

Introduction to Pasture-Raised Poultry: Maximizing Foraging Behavior¹

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A defining characteristic of pasture-raised poultry is access to pastureland that is rotationally grazed. This practice provides poultry with fresh pasture and small quantities of grass, insects, and worms (Glatz et al. 2005; Miao, Glatz, and Ru 2004), which in turn can lead to enhanced quality of meat and eggs.

In a well-managed system, birds may eat enough nutrients to replace 5%–10% of a grain-based diet. However, the percentage of diet substituted by these sources may depend on several factors, like breed and age of the bird, environment, and the quality of the forage. This makes it difficult to know which nutrients will be supplied and in what amount (Fanatico 2007). Birds raised on pasture will still require a grain-based ration formulated for their growth stage.

According to the National Center for Appropriate Technology (Fanatico 2006), chickens obtain limited nutrients from plant material even with high-quality forages. Poultry cannot digest large quantities of fiber because they do not have the enzymes required to digest cellulose and other complex carbohydrates (Sloan and Damron 2003). Poultry have two large

pouches attached to the lower end of the small intestine. These pouches are called "ceca" and contain microorganisms capable of some fiber digestion. This, in turn, releases small amounts of carbohydrates that can be used by the birds (Duke 1986). Research has shown that the ceca in foraging poultry are much larger than that of poultry that do not forage (Fanatico 2007). Other avian species, such as geese and turkeys, can obtain added nutrients from forage because they are better able to digest fiber due to the larger microbial population in their digestive tracts. When formulating diets for broilers and layers, it is best to assume zero contribution to the birds' nutrient requirements from pasture in order to ensure adequate nutrient intake from a well-balanced diet.

With an elementary understanding of poultry nutrition and pasture management, individuals can maximize the benefits associated with raising birds on pasture. These benefits may also extend to other species of grazing livestock that use the same pastures.

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Foraging Behavior

Chickens, for the most part, are animals of habit. Habits acquired early in life are some of the most important factors in the birds' ability to forage. If the birds have access to pasture every day, they will learn to forage on young vegetative plant material and live protein sources, such as insects, worms, and grubs. Some breeds may be better foragers than others. If the birds roost in a secure coop at night, they should have access to the outdoors at the same time every morning so as to develop the habit of foraging during the early morning hours.

A study conducted at Truman State University by Chisholm et al. (2003) evaluated the feed efficiency of various production systems. Their results revealed that broilers spent more time outside foraging during the early morning (45% of birds) and late afternoon (29%), compared to 24% in the middle of the day. Chisholm et al. also concluded that the amount of sun and time of day have the greatest impact on chicken foraging behavior. With this in mind, it is safe to assume that most poultry foraging activity will take place in the morning hours of 6 a.m.–10 a.m. and the afternoon hours of 4 p.m.–6 p.m. Other studies conducted by Dawkins et al. (2003) found that birds did not go outside frequently during the middle of the day or in winter.

Most pasture-based layer operations allow the birds free range during the day (Figure 1) and return to an enclosed structure at night to guard against predation. In order to maximize foraging opportunities for hens, they should be released from the coop early in the morning. Additionally, the housing structure should be moved to fresh pasture during the morning hours to give the flock access to fresh pasture during peak foraging hours. Feed and water should be provided outside as well as inside.

In Florida, broilers are typically raised in some sort of confined housing structure that is rotated around the pasture to maximize foraging behavior. This practice ensures an even distribution of nutrients, provides the birds with fresh forage material, and, most importantly, prevents loss of the grass stand caused by overforaging and scratching. There are different types of confinement housing

structures that can be used in broiler production systems, such as the one shown in Figure 2.



Figure 1. Free-range laying hens scouting a bahiagrass pasture in North Florida. (Photo: Tom Wright, UF/IFAS)



Figure 2. Hoop houses are commonly used in broiler production and must be moved daily. (Photo: Tom Wright, UF/IFAS)

In both production systems, producers use pasture management and rotation to maximize foraging behavior and reduce the risk of soil erosion and weakening of the grass stand.

Pasture Management

Pasture management in pastured poultry operations will help prevent health problems and reduce the impact of poultry production on the environment. With this in mind, it is important to establish and manage forage species that are adapted to your geographical area in order to successfully achieve the benefits associated with this production system. It is essential to determine soil fertility status, select appropriate forage species, choose a fertilization program, and control foraging in any grazing system (Sollenberger, Newman, and Vendramini 2009).

To determine soil fertility status, submit soil samples for analysis. A soil analysis will provide an initial baseline of nutrient concentration and soil pH. If necessary, adjust soil pH according to analysis recommendations; this practice, more than any other, affects the level and economic efficiency of forage production. In a pasture-based poultry system, it is recommended to submit soil samples for analysis on an annual basis to monitor nutrient levels in the soil. If needed, fertilizer should be applied based on the soil analysis results to add nutrients that are lacking. For more information on how to submit soil sample for analysis, contact your local county Extension agent.

In North Florida, warm season perennial grasses like bahiagrass and bermudagrass will provide a suitable forage base for poultry. Proper establishment of these forages will ensure the long-term health and survivability of the pasture. During the cool season, annual forages such as rye, ryegrass, or oats will need to be planted annually in order to provide a forage base from December to May. Cool season grasses are usually high quality and, unless the forage will be grazed by other livestock, it is difficult to justify the cost of planting cool season pastures to be used exclusively by poultry. For more information on pasture establishment, variety, selection, and additional resources, visit the Forages of Florida Website <http://agronomy.ifas.ufl.edu/ForagesofFlorida/index.php>.

