

UNIVERSITY OF MISSOURI

COLLEGE OF AGRICULTURE

# Agricultural Experiment Station

COLUMBIA, MISSOURI, OCTOBER, 1915

CIRCULAR NO. 76

---

---

## FEEDING FOR EGG PRODUCTION

H. L. KEMPSTER

The hen is an economical transformer of food into a finished product. A hen laying 200 eggs in a year is not at all unusual. A four-pound hen laying this number will produce six times her weight in eggs. To do this she will require from seventy to eighty pounds of feed. For economical production it is necessary:

1. That the food be properly selected.
2. That it be fed in correct proportion and in a judicious manner in order that her digestive organs may be kept in good condition.
3. That she be fed enough so that she has plenty of surplus for egg production.

Food is taken into the body, to furnish energy and to build up tissue. In feeding for egg production the purposes for which food is supplied are:

1. To supply the body needs.
2. To produce eggs.

The problems of poultry feeding require good judgment and keen observation. Hens fed for egg production should have foods high in the food elements which are found in eggs. Those fed in the fattening pens should have the foods which most economically produce fat. The best ration, then, is the one which supplies most economically the food requirements of the bird for the purpose for which it is kept.

It should be remembered that one of the principles of poultry feeding is that the hen cannot do well if fed on a whole grain ration. Not only does a ration of grain fail to furnish the proper food nutrients, but such a ration is difficult for the bird to digest properly. The great fault with the farmer in his poultry feeding is that he attempts to feed a whole grain ration, and generally only one grain at that. Such a ration results in poor egg production and also causes digestive disorders, liver and kidney troubles. Complaints of this kind frequently come to the department of poultry husbandry and a suggested change in the ration has usually resulted in the elimination of the trouble. Efficient digestion demands a combination of whole and ground grains. A ration should consist of grains and ground feeds. Generally speaking, twice as much grain should be consumed as ground feed. This depends, of course, upon the nature of the foods fed. Whole and cracked grains are designated by poultry feeders as *scratch foods*. Combinations of ground feeds either wet or dry are called *mashes*.

### ADAPTABILITY OF FEED STUFFS

**Wheat.** Wheat is probably the most popular poultry food. It is a safe food, greatly relished by the fowls; it runs high in its protein content; and it has a large amount of ash. Shrunken wheat can be fed to advantage, and can often be obtained cheaply. Wheat screenings, if of good quality, can be used. Salvage wheat is often found on the market. It should be used with caution. Grain burned by fire makes satisfactory poultry food: there is, however, a large amount of salvage grain that was never in an elevator fire. The wheat has spoiled by moulding, and has been charred so as to hide this fact. Mouldy grains of any kind should never be fed. The moulds not only set up digestive disorders, but cause a certain disease of the lungs.

**Bran.** Bran is a by-product of wheat. It should always form an important part in any poultry ration. Bran is high in ash content, and also renders the mash ration of such consistency that digestive disorders are not so likely to arise. This is the chief value of bran as a poultry food. Only a small portion of it is digested by chickens, so that for its food value alone it would be an expensive feed.

**Middlings.** Middlings are lower in protein content and higher in starch content than bran, but because of the relative cheapness should be used. A mash too high in middlings is pasty, and when

used, middlings should be mixed with other foods so as to be easily handled by the digestive tract.

**Corn.** In Missouri corn should form a large portion of the ration. It is liked by the fowls. Because of its high starch and fat content, it is fattening. It should be fed in combination with other grains. Cracked corn is in a form more easily assimilated than whole corn, and better results will come with the use of it. Feeding immature or green corn in the fall often results in digestive troubles.

**Corn Meal.** Corn meal should be present in all rations. It may be used in the mash, but should be mixed with other feeds so as to lessen the liability of crop impaction. One danger in handling corn meal is its liability of heating or fermenting in storage. Sour or mouldy feed should never be fed. A good practice is to mix the corn meal with bran in proportions desired, and store mixed rather than attempt to store separately. One of the reasons why corn bread is better than corn meal as a chick food is that baking destroys the ferments or moulds.

