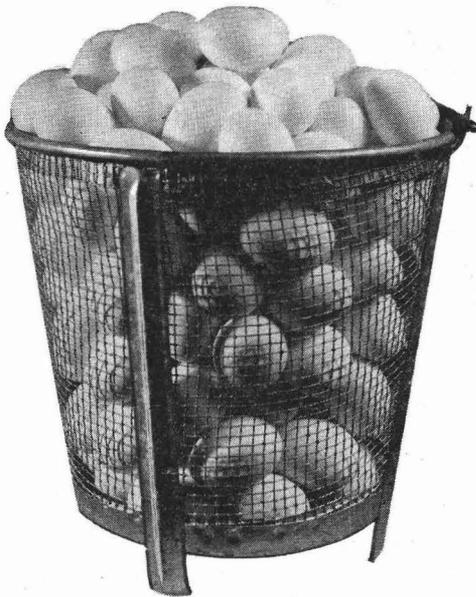


Feeding for Egg Production

By
F. E. Fox



Oregon State Agricultural College
Extension Service

Corvallis, Oregon

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Associate Professor of Poultry Husbandry

INTRODUCTION

FEED is the largest cost item in the production of eggs. A reasonable understanding of the nutritional requirements of laying fowls and the adoption of a proved method of feeding may mean the difference between profit and loss. Normal, healthy, high-producing stock will not maintain maximum egg production if fed a ration that does not supply body maintenance and production needs. Conversely—inferior, diseased, and low-vitality stock will not produce profitably when fed a good ration under the best known conditions.

Feeding is but one of the many important problems to which the poultryman must give thoughtful consideration. Increased egg yield, mass production, confinement of laying stock, and many artificial management practices have created a far more complex feeding problem than formerly existed under more natural conditions. Recent experimental findings in the field of poultry nutrition are keeping pace with the changing conditions, and provide ample protection for the poultryman's investment so far as the feeding phase of his business is concerned.

Oregon produces a surplus of eggs which must compete in distant markets, on a specified quality basis, with eggs from all parts of the nation. The careless use of feeds that are known to have an objectionable effect on interior quality is damaging to the industry, even if practiced only by a few poultrymen.

FEEDS FOR EGG PRODUCTION

Feeds affect interior quality of egg. Excessive feeding of highly pigmented feeds such as kale, rape, rye pasture, yellow corn, and certain weeds like Shepherd's purse, mustard, any penny cress will give an undesirable deep color to the egg yolk. A large percentage of cottonseed meal in the ration will result in yolk color for storage eggs varying from salmon to dark green to nearly black and the whites will vary from normal color to pink. The excessive feeding of onions, fish, and fish oils may give the eggs an undesirable flavor.

The uses of feed. The first use of feed by the hen is for body maintenance, approximately 75 per cent of her normal feed intake being used for this purpose. A limited supply of feed, therefore, might be no more than sufficient to maintain the body. Eggs are manufactured by the hen from the liberal supply of balanced feeds consumed in excess of body requirements. The supply of essential feeds must be reasonably constant because the hen, in supplying any missing ingredient, can rob her body supply only to a limited extent.

Content of feeds. Both feeds and eggs contain the same compounds, or nutrients; namely, proteins, carbohydrates, fats, ash, vitamins, and water. The proportion of each food element varies in different feeds and the poul-

tryman's aim must be to furnish the correct supply of each for egg manufacture. Only a portion of each nutrient found in poultry feeds is capable of being used or is available, creating a variation between the actual feeding value and analysis of the feed. For example, one feed may contain a large amount of fiber, which belongs in the carbohydrate group, and the fiber will affect the digestibility or availability of other nutrients. Some proteins are more complete and hence more valuable than others, whereas certain essential amino acids, which are the building blocks or constituents of proteins, may be absent, thus lessening the food value or efficiency of that particular protein.

