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Feeding Meat-type Chickens

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In recent years, interest in raising small flocks of meat chickens (broilers) has dramatically increased. Producers with small acreages find that chickens (meat-type or egg-laying) can make a valuable addition to their small farms. To maximize the value of their meat chickens, producers need to properly feed and manage their flock.

While chickens have been domestic animals for millennia, their history as animals produced specifically for meat began in the mid-1920s. Prior to and through the 1950s, chicken meat was a by-product of the egg industry in some parts of the country. Young cockerels (males) and spent hens (layers past their prime) were slaughtered for meat. By today's standards, these birds would not provide high-quality meat because laying breeds and old hens make a poor meat product.

In the 1940s and '50s, the A&P Tea Company's "Chicken of Tomorrow Contest" identified the Cornish Cross (Figure 1), developed by Charles Vantress of California, as the best chicken to economically produce meat. By the late 1950s, this breed was adopted by virtually the entire chicken meat industry. Since then, due to advances in management, breeding, and nutrition, the Cornish Cross has become the most efficient traditional livestock species produced worldwide: It grows from about 2 ounces to over 6 pounds in 6 weeks, while consuming about 10 pounds of feed.

In recent years, many small acreage farmers have rejected the Cornish Cross in favor of other breeds that were grown in the past, often referred to as "heritage breeds." Some of these are purebred standard breeds, while others are standard breed types crossed with the Cornish Cross for the size and growth characteristics of the more efficient commercial meat chickens. Feeding heritage breeds and Cornish Cross is similar; however, the economics of production, growth rate, feed



Photo by: James Hermes

Figure 1. Cornish Cross

consumption, and final body weight favor the Cornish Cross. In some markets, heritage breeds and slower growing broiler types may provide producers with a marketing advantage and higher prices, which can offset higher production costs.

Chicken Biology

What we feed animals depends on their biology and digestive anatomy. Chickens are monogastrics, meaning they have a simple stomach with minimal ability to digest fiber. Their digestive system is more like that of humans than cattle. Thus, for good health and maximum productivity, it is necessary to feed meat-type chickens a high protein, low fiber diet.

Nutrients and Ingredients

For good health and maximum productivity, chickens need to consume the required levels of certain nutrients, including: crude protein (comprised of a mixture of amino acids), fat, minerals, and vitamins.

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Although not technically a nutrient, energy (calories) is also necessary. When all of these nutrient requirements are met from various combinations of ingredients, the chickens' diet is balanced.

Nutrients are found in feed ingredients such as:

- Grains (corn, wheat, barley)
- Legumes (soybean and peas)
- Meat
- Fish
- Poultry by-product meals
- Tallow
- Vegetable oil
- Limestone
- Salt
- Vitamin/mineral premixes

To properly formulate feeds, the nutrient levels in each feed ingredient and the chickens' requirements must be matched as closely as possible.

Standard vs. Organic Feeds

Typically, commercial feeds that are available to producers of small flocks of chickens, by the sack or in bulk, are either a standard or an organic feed. Both standard and organic feeds are formulated to meet the nutrient requirements of chickens at a particular point in their life cycle or production level. This is termed "phase feeding." For meat chickens raised in small flocks, there are typically two phases prior to marketing: starting and growing. Starter diets provide maximum growth during the first 2 to 3 weeks. Grower diets are fed from about 3 weeks to market age. In general, these diets are formulated so that the crude protein level declines and energy (calories) increases from starter to grower.

In some cases, commercial feeds can be fed from hatch to market. These complete feeds are formulated to meet the average needs of meat chickens throughout their growth. While nutritionally adequate, these feeds may result in slower growth and higher feed costs. Starter, grower, and all-purpose feeds can be fed to meat chickens at any time; none will be detrimental to the birds. However, some efficiency may be lost. The purpose of phase feeding is getting the best productivity for the least cost.

