EXTENSION BULLETIN 345

MARCH 1958

POULTRY FEEDING

Michigan State University
Cooperative Extension Service
East Lansing

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Poultry Feeding

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Success in poultry feeding depends on many things. Among them are good breeding, good health, good management, good housing, and good feeds. All are vital to profitable feeding operations.

This circular deals only with feeds and feeding of poultry. To profit from his investment in breeding, housing, and other factors, a poultryman must properly balance the feeds and properly feed them.

RATIONS—COMMERCIAL OR HOME-MIXED?

Many good commercial poultry feeds are sold in Michigan and most poultrymen buy some feed in this form. Along with the feed ingredients, the feed manufacturer sells nutritional and feed mixing know-how, quality control of ingredients, and an alertness to ingredient price changes which a poultryman could hardly match.

On the other hand, many poultrymen raise grains which could be used as basic ingredients in home-mixed feeds. In general, a farmer should not consider home mixing unless he raises much of the grain needed. Even then, it usually pays to take the homegrown grain to the local mill for grinding and mixing with concentrates.

In any comparison of the costs of commercial and home-mixed feeds, all charges for home-mixing should be included—not just costs for feed ingredients. Actually, the cost of feed is not as important as the results it produces. Higher-priced feed may be worthwhile if it increases income from the poultry flock.

FEED FORMULAS AND FEED MIXING

If, after careful consideration of the above, you decide to mix your own feed, you can get formulas suited for home use from the Department of Poultry Husbandry, Michigan State University.

Remember, feed mixing requires care and attention to detail. Too much of a certain ingredient may result in waste; too little may produce a poor feed. Both may be costly—one in wasted feed, the other in lost production.

NUTRIENTS

Actually, birds do not require a series of ingredients. What they need is a series of nutrients which make up the ingredients. These nutrients are carbohydrates, fats, proteins, minerals, vitamins, and

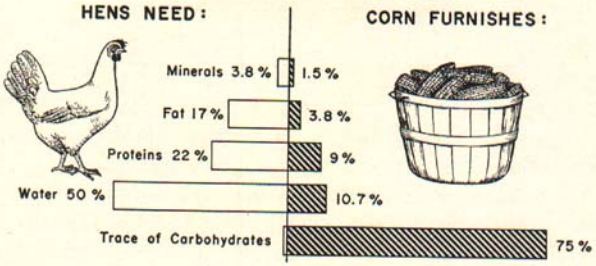

Fig. 1. Homegrown grains, such as corn, do not have nutrients in proper proportions to feed poultry. They supply generous amounts of carbohydrate but not enough proteins and minerals to serve as a complete feed.

water. Although water is not technically a nutrient, it is often listed as one because of its importance.

Carbohydrates and **fats** are prime sources of the energy that keeps the body "engine" running. The grains which make up the largest part of poultry feeds are energy feeds; these grains can be homegrown (Fig. 1).

Proteins are tissue builders; they form muscle, heart, liver, and other body tissues. Proteins are composed of many different amino acids with certain ones more important (essential) than others. Differences in the amount and proportion of these amino acids account for the differences in quality of protein supplements. Fish and animal products are high-quality protein sources because they have a higher proportion of essential amino acids. However, they ordinarily cost more per unit of protein than do vegetable protein supplements. Therefore, a minimum of animal products and a maximum of vegetable protein products are used in mixing poultry feeds.

Minerals help build bone as well as other tissues. Of the dozen or so minerals needed by poultry, calcium, phosphorus, and salt are added in major amounts to feeds; manganese and iodine are given in small or "trace" amounts.

Homegrown feeds are low in minerals; therefore, minerals must be added to make up any shortage. Bonemeal and defluorinated and dicalcium phosphates supply calcium and phosphorus; ground limestone and oystershell give calcium.

Vitamins are necessary in poultry feed for the birds to grow and lay as they should. A lack of vitamins may cause death in a few days,

or almost normal growth but poor feed conversion. Most important in supplementing ordinary poultry feed ingredients are vitamins A, D, B_{12}, and riboflavin.

Water, the least costly of all nutrients, is very important to poultry. It aids digestion and lubricates the body tissues. If poultry are to use their feeds efficiently, they must have easy access to good, clean drinking water at all times. A chicken needs 2 pounds of water for every pound of feed it eats. Lack of water will stop production faster than lack of any other nutrient.