The highest quality and most palatable forage that can be offered to poultry is a blend of grasses and legumes, like clover. One option is to plant wildlife food plot blends for warm and cool seasons that contain species adapted to the soil and weather conditions. Clovers are considered to be highly palatable; however, it is difficult to establish clovers in deep sandy soils without irrigation, and the seed is expensive.

Site selection is another important aspect that should not be overlooked. Pastures used for poultry production should be well drained. Birds can drown easily or suffer from hypothermia when puddles of water form. Heavy, poorly drained soils are therefore generally unsuitable for pastured poultry (Gordon and Charles 2002).

Pasture Rotation

Rotation is the key to keeping forage young and vegetative in pastured poultry production (Fanatico 2007). Mobile houses that can be moved frequently are ideal (Figure 3). It is important to note that where excessive nutrients build up in the soil, pathogens are also likely to build up, resulting in "fowl sick" land. Although many pathogens and parasites will die after their poultry hosts are removed, some are able to survive for long periods of time and reinfect birds when they are returned to the land (Fanatico). An additional consequence of not rotating pasture is that the vegetation will become worn down to the soil and may cause the soil to erode, especially since chickens naturally scratch the soil.



Figure 3. Jim Hudson of C & M Earthworks rotates his Salatin-style pen using a hand truck. (Photo: Elena Toro, UF/IFAS)

One important factor to consider is the even distribution of nutrients that results from moving birds on a regular schedule. This will allow for uniform forage growth throughout the pastures and prevent bare spots from forming that eventually lead to weed and disease problems. In time, pastures will become more productive and yield more forage.

Rotating pastures allows grass a resting period, which will in turn facilitate forage regrowth. The resting period should ideally be between 14 and 21 days if other livestock will graze the pasture. However, birds prefer to consume tender regrowth, which can occur in as little as 10 days after grazing. After the 30th day of regrowth, bahiagrass and bermudagrass will become fibrous and difficult for

the birds to consume. If the grass becomes tall and stemmy, mowing will be necessary.

The following are some rules of thumb for pasture rotation:

- Broilers: During the first two weeks on pasture, move the birds once per day. For the remaining amount of time on pasture, move the structure twice per day to maximize foraging behavior.
- Layers in a free-range system: Rotation is variable and depends on the size of the flock and paddocks. Moving free-range structures every three to seven days (Figure 4) may be adequate for North Florida.
- Layers in permanent housing: Subdivide the yards into at least four separate yards and rotate flocks among these.



Figure 4. A patch of new grass after the mobile hen house was removed from the pasture for seven days. (Photo: Elena Toro, UF/IFAS)

Other Benefits of Foraging

Eggs and meat produced from pasture-raised poultry are considered to be an excellent source of animal protein, as are the meat and eggs purchased in supermarkets from birds continually housed inside large modern commercial poultry operations. In fact, meat, milk, and eggs are considered by nutritionists to be the highest quality protein sources available to consumers. In addition to their high-quality protein, there is evidence that eggs and meat from pasture-raised poultry may contain some added nutritional benefits. The following is a compilation of

findings from the literature review conducted by Dr. Ann Fanatico (2007).

- Karsten et al. (2003) found eggs from chickens raised on legume pasture have more vitamin A and E and more omega-3 fatty acids than eggs from chickens raised indoors. Additionally, these researchers compared the amount of unsaturated fatty acids in three types of pasture: alfalfa and grass; red clover, white clover, and grass; and mixed grass. They concluded that eggs from hens consuming legumes and grasses contained more omega-3 fatty acids and vitamins than eggs from hens foraging on grass alone. This study showed that legumes contain more unsaturated fatty acids, and the leafier the plant, the more omega-3 fatty acids it contains.
- Robertson et al. (1966) found the meat of free-range birds contains more thiamine than birds raised indoors.

Additionally, access to pastures and/or insects may contribute to flavor. Diet manipulation could offer potential to enhance poultry flavor, and some forages and herbs (such as rosemary) may result in distinctive flavors (Gordon and Charles 2002).

Conclusion

Poultry are not ruminants like cows and sheep; therefore, even though they have access to pasture, they obtain a minimal amount of nutrition from foraging. Nonetheless, the nutritional quality of meat and eggs from birds raised in well-managed pastures is greatly enhanced. Consumers perceive pasture-raised poultry as an alternative to commercial production and are willing to pay a premium for these locally produced poultry and eggs. Pasture management and rotation are the keys to maximizing foraging behavior and ensuring adequate groundcover. Whenever possible, use legumes to enhance the quality of the forage. Bare land is not recommended, as it can foster disease problems in the flocks and negatively impact soil quality. The addition of poultry litter to the soil provides nutrients that can be used by pasture grasses; this in turn increases forage yield. This increased forage yield is extremely beneficial to those producers who plan to graze other livestock in the same pastures.

Small-scale poultry production makes economic sense because the start-up cost is low while the potential for significant steady income is high.

Further Poultry Information

For production system examples, educational videos, and science-based presentations online, visit the pastured poultry virtual field day at http://vfd.ifas.ufl.edu/pastured_poultry.

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