Standard feeds are produced in medicated or non-medicated forms. Medicated forms, which are only in starter feeds, contain a coccidiostat that inhibits the growth of the *Eimeria* sp. protozoan responsible for the poultry disease coccidiosis. The coccidiostat typically

used in feeds is Amprolium (Amprol®). Amprol® is a very safe compound that remains in the gut of the chicken and does not go into the bloodstream, so it can be fed to chickens up until the day of slaughter. Antibiotics and hormones are not added to any commercially available feeds (hormones in poultry feed are not legal). Non-medicated feeds lack the addition of the coccidiostat.

Organic feeds have similar formulations as standard feeds; the difference is the source of the ingredients. Ingredients in organic feeds must be grown and processed under certified organic conditions. In organic feeds, there are no residues from chemical fertilizers or pesticides, and genetically modified organisms (GMO) cannot be used. Organic feeds are non-medicated and cannot contain any animal products, including ingredients such as meat meal, meat and bone meal, blood meal, or poultry by-product meal. Depending on the certification program, fish meal may or may not be acceptable in organic feeds. When formulating organic diets, some nutrients are difficult to provide in sufficient amounts to achieve optimal performance. Methionine, an important amino acid, is typically low in poultry diets and is usually added in synthetic form. Currently, some synthetic methionine can be added to organic diets; however, this practice is being phased out.

Whether using standard or organic feeds, for maximum production and the best feed conversion (the ability of the bird to convert feed to body weight), crude protein levels should be about 22–23% for starter feeds and 18–20% for grower feeds. Lower or higher protein levels can reduce performance or negatively affect bird health or both. For example, chick starter feeds that are formulated for egg-type chicks will reduce growth rate and feed conversion if fed to meat-type chickens because of the lower protein and energy levels formulated for slower growing egg-type chickens.

Feed Storage

It is important to store feed properly. All feeds should be stored under relatively dry conditions in closed containers to reduce rodent contamination and molding. In addition, prepared feeds should be used within a month or so. Old feeds can lose nutrient quality, especially vitamin levels, and may become rancid.

Scratch and Grit

Scratch is generally a combination of whole wheat and cracked corn and should not be considered feed. It

is not suitable for young birds but may be provided as a “treat” to birds ready for market. Broadcasting scratch on the ground encourages the birds’ scratching behavior, giving them exercise.

When feeding whole grains, grit may be necessary for proper and complete digestion. Consumed grit remains in the gizzard and grinds grains into small particles so it can be digested. Pastured birds will consume small stones or pebbles from the ground, or grit can be purchased. Grit should not be mixed with the feed; grit should be provided in a separate container so birds have the choice whether or not to eat it. Birds fed only prepared feeds do not require grit.

Pasture/greens

These days, most producers of small flocks of meat chickens allow their chickens access to pasture. While this practice is not necessary, there is some benefit to the chickens having access to insects and exercise. When chickens are pastured, they mostly forage for insects and seeds, which are only plentiful in the late spring through the early fall.

Pastured chickens will consume some grass, but there is little nutritional value in it for them. Green grass is mostly water and fiber with relatively small amounts of the other nutrients. When chickens eat grass, they use the water, and the fiber moves through the digestive system virtually unchanged. As discussed previously, chickens are monogastrics and do not have the enzymes to digest cellulose.

One of the primary benefits of pasturing poultry is for marketing purposes. While there are questionable nutritional or health benefits of pasture-reared chickens, some consumers are willing to pay a higher price for birds raised on pasture. At this time, there is little substantive evidence of major differences in taste, nutritive value, or other benefits of pastured poultry. Hopefully, research in the near future will provide some answers.

Water

Water is arguably the most important nutrient for chickens. Chickens will drink twice the amount of water as they eat in feed and more when the temperatures are high (>85°F). Water aids in moving the feed through the gut and provides a solvent for nutrients to travel from the gut into the blood stream. Water is also used for body cooling, maintains the proper body pH, and keeps the proper amount of moisture in all the chickens’ tissues. It

is extremely important that chickens have access to clean, fresh, relatively cool drinking water at all times.

