches in width. During cold weather the size of the opening may be regulated with a curtain or series of them made from medium weight canvas or feed sacks. This opening is seldom completely closed. More flocks disappoint their owners because of too little fresh air than because of too much of it.

The most comfortable poultry houses are at least 18 and preferably 20 feet deep. Narrow houses are difficult to ventilate because they are drafty and cold when an adequate supply of fresh air is provided and are stuffy and unhealthful without the necessary exchange of air. Houses of proper depth when equipped with an open front are easily managed, require little attention and produce excellent results. In square houses the open front extends completely across the south side of the house. Houses that are oblong usually have less of the south exposure devoted to the open front. However, the same amount of open front for a given amount of floor area is provided. The rule of 1 square foot of open front for every 15 square feet of floor space is used in determining the size of the open front. The open front should begin eighteen to twenty-four inches above the inside floor level of the house and extend upward about thirty inches. Ventilation flues or stacks, and baffle ventilators usually prove unsatisfactory. Too little is known about the use of flues. These require much attention, often fail to work, and sometimes work directly opposite to the intended way.

Light, Cheerful House Desired.—A comfortable house should be light and cheerful. Small windows should be arranged on all sides of the house to light all of the floor space and enable the hens to use all of it. Removal of these windows during the summer also

makes the house cooler. The windows must be tightly fitted, however, to prevent drafts in winter. Special laying, scratching and roosting rooms in a house make it dark, reduce the number of birds that can be kept and serve no good purpose.

Equipment for the Laying House.—Screened droppings platforms are an important part of any comfortable house. The platform should be located along the back or north wall of the house at a height of 30 to 36 inches. Unusually high droppings platforms are unnecessary and undesirable. Roosts and the droppings platform should be built in sections which may be easily removed for cleaning when necessary. The roosts may be preferably made from 1x4 inch material and the narrow edge used as the roosting surface after the corners have been rounded. Wide square cornered roosts cause foot injuries and are less desirable.

Poultry netting of 1½ inch mesh should be tacked to the lower side of the roost poles and extended to all edges of the droppings platform. This sanitary measure prevents the chickens from working in the droppings, tends to keep their feet clean, and reduces the spread of disease as well as the number of dirty eggs.

One nest should be provided for every four or five hens. These may be swung immediately beneath the droppings platform.

Trough or box type feeders, which must be filled occasionally by the caretaker are preferable to large self-feeders. Five foot feeders, which can be easily moved, are better than larger ones and are less expensive.

Feeders and water fountains should be raised above the floor enough to prevent the litter from being scratched into them. Excessive height is to be avoided and a height of 18 inches to the upper side of the feeders is all that is necessary.

5. Securing Chicks for Pullet Replacement

Quality Chicks.—Quality in poultry as in all other classes of livestock has distinct advantages and is most economical and profitable.

Chicks that are purchased on price alone, particularly when it is low, are likely to be a poor bargain as mature pullets. It costs just as much for equipment, feed, labor, and all other production expenses to raise poor or good quality chicks.

The variety of chickens is not as important as the strain selected within the breed or variety. It is desirable, however, to select the more common breeds of chickens such as White Leghorn, White or Barred Rock, White Wyandotte or Rhode Island Red. It is more difficult to get hatching eggs, breeding stock or baby chicks of good breeding from the less common varieties that have no superior

money making qualities. From one-half to two-thirds or more of the total poultry income is derived from eggs. The importance of getting chicks that will develop into high producing pullets cannot be overemphasized. Missouri farm flock records over a period of years show that the net income above all expenses is 2¼ times greater in flocks that lay an average of 150 eggs as compared to those that lay slightly less than 100 eggs.

The number of eggs laid is only one of several important considerations. Large egg size (24 ounces or more per dozen), freedom from disease, and the vigor and vitality of the parent stock are also important.

True pictures about all of these characteristics are not always presented in glowing advertisements. The club member and his parents should carefully check all of these important matters in determining desirable chick sources.

Chicks should be obtained from flocks that have been carefully tested for pullorum disease. This disease, which is transmitted in the egg and spread in the incubator and in the brood of chicks after hatching, is responsible for a high percentage of chick losses up to three weeks of age. Testing the parent stock to remove infected hens, and strict sanitation in the hatchery and in the incubator reduces loss to a practical minimum when properly done.

Quality chicks cost more and reliable producers cannot be expected to sell this superior stock at prevailing competitive prices. However, the additional cost of $5 or even $10 per hundred chicks is actually the best investment that any one desiring success in poultry raising can make. Mortality throughout the life of the birds is likely to be much smaller, and net returns with proper care and management are almost sure to be much greater.

Record of Performance breeders are the most reliable source of breeding stock, particularly male birds. The production records and the accumulation of all other facts about the parent stock are made under close, unbiased supervision. This is the most logical assurance of the ability to buy truly represented breeding stock.

Many persons who set their own eggs without the necessary attention to desirable breeding characteristics and disease control would gain financially by purchasing superior chicks or hatching eggs from a reliable breeder in whom they have confidence.

Time of Hatching.—Nature provides an object lesson as to the best hatching time. Many persons have observed that the earliest broods of robins and other wild birds seem to develop best. The same result is usually observed in comparison of the rate of growth in early and late hatched chicks.

Chickens of the heavy breeds should be hatched in February or early March. Leghorns should be hatched in March or early April. Weather conditions are more favorable and faster growth results. Chickens grow most rapidly to twelve weeks of age.

Early hatched pullets develop into larger, heavier birds at maturity and start laying in the late summer or early fall when egg prices are higher. Cockerels reach broiler weights when prices are normally higher than those to be obtained from later hatches.

Early hatched chicks are less likely to become infected with coccidiosis because the parasite causing this disease requires warm soil and moisture to become actively infective. This is also true of worm infestation which does more harm to infested chicks under twelve weeks of age than to older ones.

Chicks use feed for growth to better advantage during cool weather. Consequently, early hatched chicks gain in weight and size at a lower cost.

Selection of Hatching Eggs.—Desirable hatching eggs are normal in shape, clean, and have sound shells. Eggs that have rough, porous shells, or ones that are ridged or unusual or irregular in shape should not be used for hatching purposes. Such eggs hatch

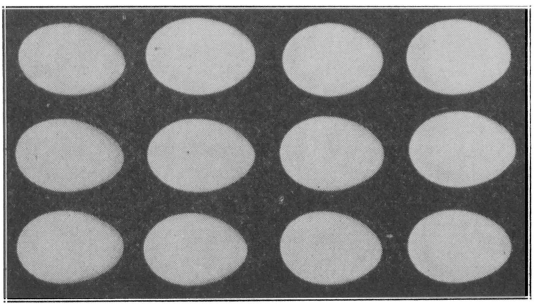

Fig. 2.—Normal shape of desirable eggs for hatching.

poorly. In addition these characters in eggs are inherited. Pullets that are secured from the few eggs of this appearance that hatch are likely to produce similar eggs which have lowered market value.