**Oats.** Oats can be used successfully in the ration. When fed whole they should be fed in limited quantities, not more than one-third of the grain ration, because of the high percentage of hull. Chickens are able to digest but very little crude fibre, and for this reason one must limit the amount of foods with hulls, such as buckwheat, oats, sunflower seed, etc. The ration should not have more than  $3\frac{1}{2}$  to 4 per cent of crude fibre. Ground oats make an excellent mash for chickens, while pin head or steel cut oats make excellent chick food, as do rolled oats.

**Protein or Nitrogenous Food.** The hen requires some food high in protein. All our grain foods so far considered do not furnish enough protein. It is necessary, then, to supply something which will balance the ration, or equalize the relation between the proteins and the carbohydrates and fats. Of the vegetable protein foods, *oil meal* is perhaps the most popular. It is high in protein, containing 30 per cent, and makes a valuable addition to the mash during the moulting season. It should never form more than one-fifteenth of the ration. *Cottonseed meal* is not considered as palatable and it is slightly constipating. If fed, it should be in very small quantities. *Gluten meal* is also used for the same purpose and is greatly relished.

**Meat.** Meat foods are considered essential for efficient egg production. In fact, it is poor economy not to feed meat food of some kind. Increased returns from feeding it more than make up for the expense. Beef scrap is perhaps the most common meat food.

This is a commercial product which comes in ground form, will keep indefinitely, and can be mixed in the mash. Beef scrap runs very high in protein and in addition contains ash which is beneficial. It is a useless expense to feed too much. One-twelfth beef scrap in the ration is as much as necessary, provided no other food unusually high in protein is fed. If oil meal, gluten meal, etc., are fed, this proportion can be reduced. At the Missouri Agricultural Experiment Station a pen of twenty-five Leghorns was fed beef scrap and produced 869 more eggs from November 1, 1914, to July 1, 1915, than a corresponding pen which was fed the same ration but without the beef scrap. The two pens ate practically the same amount of food, so that \$2.10 worth of beef scrap produced 869 more eggs.

**Green Cut Bone.** Green cut bone is popular as a meat food. It is greatly relished by hens. The preparation of it is laborious unless one has a power cutter. It must be fed almost as soon as prepared, for it spoils very quickly in warm weather. A small amount daily increases materially the egg production. When one meat food is fed there is no need of supplying others.

**Tankage.** Tankage is not so satisfactory because the hens do not like it so well. Fresh fish, infertile eggs, table scraps, etc., can also be used in the supply of animal food.

**Sour Skimmed Milk or Buttermilk.** For farmers the use of sour skimmed milk or buttermilk is urged. At the Missouri Agricultural Experiment Station it was shown that by the use of sour milk the cost of producing eggs was reduced ten cents a dozen. A pen of twenty-five Leghorns which was fed sour milk produced in eight months 850 more eggs than another pen fed the same ration, but without sour milk. At the rate of 20 cents per hundred pounds for milk, \$2.60 worth of milk produced 850 more eggs. The pen consumed 100 pounds less feed during that time. Sour milk is better than sweet milk. In feeding milk one should keep the pails or pans clean. When milk is fed it is unnecessary to feed beef scrap or green cut bone.

**Ash Grit, Crushed Rock, Limestone, etc.** These materials should be kept before the hens all the time. The lime makes the shell and the grit aids digestion. Flint grit cannot take the place of limestone or oyster shell. Limestone and oyster shell are the most common sources of lime and should be kept constantly before the fowls.

When fowls are allowed to range over gravelly soil there is no need of supplying grit, but where small pebbles are lacking and the birds are confined, grit must be supplied. A gravel pile on the farm usually solves this problem.

During the egg production period the hen requires three times as much ash or lime as there is in the grain and meat foods. This is largely because she requires large quantities to manufacture the egg shell. When a feeder fails to supply extra ash as suggested, the egg production will be considerably less or the hen will lay soft-shelled eggs.