Most grain feeds supply carbohydrates and fats in relatively large amounts but do not contain a large supply of either proteins or ash. Grain alone does not constitute a balanced ration for egg production, because there is not enough protein and ash for egg manufacture. To supply this deficiency the grain feeds must be supplemented by a mash composed of mill byproducts; ground grains; high protein concentrates such as meat meal, fish meal, and oil meal; ash ingredients such as oyster-shell flour, bone meal, and salt.

Variety and palatability. A combination of several feeds permits the deficiencies of one to be made up from the elements in others. Palatability of feeds is important. Little is gained if, through lack of palatability, the feeds supplied are not consumed in sufficient amounts for heavy production. A variety of feeds aids in palatability by reducing the monotony of the diet.

An economical ration. Availability of feeds has a marked influence on the cost of a ration. Certain concentrate ingredients have to be added to local feeds, but as nearly as possible the ration should consist of the feeds that are available locally.

Scratch grains. Yellow corn is the most palatable grain generally used in scratch mixtures, furnishing carbohydrates and fats economically. It should be of a grade not lower than No. 2.

Wheat is one of the best poultry grains, not being as fattening as corn and generally available at a more reasonable price than some other grains. It is high in carbohydrates and low in fiber and ash.

Heavy, thin-hulled oats have a relatively high feed value. They are not as palatable as corn or wheat, probably because of their higher fiber content. Oats should not exceed one third of the scratch grain by measure.

Barley is fattening and contains less fiber than oats. It may be substituted for oats in the ration or replace 50 per cent of the corn in the scratch grain. It is less palatable than corn, wheat, or oats.

Kafir, milo, rye, buckwheat, and other less common grains generally are not available in Oregon in sufficient amounts to make them economical feeds.

Three scratch mixtures are listed below. Their choice may depend upon local conditions.

(1)	(2)	(3)
800 pounds wheat	1,000 pounds wheat	800 pounds wheat
800 pounds cracked corn (yellow)	600 pounds cracked corn (yellow)	400 pounds whole corn (yellow)
400 pounds oats	400 pounds oats or Hannchen barley	400 pounds Hannchen barley 400 pounds heavy oats

Mash feeds. In the past byproducts formed a high percentage of all mash mixtures. The present tendency is toward the more liberal use of

coarsely ground whole grain, the same grains used in the scratch being used in the mash. High protein feeds such as meat meal, fish meal, or dried milk are added along with minerals.

The following are suggested mash mixtures, selection being based on the feeds available and relative costs:

(1)	(2)
320 pounds millrun	240 pounds millrun
400 pounds ground wheat	400 pounds ground wheat
400 pounds ground corn (yellow)	300 pounds ground corn (yellow)
200 pounds ground oats	200 pounds ground oats
100 pounds ground barley	300 pounds ground barley
200 pounds meat meal	200 pounds meat meal
100 pounds fish meal	200 pounds fish meal
100 pounds dried milk	100 pounds dried milk
100 pounds alfalfa-leaf meal	100 pounds alfalfa-leaf meal
20 pounds bone meal	20 pounds bone meal
20 pounds O. P. oil meal	20 pounds oyster-shell flour
20 pounds oyster-shell flour	20 pounds dairy salt
20 pounds dairy salt	

The analyses of mashes vary in accordance with the composition of the ingredients used from different regions. Each suggested mash mixture contains, under Western Oregon conditions, approximately 4.5 per cent fat, 8.0 per cent ash, 19.0 per cent protein, and 4.2 per cent fiber.

A high grade of biologically tested vitamin D oil should be added to each mash mixture. Under average conditions an oil having a vitamin D strength equivalent to that of U. S. P. cod liver oil should be used at the rate of 1 per cent of the total mash mixture. Vitamin D concentrates or other oils should be incorporated in the mash in proportionate amounts.

The foregoing recommendations are intended to allow a margin of safety for average conditions. Where fowls have free access to sunlight less oil will be needed. Fowls in close confinement having access to little or no sunshine may need oil in greater amounts. Fowls used for breeding purposes require more oil than commercial laying hens.

The alfalfa content of the mash may be reduced approximately 50 per cent where kale or other succulent green feed is fed regularly.