Since the size, shape and color of eggs are inherited characters, uniformity of these characteristics should be used in selection. White eggs should be free from creamy tints and be chalk white in color. Brown shelled eggs may vary slightly in color, but a uniform shade is desired. It can be obtained by careful selection.

Small eggs will not produce large vigorous chicks and should never be used because the pullets from such eggs are likely to lay

the kind of eggs from which they were hatched. Hatching eggs should each weigh two ounces or slightly more.

Incubation.—Chicks of different ages, even though no more than three or four days apart, should not be brooded together. This slight difference in age is important because chicks grow rapidly and the smaller chicks die in large numbers if forced to compete with the older chicks for feed, water and warmth. The number of chicks desired for one brooder house should be secured at the same time. This means artificial incubation is almost essential.

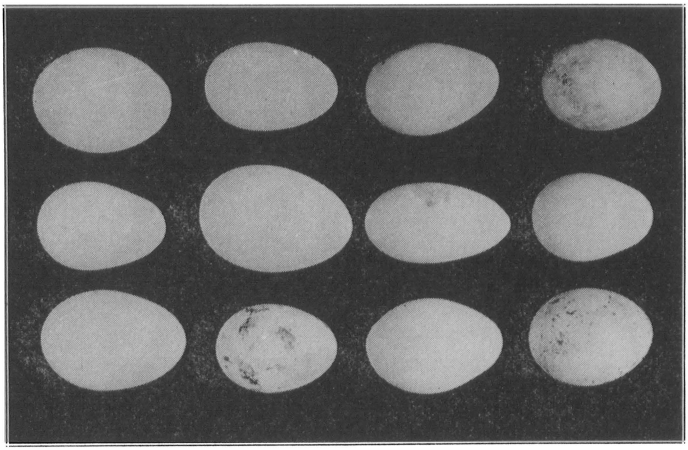

Fig. 3.—Undesirable hatching eggs.

It is usually less expensive and more satisfactory to purchase chicks or have the eggs hatched in modern incubators which normally produce more vigorous chicks.

If a small farm incubator is to be used the operating instructions of the manufacturer should be followed. It is important, however, that the incubator thermometer be checked in warm water with a fever thermometer to be sure of its accuracy.

If the hatch in these small machines is early and the chicks are small it is probable that the temperature of the incubator was too high or that the amount of moisture was too small. If the chicks hatch late and are slow to fluff out these conditions indicate too much moisture, too little ventilation and possibly too low a temperature.

6. Brooding Chicks

Equipment.—Chicks must be brooded under sanitary conditions. Small broods of chicks, 50 or 75 chicks, as well as a large brood of

300-350 chicks require good, but not necessarily expensive equipment.

Small numbers of chicks that are raised for meat and pullet replacements in family size farm flocks may be brooded in a Lamp Brooder (Figure 4). This small brooder makes it possible to

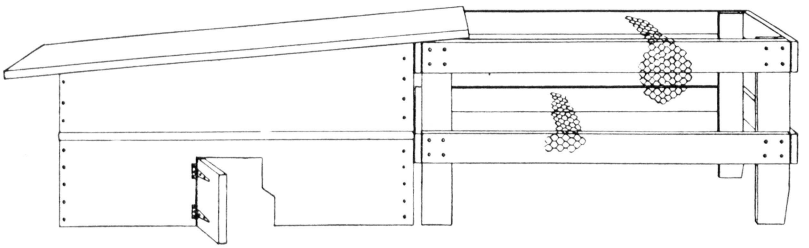

Fig. 4.—Diagram showing construction of a lamp brooder.

follow all the necessary brooding essentials that are profitable with larger broods in the regular Missouri colony brooder house.

Portable brooder houses should be used whenever possible to permit brooding chicks on ground which has not been used for this purpose in the two preceding years.

If brooder houses on the club members' farms cannot be moved a summer range shelter can be inexpensively built to enable the use of the same sanitary measures that are possible with the portable houses.

This range shelter is built of light 1x4 material and poultry netting. The poultry netting floor and sides of this equipment (See Extension Circular 253) enables its use as a sun porch so the chicks can be brooded on this wire floor and avoid infection from the old ground that is filled with worm eggs and other parasites and diseases. After the chicks no longer need heat from the brooder stove they may be moved to clean range and housed in the same shelter until maturity.

A good brooder stove is very necessary. A brood of chicks that becomes overheated is seriously injured. Chilled chicks also become poor property. Stoves that are hard to regulate should be avoided.

Any good coal, oil or electric brooder will give satisfactory results. A new wood burning brooder stove is also available. It has the advantage of low operating cost.

A sufficient number of feeders and water fountains should be provided. At hatching time one inch of feeder space and $\frac{1}{2}$ inch of watering space should be provided for each chick. As they grow and become older the size and number of feeders and water foun-

tains should be increased. No set rule will apply, but additional feeding and watering space should be provided to avoid crowding.

Brooding Sanitation.—Clean range for baby chicks and growing stock is the foundation for all the future health of the flock. If developing chickens are heavily infested with worms and other parasites at an early age they fail, despite treatments, to develop into healthy, profitable adult birds.

Clean ground must fill these requirements:

1. Where chicks have not been raised during the past two or three years.
2. Away from contaminated ground about the old poultry yards or runs on ground that does not receive water drainage from such areas.
3. On ground where poultry litter and droppings have not been spread for at least two or three years.
4. Whenever possible green feed such as bluegrass or legume hay crops, including alfalfa, sweet clover, red clover and Korean lespedeza should be provided.

Club members should select three clean ground locations for use in three successive years. At the end of this period the chicks can be returned to the first area and the rotation repeated. These areas need not be separately fenced if locations for the brooder house or range shelter are 150 yards apart.

Before chicks are placed in any kind of brooder house, it must be thoroughly cleaned and disinfected. All the old litter and droppings must be removed. The floor should be scraped and the walls as well as the floor swept clean. After all filth has been removed the house should be disinfected with lye water. A lye solution may be made by dissolving one can of ordinary lye in twelve gallons of cold water. This is the cheapest and best disinfectant that can be used.

If movable brooder quarters are to be used the building should be thoroughly cleaned and disinfected before moving to prevent any possible spreading of diseases and parasites to the clean location.

