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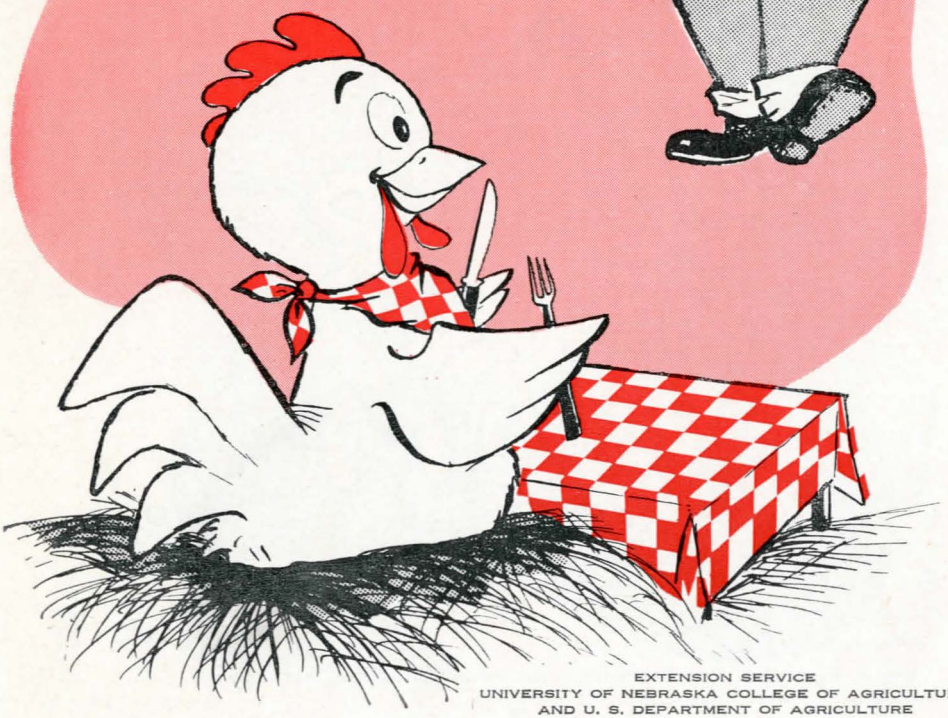
FEEDING LAYING HENS



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Feeding Laying Hens

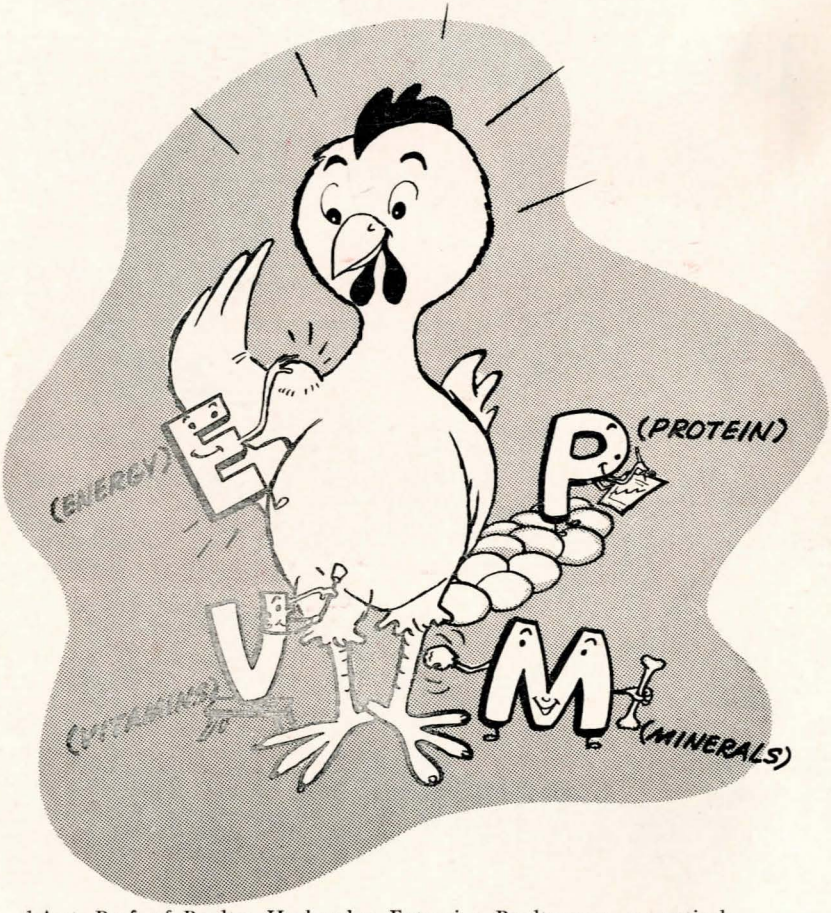
T. W. Sullivan and John L. Skinner[1]

The profit or loss from a laying flock depends on many things. Good breeding, efficient and economical feeding, and good management are very important.