Antibiotics, arsonic acid derivatives, and furazolidone are not nutrients. They are added to feeds to improve growth by bringing about changes in the intestinal organisms.

FEEDING SYSTEMS

Feeds are fed to poultry in the following ways: (1) all-mash; (2) cafeteria or free choice; (3) mash and controlled-grain. All these methods can be successful; adoption of one or the other depends on the individual circumstances of the poultryman. The composition of the feed and the amount the birds eat are more important than the feeding system (Fig. 2).

Fig. 2. Fill feeders regularly, and keep a record of how much is fed. Enough of the right feed is more important than the way it is fed.

(1) **All-mash** feeding uses a single mash. It is the usual feed for starting young chicks. Growing and laying birds can be fed this way too, although a calcium supplement (such as crushed oystershells or limestone) must be made available after 16 weeks of age. All-mash feeds—granular, pelleted, or crumbled—are well suited for use in mechanical feeders; they allow better control of any medication used and take less skill on the part of the feeder.

(2) **Cafeteria-style** feeding uses a highly concentrated mash (28 percent protein or more), whole grains, and calcium supplement in separate hoppers. More homegrown whole grains can be fed this way. However, not all birds balance grain and mash intake satisfactorily.

(3) **Mash and controlled-grain** feeding uses a less concentrated mash, limited amounts of whole grains, and calcium supplement. This is the system used most in Michigan. Control the amount of grain eaten by the birds so that in normal weather it about equals the amount (weight) of mash. Grains are fed in hoppers or in the litter. When it is very cold, feed somewhat more grain than mash; when it is very hot, feed somewhat more mash than grain.

The purpose of any feeding system is to supply the bird with its nutrient requirements. Therefore, different feeding systems require feeds of different formulas.

MASH-GRAIN PROPORTION

The protein content of commercial mashes may vary from 15 to 38 percent. Scratch grains vary from 8.5 to 12 percent, with the usual grain mixture of corn, wheat, and oats averaging about 10 percent. Table 1 shows how much grain to feed with an egg mash of a particular protein content to meet the protein needs of the layers.

TABLE 1—Proportion of grains to feed with several types of laying mash

Percent protein in mash	Pounds daily per 100 birds		Proportion of grain to mash
	Grain	Mash	
16	0	28	0 to 1
20	14	14	1 to 1
27	21*	7	3 to 1
32	22*	6	4 to 1
38	24†	4	6 to 1

*Two grains.
†Three grains.

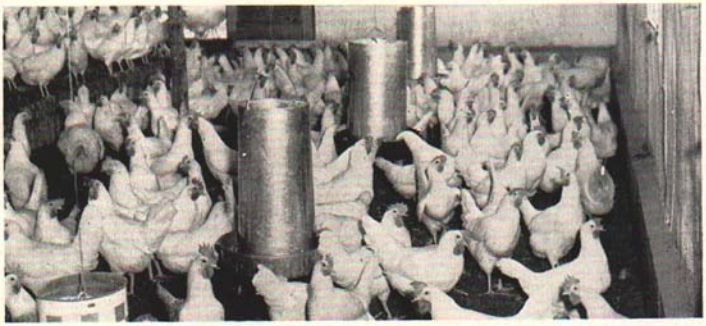

Fig. 3. Space the feeders and waterers; be sure to leave enough room for the birds to move around them.

SPACE

Birds must have "elbow room" at the feeders and waterers, or feed and water intake will suffer and performance will be limited. (See Fig. 3.) Some recommended distances are shown in Table 2.

TABLE 2—Feeding and drinking space for 100 birds*

Age of birds in weeks	Feeding space	Drinking space
Chickens		
0- 2	8⅓ ft.	1⅔ ft.
3- 6	14½ ft.	3⅓ ft.
7-12	25 ft.	3⅓ ft.
16-20	35 ft.	3⅓ ft.
Over 20 (hens)		
All-mash	40 ft.	4 ft.
Mash, grain in litter	30 ft.	4 ft.
Mechanical feeder	30 ft.	4 ft.
Calcium supplement	1 ft.	.....
Grit	½ ft.	.....
Turkeys		
0- 2	16 ft.	3 ft.
3- 4	24 ft.	6 ft.
5- 6	32 ft.	8 ft.
7- 8	40 ft.	10 ft.
9-16	40 ft.	12 ft.
16-maturity	60 ft.	12 ft.
Layer	30 ft.	16 ft.