If permanent brooding equipment is used the litter should be removed to a safe distance to avoid any possibility of infecting the brood from this source.

When brooding in confinement is practiced, it is best to keep a pan of disinfectant just outside the brooder house door to permit the caretaker to disinfect his overshoes before entering the house.

Feeding.—Chicks should be fed when 24-36 hours old. Further delay in feeding is harmful. The College of Agriculture starting ration is given below:

100-lb. Mix	*500-lb. Mix*
54 lbs. Ground Yellow Corn	270 lbs.
15 lbs. Shorts	75 lbs.
10 lbs. Bran	50 lbs.
5 lbs. Alfalfa Leaf Meal	25 lbs.
5 lbs. Dried Milk	25 lbs.
10 lbs. Meat Scrap	50 lbs.
1 lb. Salt	5 lbs.
1 pint Tested Cod liver oil	5 pints

This all-mash feed, without grain, should be kept before the chicks in open hoppers until the cockerel chicks are sold as broilers between the ages of 8-10 weeks. If cockerels are held for a longer period they may be fed until marketed on this ration.

When 8-10 weeks old the pullets should be shifted to a growing mash and grain ration.

The Missouri growing mash formula consists of:

100-lb. Mix	*500-lb. Mix*
25 lbs. Ground Yellow Corn	100 lbs.
25 lbs. Shorts	100 lbs.
25 lbs. Bran	100 lbs.
10 lbs. Meat Scraps	40 lbs.
5 lbs. Dried Milk	20 lbs.
4 lbs. Alfalfa Meal	16 lbs.
1 lb. Salt	4 lbs.

Whole or cracked yellow corn or one-half yellow corn and one-half wheat or barley or kafir may be fed. Both mash and grain should be constantly supplied in open hoppers. This results in faster growth and heavier pullets that will lay more winter eggs and return a greater profit.

Each light breed pullet, if fed from 24 hours of age to maturity at 20 weeks, will eat about 8 pounds of all-mash starter, 6 pounds of growing mash and 6 pounds of grain.

Heavy breed pullets will consume 9 pounds of starter, 10 pounds of growing mash and 10 pounds of grain to 24 weeks of age.

Management to 8-12 Weeks.—Crowding chicks results in slower growth, higher feed costs and greater death losses and the pullets raised are of poorer quality. For these reasons the greatest number to be raised in a 10x12 brooder house is 350 and 50 chicks is the largest number to be brooded in the Missouri Lamp Brooder.

Brooding temperature is important. Chicks should be brooded at the lowest temperature that will keep them comfortable. This means starting the first day at a temperature of not more than 95° F. at the edge of the hover. This temperature should be reduced 5-8 degrees at the end of the first week and a like amount at the end of the second and third weeks. When a temperature of 75°-80° F. is reached, this temperature should be maintained until artificial heat is no longer needed.

Chicks should be taught to roost as early as possible. Low roosts should be placed in the house when the chicks are three weeks old. These may be built of 1x1 or 1x2 boards and the corners of these poles should be rounded. The roost may be located at the rear of the building. In the beginning they should be from 2 to 3 inches above the floor. After the chicks learn to roost they may be raised to 18 or 24 inches above the floor. Inch poultry netting should be tacked to the lower side of the roosts and extended to the floor in front of them. This will prevent the chicks from picking the droppings, improve sanitation and reduce labor in caring for them.

The litter used will determine how often it must be replaced. However, it is important to change it frequently. Chaffy straw, very coarsely crushed corn cobs, or coarse sand are some of the types of litter used satisfactorily. If sanitary conditions are not maintained disease organisms that may be introduced by the caretaker will develop rapidly at brooder house temperatures.

7. Summer Management of Young Stock

After pullets reach the age of 8-12 weeks the task of raising a healthy pullet flock is only well begun.

The need for sanitation is just as important during the remainder of the growing period. Clean range is still important to avoid round worm infestation and coccidiosis infection.

Pullets that become infested with worms make slower growth and consume more feed to maturity because they do not start to lay as early and seldom have the vitality to continue in production during the winter months.

Money spent for worm treatments is poorly invested because the trouble can be avoided and the cost of raising better pullets reduced.

The range should provide green feed and shade. An alfalfa, clover, lespedeza or bluegrass field or the edge of a corn field provide excellent locations for the portable brooder house or range shelter.

A continuous supply of tender green feed is desirable. The seeding of pure sudan grass, rape or other forage plants is recommended when necessary to supply ample green feed.

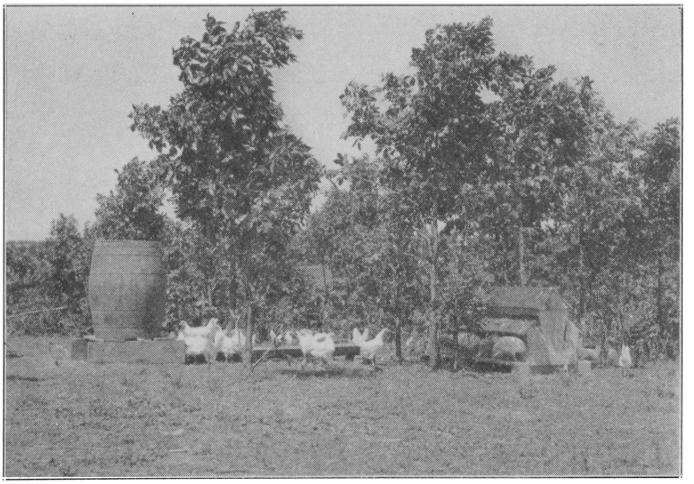

Fig. 5.—Feeding arrangement for young stock on range.

The range should provide limited shade. Dense, heavy shade which is not reached by sunshine some time during the day is not desirable. Sunlight has a disinfecting effect which is needed. However, some shade, particularly during the hottest part of the day, is essential. If natural shade is lacking a brush arbor can be built to provide protection.

Summer Quarters.—Crowded summer quarters should be avoided. Crowded conditions cause slow, uneven growth and many stunted, unthrifty pullets. A 10x12 brooder house will accommodate no more than 100 pullets. A summer range shelter solves this problem at a low cost in providing more comfortable quarters than a brooder house that is used to house no more than the recommended number of pullets.

Cool, well ventilated summer quarters are necessary to grow out a good flock of pullets. The windows of the brooder house should be removed and a wire door substituted for the wooden one to permit the largest possible amount of air to circulate through the house. The range shelter has another advantage in that respect, since it provides a maximum amount of air and protection from weather and vermin.

