Forage Crop Selection for Pasture Poultry Production
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Raising poultry on pasture was a common occurrence until the latter half of the 20th century. Fresh forage provided an important ration balancing factor during the years before poultry nutritionists fully understood the required essential vitamins and minerals for growth and optimum meat and egg production. With the development of balanced pelleted rations, poultry no longer require access to pasture, but there are still benefits from the lush forage, invertebrates, and exercise that pasture provides. In addition, we continue to learn more and more about the positive influence that fresh grasses and legumes have on fatty acid profiles and general bird health. Although this paper focuses primarily on the attributes of different forage species and how to successful establish them, ATTRA has an excellent publication on the Nutritional aspects of forage entitled “Pastured Poultry Nutrition and Forages” at www.attra.ncat.org.

Pasture Availability
The ideal pasture for poultry is one that provides forage for as much of the year as possible. This will vary with the region of the country you are in, but certain species have longer growing seasons than others. The best pasture is also one that contains perennial species that come back year after year. In areas of the northern U.S. it’s important to only choose forage species and varieties with good cold tolerance. In other areas of the country drought tolerance is also important. In the table below, we highlight several forages that have long growing seasons, but alfalfa and tall fescue are two forages with especially long growing seasons.

Tolerance to How Poultry Graze
One of the most important aspects in choosing forage species for poultry is how well they hold up to biting and scratching. In other words, are they tolerant to “grazing?” Grazing tolerance refers to the ability of the forage to recover from grazing and trampling. Plants that withstand grazing generally have a high vegetative to reproductive shoot ratio and new root growth is initiated following defoliation.

One of the perennial grasses most tolerant to poultry grazing is KY bluegrass. This species is well adapted in the central states of Virginia, Kentucky and Missouri and north of these states where it often naturally occurs in well managed pastures. Tall fescue and perennial ryegrass also show good tolerance to grazing, but remember that the variety “KY 31” and most naturally occurring stands of tall fescue are endophyte infected. An endophyte is a bacterium or fungus living within a plant for at least part of its life without causing apparent disease. Some fungal endophytes are shown to improve host growth and increase the ir tolerance to stress, but the toxins they produce are detrimental to animals grazing on them. Most of the research looking at endophytes and grazers have dealt with ruminants (cattle, sheep and goats). There is limited research on the impact on poultry, but there is some evidence to show that laying hens consuming tall fescue infected seeds (seeds have high levels toxin) are more likely to produce shell-less eggs (Conover et al., 2003). The endophyte grows within the plant tissue so it is necessary to submit a sample to a laboratory to test for endophyte occurrence.

Fortunately, when KY 31 tall fescue is managed at a leafy stage (not seedheads) the toxicity level is much lower and all grass seed companies now sell tall fescue varieties that are endophyte free or contain beneficial endophytes that do not produce toxins. Make sure to ask for these varieties when planting tall fescue. Additionally, avoid turf-type tall fescue and perennial ryegrass because they have been developed to have high levels of toxins to reduce
insect and grub damage. This is great for yards and sports fields, but not good for grazing poultry.

The legume with the greatest tolerance to grazing is white clover. Alfalfa is a very productive legume in terms of forage production, but it does not have the fibrous root system and low growth habit of clover so it is not as resistant to grazing. When planting alfalfa for poultry, it is very important to provide at least 25 to 30 days before moving birds back onto the same alfalfa pasture that they have just grazed. Grazing tolerant or so called “traffic tolerant” alfalfa varieties are recommended when planting stands for poultry grazing.

Able to Attract a Variety of Different Types of Insects

An important benefit of pasturing poultry are the invertebrates that they consume while foraging. Again, there is very limited research on the effect of pasture type on the insect population attracted, other than the problems created when certain insects damage the forage stand itself. Preliminary research at the University of Kentucky has shown that different kinds of insects are attracted to grass pastures versus alfalfa pastures, though in this particular study the numbers of insects trapped were low and not likely to be of nutritional importance to foraging poultry. Further research is definitely needed in this area. Interestingly though, whenever University entomologists are looking to collect a wide variety of insects, they go to an alfalfa field.

Nutrient Value of Foliage Produced

Although poultry are not ruminants, they can obtain some nutrients from good leafy pastures. There is some research to show that eggs from pasture laying hens have higher omega-3 and vitamin E levels (Lopez-Bote et al., 1998). Research in this area is difficult to relate to actual field production because of differences in the type and quality of forage provided and variability throughout the year. It would not be wise to depend on pasture consumption for year-round increases in nutrient content of eggs.