Feed expense amounts to about 60 percent of the total cost of producing eggs. The labor return and profit obtained from a laying flock is greatly affected by the quality and cost of the feed.

Nutrients

Birds need a series of nutrients which are found in the various feed ingredients. These nutrients are energy (carbohydrates and fats),



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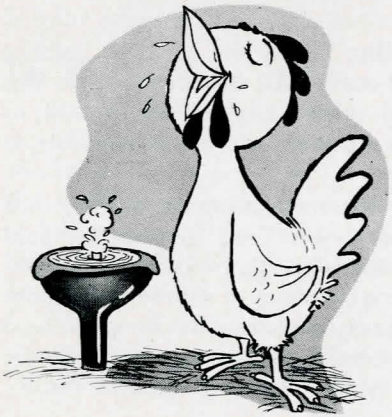
protein, minerals, vitamins and water. Water is not usually considered as a nutrient, but its importance must always be emphasized.

Energy is required for the building of new tissue, for maintenance of the body, for locomotion and for heat production. Corn, milo and various other grains are the main energy sources in poultry rations. Animal fats are concentrated sources of energy which may be used to increase the energy content of the ration.

Proteins are composed of many different amino acids with certain ones being more important than others. Laying hens need amino acids for the building of new tissue, egg production and body maintenance. Fish meal, meat scraps and other animal by-products are good protein sources. Soybean meal is also a good protein source, with one not too serious drawback; it does not contain enough methionine, one of the essential amino acids. The protein or amino acid requirements of birds can be best met by including several protein sources in the ration. Certain synthetic amino acids, including DL-methionine, are now available for use in poultry rations.

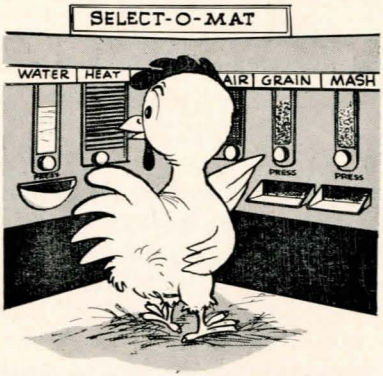
Minerals perform a variety of important functions. Certain minerals give rigidity to bones, skeleton and egg shells, as major components in their structure. Minerals are needed for the formation of blood cells, blood clotting and numerous metabolic reactions; they are also very closely associated with the function of muscles. Of the minerals needed by poultry, calcium, phosphorus and salt (sodium chloride) are added in major amounts to feeds; iodine, iron, manganese and zinc are given in small or trace amounts.

Vitamins likewise perform a variety of important functions. Vitamin A is needed for the health and well-being of the skin, linings of the digestive and respiratory tracts and other epithelial tissue. Vitamin D plays an important role in bone formation and the metabolism of calcium and phosphorus. The B-vitamins are involved in energy metabolism and in the metabolism of many other nutrients.



Water, which makes up 55 to 78 percent of the live weight of chickens, softens and hydrolyzes the food and transports nutrients, metabolic products and excreta. In addition, water acts as a lubricant and is essential for the regulation of body temperature. Chickens will ordinarily consume two to three pounds of water for each pound of solid food eaten. Egg production will stop sooner from a lack of water than from a lack of any other nutrient.

FEEDING SYSTEMS



Feed may be given to laying hens in the following ways:

(1) All-mash.

(2) Mash and controlled grain.

(3) Free choice or cafeteria style.

The choice of one of these feeding systems will depend mainly upon the size of the flock and the labor and equipment available. Any one of these feeding systems, with proper attention, may be successful.

All-Mash

All-mash feeding involves the use of a single mash which contains all components of the ration. Egg quality factors, such as shell thickness and yolk color are more uniform and more easily controlled with this system. Such a ration can be easily dispensed in hanging or automatic feeders. Less skill on the part of the feeder is required with the all-mash system. A calcium supplement such as crushed oyster shell or granular limestone can be made available free-choice, if desired.

Mash and Controlled Grain

Mash and controlled grain feeding involves the use of a concentrate (20 to 28 percent protein), and limited amounts of whole grains and calcium supplement. The amount of grain fed should be calculated to make the total feed intake contain about 16 percent protein. Slight adjustments can be made seasonally to provide more energy in cold weather (more grain) and less energy in hot weather (less grain). Grains may be placed in hoppers or scattered on the litter.