Liberal feeding must be practiced. Growing mash, grain, oyster shell, and plenty of clean, fresh water should be available for the

pullets at all times. Water and feed should be placed in the shade on the range as well as in the roosting quarters. Improved sanitation can be obtained by placing this feeding and watering equipment on wire platforms. Water and feed that is wasted falls through the wire netting and cannot be reached.

Avoid Parasites.—Lice and mites multiply rapidly in hot weather. The flock, house and equipment should be examined every two or three weeks to be sure they have not become infested with these parasites.

Control of these parasites is discussed on page 33.

If the club member lives on a farm or in a community where outbreaks of chicken pox each fall are common, the pullets should be vaccinated to prevent this disease. Vaccination should be done between the ages of 8 and 12 weeks just after the cockerels are sold as broilers.

Information on chicken pox will be found on page 31.

Change Ration.—After the pullets are housed, the change from a growing mash to laying mash should be gradually made by mixing increasing amounts of laying mash with the grower feed. In ten days the change should be completed.

The onset of laying should occur naturally. The age at which pullets start to lay is an inherited characteristic. It is a mistake to attempt to force heavy egg production or to try to delay the onset of laying. Healthy pullets that have been properly fed will start laying when they mature, and until they are ready to lay they should not be unduly stimulated to start production.

8. Feeding and Management of Flock for Summer Egg Production

Any well developed hen or pullet that is healthy will lay well during the spring months of March, April and May. During the summer months that follow the problem of securing good egg production depends upon good management.

The hens should be kept in comfortable quarters that are cool during the day and well ventilated. Roosting space should be ample to avoid excessive heat during the night.

Ample supplies of clean fresh water, laying mash and oyster shell must be available.

Grain should be limited to an evening feeding in the case of heavy breed birds or light breeds that are hand fed grain.

Every effort should be made to get the hens to eat large amounts of laying mash. A wet laying mash should be fed at noon each day as described on page 9.

The hens should be confined within the house until after the wet mash feeding each day. This keeps the layers near the kind of feed and water necessary for high egg production.

Close culling should also be done to remove the early molting, broody and unthrifty hens as they appear. This practice reduces feed costs, and increases net income. A discussion of culling procedure will be found on page 23.

Lice and mites may seriously reduce egg production and since they multiply rapidly in hot weather the flock should be examined every two or three weeks for the presence of lice. The roosts and other equipment in the house should also be examined for mites.

Club members that follow these recommendations can obtain satisfactory egg production until late October or early November from the mature flock.

Other management considerations are the same as those discussed under Winter Management.

9. Culling and Production Judging

Culling begins with the removal of unthrifty young stock. Pullets placed in the laying house should be selected for size, rate of maturity, health and vigor.

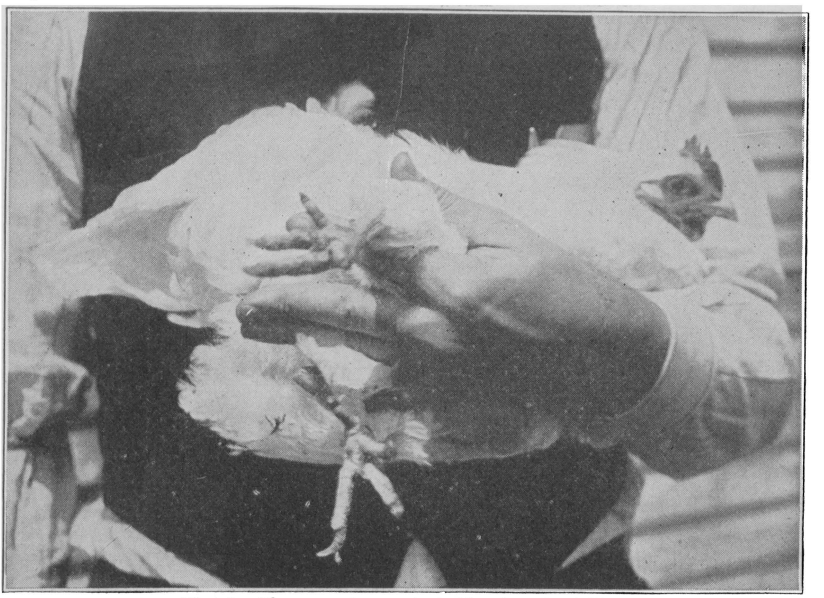

Fig. 6.—The correct way to hold a hen in culling.

In the laying flock poor individuals should be removed as they appear during all months of the year. However, the greater part of culling is done toward the end of the laying season from July to November.

Proper treatment and good feeding of a flock ahead of the time it is to be culled is necessary. Good hens will appear to be culls if they have not had good feed and care.

One of the first points in culling is to learn the proper way to hold the birds. Figure 6 illustrates this method.

The hen should be held in the left hand with the palm upward and the fingers extended. Allow the breast bone of the hen to rest on the palm with head pointing toward the elbow. The extended fingers should grip the legs in such a manner as to allow the hen to be comfortable. This grip involves placing the thumb and first finger on the outside of the right leg and the second finger between the legs.

A good producing hen has vigorous, strong, healthy appearance and is gentle and friendly. A poor layer is wild or cross.

The eye of a good hen has a bright, alert appearance. The head is broad, and fairly short with a short, well curved beak. The entire head has a clean, clear cut appearance in contrast with a dull eye, long narrow, beefy type head found in poor producers. This is shown in Figures 7 and 8.

Fig. 7.—Head of a poor producer.

Fig. 8.—Head of a good layer.

Birds that have poor heads usually will be found lacking in other body characteristics. A good hen has a broad back, deep body, and is wide between the legs. Such a bird gives a clean cut appearance, has a full broad chest and possesses constitutional vigor and the ability to turn large amounts of feed into eggs. When handled these good hens have a square, angular feeling to the touch. Hens

that lack these good qualities have small rounded bodies that lack depth and width. They are narrow between the legs and have shallow chests that indicate a lack of vigor. Figure 9 shows a good producer. Notice the full breast, deep, long body, clean cut square head and frayed worn feathers.