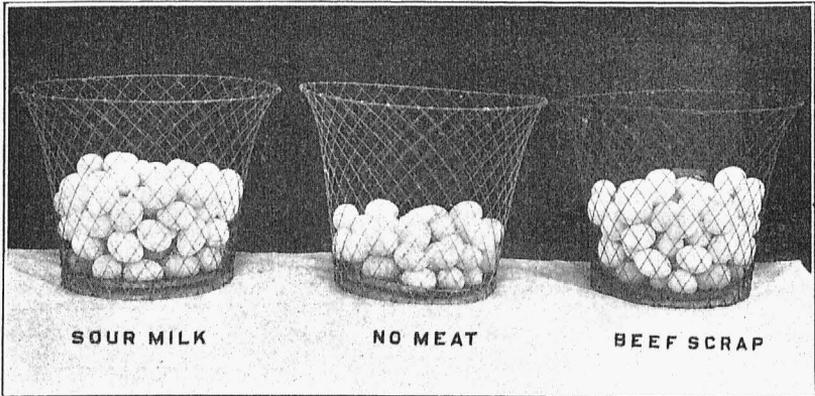


Fig. 1. *Feed sour milk or beef scrap. The hen fed no meat or milk laid 38 eggs while 71 were being laid by the milk fed hen and 72 by the hen fed beef scrap.*

**Green Food.** Green food is very important as a poultry food. Its function is not so much to supply food nutrients as to assist in the digestion of other foods and in keeping the digestive tract in better condition. Green food is greatly relished by all kinds of poultry. Absence of green food causes hens to lay eggs with pale yolks. So far as possible green food should be grown on the poultry runs. In winter it can be supplied by various means. Cabbage and mangel wurzels (large beets) are perhaps the best, but steamed clover or alfalfa can be utilized. Some people get a heavy stand of rye in the fall, cut this in the winter when the chickens are not permitted to run, and feed it in the pens. Ensilage chopped very fine is also used. For summer feed the sowing of the runs to wheat the previous fall and oats in the spring followed by rape, buckwheat, or soybeans gives good results. Other forms of succulent food are potatoes (boiled), carrots, turnips, onions, etc. The two last named are said to flavor the egg. Soaked beet pulp can be used as a green food.

A popular source of green food is sprouted oats. It requires considerable labor to keep the flock supplied with sprouted oats. The sprouting is done by the use of trays two or three inches deep with holes in the bottom for drainage. The trays should be kept in a room at a temperature of 70 degrees. A half-inch of earth should be placed in the bottom of the trays. A half-inch of oats which have been soaked in warm water over night is placed on the earth. The oats should then be covered with a half-inch of sand and the trays kept moist. When the oats are three inches long they should be fed. As a green food, sprouted oats cannot be excelled but the difficulty comes from the great amount of labor and the necessity of having a satisfactory room in which to do the sprouting.

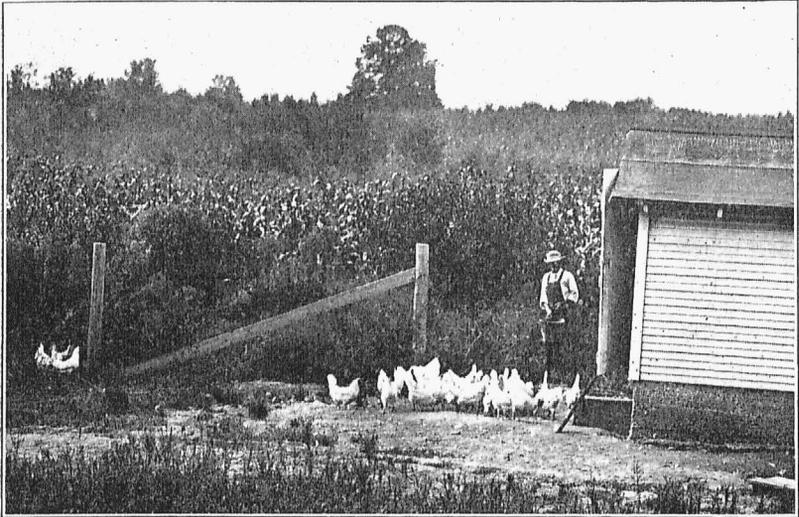
**Water.** Failure to supply clean fresh water will decrease egg production materially. Hens must have water. The egg is 65 per cent water. The more eggs a hen lays the more water she requires. The warmer the weather, the more she will consume. If this important point is neglected not only will the number of eggs be less, but they will be smaller and ovarian troubles may result. A drinking stand eighteen inches high upon which the pail can be placed assists in keeping the water clean.