*Space is given in running feet—a 3-foot feeder or waterer provides 6 running feet because birds can eat or drink from both sides. Drinking space of 12 feet is equivalent to four 5-gallon fountains or one automatic jet flow waterer.

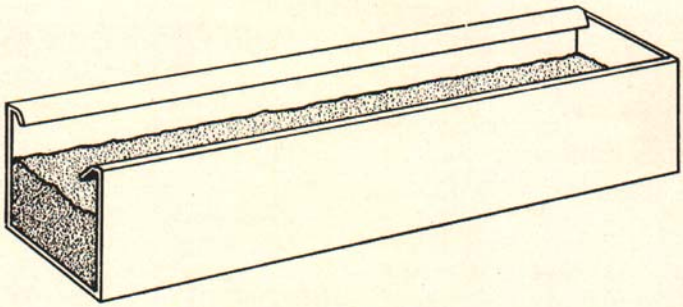

Fig. 4. Use feeders that are designed to keep feed losses low. Fill them no more than half full or 2 inches from the top, depending on their depth. This view shows the lip which helps cut down on "billed-out" feed. Feeding space is available on both sides so that a 4-foot feeder gives 8 running feet of space.

Feeders and waterers should be evenly spaced through the house and above the roosts so that birds do not have to go more than 15 feet for feed or water.

FEEDERS

Much feed is wasted because feeders are poorly designed or are too full. Feeders with "lips" extending inward and downward cut down on loss of feed from "billing out". Raise the feeders from time to time as the birds grow so their backs remain level while eating. Do not fill feeders closer than 2 inches from the top (Fig. 4). Place feeders and waterers on low wire frames and keep them clean.

FEEDING TIME

Consumption of nutrients depends on the length of feeding period as well as the composition of the feed. Birds need about 14 hours of light per day for feeding. This means some supplemental use of artificial light. Lights are needed even more on dark, cloudy days. Keep bulbs clean, and replace burned-out bulbs.

GRIT

Grit serves to crush coarse feed in the gizzard of poultry. Thus, grit is more useful with whole-grain feeds. Grit may be hard or soft, and it may or may not contain calcium. Oystershells and limestone

provide calcium, but they do not last long as grit in the bird. Granite, river gravel, and pebbles are hard, long-lasting grits which do not supply calcium.

For very young birds, sprinkle small-sized grit on the mash once a week; for growing birds, provide medium-sized grit in hoppers; for laying and breeding birds, supply large-sized grit in hoppers.

FEEDING ACCORDING TO AGE OF BIRDS AND PROTEIN CONTENT OF MASHES

Chicken feeds vary in nutrients according to the age of birds being fed. For example, young birds need more protein than do older birds. The percentage of protein in feeds is a guide to their use. Thus, chick all-mash starter or broiler feed contains about 20 percent protein or more, and you should keep it before the birds all the time until they are 7 weeks old. You can also use these mashes for growing birds if you supplement them with whole grains—feed limited first and free-choice after 10 weeks of age.

Usually, after the seventh week a growing mash containing about 17 percent protein is fed all-mash, or a 20- to 22-percent-protein growing mash is fed with grain (Fig. 5). If you plan to feed the birds all-mash during the laying period, raise them on all-mash feeds.

Fig. 5. Feeds are made up to fill the nutrient needs of poultry of a certain age and for a certain purpose – broiler feed is mixed to produce meat, egg mash to produce eggs, and breeder feeds to produce eggs of high hatchability.

When a flock is fed a laying formula, either an all-mash containing 15 to 18 percent protein can be fed, or a limited amount of grain can be fed along with a mash of 20 to 22 percent protein content. Breeding flocks must be fed breeding mashes which are especially fortified in nutrients essential to good hatchability. Mashes designed for maximum egg production may not be suitable for breeder flocks (Fig. 6).

Turkeys require more protein than chickens because they grow faster. Practical all-mash turkey starters contain from 28 to 30 percent protein; all-mash growers from 16 to 25 percent; all-mash breeder, 15 to 16 percent; and breeder to be fed with grains, 24 to 26 percent.