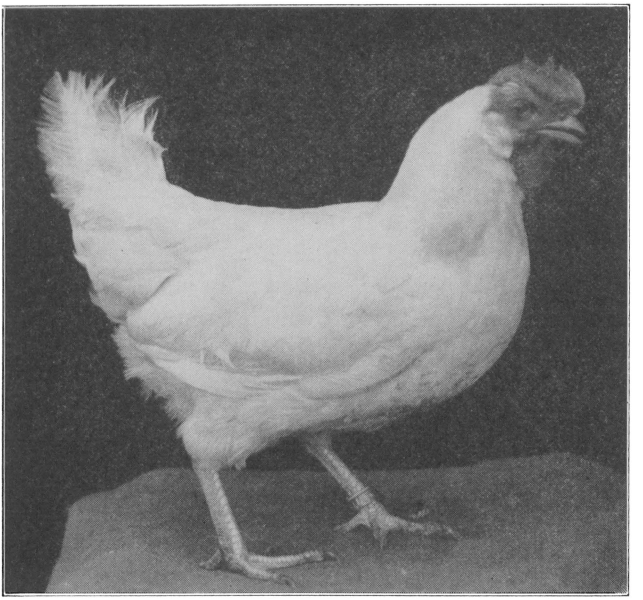

Fig. 9.—A good producer at the end of laying year. The bare head is quite characteristic of heavy layers.

Judging Past Production.—The amount of yellow color in the skin, legs and beak of the breeds and varieties of chickens that have skin of this color tells a story of past egg production. A bird takes yellow color into her body from yellow corn and green feeds. This color when it does not go into egg yolks is deposited in the skin. It is most noticeable in the area around the vent and in the beak and shanks. If a hen is laying regularly this color fades away until a bleached or white appearance develops in steadily producing birds. The color first fades in the skin around the vent. The beak starts to fade at the base next to the head and takes 4 to 6 weeks to completely bleach to the tip. The legs bleach more slowly because of thick scales and 4 to 6 months of steady laying is necessary before all the color disappears.

This fading of color makes it possible to judge past production rather accurately since this color returns during the summer months when the poorer hens slow down or stop laying completely. This information does not apply to chickens of the white skinned varieties such ar Orphingtons.

A good producing hen has a soft, loose, velvet-like skin. Her breast bone is fine and the pin bones are thin and flexible. A poor producer has coarse pin bones; is thick skinned and the flesh of the abdomen will feel hard and tight.

The breast bone of a hen which is not in laying condition will be drawn up so there is little distance between the rear end of it and the pin bones which will also be close together. A hen in laying condition will show a depth of three to four finger widths between the end of the breast bone and the pin bones, which will also be expanded two or three fingers in width.

The Molt.—The hen uses the same feed to make eggs and feathers. If she starts changing feathers, she slows up or completely stops

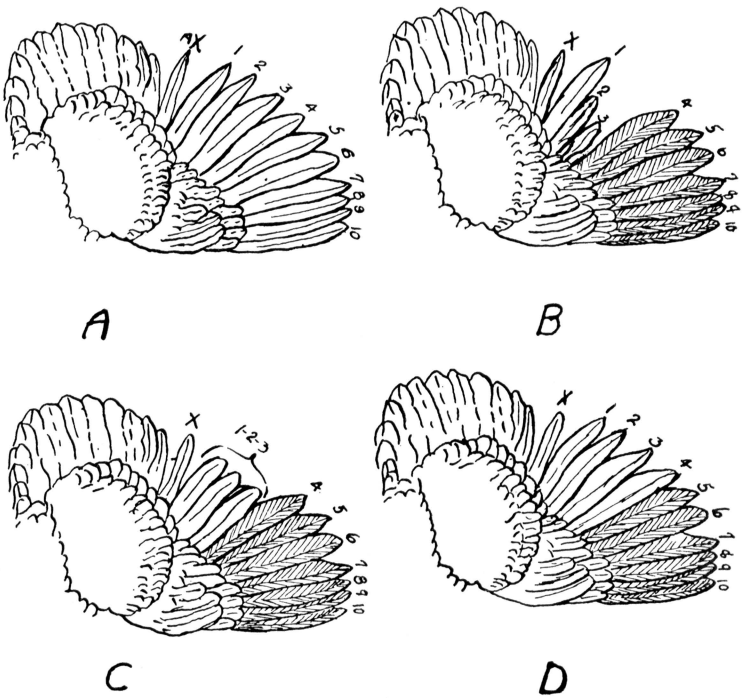

Fig. 10.—(A) Wing with feathers fully renewed. (B) Normal wing molt showing first three primaries in process of replacement. (C) First three primaries molted in a clip. (D) Wing with first four primaries renewed. B Molt has been in progress about six weeks. C Three feathers molted at one time, indicating a two or three weeks vacation which started about four weeks previous. D Probably molted in succession in which case vacation started over eight weeks earlier and extended over a period of approximately four weeks. This hen has probably resumed laying.

egg production. Poor producers start molting in the early summer and usually stop laying completely or lay very few eggs. In contrast, the hen that molts in September or October or later completes the task of growing new feathers in about 60 to 90 days. She starts laying again almost as soon as the inferior hen that starts molting during the late June or July months. Early molting hens usually lay at a slower rate than the fast molters and require more time to complete the growth of new feathers. Consequently they are unprofitable.

The way in which a hen sheds her primary wing feathers makes it possible to estimate how long the molt has been in progress and approximately how much vacation the hen has taken. Figure 10 shows a diagram of a chicken wing divided between primary and secondary feathers. There are from 9 to 11 primary wing feathers which are separated from the secondary feathers by a wide feather called the axial feather. This feather is easily distinguished from the primary and secondary (inner half of wing) feathers because the shaft of the feather divides it into two equal parts. The shaft in the primary feathers is off center and causes the web of the feather to be wider on one side than the other.

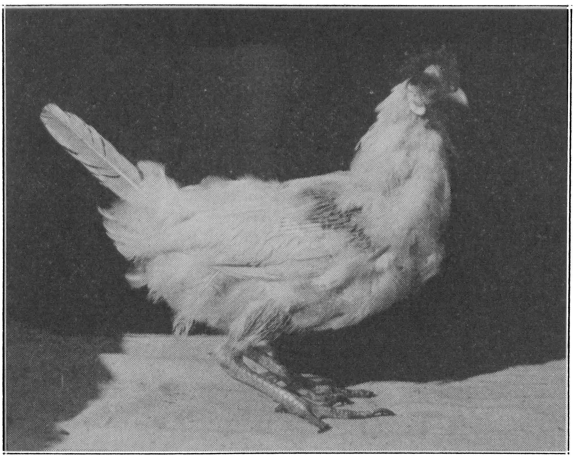

Fig. 11.—A hen in full molt. Characteristic type of molting for heavy layers. Photographed November 1.

Hens that stop laying in July or later usually lose the primary wing feathers closest to the axial feather. For each loss of a primary wing feather it is safe to estimate that a two weeks vacation was taken. It takes about six weeks for a new feather to grow completely. A new feather of this type has a bright pink quill as com-

pared to a white quill in the old ones. These facts make it possible to estimate when the vacation started and by adding two weeks additional vacation for each new feather found, the approximate length of vacation can be determined.

