

Nutrition for Backyard Chicken Flocks

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Farm-fresh products, such as eggs and chickens, have always had a special appeal. A small backyard flock can supply a family with eggs and meat of the highest quality, and caring for and enjoying the products of a flock of chickens can be very therapeutic. Keep in mind that producing eggs and poultry meat at home is not always economical and each family should consider its own economic situation before starting a home flock. A successful home chicken flock will require good breeding stock combined with careful management, disease control, and an adequate feeding program.

Unless you have an interest in a specific breed for exhibition or hobby purposes, there are two basic choices you must make when deciding what type of poultry to keep. You may choose a breed that excels in egg production or in meat production. The two types of chickens that are bred to produce eggs are the Single Comb White Leghorn, which produces white eggs, and the dual purpose bird, which produces brown eggs. Leghorns have been genetically selected for high egg production, egg quality, and large egg size. They also consume a small amount of feed. Brown egg layers are larger birds that consume more feed than Leghorns and produce fewer eggs, but they are a good choice for home egg and meat production purposes. The most efficient meat production comes from commercial broiler birds that have been selected for fast growth rate and efficient feed use. This type of chicken can be used for broiler, roaster and capon production, but are inefficient egg producers and, when mated, fail to produce desirable traits that were present in the parents. So, for maximum performance, replacement chicks need to be purchased from the hatchery rather than homegrown.

Feed accounts for approximately 70 percent of the cost of raising domestic fowl. For this reason, you should understand nutritional concepts well, and you should strive to optimize your feeding management. Dietary requirements are determined by the age and type of

poultry. These differences require that each diet be formulated to have specific quantities of required nutrients. Some feedstuffs are high in one nutrient but low in another, which is why chicken feed is comprised of a variety of feedstuffs. In addition to the nutrient composition of a diet, other factors such as the physical form of the diet and storage needs of the feed may influence diet quality.

Poultry Diets

Because different types of poultry require different nutrients, different diets must be fed as illustrated in Table 1. However, there are times when nutrient requirements overlap between types or ages of poultry, so it is possible to make some substitutions. At other times, it is critical that the correct diet be provided. For instance, if an immature chicken is fed a layer diet, the calcium level is so high that the young bird will experience improper bone formation, kidney failure, and possibly death. On the other hand, feeding a broiler starter diet to a laying hen will result in poor eggshell quality.

The primary concern when formulating a diet is to meet the bird's nutrient requirements. In general, a bird will eat to satisfy its energy or calorie needs. Therefore, all other dietary nutrients must be provided based on the amount of energy that the chicken will consume and should have the proper balance of energy to other nutrients. During summer, feed consumption tends to decrease as environmental temperature increases, so protein, energy, vitamins, and minerals must be increased in the diet. In the winter, the opposite is true and birds eat more to maintain their body heat. Growing birds require more protein than mature chickens do. In addition, heavy meat-type chickens require more protein than lighter egg-laying strains do. Nutrients that include protein, energy, vitamins, and minerals comprise the most important part of a feed. Therefore, different combinations of feed ingredients can be selected to formulate a diet with the same nutrient composition, while the ingredients used may be subject to change due to availability and cost.

Table 1. Guidelines for the Nutrient Requirements of Different Ages and Types of Chickens