The dried-milk ingredient of the mash may be omitted when a daily supply of 2 or 3 gallons of liquid milk or equivalent is available for each one hundred hens.

Green feed. Kale and alfalfa, supplemented with green oats and vetch in the spring before the alfalfa hay is ready for cutting, give a continuous green feed supply throughout the year west of the Cascade range. Green and dry alfalfa will supply the necessary green feed in Central and Eastern Oregon. For each one hundred birds 5 or 6 pounds of succulent green feed daily, run through a cutter, will be a satisfactory amount. Too large a consumption of green feed may cut down the mash and grain consumed, resulting in a drop in egg production. Too large a consumption of green feed also may make dark colored yolks, undesirable on the commercial market. The sprouting of grains for green feed is not advised.

Mangel beets and carrots, while not strictly green feeds, do supply succulence, help to keep the birds occupied, and tend to prevent such vices as feather eating and cannibalism. Carrots are high in vitamin content but, unlike green vegetation, do not supply the pigment causing dark-colored yolks.

Minerals. Minerals are one of three vital nutritive factors. Unless care is taken that there is a sufficient supply of those needed, egg production may decrease. The feeding of minerals is vastly more important under the

present intensive poultry keeping conditions than formerly under small-flock and free-range conditions.

Grains and their byproducts are low in minerals and must be supplemented with ingredients of higher mineral content. They do not supply calcium, phosphorus, sodium, and chlorine in adequate amounts. A number of other minerals are of vital importance but are supplied in sufficient amounts by the ordinary ration. Iron usually is found with the vitamin supply and iodine is provided by fish meal and oyster-shell.

Oyster-shell kept before the birds in hoppers all the time supplies the much-needed calcium carbonate for eggshells. Bone meal or granulated bone will supply phosphorus. Salt supplies sodium and chlorine and is added to the mash at the rate of 1 per cent of the total mash mixture. Care should be taken that there are no lumps and that it is evenly distributed throughout the mash.

Grit is fed in hoppers. A granite grit is not as soluble as the usual limestone grit and will last longer. The granite is not as good a source of calcium supply, however, as the limestone grit. The Utah Experiment Station has found some limestone grits that contain a relatively large amount of magnesium; such limestone is known as dolomite and is undesirable.

Charcoal. Chickens eat charcoal readily, and although the necessity of charcoal has been questioned by some authorities, there is no experimental evidence proving it to be harmful or unnecessary. It is recommended that charcoal, if fed, be kept in hoppers before the birds at all times.

Water. As both the fowl's body and the egg are high in water content a good supply of water is imperative. A dozen eggs contain approximately one pint of water.

Milk. Milk contains highly digestible proteins, minerals, and valuable vitamins. Liquid skim milk or buttermilk contains about 10 per cent solids; condensed buttermilk, about 30 per cent; and dried milk, about 90 per cent. On this basis, 1 pound of dried milk is equivalent to approximately 3 pounds of semisolid or 9 pounds of fresh skim milk, the relative economy being determined largely by the price. The choice of milk products will depend on the available supply. Liquid skim milk or buttermilk furnishes the milk solids at a lower cost per pound than either the semisolid or dried-milk products. Dried buttermilk or skim milk may be included in the mash at the rate of 5 to 10 per cent of the mixture when liquid milk or its equivalent is not available. Liquid buttermilk or skim milk kept before the birds all the time helps to supply protein, minerals, and vitamins, and also acts as a laxative. Less protein is needed in the mash when a supply of liquid milk is provided.

Vitamin feeding. Although vitamins are found only in natural products and cannot be made by the body, the animal body may store them. Vitamins are designated by letters of the alphabet in the order in which they were discovered—A, B, C, etc. Of these food factors that play so vital a part in nutrition only three have an important bearing in poultry feeding—A, D, and G. The other vitamins either are present in sufficient quantity in the usual feeds or do not affect poultry.

VITAMIN A is well supplied in green feed, particularly thin, leafy vegetation. Alfalfa is a good source while yellow corn and some fish oils supply a fair amount. The lack of vitamin A causes eye trouble and reduced egg production.