In late molting hens the exception to this general rule is found. These good hens frequently molt two and three primary wing feathers at the same time. When this occurs the new feathers will grow out at the same rate and the rest period is no greater than had just one feather been dropped.

Figure 11 shows a late molting hen in the process of rapidly growing new feathers.

A temporary upset or a sudden change in feeding can cause molting to occur. For this reason the severity of the molt and the other characters of good and poor hens should be considered in selecting the good hens from the culls.

The following culling chart serves as a summary of the characteristics of good and poor producing hens:

CULLING CHART

High Producers		Poor Layers
Strong, healthy, friendly.	1. Vigor	Lazy, wild, weak.
Full and waxy; red.	2. Comb	Shrunken, pale color.
Shanks, beak, skin bleached out.	3. Color	Shanks, beak, skin yellow.
Velvety, soft skin.	4. Quality	Coarse, dry skin.
Pin bones fine.		Breast bone and pin bones thick.
Abdomen soft, body deep, pin bones spread.	5. Condition	Abdomen hard, body bones closed up, pin bones close together.
Late, fast molter.	6. Molt	Slow, early molter.

10. Production and Care of Good Market Eggs

Eggs do not require a ripening period, but are best when freshly laid. They require the same care that is necessary to prevent milk from spoiling. They should be cooled rapidly, stored in a cool cellar or basement and should be marketed at least twice a week during the summer months.

Unless they receive care that protects and preserves their original good quality consumers quickly become discouraged and use fewer eggs. This, of course, lowers the price that the producer of good and poor eggs is able to secure.

Produce Clean Eggs.—Eggs are clean when laid and should be kept clean. This may be done by providing one nest for every four or five hens in which clean nesting material is always kept. The eggs should also be gathered three or more times each day before the hens have a chance to get them dirty. Clean litter on the floor serves as a door mat for the hens before getting on the nest. This will reduce the number of dirty eggs.

Protect Eggs From Heat.—Frequent gathering is also important because the heat from the hens sitting on the eggs causes the egg whites to become thin and watery. For the same reason broody hens should be confined in coops. Heat damage lowers the quality and price that can be received.

Since heat damage is serious, it is important to gather the eggs in wire baskets which permit a free circulation of air for more rapid cooling. The eggs should be left in these baskets over night in a cool basement or cellar to allow all the animal heat in the egg to escape as quickly as possible. If eggs are cased immediately, the animal heat stays in them for a much longer time and their quality declines.

At the time an egg is laid, it has no air cell, but as the body heat of the hen leaves it the contents inside the shell contract, leaving a small air cell which is normally located in the large end of the egg. The older it becomes, the more moisture evaporates from it and the larger it becomes. For this reason the size of the air cell is used by market men to tell the age of the eggs. Consumers do not want to buy stale eggs and consequently the price for eggs with large air cells is much lower than that to be obtained for a fresh egg. This is another reason for frequent marketing.

Storage Place Should Be Moist.—Since the size of the air cell is used to estimate the quality of an egg and since eggs lose market value more rapidly in dry places, eggs should be kept in a place having a high percentage of moisture in the air.

This may be accomplished by building a sand box in the corner of the basement or cellar. Three or four inches of sand should be placed in the box and a bucket of water should be added to the sand each morning during the summer months. The eggs may be cooled out in wire baskets, placed on a rack directly above the sand box. The evaporation of moisture from the sand cools the eggs more rapidly and prevents the air cell from becoming too large.

Since eggs absorb flavors and odors, the cellar or basement should be free of spoiled fruit, onions, or kerosene which would give the eggs an objectionable flavor.

Produce Infertile Eggs.—After the hatching season, infertile eggs should be produced. The old male birds and young cockerels should be sold or securely penned away from the laying flock. A fertile egg during the summer months will start to develop a chick within a few hours after it has been laid. Such eggs are unfit for human food and mean an absolute loss to the egg producer. The average rooster eats about 85-90 pounds of feed per year and aside from producing fertile eggs for hatching they are of no value.

Case Properly and Handle With Care.—The eggs should be cased with the small end down—if the large end is placed down the air cell in this end is likely to be broken and a fresh egg would be classed as old if damaged in this way. Avoid rough handling in taking the eggs to market. During the summer months they should be protected from the sun to prevent heat damage.

Good cases and clean flats and fillers should be used in packing eggs for market. The flats and fillers should be dusted off because the dust and moisture on the shell will result in a soiled egg.

Eggs should be handled and prepared for market in this manner to preserve their original value and secure their increased use at better prices.

They should be sold on a graded basis that will reward the producer for his care in delivery of a quality product to market.

It is just as unfair to sell all eggs or chickens at the same flat price as it is to sell all hogs, cattle or sheep at a flat price regardless of the size, age, weight and finish.

11. Disease Prevention and Parasite Control

Disease prevention and parasite control depends upon securing healthy,vigorous chicks and sanitation in developing them into equally healthy, vigorous pullets.

Control of pullorum disease which is one of the principal causes of chick losses up to three weeks depends upon accurate testing of parent stock to remove infected birds.

Control of coccidiosis is dependent upon strict sanitation following the suggestions previously made on the use of clean range and other sanitary practices.

Coccidiosis Symptoms and Treatment.—The common symptoms of coccidiosis include ruffled feathers and a droopy, ragged appearance. Blood is frequently found in the droppings, but chicks may have the disease without this symptom.

In the event an outbreak of this disease occurs the brooder house should be thoroughly cleaned, all litter removed and the floor

scrubbed with lye water. Fresh litter should be placed in the house and changed every other day.

The chicks should be changed from their regular ration to a mash composed of 20 pounds each of corn meal, bran and shorts and 40 pounds of dried skim milk or dried buttermilk. No other feed should be given for 5 to 8 days, but clean, fresh drinking water is necessary.

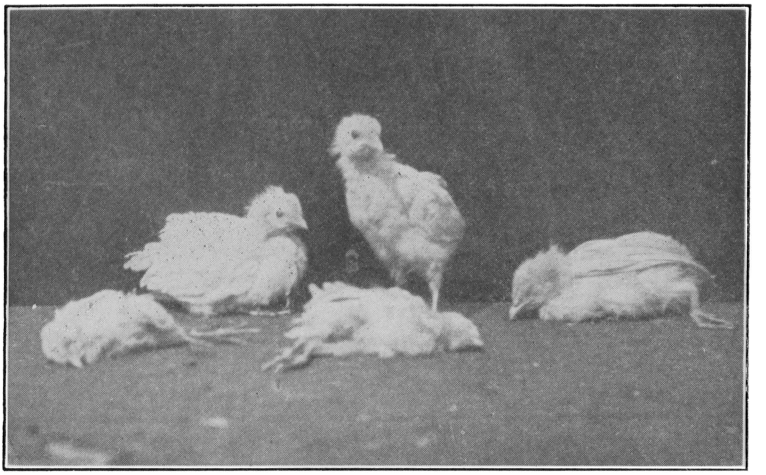

Fig. 12.—A group of chicks affected with coccidiosis.