Free-Choice

Free-choice or cafeteria style feeding allows the birds to balance or regulate their intake of grain and mash. All birds cannot do this satisfactorily. A highly concentrated mash (28 percent protein or more), whole grains and a calcium supplement are made available in separate hoppers.

If either of the two latter feeding systems is adopted, home-grown grains can be used for greater economy. The feed consumed should furnish the bird with all nutrients needed for egg production, regardless of the feeding system. Feeds or concentrates of different composition and suited to the available grains, can usually be purchased locally. Feeding instructions are generally given or can easily be obtained from the dealer or a sales representative of the feed mill.

RECOMMENDED FEED FORMULAS AND MASH-GRAIN MIXTURES

Formulas for two complete all-mash rations are presented in Table 1. These rations should be economical to mix since most of the ingredients are readily available in Nebraska. By using different amounts of various feed ingredients many other rations could be formulated.

The average flock owner should not attempt to mix his complete ration starting with the individual ingredients. If several thousand laying birds are kept it may be economical to buy, store, grind, and mix all of the ingredients of the ration. Local feed mills will usually "custom mix" complete rations for small or large flock owners.

Many different commercial poultry concentrates are available. They range in protein content from 20 to 42 percent. Concentrates containing 26, 32 and 38 percent protein are most common; various proportions of each of these concentrates to be mixed with various grains for complete rations are listed in Table 2. The majority of flock owners, who feed an all-mash ration, should carefully consider using home-grown grains mixed with a concentrate to form a complete ration.

FEEDING THE LAYING FLOCK

Level of Protein

Poultry nutrition authorities do not agree on the optimum or best protein level for laying rations. Some recommend protein levels of 17 to 18 percent, while others feel that 15 percent is adequate.

Good egg production has been obtained experimentally with purified rations containing only 12 to 14 percent protein. In hot weather, laying hens consume less feed. Under such conditions the protein intake is reduced. Therefore, the use of high protein (17 to 18 percent) laying rations during the hot weather season is probably justified. If the ration contains good quality protein (plenty of the essential amino acids), under normal conditions 15 to 16 percent of protein is quite adequate for laying hens.

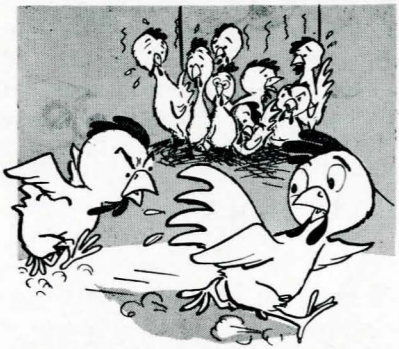
Egg Shell Quality

Several factors are known to be involved in egg shell problems (soft shells, checks and cracks). As hens get older, shell strength and thickness decrease. After a long period of heavy egg production, the bird's hormonal systems are probably less active, and her stores of extra mineral (in the bones) somewhat depleted. This depletion may be caused by inadequate levels of calcium and phosphorus in the laying ration.

High environmental temperature will cause hens to lay eggs with thinner shells as compared to birds in more optimum temperatures (40 to 70° F).

Nutritional factors which affect egg shell quality are calcium, phosphorus, manganese and vitamin D_3. It has been demonstrated recently that ascorbic acid (vitamin C), added to laying rations at the rate of one to two ounces per ton, could increase egg shell thickness. Abscorbic acid does not produce this response consistently. Increasing the level of dietary calcium appears to be the most reliable means of combating egg shell problems. Calcium levels as high as 3.75 and 4.00 percent of the ration have been fed experimentally with good results. Only 2.4 to 3.0 percent of calcium (in the ration), however, is recommended for hens in heavy production. The ration should also contain adequate levels of vitamin D_3, phosphorus and manganese.

Cannibalism



Cannibalism may develop as a result of over-crowding and various other environmental factors. Sometimes a deficiency of either protein or salt may induce feather picking and cannibalism. When this vice gets started in a flock, it is always best to debeak all of the birds as soon as possible. The addition of extra protein or salt to the ration will help prevent cannibalism, but will seldom stop it.

Grit

Grit aids the bird's gizzard in the grinding of coarse feed and particles of litter and feathers that may be ingested. Therefore, grit is more beneficial when whole grains are fed. When finely ground feed in the form of an all-mash ration is fed, grit may have very little or no effect on egg production or feed utilization.

Grit may be hard or soft and it may or may not contain calcium. Oyster shell and limestone granules provide calcium, but are quickly dissolved in the gizzard and their grinding action is limited. Granite particles, river gravel and pebbles are hard and long-lasting, but do not supply calcium. Medium-sized grit may be supplied free-choice to laying birds in hoppers separate from the feed.