Bird Type	Age	Diet Type	Metabolizable Energy (kcal/lb)	Crude Protein (%)	Calcium (%)	Available Phosphorus (%)
Egg production (Leghorn-type crosses)						
Pullets	0 to 6 weeks	Starter	1290 to 1315	20.0 to 22.0	0.85 to 1.00	0.40 to 0.45
	6 to 14 weeks	Grower	1290 to 1315	16.0 to 18.0	0.80 to 0.95	0.35 to 0.42
	14 to 20 weeks	Developer	1250 to 1290	14.0 to 16.0	0.75 to 0.92	0.30 to 0.38
Laying	> 20 weeks	Layer	1290 to 1315	15.0 to 19.0	3.60 to 4.20	0.32 to 0.45
Breeding	Mature	Layer/Breeder	1290 to 1315	14.0 to 18.0	3.40 to 4.00	0.32 to 0.40
Meat Production (Dual purpose-type meat and egg crosses)						
Broilers	0 to 4 weeks	Starter	1350 to 1385	20.0 to 23.0	0.90 to 1.00	0.42 to 0.45
	4 to 8 weeks	Grower	1385 to 1405	19.0 to 20.0	0.86 to 0.92	0.38 to 0.43
	> 8 weeks	Finisher	1425 to 1450	15.0 to 18.0	0.78 to 0.88	0.32 to 0.40
Pullets	0 to 4 weeks	Starter	1275 to 1300	18.0 to 19.0	0.85 to 1.00	0.40 to 0.45
	4 to 12 weeks	Grower	1275 to 1300	17.0 to 18.0	0.80 to 0.95	0.35 to 0.42
	12 to 22 weeks	Developer	1260 to 1280	15.0 to 16.0	0.75 to 0.90	0.32 to 0.40
Laying	> 22 weeks	Layer	1225 to 1300	14.0 to 16.0	3.00 to 3.40	0.34 to 0.41
Breeding	Mature	Layer/Breeder	1290 to 1300	14.0 to 16.0	2.75 to 3.50	0.30 to 0.40

Complete Feeding and Grain Feeding

The simplest way to feed a small flock of chickens is to purchase a complete diet from your local feed store. Complete feeding diets need no additional supplements and may be purchased as mash, crumbles, or pellets. This is generally an easy way to feed chickens; you only need to fill up a feeder from one bag rather than blend several different feed sources. In addition, you can be sure that the birds are receiving the best possible diet, and you will reap the benefits of healthy, productive birds.

A cost-effective alternative feeding method provides the birds with a mixture of a complete feed and grain supplement. The complete feed-controlled grain system is economical because only half of the diet must be ground and mixed at the feed mill. This system is easy to use when feeding Leghorns because they tend to balance their consumption of grain and mash. Heavy hens, however, tend to eat more grain, so a greater amount of mash diet should be available, and the grain diet may require some restriction.

Feeding Leghorn-type Replacement Pullets

Complete starter feeds for Leghorn-type or light breed replacement pullets should contain 20 to 22 percent protein, depending on energy level, and should be used until birds are 6 weeks old. Allow 200 pounds of feed per 100 birds for the first six weeks. After birds are 6 weeks old, there are two systems of feeding: (1) the complete

feed system, and (2) the complete feed-controlled grain system. Commercial poultry producers use the complete feed system because it requires less labor and works well in automatic feeders and bulk feed-handling equipment. A complete feed can be purchased from a feed dealer or mixed on the farm. Complete grower feeds for replacement pullets 6 to 14 weeks old contain 16 to 18 percent protein. Complete developer feeds for replacement pullets 14 to 20 weeks old contain 14 to 16 percent protein. Switching to developer feed at an earlier age, when pullets are 8 to 10 weeks old, will tend to delay the onset of egg production one to two weeks, but eggs are usually larger. Although growth rate is reduced, final body weight is about the same when delayed egg production starts.

The complete feed-controlled grain system can be initiated at six weeks when birds are offered growing mash. Use 16 to 18 percent protein complete growing mash from weeks 6 to 20. Never feed more scratch grain than birds will finish in one to three hours. For floor-reared birds, small amounts of grain scattered in the litter causes the birds to scratch in the litter, thereby keeping it in better condition. If using the complete feed-controlled grain system, pullet-size granite grit should be available when birds are 6 weeks old. Replacement pullets can also be placed on range at six weeks if the outside temperature is warm. Range feeding cannot provide a complete diet for pullets and a 16 to 18 percent protein grower feed should be provided free choice. Scratch-type grains can also be

Table 2. Daily Protein Needs of Leghorn Hens During Two Phases of Egg Production

Body Function	Phase I (20 to 42 weeks of age)	Phase II (> 42 weeks of age)
Production of an egg	12.2 gr/day	13.5 gr/day
Maintenance of daily body protein	3.0	3.4
Daily body growth	1.4	0.0
Daily feather growth	0.4	0.1
Total daily protein needs	17.0	17.0

Adapted from "Scott's Nutrition of the Chicken," S. Leeson and J.D. Summers, 2001, University Books, Guelph, ON, Canada

provided in a separate feed hopper or scattered on the ground with the intent that the hens can clean up all grain within 20 to 30 minutes.

Feeding Leghorn-type Layers

For light-breed Leghorn-type hens, 20 to 22 weeks old, replace grower feed with layer feed when egg production begins. Make sure not to introduce the laying diet more than two weeks before the bird begins to lay, because early introduction of the layer diet may cause improper bone development. A Leghorn hen begins to lay eggs at approximately 18 to 22 weeks of age if she matures during spring. A hen maturing during fall or winter will need a larger body size before production begins, so more time may be required before lay is initiated.

Research indicates that light breed hens require at least 17 grams of well-balanced protein per day. The egg production cycle can be separated into two phases. Table 2 illustrates how hens use their daily protein intake for various body functions.

During Phase I (20 to 42 weeks old), hens need protein for growth, feather development, and maximum egg production. In Phase II (> 42 weeks old), hens require more protein for egg production and body maintenance

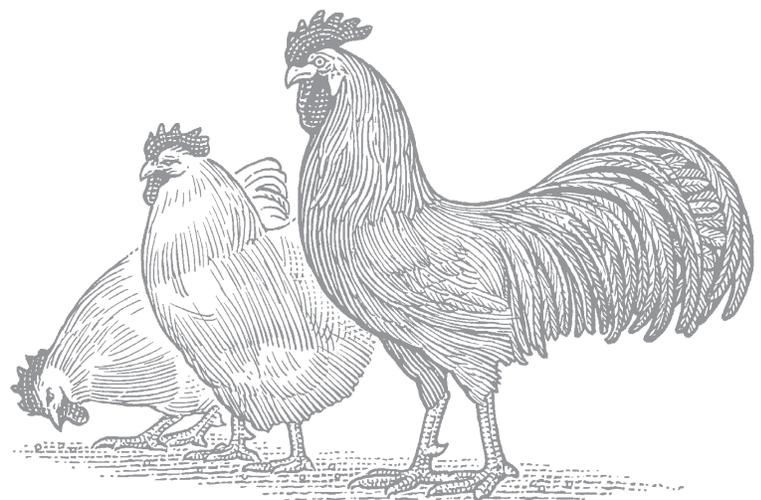
because of increased egg size and body weight, and require less protein for growth and feather development than in Phase I. There are also seasonal effects on feed consumption; for example, a hen may consume up to 340 kilocalories of metabolizable energy per day during winter to keep warm, but in summer, she may consume only 260 kilocalories of metabolizable energy per day. Therefore, during summer when temperatures are high, a higher dietary protein level should be fed. During winter, when temperatures are low, a lower protein diet can be fed without affecting egg production. Table 3 shows the relationship between feed consumption and dietary protein requirements that may be due to seasonality.

Small farm flocks can use the complete feed-controlled grain system for layers, which uses a complete feed containing 20 to 22 percent protein, and a controlled feeding of scratch grains until the desired protein intake is achieved. Most scratch grain mixtures average 10 percent protein. Thus, feeding five parts of a complete feed containing 20 percent protein (5 x 20 = 100) and one part grain containing 10 percent protein (1 x 10 = 10) equals

$$\frac{100 + 10}{6 \text{ total parts}} = 18.3 \text{ percent protein}$$

Table 3. Protein Requirements for Light Breed Leghorn-Type Laying Hens According to Daily Feed Consumption

Feed consumption lbs/100 hens/day	Dietary Protein Level (%)
18	21
19	20
20	19
21	18
22	17
24	16
25	15
27	14



Grains are high in energy and low in protein, minerals, and vitamins; therefore, excessive grain feeding in proportion to complete feed can result in severe nutritional deficiencies. This concept is particularly important because the overuse of grain feeding may affect egg production. Sometimes complete layer feeds containing 20 to 22 percent protein are not readily available; you should purchase a complete layer diet that contains the highest amount of protein to accommodate a grain-feeding system approach. Supplemental grains can be mixed with the complete feed, supplied in a separate feed hopper, or scattered on the floor or ground. As with any grain feeding program, grit should be available.

If supplemental lighting is not provided to maintain production during short daylight months, remove the layer feed during the molt and unproductive periods and replace it with developer. Replace the developer feed with laying diet once egg production is initiated to prevent problems associated with lack of adequate calcium.

Feeding Breeders

Nutrient requirements, particularly vitamins and trace minerals, are slightly higher for breeder birds than for chickens that produce table eggs. Breeder birds are expected to produce eggs that yield healthy chicks; therefore, higher dietary fortification is essential for adequate nutrient transfer from hen to egg to ensure good embryonic development and hatchability. Since most commercial feeds contain more than adequate amounts of vitamins and trace minerals, they may be used as either layer or breeder feeds.

Calcium Supplementation

Laying diets may contain part or all of the calcium required by the hen. When buying a layer feed, ask your feed dealer or read the feed tag to ensure that the diet contains at least 2.5 to 3.5 percent calcium. Since egg-laying hens require large amounts of calcium for eggshell development, you can also supply an extra source of calcium regardless of the amount in the feed. Therefore, oyster shell, calcite, or limestone can be offered free choice. When the laying diet does not contain enough calcium to meet the bird's requirements, these sources must be provided. Complete feeds for raising replacement pullets have adequate calcium; therefore, extra calcium should not be supplied. **CAUTION:** Laying mash should not be fed to chicks or growing poultry because the high calcium level may cause growth problems, kidney damage, or death.

Grit Supplementation

In addition to calcium, hard insoluble granite grit should be fed. Because of the rather high acid level in the gizzard, calcium grit dissolves quickly and there is little opportunity for it to function as a grinding material. Birds frequently eat feathers and other materials and, when they consume coarse materials of this kind, hard grit in the gizzard aids in grinding it so that it can be digested and eliminated from the body. Grit is available in chick and hen size. Continuous feeding is not necessary, but grit should be available, free choice, 2 or 3 days per month. A suitable grit and oyster shell hopper for a laying flock is divided into two compartments so that both the grit and the calcium can be fed from the same hopper. For meat production birds, grit can be fed on top of the mash or grain at the rate of about one pound per 100 birds, once monthly. For little time, effort, and cost, hard insoluble grit and calcium supplementation can easily be added to a laying hen feeding program.

Feeding Birds for Meat Production

Meat production birds also have special dietary needs and, due to their ability to rapidly gain weight, they should be fed high protein diets. During the first four weeks, broiler-type chickens need a starter feed that contains 20 to 23 percent protein, depending on the energy content of the feed. From four to eight weeks, a broiler grower feed containing 19 to 20 percent protein is used. Beyond eight or nine weeks a broiler finisher diet containing 15 to 18 percent protein is fed. Do not feed scratch grains to broilers; it makes them fat too soon. The finisher diet is designed to add the desired amount of fat to the broiler's body. The finisher diet (final 10 days before slaughter) gives birds a slight finish of fat, hence, the lower protein and high energy content diet. In addition, no coccidiostat is added to the finisher diet. The withdrawal time for removing the coccidiostat from the feed must be followed or residues will appear in the final meat product. Do not feed the finisher diet or supplemented scratch grains for more than two weeks or an overly fat bird will result.

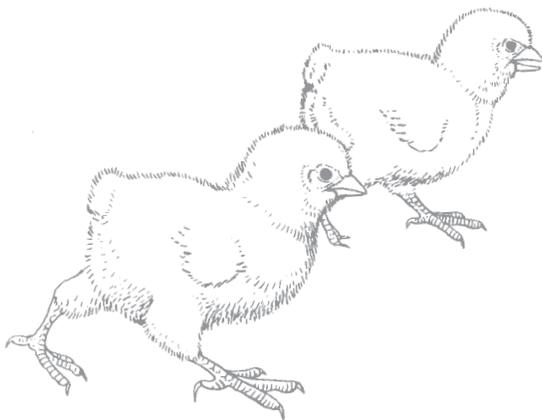
When raising roasters, you should follow a different feeding schedule. Roasters are raised for approximately 12 weeks, although some are kept for five months. Begin by feeding the broiler starter diet. From weeks 2 to 12, feed a pullet starter or grower diet. The pullet feed will have less energy and the roaster will not put on too much fat. Feed the broiler grower diet, beginning at 12 weeks, until your birds almost reach the desired weight. At that time, always feed a coccidiostat-free finisher diet or supplemented

scratch grains for 7 to 10 days before slaughter. The exact timetable you should follow for feeding roasters will depend on the date you choose for processing.

For roasters (8 to 12 pounds, marketed 3 to 5 months), the following complete feed schedules are suggested:

- Broiler starter (20 to 23 percent protein) 0 to 2 weeks.
- Pullet starter (20 to 22 percent protein) 2 to 6 weeks.
- Pullet grower (16 to 18 percent protein) 6 to 12 weeks.
- Broiler grower (19 to 20 percent protein) 12 weeks, until the birds almost reach the desired weight. Starter and grower feeds must contain a coccidiostat.
- Broiler finisher (withdrawal) (15 to 18 percent protein) or supplemented scratch grains (10 percent protein). This feed should be fed for 7 to 10 days before slaughter because it contains no medication or a medication requiring no withdrawal time. Also, these feeds are high in energy and low in protein, which will produce excessively fat birds when used longer than two weeks.

You may wish to supplement the complete feed with pasture or green chop (lawn clippings); young, tender plants provide a valuable supplement for chickens, but old, fibrous plants are not easily digested and are of little value. Don't feed lawn clippings to chickens if pesticides have been applied recently. Chickens may begin pasturing at any age as long as weather is favorable and protection from predators is available. The growth rate of birds on pasture will be slower than the growth rate of birds fed only complete feeds. If supplemental grains are available, these can be started when roasters or capons are 10 weeks old. A complete broiler grower diet containing 18 to 20 percent protein should be available free-choice at all times. When supplemental grains are fed, feed only what the birds will eat in a few hours. A purchased scratch grain mixture or a home-brewed mixture can be comprised of 2 parts corn, 1 part wheat, and 1 part barley or oats by weight.



Controlled grain feeding is important during the growing period because excessive grain consumption will make birds too fat. The following table is a guide for controlled grain feeding.

Table 4. Guidelines for Controlled Grain Feeding to Roasters

Age (weeks)	Parts of Mash	Parts of Grain Mixture
1 to 10	100	0
10 to 13	80	20
13 to 16	60	40
16 to market	50	50

Finisher feed can then be fed until the birds are marketed. Pullet-size granite grit should be provided free-choice during the growing period for roasters, or it can be top-dressed on the feed at the rate of 1 pound of grit per 100 birds per month.

Some people do not want to feed their meat birds three different diets during the eight to twelve weeks that they are raised because it is difficult to buy small quantities of feed and because larger quantities are more economical. Therefore, it is common to purchase a 20 percent protein feed for meat birds, which can be fed for the bird's lifetime.

Feeding Dual-Purpose, Heavy-type Egg Layers

Heavy breeds require about 24 grams of well-balanced protein per day for maintenance. Dual-purpose breeds require a level of protein between the light (17 grams protein per day) and the heavy breeds. Specific nutrient requirements for dual-purpose breeds have not been adequately researched. Their nutrient requirements will probably be slightly higher than light breeds, but the same recommendations can be applied for both light and dual-purpose breeds. Refer to Table 1 for additional information concerning the feeding of dual-purpose birds. All of the aforementioned principles concerning controlled grain feeding, and calcium and grit supplementation of light breed Leghorn-type layers can be applied to the feeding of dual-purpose, heavy-type layers.