### FEEDING MASH

Mash is a combination of ground feeds. A mash may be moist or dry. It should constitute about one-third of the ration. Mash may be fed dry in hoppers where the birds may have access to it for part of the day. The advantages of feeding the dry mash are that it saves labor, there is no danger of the hens overeating, and food is always available so that each hen gets her share. It has been difficult to secure a suitable dry mash hopper which will prevent the hens from wasting the food. In spite of this slight disadvantage the dry mash system of feeding is being employed on nearly all commercial poultry farms because of the saving in labor. Often the mash is stored in boxes and a definite quantity is fed daily. Where this is done it serves as an indicator of the appetite of the fowls. Many feeders govern the amount of scratch food fed by observing the condition of the mash trough. If the same amount of mash is fed daily and at the next feeding some remains in the trough this indicates that the hens have been slightly overfed. Accordingly the scratch feed can be reduced. If the mash is all cleaned up the full amount of grain should be fed.

Hens must be educated to eat dry mash. They should be fed dry mash when chicks; otherwise it is difficult to get them to eat it.

They much prefer mash moistened with water or milk. The objection to wet mash is that too much work is required to prepare it; it also requires greater skill to feed it successfully than it does to feed dry mash. Some persons object to feeding wet mash before noon for the reason that the birds gorge themselves and remain inactive the rest of the day. Where wet mash is used it should never be fed in such quantities that the birds are completely satisfied. They should clean up all that is fed and still be slightly hungry. Another reason for this is that if any wet mash remains it will sour and spoil before the next meal.



*Fig. 2. Feeding the flock. Feeding at the poultry house encourages the flock to stay at home.*

Both systems of feeding mash have their advantages. There is no reason why a combination of the two cannot be used. If, especially during the winter, a small quantity of wet mash is fed, say a handful to every four hens, it will stir the birds to activity and increase their hunger, which they can satisfy by visiting the dry mash hopper. The birds will be better satisfied and better egg production will thereby be encouraged. The more mash the hens can be encouraged to eat, the greater the egg production will be. The correct amount varies from a third to a half of the amount of grain eaten. One should never forget the importance of feeding ground food.

## VARIETY

Variety in the ration should not be overlooked. Any surprises assist materially in keeping the birds happy and more inclined toward egg production. There should, however, be no quick changes in the ration. A decided change in the method of feeding may throw the hen into a molt. Variety can be maintained without necessitating any marked change. Supplying green food in different forms, the occasional feeding of a wet mash, green cut bone and other delicacies will assist materially in the production of more eggs.

## RATIONS

The following are suggested rations for egg production the parts being given by weight, not volume:

### Ration 1

Scratch Food

*In Winter*

1 part wheat  
2 parts corn

*In Summer*

2 parts wheat  
1 part corn

Mash (ground food)

1 part bran  
1 part middlings (shorts)  
1 part cornmeal  
1 part commercial beef scrap

### Ration 2

Scratch Food

*In Winter*

6 parts wheat  
3 parts corn  
3 parts oats  
3 parts buckwheat

*In Summer*

6 parts wheat  
6 parts corn  
3 parts oats

Mash (ground food)

6 parts cornmeal  
6 parts middlings  
3 parts bran  
1 part alfalfa meal  
1 part oil meal  
5 parts beef scrap

## Ration 3

Scratch Food	Mash
Early morning and night cracked corn	3 parts bran
At noon equal parts wheat and oats	1 part middlings
	1 part cornmeal
	1 part meat scraps
	Occasionally 1 part oil meal is added to this ration

## Ration 4

Scratch Food	Mash
<i>In Summer</i>	Ground oats
1 part corn	Butter milk or sour skim milk as a drink
2 parts wheat	
<i>In Winter</i>	
2 parts corn	
1 part wheat	

## Ration 5

Scratch Food	Mash
6 parts corn	2 parts bran
6 parts wheat	1 part corn meal
4 parts oats	1 part gluten meal
2 parts barley	1 part ground oats
1 part kafir	1 part middlings
1 part buckwheat	1 part beef scrap

## Ration 6

Scratch Food	Mash
<i>In Summer</i>	4 parts bran
1 part corn	8 parts shorts
2 parts wheat	8 parts corn meal
	8 parts ground oats
<i>In Winter</i>	8 parts beef scrap
1 part corn	4 parts gluten meal
1 part wheat	1 part oil meal

In all the above rations grit, oyster shell and water are kept before the birds all the time. In addition, green food is fed frequently.