Pellets and Crumbles

Pelleting increases the density of mixed feeds, but adds to their cost. Crumbles are pellets that have been broken down into smaller sizes. Both have certain advantages over mash. Coarser particles of the mash that might be picked out, and very fine powdery ingredients that might sift out, are held in proper balance throughout the entire mix with pelleted feeds. Pellets are somewhat more palatable to poul-

try. There is, however, a tendency toward more cannibalism when crumbles or pellets are the only feeds available.

Storage of Feed

The nutritive value of mixed feed is highest when it is freshly prepared. High temperatures, light, moisture and other local factors may decrease the value of feed during storage. Therefore, feed should be mixed and delivered often. Most feed should be used within three weeks after it is mixed, or sooner, if possible.

Antibiotics and Related Additives

The use of antibiotic supplements and related additives in rations for young growing birds is a good practice. Increased growth and improved feed efficiency are obtained in birds fed these supplements. Antibiotic supplementation of laying rations cannot be so clearly justified. Egg production and feed efficiency are not consistently improved by the feeding of these supplements. A low level of antibiotic (5 to 20 grams per ton) fed continuously in laying rations should prevent production slumps due to occasional sub-clinical infections and disease. Antibiotic supplementation in this manner is recommended for laying hens.

The Feed Tag or Label

The label attached to most commercial feed gives the guaranteed minimum content of crude protein, crude fat and nitrogen-free extract, and the guaranteed maximum content of crude fiber. Although this information is of general nature, it may be very useful.

Crude protein values may be used in the mixing of an all-mash ration or to adjust the birds' protein intake when whole grains are fed. Since the crude protein content of the feed is calculated from the total nitrogen content which is determined chemically, the quality of the protein (total amino acid content) can not be determined from the labeling. The values for nitrogen-free extract and crude fat are probably of little value to most poultrymen. Nitrogen-free extract includes a group of carbohydrate substances which, for the most part, are readily digested and utilized by simple-stomach animals (pigs and chickens). The higher the content of crude fat and nitrogen-free extract, the greater the energy content of the feed. Crude fiber includes those carbohydrate substances (cellulose, lignin and hemicellulose) which make up the cell walls and woody material of plants. Poultry make very little or no use of crude fiber. In fact, rations for growing birds should contain relatively low levels of fiber, less than eight percent. The energy content of poultry rations is probably more important than the fiber content; usually a medium or high energy ration will be low in fiber content.

Other useful information such as the content of calcium, phosphorus, salt and iodine also may be found on the feed bag.

Table 1.—All-mash laying formulas.

Ingredients	Per 1,000 pounds	
	Ration 1	Ration 2
	Lbs.	Lbs.
Ground yellow corn	565	360
Ground milo	.....	360
Wheat standard middlings	150	.....
Soybean meal (44% protein)	115	100
Dehydrated alfalfa meal (17% protein)	50	50
Meat and bone scrap	40	75
Corn fermentation solubles *or* brewers yeast	20	.....
Dicalcium phosphate *or* defluorinated rock phosphate	10	5
Calcium carbonate (limestone)	45	41
Iodized salt	5	5
DL-Methionine	.....	0.5
Manganese sulfate, grams	114	114
Vitamin A, U. S. P. units	1,500,000	2,000,000
Vitamin D_3, I. C. units	400,000	400,000
Riboflavin, mg.	2,000	2,000
Calcium pantothenate*, mg.	3,000	3,000
Vitamin B_{12}*, mg.	5	5
Antibiotic supplement, grams	5	5
Calculated average composition		
Protein, percent	15.75	16.20
Calorie: Protein ratio	54:1	58:1
Productive energy, Cal./lb.	850	940
Calcium, percent	2.60	2.61
Total phosphorus, percent	.80	.84

* Needed only when hatching eggs are desired.

Table 2—Concentrate and grain mixtures for complete laying rations.

Ingredient	Ration		
	A	B	C
	Lbs.	Lbs.	Lbs.
Concentrate (26% protein)	350	350	300
Ground corn	325	250	200
Ground milo	325	250	200
Pulverized oats	.....	150	100
Ground wheat	.....	.....	200
Total, lbs.	1000	1000	1000
Protein, percent	15.6	15.9	16.0
Concentrate (32% protein)	300	300	250
Ground corn	700	350	300
Ground milo	.....	350	300
Pulverized oats	.....	.....	150
Total, lbs.	1000	1000	1000
Protein, percent	15.8	16.2	15.8
Concentrate (38% protein)	250	220	200
Ground corn	750	390	325
Ground milo	.....	390	325
Pulverized oats	.....	.....	150
Total, lbs.	1000	1000	1000
Protein, percent	16.1	16.2	15.9