Bluestone should be used to disinfect the water and reduce this means of spreading infection during the period. Use one ounce of bluestone in 8 gallons of drinking water.

If liquid milk, either sweet or sour, is available it may be used instead of dried milk if it is fed with the regular chick starter and without water to drink. At the end of 5 to 8 days or when recovery is noted the chicks may again be fed this regular chick starter. The chicks should then be moved to a clean ground location or reinfection is almost sure to occur.

Chicken Pox.—Chicken pox may be controlled by vaccinating pullet flocks between the ages of eight and twelve weeks. This produces immunity for life provided the recommended chicken pox virus vaccine is used. Pigeon pox virus vaccine is not recommended.

Chicken pox usually breaks out in the fall or early winter. It appears as raised brown wart-like scabs on the comb, wattles and bare parts of the head. In cases of light infection these scabs are often mistaken for scratches resulting from pecking, fighting and other minor injuries.

Vaccination is simply done by removing a few feathers from the thigh of the young pullet and applying a very small amount of the vaccine to two or three follicles where the feathers have been removed.

Vaccination is recommended on only those farms where pox infection has caused trouble in previous years or in communities where infected flocks are quite common. There is no need to vaccinate for the disease if it has not caused trouble in the community because the process of vaccination would introduce the infection on farms where it has not been present. The introduction of the infection, whether from other flocks or by vaccination, requires an annual vaccination of pullet flocks to prevent future outbreaks of the disease.

Worm Control and Treatment.—Control of round worms depends upon sanitation in the use of clean range. When clean range is used there should be no necessity for worming the pullet flock before housing in permanent quarters. Adult birds may require a worm treatment at the end of the first year's production. Treatment should be given each individual bird at the time the flock is in a general molt.

Tape worms cannot be effectively controlled or eliminated by treatment. Success in preventing a serious infestation depends upon sanitation. The tape worm completes a part of its life cycle in the chicken and a portion in insects such as slugs, flies, etc., upon which the chickens may feed. Clean quarters which reduce the fly hazard will also reduce tape worm infestation.

Before any worm treatment is given the club member should know the kind of worm with which the chickens are infested. Then treatment may be expected to be somewhat effective. Double duty worm pills, combining treatment for both round worms and tape worms, are not recommended.

Round worms are white or yellowish white in color and from 2-4 inches in length. They are round or cylindrical while the tape worm is flat, ribbon-like and made up of sections or segments.

Chickens may be affected with both types of worms at the same time. Treatment, however, should be made for one type of worm and followed with a treatment for the other kind in a week or ten days.

Chickens that are heavily infested with worms of either type become thin, light in weight, and have ruffled feathers and a general unthrifty appearance. Paleness of the head, comb and shanks is also characteristic.

Nicotine in some form is recommended for the elimination of round worms. There are a number of commercially prepared round worm pills on the market for this purpose.

Common household lye is valuable in holding down tape worm damages. To use this treatment mix ½ gallon of wheat and ½ gallon of oats and add 1 rounding tablespoon of household lye that has been previously dissolved in 1 pint of warm water. Cover this mixture with water and boil slowly for two hours. Scorching of the grain should be avoided by adding a little water from time to time and by stirring the mixture frequently. Excess water should be drained off.

The birds should be starved for 24 hours before feeding this mixture and water should not be given for the last 12 hours of this fast. The grain that has been boiled in lye solution should then be placed before the birds for about two hours. Water should also be provided. Two hours before roosting time is an ideal time to feed this mixture. In this way most of the worm segments will be deposited under the roosts and can be collected and destroyed early the next morning. A second treatment must be given in a week.

Any worm treatment to be effective is somewhat severe. Hens that are laying well do not need treatment and sanitation in preventing infestation is far more important.

Colds and Roup.—The best insurance against colds and roup consists of early housing in comfortable quarters that are free from drafts, dampness and over crowding.

Should an outbreak of colds occur, it is most important that the cause of the trouble be determined and corrected. The affected birds should be removed from the flock as a means of reducing the spread of the infection. Bluestone may be used in the drinking water at the rate of one ounce to eight gallons of water as a disinfectant to reduce the spread by this method. Emphasis on prevention through comfortable housing and adequate feeding are the key notes to success.

Lice and Mites.—Lice live on the body of the bird and lay their eggs on the feathers. They multiply rapidly, particularly in warm weather. The nicotine sulfate treatment to rid poultry of these pests is very effective and easily carried out. "Black Leaf 40" (nicotine sulfate) is spread upon the roosts in a narrow, thin line about an hour before roosting time. As the hens perch on the roosts during the night, the heat from their bodies causes a nicotine gas to form. This kills the lice but does not kill the eggs on the birds' feathers. For this reason it is necessary to repeat this treatment

in 7-10 days to kill the lice that hatch before they mature to lay more eggs.

Sodium fluoride as a dust and in suspension as a dip are also used to control lice. Sodium fluoride powder is dusted on the bird and worked into the feathers.

Dipping in a solution of sodium fluoride is a very effective method of keeping the flock free from lice. If all the birds on the farm are dipped twice a year, the flock can be kept comparatively free of body lice. The dip method is useful for pullets under range conditions when housed in buildings which permit too free a circulation of air for successful use of the nicotine sulfate method.

Since dipping must be done on warm bright days, the flock should be treated in advance of cold weather in the fall if infested. If the old birds are dipped in the fall before the pullets are placed in the house, it is often unnecessary to treat the pullet flock. It may be necessary to dip a second time as soon as warm weather permits in the spring.

The dip is prepared by adding one ounce of sodium fluoride powder to each gallon of water. The birds should be held by the wings and the entire body placed under water. The free hand should be used to ruffle the feathers to be sure the solution reaches the skin. Finally the head can be pushed under once or twice and excess material allowed to drain back into the container for a few seconds before releasing the bird.

Sparrows and other birds should not be permitted in the house with poultry, because they frequently bring in both mites and lice.

Mites do not live on the chickens but live in the cracks and crevices about the roosts and nests where they can crawl on to the birds. They may be eliminated by thoroughly cleaning the house, disinfecting it with lye solution and painting the roosts and droppings platforms with waste crank case oil.