VITAMIN D is present in certain fish oils, ultra-violet light, sunlight, and some commercial products. The vitamin strength of oils varies but the vitamin D does not deteriorate in mixed feeds as does vitamin A. The need for oil is greater in cloudy, rainy weather or when birds are closely confined in houses not admitting direct sunlight. Irradiating poultry feeds with ultra-violet light has not proved practical as yet. The presence of vitamin D promotes better health and stronger eggshells. The lack of it results in poor utilization of calcium and phosphorus, faulty bone formation, and leg weakness.

VITAMIN G is found in milk products, yeast, meat meal, and oat hulls. The presence of this vitamin in suitable amounts improves the fertility of eggs, and its use is particularly desirable when eggs are to be used for hatching purposes.

FEEDING METHODS

Use of scratch grains. Scratch grain usually is fed both morning and evening. Approximately 3 pounds per one hundred birds is fed in the morning and all they will consume in the evening. Daily consumption of one hundred White Leghorn hens will be approximately 10 to 15 pounds of grain. The consumption of grain frequently will vary from day to day in accordance with the appetites of chickens. There is an even wider variation with the rate of production, seasonal temperatures and length of days.

Overfeeding costly. The overfeeding of grain dulls the appetite of fowls and soon will result in a decreased consumption of feed and an inevitable drop in egg production. By careful examination of the litter for uneaten grain the thorough poultryman will learn whether excess grain

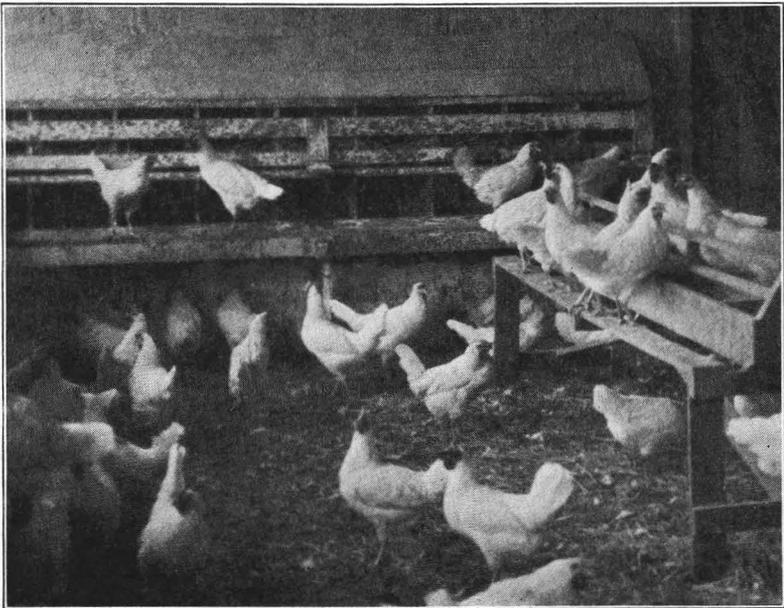


Figure 1. O. S. C. mash trough and open nests.

has been fed. Laying hens should go to roost with full crops. An examination of the crops of several birds at night may indicate to the poultryman whether additional feed is advisable.

Constant supply of mash advised. Dry mash should be available in mash troughs at all times. The O. S. C. mash trough will hold only a few days' supply, necessitating frequent fillings and thereby insuring a fresh supply of mash and the opportunity to check on its consumption.

Total annual consumption and varying conditions governing daily consumption of mash are similar to those for grain.

The economical use of mash is influenced by the amount of mash trough space provided, insufficient trough space promotes crowding and reduced consumption of feed. The following are practical suggestions for the number of lineal feet of dry-mash trough space:

<i>Number of hens</i>	<i>Number of O. S. C. mash troughs suggested</i>	<i>Feeding space provided per 100 hens</i>
100.....	2	28 feet
200.....	3	21 feet
250.....	4	22 feet
400.....	6	21 feet
500.....	8	22 feet

Emergency feeds may be needed. Occasionally it is necessary to vary the routine method of feeding by supplementing it with more appetizing feeds in order to increase the fowls' intake of food to meet such emergencies as sharp reductions in production, partial molts, sluggish appetites, attempts to hold up production through the molting season, and unfavorable temperature conditions.