Cover Crop to Prevent Erosion

Foraging chickens can be hard on pasture crops and can often denude areas rapidly. This can result in erosion when pastures are on a hilly terrain. It is important to maintain a healthy cover of grass to prevent erosion. If pastures are heavily denuded in the fall then a cover crop of annual forages such as annual ryegrass, cereal rye or wheat will protect the soil and provide some grazing late fall and the following spring. When planting these annual cover crops make sure to ask for varieties that show good winter survival.

Potential for Silage as Winter Feeding of Poultry

Producers raising ruminants frequently produce silage for winter feeding of their stock. It could be in long plastic tubes, upright silos, or in individually wrapped round bales. Dehydrated alfalfa has been used in poultry rations, but there is very little research on the use of silage of any kind for poultry. Interestingly, in South Korea, organic egg producers routinely use grass silage for the beneficial chlorophyll and carotene content. There are small scale silage systems using 55 gallon drums or heavy duty plastic bags.

Non-Traditional Forage Crops

There is a wide selection of non-traditional forage crops. One example is chicory. Most of us think of chicory as a blue flowered weed that grows along roadsides, but there are improved varieties of chicory including ‘Puna’, ‘Puna II’, and others. Chicory is a broadleaf, perennial forage herb that provides a highly nutritious feed to grazing animals and poultry. It has a thick, deep taproot capable of breaking up compacted soils and cycling nutrients from the subsoil. As an improved pasture plant it combines well with other grasses and clovers and
should be rotationally grazed from spring to late autumn. It is hardy, pest and disease resistant and drought tolerant. Sow early spring in temperate areas. Sow autumn in subtropical areas. It germinates best at 10 - 21°C soil temperature. Soil should be moderately fertile and well drained; it is tolerant of acid soils pH 5.5 to 6.

Forage Establishment
Successful pasture poultry production requires careful planning and detailed attention to establishment, production, and utilization of forage crops. Establishment of a good stand is a first and important step in a successful forage program. Several steps are of vital importance in the establishment and maintenance of good forage stands. It is difficult to predict the probability of success in establishing forages when so much depends on weather. The steps outlined below do not guarantee success, but if followed, they can increase the probability of obtaining thick, vigorous forage stands.

1. Match plants to soils.
   There is wide variation in soil capabilities on almost every farm. Soils differ in their capacity to supply water and nutrients, and they vary in slope, internal drainage, and other factors that affect establishment, production, and persistence of a given forage crop. In addition, grasses, legumes, and grass-legume combinations vary widely in their ability to become established, produce, and persist on different soils. It is important to match the plant species or mixture of species to the soils so that the greatest returns can be realized and the soil is protected. The best use of level to gently sloping, deep, and well-drained land is to plant the highest-producing crops such as alfalfa or alfalfa-grass mixtures. Steeper land should be maintained in sod-forming or thicker grasses, such as tall fescue, perennial ryegrass or KY bluegrass, to minimize soil erosion. Alfalfa should only be used where soil is at least two feet deep and well drained. On soils that are less than two feet deep or are poorly drained, clover-grass mixtures or pure grass stands may be used. Legumes, especially clovers, may be established in grass dominant sods through renovation.

2. Match plants to the intended use
   If the pasture is to be used for other purposes besides grazing poultry, plan for maximum quality and versatility in the forage program. Select plants that produce high-quality feed, and use each field for hay, silage, and/or pasture as weather and feed needs dictate. Legumes generally produce higher-quality feed than grasses. Taller-growing legumes, such as alfalfa and red clover, are more versatile than a legume such as white clover, which is used primarily for grazing. Grasses such as orchardgrass, perennial ryegrass, tall fescue, and timothy are higher yielding than KY bluegrass for hay and silage.

3. Select high-quality seed of an adapted variety
   Selecting high-quality seed is an essential step in the establishment and longevity of a forage stand. This seed will have high percentages of germination and purity, low percentages of weed seed, and be free of noxious weed seed. Another important criteria is the selection of improved forage varieties that are adapted to your geographic location. For organic production, the seed must be non-GMO. Currently, alfalfa is the only forage crop where GMO varieties are available. It is never a good practice to plant large acreages to varieties of unknown performance or adaptation. The best assurance of genetic purity is to plant certified (or blue tag) seed, if available. Poor quality seed and/or unadapted varieties are never a bargain at any price.