A clean, comfortable house, and sanitation in feeding and watering, combined with healthy stock, is the greatest insurance against parasites and disease losses. It is much easier and less costly to follow the necessary steps outlined than to attempt "doctoring" after a disease or parasite is established.

POULTRY II—PULLET PRODUCTION

This project is similar in many respects to the Home Flock Management project. However, ownership of the poultry is necessary and the minimum number of chicks to be brooded by the club member is 300 to 350.

In this advanced club project husbandry practices are studied in more detail with frequent reference to Missouri College of Agriculture bulletins on many of the subjects involved.

POULTRY III—YOUNG POULTRYMAN'S FLOCK

This advanced club project follows pullet production project number 2, ownership of the birds, by the club member, is required. More detailed study of adult bird management and breeding problems is undertaken involving enlarged reference to Missouri College of Agriculture bulletins. Record keeping for a full year on regular demonstration flock forms and a business analysis of farm poultry business is a definite part of this project.

POULTRY CLUB OBJECTIVES

Project Work Plan—

Poultry I.—Farm Flock Management.—The objectives of each club member are to care for the farm flock, without ownership, but with a share in the returns according to a home plan mutually agreed upon. The problems taken up will include feeding, raising young stock brooding, housing, general management and record keeping. The project work should be organized in the fall or early spring, and the year's work ordinarily will be completed by November 1.

Poultry II.—Pullet Production.—The objectives of each club member are to secure and own 300 or more production baby chicks, or hatch out the equivalent, by April 15 and keep records. The chief problems will include brooding, young flock management until the pullets are in production, and record keeping.

The project work should be organized by November 1, if eggs are to be hatched, and by January 1, if baby chicks are to be purchased; and the work should be completed by November 1.

Poultry III.—Young Poultryman's Flock.—The objectives of each member are to own and manage his own flock, and carry out about the same plans as suggested for Poultry I.

Project work should be organized in October or November and should be completed by the following October 1.

Records.—Each club member will be required to keep a record of expenses chargeable against the poultry under his or her care, including the cost of feed, young stock, equipment, and other expenses, and a record of all income from the sale of eggs, poultry and any other income. A daily egg record of producing flocks should be kept.

Ownership.—In Poultry I, farm flock management ownership of the poultry and equipment is not required, but the club member should receive a specified share of income for their efforts.

Poultry II, Pullet Production; and Poultry III, Young Poultryman's Flock are for boys and girls who will own the poultry and own or rent the equipment used.

Time Required.—Since poultry clubs cover a somewhat longer period of the year than most 4-H club projects, time will usually be required to attend from 8 to 10 meetings, the club tour and achievement day in addition to the time required on the project and for the keeping of records at home.

RECORD

FOR 4-H POULTRY CLUB MEMBERS

Poultry Project _____

Name of Member _____ Age _____

County _____ P. O. _____ R. F. D._____

Name of Community _____

Name of Club _____

Name of Community Club Leader _____

Name of Project Leader _____

Date Started _____ Date Completed _____

HATCHING RECORD

Number of eggs set or chicks bought _____ Number infertile ____

Number of chicks hatched or bought _____ Date of first hatch____

How hatched _____ Date of last hatch _____

BROODING RECORD

How brooded _____

Num. killed by accident _____

Num. lost from disease _____

Num. lost from other causes _____

Total number lost _____

Total number raised _____

FEED EXPENSES*

Date	Kind of Feed	No. lbs.	Price per 100	Cost
	Total Feed	Lbs.		Cost $

*Make the feed record as simple as possible. The amount and cost of the feed is what is wanted. Weigh or measure a week's or a month's supply and store it in a convenient place. Charge farm grown feed at market prices.

Date	Number of Eggs					
	November	December	January	February	March	April
Number of hens first day of month						
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
Total Eggs						
Number of hens last day of month						

To secure average number of eggs, add number of hens on beginning and end of month and divide by two. This figure divided into the total number of eggs gives average number of eggs per hen.

	No. of hens	Ave. No. Eggs	Total Sales	Total Expenses
Nov.				
Dec.				
Jan.				
Feb.				
March				
April				

Date	Number of Eggs					
	May	June	July	August	September	October
Number of hens first day of month						
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
Total Eggs						
Number of hens last day of month						

To secure average number of eggs, add number of hens on beginning and end of month and divide by two. This figure divided into the total number of eggs gives average number of eggs per hen.

	No. of hens	Ave. No. Eggs	Total Sales	Total Expenses
May				
June				
July				
August				
Sept.				
Oct.				

FINANCIAL SUMMARY—Cost of Raising Pullets

Receipts	*Expenses*
Num. of cockerels sold_____ Wgt._____ Value $_____	Num. of eggs set or chicks bought_____ Value $_____
Num. of pullets sold_____ Wgt._____ Value $_____	Num. of lbs. of feed used_____ Value $_____
Num. of cockerels eaten_____ Wgt._____ Value $_____	Amount of fuel used_____ Value $_____
Num. of pullets eaten_____ Wgt._____ Value $_____	Miscellaneous expenses_____ Value $_____
Num. of cockerels on hand October 1_____ Wgt._____ Value $_____	Total cost of raising chickens $_____
Num. of pullets on hand October 1 ____ Wgt._____ Value $_____	
Total value of chickens raised $_____	
Did your pullets lay before Nov. 1?_____	
How many eggs did you get? What was the market value of them? _____	
Total Receipts $_____	Total Expenses $_____

Receipts less Expenses $_____

FINANCIAL SUMMARY—Laying Flock

Num. Hens Beginning of Project _____ Value $_____
Num. Hens End of Project _____ Value $_____
Increase or Decrease in Value $_____
Total Sales from Eggs $_____
Total Sales from Fowls $_____
Total Income $_____ Total Expense $_____
Receipts less Expenses $_____

Explanation—Fill out all the blanks and the summary of general club activities; write a story of club work for the year on blank sheet of paper; hand this report blank and story to the club leader; attend the round-up or achievement program; and then your club work will be completed.

SUMMARY OF GENERAL CLUB ACTIVITIES

1. Did you make an exhibit? _____ Where? _____
   What? _____
2. How many individual demonstrations did you give before the club? _____
3. How many team demonstrations did you help give? _____
4. Where? _____
5. Did you judge with a score card? _____ Did you judge by comparison? _____
6. Value of club rewards won $_____
7. What special club activities, if any, did you attend, such as 4-H club camp, State 4-H Club Round-up at the College of Agriculture, etc.? _____
8. How many club project meetings did you attend? _____

(Signed) _____
Club Member.

Approved—Club Project Completed.

_____
Project Leader

Date _____

Notes—Pictures—Clippings:—