Mash moistened with milk is an excellent emergency feed. It should be given in an amount that the hens will consume eagerly in twenty minutes, usually about 2 pounds of mash per one hundred birds. The moist mash may be fed in the middle of the day or after the evening grain feed.

Rolled barley soaked over night in milk is an emergency feed that also aids in restoring normal appetites and increased body flesh.

Green cut bone fed three or four times a week at the rate of 3 or 4 pounds to one hundred hens is a stimulating feed that aids in getting fowls back into production.

Liberal feeding of additional succulent greens or root crops during slumps in production is advisable.

Any one of the various feeds used as an emergency feed should be gradually discontinued when the desired results from its use have been obtained.

Bringing pullets into lay. Three or four weeks before the pullets are moved into the laying house, the laying mash to be used may replace an additional fourth of the developing mash each successive week so that the mature pullets are on a full laying ration at the time they are housed. This practice is sound because it reduces the hazards of making too many major changes at the time of housing.

Pullets should be fed liberally on green feed while coming into production. The practice should be continued after housing and until they are producing eggs of high enough grades to warrant a reduction of green feed in the interests of less yolk coloring. Succulent green feed promotes a laxative condition which is less favorable for prolapsis troubles. Because it keeps the pullets occupied such feed is also an aid in prevention of cannibalism.

Gain in weight essential. Under normal conditions of growth a flock of leghorn pullets will lay from 20 to 30 per cent at six months of age. Many disappointments caused by drops in production and partial molts may be avoided by feeding pullets with the understanding they have not reached their mature weight. Pullets should gain in weight each of the first few months after they come into production.

Grain is fed liberally during the shorter and colder days of fall and early winter in order to meet the demands of growth, egg production and body maintenance of the pullets. As production increases, the feed intake must increase because the birds cannot long draw on body reserves. Daily consumption of grain occasionally may reach or exceed 15 pounds per one hundred pullets during the period of growth and increased production. The grain may be reduced to approximately 12 pounds daily after the birds are older and more mature.

The amount of mash consumed during the early fall months of lay is not quite equal to the grain consumed. The mash is left before the pullets in hoppers at all times. As pullets do not carry a vitamin D reserve long after being brought in from sunshine conditions of the range, the mash ration must contain an adequate supply of vitamin D oil or egg production will drop off rapidly.

HOUSING RANGE PULLETS

Transferring pullets from the freedom of the range to confinement in laying houses requires good judgment if adverse conditions of production and cannibalistic habits are to be kept at a minimum.

Physical and sexual maturity important. Pullets should be housed according to their physical and sexual maturity. Any normal flock of pullets of the same age will mature in three groups; first, the early maturing individuals; second, the greater number or average of the flock; and third, the slower maturing ones. To house these three grades of pullets at the same time and in the same room frequently is an expensive mistake.

Liberate in morning. The pullets should be liberated in the laying house during the early morning. This practice affords the opportunity for them to get familiar with their new quarters and the caretaker prior to roosting time. Thus piling up at night because the environment seems strange is avoided. The birds also will act as leaders for those of similar development housed with them later.

Range houses should be equipped with a few nests for those pullets which lay before being moved into permanent houses. Pullets which form the habit of laying on the floor or ground while on range become easy prey for cannibalistic and curious mates when they continue the habit in the more crowded laying house.

Pullets should not be moved into the confinement of a laying house during extremely warm and low-humidity weather because they then are restless and more likely to develop cannibalism than under cooler weather conditions.

An outside yard should be provided both as a measure of prevention of cannibalism and as an emergency in the event it does develop. Its use should begin if necessary as soon as the pullets are familiar with the house and continue until the birds have adjusted themselves to their new environment.