Mixing Feeds at Home

It is possible, but somewhat difficult, to mix chicken feeds at home from homegrown ingredients. Table 1 (page 4) gives sample starter and grower diets for meat chickens. Nutrient levels in home-mixed feeds will vary from batch to batch because ingredients change and measurements differ. It may be best to purchase feeds that are formulated and mixed by a professional from either a feed store or a custom feed mill. This ensures better consistency, which will result in maximum productivity.

Meat chickens tend to have better performance when fed a pelleted diet (meaning ground ingredients that are formed into a pellet). Feeding diets in mash form (the consistency of course corn meal) is adequate, but maximum performance may not be realized. For home-mixed diets, pelleting requires specific equipment for pellet processing.

Most ingredients (e.g., cereal grains, legumes, canola), even those that are common in animal feeds, contain either high fiber levels or other “anti-nutritional” factors that can cause significant problems in chickens’ health and growth by interfering with the digestive process. In commercially prepared diets, these problems are managed through processing, adding enzymes, and using problem ingredients in small amounts or avoiding them all together. Care must be taken when using nontraditional feed ingredients in poultry diets.

Alternatives to Traditional Ingredients

For decades, corn and soybean meal have been the basic ingredients of traditional poultry feeds. These ingredients are plentiful and affordable, and after processing have virtually no anti-nutritional properties for chickens. In recent years, interest has increased, especially among producers of small flocks, to identify alternative ingredients for poultry feeds. There are several reasons for this, including: the perceived problems associated with corn and soy in the health of chickens and humans, the fact that most corn and soy are genetically modified, and the increased carbon footprint required to import these ingredients to the western United States.

Research is ongoing to find beneficial alternatives to traditional corn- and soy-based feeds for poultry. Grains such as wheat and barley have successfully replaced

Table 1. Sample starter and grower diets for meat chickens using homegrown ingredients¹

Ingredient	lb/100lb of diet (%)	
	Starter	Grower
Coarsely ground grain (corn, wheat, barley, oat groats, triticale, etc.)	45.5	49
Wheat bran, mill feed, rice bran, milling by-products, etc.	12	18
Soybean meal, peanut meal, canola meal, pea meal, sunflower meal, safflower meal, sesame meal, lentil meal, chickpea meal, etc.	28	18.5
Fish meal, meat meal, blood meal ²	5	5
Alfalfa meal	4	4
Brewer's yeast, milk powder	2	2
Vitamin supplement (pre-mix)	Yes ³	Yes ³
Salt with trace minerals	0.5	0.5
Bone meal, defluorinated dicalcium phosphate	2	2
Ground limestone, marble, oyster shell	1	2

¹ Adapted from *Feeding Chickens*, University of California Cooperative Extension Leaflet 2919, May 1983.

² If animal products are not used, add extra protein.

³ Pre-mix should be added. Each brand is formulated differently, so the amount will vary depending on the brand.

corn in poultry feeds, as long as synthetic enzymes are added to the feed to aid in the digestion of these grains. Corn is high in energy due to its starch content, so corn alternatives need to be able to replace its energy level, or fat will need to be added to maintain the caloric level. Soy is the main protein source in traditional poultry feeds; therefore, alternative ingredients must also have relatively high protein content. Canola meal is often used as an alternative to soy. Canola meal has protein levels around 30% compared to 44% for soy, but because of the invasive nature of the canola plant, planting is highly regulated in the West. Much of the canola used in feeds in the United States is imported from Canada.

Other potential alternatives are legumes, such as kidney beans, pinto beans, and dry field peas. These “legume grains” have protein levels around 25% but

have high levels of anti-nutritional factors. Beans negatively impact chicken growth rates if they are at levels up to 30% of the chickens’ diet, as will peas at levels greater than 50%. There are many other potential feed ingredients that have yet to be researched for their dietary and production value in poultry feeds.

Summary

Meat chickens have the genetic potential for extremely fast growth with very good feed conversion. If fed poorly, meat-type chickens will not be able to reach their genetic potential, which results in higher production cost. Feed is the single largest proportion of the cost of growing chickens. It is important that producers maximize their investment by properly feeding their meat chickens.

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