Approximately twice as much grain (scratch feed) as ground feed (mash) is fed. Where beef scrap is mentioned in the ration it can be eliminated, provided the hens are fed all the sour milk they will drink.

### METHOD OF FEEDING

The practice of poultry feeding, while governed largely by circumstances, should as far as possible be confined to a regular routine. Regularity is one of the keynotes to success. The hens very soon learn when to expect their daily feed and if they are disappointed, the effect may be noticed in the egg basket. In addition, the poultry feeder should learn the characteristic needs of his flock and cater as much as possible to its desires. He should attend to his duties in a quiet manner, avoiding any action which might frighten the hens or cause them to become excited. He should also gain their confidence and make them feel that he is their friend. This can be easily done by displaying interest in their welfare. By occasionally feeding them some grain from the hand pets will soon be created, making the keeping of hens a little more interesting—and also influencing the egg yield.

In the morning grain should be fed—a small amount in the litter. This should be buried deep. Clean water should be provided. The grit and shell hopper should be kept filled. At noon the dry mash should be fed by opening the hopper or by placing it in troughs.

Any green food should be fed at this time. At night more grain should be fed—enough so that no bird goes to roost hungry. Every bird should have a good full crop when it goes to roost. If the feeder has any doubt, a visit to the hen house after the birds have gone to roost and an examination of the crops will indicate whether the correct amount has been fed. There is no set rule as to how much should be fed. A hen eats approximately 3—4 ounces a day, or about six pounds a month. The amount fed each day varies with the appetite of the bird. There is no danger of overfeeding, providing the birds are compelled to take sufficient exercise. The aim in poultry feeding is to feed all that the bird can consume and yet be kept busy. Approximately twice as much grain should be fed at night as in the morning. In the morning feed half a handful to each bird; at night double this amount. If the birds do not appear hungry at the next feeding, too much has been fed. If they are unus-

usually eager at the next feeding, too little was fed at the last feeding. The amount also varies with the time of the year, more being eaten in the winter, especially if the birds are unable to get food from the yards upon which they run.

### EXERCISE

The success of egg production depends largely upon the activity of the bird. The reason the Leghorns excel in egg production is largely because they keep themselves in good physical condition. They exercise. The hen that is inactive and shows long toe nails is seldom a good producer. The hen that is first off the roost in the morning, keeps busy during the day and is the last to go to roost at night is the profitable hen. Some birds have the disposition to take exercise; others have to be forced. This is especially true of the heavier breeds. Strains of Rocks and other breeds are inclined to be lazy and in a short time get so fat that they cannot produce eggs in satisfactory quantities. The circulation of blood to the ovary is restricted by the excessive fat. This unquestionably interferes with the normal functioning of the ovary and reduces egg production. Exercise can best be encouraged by not overfeeding. The poultry house should be bedded with a foot or more of straw and the grain buried in this. The skill of the poultry feeder is tested by the manner in which he compels the hens to exercise. Overfeeding causes inactivity, which will be manifested by no holes being dug in the straw. Egg production is quite largely dependent upon keeping the birds in condition. In summer it can be encouraged by sowing the yards and letting the hens dig up the grain.

### SUMMARY

The essentials of successful poultry feeding are:

1. Grain (scratch food) and ground feed (mash).
2. Animal food, such as beef scrap or sour skim milk.
3. Grit and oyster shell.
4. Green food.
5. Clean, fresh water.
6. Liberal feeding.
7. Plenty of exercise.
8. Regular attention.

Hens eat from five to eight pounds of food a month, or sixty to eighty pounds in a year. The daily food eaten by a hen is from

three to four ounces. The daily ration for 100 hens is from nineteen to twenty-five pounds.

Hens drink about six pounds of milk a month. One hundred hens drink two and one-half gallons of milk daily.

On limited range a laying hen eats two pounds of grit and three pounds of oyster shell in a year.