FEEDING POINTERS

Starting Birds

Feed and water newly-hatched chicks as soon as possible. Birds delayed in shipping need water more than feed. Dip beaks in water and place waterers close to the edge of the hover.

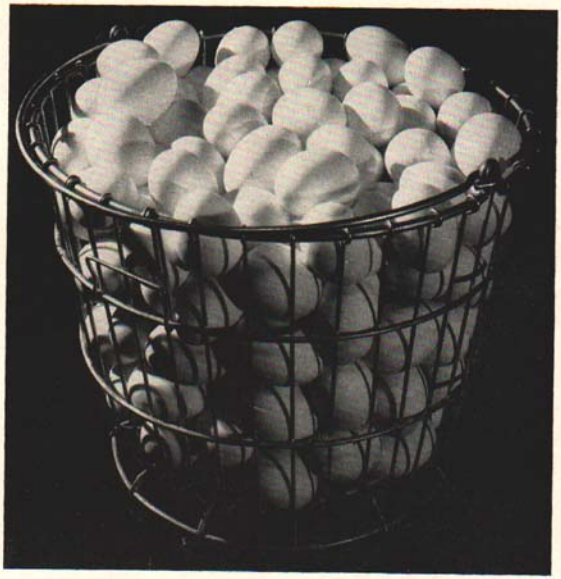

Fig. 6. Feed can be mixed to produce large numbers of market eggs, or fortified more to produce eggs of high hatchability.

Fig. 7. Cut-down baby chick boxes make good feeders to start the chicks.

Put some feed on egg case flats or chick boxes at first (Fig. 7).

Poults must be taught to eat in these ways or many will starve to death.

To prevent pasting, cover the mash with finely-ground chick grains for the first feeding.

Put lights over feeders.

Cover litter with clean sacks, paper, or corrugated cardboard to prevent newly-hatched poults from eating litter.

Provide extra drinking space in very hot weather.

Use enough feeders and waterers (see Table 2), and place them close together.

Growing Birds

Do not remove smaller equipment until birds have learned to use larger types.

Move birds to be reared on range early in the day so they find feed and water before dark. Place some feeders and waterers inside range shelters for the first day or two.

Range crops of ladino and other clovers, alfalfa, and pasture grasses are satisfactory.

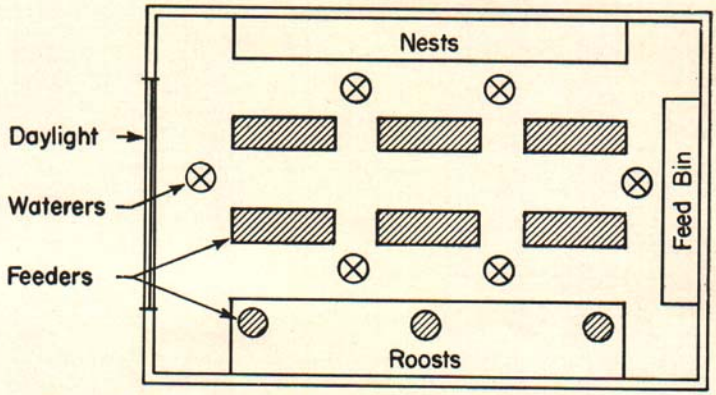

Fig. 8. Feeders and waterers should be evenly spaced on the floor and above the roosts in the laying house so that birds never have to go more than 15 feet to eat or drink.

Move feeders, waterers, and brooder houses weekly to avoid killing pasture crops.

Provide shade; too much heat slows growth.

Supply extra water during hot spells.

Laying Birds

Space feeders and waterers evenly through the poultry house and above roosts so that birds do not have to go more than 15 feet to eat or drink (Fig. 8).

Provide a greater depth of feed and water for debeaked birds than for those not debeaked.

Feed crushed oystershells or limestone free-choice because only part of the calcium requirement is in the mash.

If you plan to save eggs for hatching, feed breeder mash at least a month before that.

Be sure that the proportion of mash to grain eaten is correct for the specific mash fed.

Provide grain feeders for cockerels. Place the feeders high enough so hens cannot reach them. Some poultrymen mix booster pellets with the grain.