4. Supply proper fertility
   Just as humans and animals must have food to survive, so plants must have proper nutrition if they are to survive and produce well. The soil is a vast reservoir of nutrients needed
by plants; however, soils vary widely in their nutrient status, and a deficiency of one element can limit forage-plant growth and encourage weed encroachment. The most sensible approach to providing balanced fertility is to have soil samples tested prior to forage establishment to determine nutrient levels. Pasture fields should have soil samples taken every third year, but hay fields are sampled every year since large amounts of nutrients are removed in the hay. A soil test is the most important agronomic and economic investment in your overall forage fertility program. For organic production synthetically produced fertilizers cannot be used, but manure provides an excellent source of soil nutrients. Send samples of the manure you are applying to a soil testing lab and they will send a report outlining the nutrient status of the manure so you can apply the correct amount. With organic production, make sure that you verify the approved use of each type of fertilizer (manure, compost, feathermeal, etc.) before applying to your field.

5. Prepare an adequate seedbed

The soil should be tilled to incorporate lime and fertilizers, destroy weeds and other vegetation, and prepare a level, firm seedbed. Ridges and depressions should be reduced to a minimum to make it easier if you harvest the field for hay or if you are moving portable chicken coops. Don’t forget, a perennial forage stand should survive for several years, so it is worth the extra effort to get the soil surface smooth. No-till or minimum tillage techniques can be used to establish most forage crops, but are more difficult for organic production because herbicides cannot be used to suppress the existing stands.

6. Inoculate legume seed.

When properly nodulated, legumes such as alfalfa and clovers have a unique ability to convert large quantities of nitrogen from the air into the form that plants use to make protein and other nitrogen compounds necessary for growth. To ensure proper nodulation, inoculate all legume seed (unless pre-inoculated) with the proper strain of rhizobia bacteria just prior to seeding. Commercial rhizobia inoculums typically have a shelf life of one year, so check the “expire by” date on bags of rhizobia or on pre-inoculated seed. This should be done even if the legume to be seeded has been previously grown in the field. To ensure that inoculum sticks to each seed, use an appropriate commercial adhesive or sugar solution.

7. Use proven seeding methods

Seeding can be done using cyclone-type seeders, band seeders, cultipacker seeders, and drills with forage box attachments. Each method can be successful when seed is properly distributed and placed uniformly just below the soil surface (1/4 to 1/2 inch) and when the soil is firmed to give good seed-soil contact. Remember, though, if the seed is placed too deeply, it may not emerge. If the seed is placed at unequal depths, the stand will be uneven because of different emergence times. Also, remember that both the seed and the inoculum on legume seed must survive the seeding method. Seed germination and inoculum effectiveness may be lowered when mixed with fertilizer. Any technique can be successful if it results in uniform distribution of seed at the recommended depth and rate.

8. Seed at the right time with the correct amount of seed

Many cool-season grasses and legumes can be successfully seeded in either spring or late summer. Alfalfa, red clover, and white clovers are usually most successfully seeded in late winter or spring depending on the region of the country you are in. However, late summer seedings can be successful if soil moisture is adequate. Late summer and early fall seedings of such crops as alfalfa, fall fescue, KY bluegrass, timothy, orchardgrass, perennial and annual ryegrass, and small grains for forage are preferred by many farmers since they enable them to prepare seedbeds during favorable weather conditions and spread the year’s work more evenly. In addition, late summer and early fall seedings have fewer weed problems than spring
seedings. Warm-season species are best seeded in spring after the threat of frost has passed. Lack of adequate moisture for germination and emergence is perhaps the major problem with late summer seedings. Cultipacking to get good seed-soil contact is highly desirable. One technique to avoid some of the problems associated with dry conditions is to have everything ready to seed but to wait for at least an inch of rain before seeding. Seed as soon after the rain as soil conditions permit. This usually provides enough soil moisture not only to germinate the seed but also to give time for the young, developing roots to grow into moist soil. If rain doesn’t come early enough to get plants established, the seed may be planted the following spring. On rolling land, a light seeding of a small grain as a cover crop will protect the soil during the winter and can serve as a mulch for no-till seeding the next spring. This system doesn’t work as well for organic producers that don’t have the option to suppress the small grain with herbicides before spring planting.

Figure 1. General establishment information on the most frequently seeded perennial cool season forage crops in the United States (Note: seeding dates are listed for Kentucky and surrounding states. In the Northcentral and Northeast U.S. spring seeding dates will start later and fall seeding dates will be at the beginning of the seeding dates listed on this chart).

REFERENCES:


