

Nutrition for Backyard Chicken Flocks

► Raising chickens for eggs or meat requires the right nutrition at the right life stage. Follow these guidelines to maintain your backyard flock's growth, reproductive performance, and health.

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 therapeutic.

Producing eggs and poultry meat at home is not always economical. Each family should consider its economic situation before starting a home flock. A thriving home chicken flock will require good breeding stock combined with careful management, disease control, and a good feeding program.

Unless you are interested in a specific breed for exhibition or hobby purposes, you have two broad and basic choices when deciding what type of poultry to keep. You may choose a breed that excels in (1) egg production or (2) meat production. In general, two types of chickens are bred to produce eggs: the single comb white Leghorn, which produces white-shelled eggs, and the heavy-type egg layer (typically referred to as a 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. Dual-purpose egg layers are larger birds that consume more feed than Leghorns and produce fewer eggs. They are a good choice for home egg and meat production.

The most efficient meat production comes from Cornish cross hybrids that have been selected for fast growth and efficient feed use. This type of chicken can be used for Cornish game, broiler, roaster, and capon production. They are inefficient egg producers, however, and when mated, they fail to produce the desirable traits that were present in the parents. Therefore, purchase replacement chicks from the hatchery for maximum performance rather than breed them at home from stock obtained from hatcheries.



Feed accounts for approximately 70 percent of the cost of raising domestic fowl. For this reason, you should understand nutritional concepts and strive to optimize your feeding management. Dietary requirements are determined by the age and type of poultry (i.e., meat versus egg type). These differences require that each diet be formulated with specific quantities of required nutrients. Some feedstuffs are high in one nutrient but low in another, which is why chicken feed is comprised of various feedstuffs. In addition to the nutrient composition of a diet, other factors such as the diet's physical form and the feed's storage needs may influence diet quality.

Poultry Diets

Because various types of poultry require different nutrients, different diets must be fed (table 1). Nutrient requirements sometimes overlap between types or ages of poultry, so it is possible to make some substitutions. At other times, the correct diet must 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.

Table 1. 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	0.09 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

The primary concern when formulating a diet is to meet the bird's nutrient requirements. Generally, 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 the chicken will consume and 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 winter, the opposite is true. Birds eat more to maintain their body heat. Growing birds require more protein than mature chickens. In addition, heavy meat-type chickens need more protein than lighter egg-laying strains.

Nutrients that include protein, energy, vitamins, and minerals comprise the most essential 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.

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 a feeder from one bag rather than blend several different feed sources. You can also 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 Pullets

Complete starter feeds for Leghorn-type or light breed replacement pullets should contain 20 to 22 percent protein, depending on energy level, and be used until birds are 6 weeks old. Allow 200 pounds of feed per 100 birds for the first 6 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 Leghorn 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, tends to delay the onset of egg production by 1 or 2 weeks, but eggs are usually larger. Although growth rate is reduced, the final body weight is about the same when delayed egg production starts.

The complete feed-controlled grain system can be initiated at 6 weeks when birds are offered growing mash. Use 16 to 18 percent protein complete growing mash from weeks 6 to 20 and make pullet-size granite grit available when birds are 6 weeks old.

For floor-reared birds, small amounts of grain scattered in the litter causes the birds to scratch in the litter, keeping it in better condition. Never feed more scratch grain than birds will finish in 1 to 3 hours.

Leghorn-type pullets can be placed on range at 6 weeks if the outside temperature is warm. Range feeding, however, cannot provide a complete diet for pullets. A 16 to 18 percent protein grower feed should be provided free choice. Scratch-type grains also can be provided in a separate feed hopper or scattered on the ground with the intent for the hens to clean up all grain within 20 to 30 minutes.

Feeding Leghorn-Type Layers

For 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 2 weeks before the bird begins to lay. Early introduction of the layer diet may cause improper bone development.

A Leghorn hen begins to lay eggs at approximately 18 to 22 weeks if she matures during spring. A hen maturing during fall or winter needs a larger body size before production begins, so more time may be required before lay is initiated.

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).

During phase 1 (20 to 42 weeks old), hens need protein for growth, feather development, and maximum egg production. In phase 2 (> 42 weeks old), hens require more protein for egg production and body maintenance (due to increased egg size and body weight) and less protein for growth and feather development.

There are also seasonal effects on feed consumption. For example, a hen may consume up to 340 calories of metabolizable energy per day during winter to keep warm. But in summer, she may consume only 260 calories of metabolizable energy per day. Therefore, a higher dietary protein level should be fed during summer when temperatures are high. 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 will be influenced by 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 controlled feeding of scratch grains until the desired protein intake is achieved. Most scratch-grain mixtures average 10 percent protein. Thus, feeding 5 parts of a complete feed containing 20 percent protein ($5 \times 20 = 100$) and 1 part grain containing 10 percent protein ($1 \times 10 = 10$) equals

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

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. Therefore, purchase a complete layer diet that has 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 made available for the chickens to select as needed. If supplemental lighting is not provided to maintain production during short daylight months, remove the layer feed during the molt and unproductive periods, replace it with developer, and supply the birds with a calcium supplement and grit. The developer feed will provide the birds with a complete diet to help them replenish fat reserves, while the calcium supplement will help replace calcium in the hens' bones. Replace the developer feed with laying diet once egg production is initiated to prevent problems associated with lack of adequate calcium.

Feeding Breeders

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

Body Function	Phase 1 (20 to 42 weeks of age)	Phase 2 (> 42 weeks of age)
Production of an egg	12.2 grams/day	13.5 grams/day
Maintenance of daily body protein	3.0 grams/day	3.4 grams/day
Daily body growth	1.4 grams/day	0.0 grams/day
Daily feather growth	0.4 grams/day	0.1 grams/day
Total daily protein needs	17.0 grams/day	17.0 grams/day

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

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

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

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 sufficient 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 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 also can supply an extra source of calcium regardless of the amount in the feed. Oyster shell, calcite, or limestone can be offered free choice.

These sources must be provided when the laying diet does not contain enough calcium to meet the birds'

requirements. Complete feeds for raising layer 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 coarse materials. Hard grit in the gizzard aids in grinding these materials so they can be digested and eliminated from the body. Grit is available in chick and hen sizes. Continuous feeding is not necessary, but grit should be available free choice for 2 or 3 days per month.

A suitable grit and oyster shell hopper for a laying flock is divided into two compartments so both the grit and the calcium can be fed from the same hopper. For meat production birds, grit can be fed once monthly on top of the mash or grain at the rate of about 1 pound per 100 birds. 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. Because of their ability to rapidly gain weight, they should be fed high-protein diets.

During the first 4 weeks, broiler-type chickens need a starter feed that contains 20 to 23 percent protein, depending on the energy content of the feed. From 4 to 8 weeks, a broiler grower feed containing 19 to 20 percent protein is used. Beyond 8 or 9 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 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 supplement scratch grains for more than 2 weeks; the result will be an overly fat bird.

When raising roasters, you should follow a different feeding schedule. Roasters are raised for approximately 12 weeks, although some are kept for 5 months.

Begin by feeding the broiler starter diet. From weeks 2 to 12, provide a pullet starter or grower diet. The pullet feed will have less energy, and the roaster will not put on too much fat.

Beginning at 12 weeks, feed the broiler grower diet until your birds almost reach the desired weight. At that time, always feed a nonmedicated finisher diet or supplement scratch grains for 7 to 10 days before slaughter. The exact timetable for feeding roasters depends on the date you choose for processing.

For roasters (8 to 12 pounds, marketed at 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 can contain a coccidiostat.
- Broiler finisher (15 to 18 percent protein) or supplemented scratch grains (10 percent protein). This feed should be fed 7 to 10 days before slaughter because it contains no medication like Amprolium or a medication requiring no withdrawal time. These feeds also are high in energy and low in protein, so they will produce excessively fat birds when used longer than 2 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 have little value. Don't feed lawn clippings to chickens if pesticides have been applied recently.

Chickens may begin pasturing at any age if the weather is favorable and protection from predators is available. The growth rate of birds on pasture will be slower than that of birds fed only complete feeds. These can be started when roasters or capons are 10 weeks old if supplemental grains are available.

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 homemade 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. Excessive grain consumption will make birds too fat. Table 4 is a guide for controlled grain feeding.

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 8 to 12 weeks they are raised. It is difficult to buy small quantities of feed, and larger quantities are more economical. It is common, therefore, to purchase a 20 percent protein feed that can be fed for the birds' lifetimes.

Feeding Dual-Purpose, Heavy-Type Egg Layers

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

Heavy-type egg-laying breeds, such as Sex-Linked Brown Egg Layers and Production Reds, require about 24 grams of well-balanced protein per day for maintenance. In comparison, dual-purpose breeds, such as Plymouth Rocks and Rhode Island Reds, 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 the principles concerning controlled grain feeding and calcium and grit supplementation of light-breed Leghorn-type layers can be applied to feeding dual-purpose and heavy-type layers.

Use of a Coccidiostat

You may want to use feed containing coccidiosis prevention drugs (coccidiostat) for meat poultry and laying replacement stock. A coccidiostat is generally added to the diets of chicks, pullets, and meat birds that are raised on the ground. Often feed containing a coccidiostat is referred to as *medicated feed*. Typically, the coccidiostat used is Amprolium; others may be used instead. Medicated feed that contains a coccidiostat will help prevent the birds from being infected with an intestinal parasite called *coccidia*.

When choosing a product, 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.

Some pullet and broiler grower diets contain a coccidiostat. Many coccidiostats need to be withdrawn from the feed for 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 poultry body tissue. 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

Give chicks feed and water when they are placed under the brooder. Spread the feed in a clean cardboard box with the sides cut down to about 1 inch. You can also use egg flats 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.

Always keep fresh feed available 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 they can eat comfortably. To avoid wasting feed, do not fill the troughs more than half full. Empty and clean the feed troughs periodically to prevent the accumulation of stale or moldy feed.

Feeders adequate for a small flock can be made at home or purchased from your local feed store, farm supply store, or mail-order company. Feeders must be adjusted in size as the birds grow and 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 versus Pellets or Crumbles

Converting mash feeds into pellets or crumbles adds a given cost per ton of feed. There are some advantages, however, to feeding pellets or crumbles.

Because feed is compacted in pellet form, the bird can consume and metabolize more feed. Pelleted feeds are a complete unit of feed, and the birds cannot pick out different ingredients. Some mash feeds are extremely dusty and 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. This form of feed also makes it possible for producers to formulate high-energy, high-protein diets that aid in maximizing the amount of feed used to produce a pound of meat.

Feed Management



Feed handling is vital in providing your birds with adequate nutrition. Nutrients are destroyed during extended holding times. Fat becomes rancid and renders 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.

Make every effort to provide high-quality feed. Consider handling feed in bulk if you have flocks consuming more than 500 pounds daily.

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 bags on wooden pallets so air can circulate under and around them.

Store feed in watertight, nonmetal containers. If in the sun, metal will get very hot, increasing the chance of feed becoming rancid and destroying vitamins.

Poultry feeds should be as fresh as possible. Never store feed for longer than 1 month in the summer and 2 months during the winter.

Never allow birds to eat moldy feed; toxins produced

by molds will cause serious harm to poultry. 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 ensures they eat a balanced diet.

It will not hurt birds to be out of feed for an hour in the afternoon around, 4:00 p.m. to 5:00 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 essential in maintaining the backyard flock's growth, reproductive performance, and health. Common sense and adherence to fundamental rules should ensure that your flock remains healthy, productive, and well fed.



Revised by **Ken Macklin**, *Extension Specialist*, Professor, Poultry Science, Auburn University. Originally written by **Joe Hess**, former *Extension Specialist*, Professor Emeritus, Poultry Science, Auburn University.

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