PASTURE FOR POULTRY

Growing birds for flock replacement which have access to abundant green feed may obtain from 5 to 15 percent of their total nutrient requirements if you force them to eat forage by limiting the more palatable cereal grains and concentrates (Fig. 9). Pasture is more valuable if it is grazed or mowed to keep it tender and immature. Lower protein and less costly mashes can be used if birds have *good* pasture; if the pasture becomes bare, results may be poor. All broilers and a large proportion of market egg and breeder flocks are now confined indoors.

RESTRICTED OR FULL-FEEDING OF GROWING PULLETS?

Limiting the amount of feed during the growing period gives larger eggs at the start of egg production. These larger eggs are mainly due to age of birds, not to method of feeding. Full-fed birds lay more eggs during the first 3 months, but they lay fewer at the end of the production year than do birds for which feed intake was restricted.

Advantages of restricted feeding are that birds lay fewer small eggs and do not become too fat. Benefits of full feeding are less labor, fewer culls, earlier production, and less cannibalism.

Fig. 9. Good open range can provide from 5 to 15 percent of the total nutrient needs of growing birds.

PELLETS AND CRUMBLES

These have certain advantages over mash. Coarser particles of the mash that might be picked out, and powdery ingredients that might sift out, are held in proper balance throughout the entire mix if the feed is pelleted. Pellets are palatable to poultry—you can feed them continuously or use them to supplement mashes if production is low or the birds have gone off feed. However, there is a tendency toward more cannibalism where crumbles or pellets are the only feeds available.

Pelleting increases the density of mixed feeds, but it also increases their cost. Therefore, it is more profitable to pellet a bulky, high-fiber feed than one less so.

Crumbles are pellets that are broken down into smaller sizes; they have the same nutritional advantages as pellets.

FEED CONSUMPTION AND EGG PRODUCTION

On the average, the cost of feed is about half the total cost of egg production. The greater the egg production, the greater the feed consumption. However, the amount of feed and the cost of feed *per dozen eggs* go down as rate of lay goes up (Table 3). Why feed poor layers?

TABLE 3—Amount and cost of feed in relation to rate of lay

Eggs per year	Pounds feed per dozen eggs	Cost of feed per dozen eggs
80	10.7	43 cents
120	7.5	30 cents
160	5.9	24 cents
200	4.9	20 cents

Heavy breeds eat more feed than light breeds at any given level of production. Most of the feed eaten goes for "overhead"—the amount necessary to maintain the bird. Table 4 shows that 100 Leghorns eat 17 pounds of feed a day without laying any eggs in return. Another 11 pounds of feed results in 80 percent production. It's the last few pounds of feed eaten by layers that pay off. That is why it

pays to encourage producing birds to eat more feed. Don't starve the profit out of a pullet!

TABLE 4—Feed consumption and egg production

Egg production	Daily total feed consumption by 100 hens	
	Light breeds	Heavy breeds
No eggs	17 pounds	21 pounds
10 percent	19 pounds	23 pounds
20 percent	20 pounds	24 pounds
30 percent	21 pounds	26 pounds
40 percent	22 pounds	27 pounds
50 percent	23 pounds	29 pounds
60 percent	25 pounds	30 pounds
70 percent	26 pounds	32 pounds
80 percent	28 pounds	33 pounds

The amount of feed required by layers in a year depends on the size of the birds and their rate of lay. Table 5 gives the amount of feed eaten by birds during a year's production.

TABLE 5—Amount of feed eaten in a year relative to weight of bird and rate of lay

Weight of bird	Pounds of feed eaten in 1 year		
	150 eggs per year	183 eggs per year	216 eggs per year
4 pounds	78	83	88
5 pounds	86	91	96
6 pounds	94	99	104
7 pounds	102	107	112

STORAGE OF FEED

The nutritive value of mixed feed is highest when it is freshly prepared. During storage, the feeding value goes down at a rate which depends on temperature, light, moisture, and a number of other local factors. Therefore, mix feed or have deliveries made often. Most feed

should be used within 3 weeks after it is mixed, or sooner, if possible. (See Fig. 10.) Poultry prefer freshly prepared feeds and respond through increased production.

Fig. 10. Fresh and stale feeds look alike. Store only small lots of feed, using up each lot before starting on the fresh one.

Cooperative extension work in agriculture and home economics. Michigan State University and the U. S. Department of Agriculture cooperating. Paul A. Miller, Director. Cooperative Extension Service, Michigan State University, East Lansing. Printed and distributed under Acts of Congress, May 8 and June 30, 1914.
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