Use a Coccidiostat

It may be desirable to use feed containing coccidiosis preventive drugs with meat poultry and laying replacement stock. A coccidiostat is generally added to the diets of pullets and meat birds that are raised on the ground. The coccidiostat will keep the birds from being infected with an intestinal parasite called coccidia. However, when a drug is used, be sure it is approved for the type of poultry to which it will be fed. Feed manufacturers label feed according to the type and age of poultry (for example: starter, grower, layer) with appropriate instructions for use. Most pullet and broiler grower diets contain a coccidiostat. Many coccidiostats need to be withdrawn from the feed several days before the birds can be marketed. However, some coccidiostats do not have to be withdrawn from the feed because they do not accumulate in the body tissue of poultry. Check with your feed dealer to learn which broiler finisher feeds contain a coccidiostat that does not have to be withdrawn. Avoid feeding coccidiostats to active egg-laying birds.

Feeder Management

Feed and water should be given to chicks when they are placed under the brooder. Spread the feed in a clean cardboard box with the sides cut down to about 1 inch. Egg flats can also be used to start chicks. Allow a gradual change to the feeders from the cut-down boxes. It takes about a week for birds to learn to use feeders. Keep fresh feed available at all times to maintain healthy chickens, but avoid wasting feed. For best results, adjust the height of the feeder troughs to the height of the chickens' backs so that they can eat comfortably. To avoid wasting feed, do not fill the feeder troughs more than half full. Feeder troughs should be emptied and cleaned periodically to avoid accumulation of stale or moldy feed.

Feeders adequate for a small flock can be made at home or may be purchased from your local feed store, farm supply store, or a mail order company. Feeders need to be adjusted in size as the birds grow and also need to be constructed to allow cleaning and disinfection. There should be enough feeder space available for all chickens to eat at the same time for most efficient production.

Mash vs. Pellets or Crumbles

Converting mash feeds into pellets or crumbles adds a given cost per ton of feed. However, there are some advantages to feeding pellets or crumbles. Because feed is compacted in pellet form, the bird is able to consume and metabolize a greater amount of feed. Pelleted feeds are a complete unit of feed, and the birds are unable to pick out different feed ingredients. Some mash feeds are extremely dusty and are difficult to handle. Pelleting these feeds improves their handling quality. Most broiler feeds are pelleted because pellets make it easier for the broiler to optimize its genetic potential. Also, this form of feed makes it possible to formulate high-energy, high-protein diets, which aid the broiler producer in maximizing the amount of feed used to produce a pound of meat.

Feed Management

Feed handling is important to providing your birds with adequate nutrition. Nutrients are destroyed during extended holding times. Fat will become rancid and render the fat-soluble vitamins inactive. Mold and bacteria can grow in the rich nutrient environment of feed, causing illness and lowering your flock's production performance. Every effort should be made to provide high quality feed.

Store feed in a clean, dry, rodent-proof area. Never store feed bags on a concrete floor because feed picks up moisture from the concrete. Store feed bags on wooden pallets so air can circulate under and around the bags. Store feed in watertight, non-metal containers. Metal increases the chances of feed becoming rancid and destroys vitamins. Poultry feeds should be as fresh as possible. Never store feed for longer than one month in the summer and two months during the winter. Never allow birds to eat moldy feed; toxins produced by molds will cause serious harm to poultry. Consider handling feed in bulk if you have flocks that consume more than 500 pounds per day.

Allow birds to clean up their feed at least once a week. This prevents caking in feed troughs and accumulation of moldy feed. It also keeps the birds from picking out certain ingredients and assures that they are eating a balanced diet. It will not hurt birds to be out of feed for an hour in the afternoon around 4 to 5 p.m. At this time, you may give a limited feeding of scratch grain over the litter so that chickens keep the litter stirred and aerated.

Nutrition is important in maintaining growth, reproductive performance, and health of the backyard flock. Common sense and adherence to some fundamental rules should ensure that your flock will remain healthy, productive, and well-fed.



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