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GRASS-FED BEEF PRODUCTION

Grass-fed Beef Markets and Terminology

There has been a growing interest in the production of "grass-fed beef." On January 12, 2016, USDA actually revoked the "USDA Grass-fed" label or claim (USDA 2016); however, USDA left the standards for the claim on their website for producers to follow (https://www.ams.usda.gov/services/auditing/grass-fed-SVS) because many grass-fed or grass-finished markets persist. This interest in grass-fed beef stems from consumers not only looking for a perceived improvement in animal welfare or quality of the product they purchase; but, it also stems from producers looking to fill a niche market or maintain cattle in a more pastoral setting. Along with this interest from both consumers and producers come a lot of terms and ideas that may or may not be fully understood. The objective of this article is to clarify some of the production methods used to raise grass-fed beef.

Because of the aforementioned consumer perceptions, demand for grass-fed beef is greater than the supply in much of the United States due to land values, lack of grazing infrastructure and grass-finishing production knowledge, and other constraints. Despite consumer demand, however, approximately 95 percent of the cattle in the United States continue to be finished, or fattened, on grain for the last 160 to 180 days of life (roughly 25 to 30 percent of their life) on average. The logic behind grain-finishing dates back to research from as early as the 1800s. Cattle become less efficient, less able to convert feed to muscle or meat, as they age. Grain contains more energy, allowing cattle to maintain greater growth rates later in their lives when compared to feeding only grass or forage. In addition, feeding grain frees up valuable land resources necessary to produce forages and other crops by concentrating the cattle in a smaller area. Because of the challenges with land mass availability in the United States, some of the beef in the United States that is labeled as grass-fed actually comes from outside the United States.

Rather than debate advantages and disadvantages of the grain versus grass-fed systems, the take-home here is that all beef cattle, whether farmers choose to raise them as grass-fed or grain-fed animals, spend at least two-thirds of their lifetime in a pasture setting. Therefore, all beef may be considered "grass-fed" for the majority of their lives. Thus, beef production in the United States has been, and continues to be, a forage-based industry. The differentiation in what makes cattle grass-fed, then, generally occurs toward the end of life and will be discussed in more detail.

One of the key areas scientists have investigated are the characteristics of the beef from cattle finished on grass, as they can be quite different from characteristics of beef from grain-fed cattle. Research suggests that when finished to the same fat endpoint (0.4 inch of back fat), there is no consumer-detectable difference in tenderness between beef from grass-fed or grain-fed cattle (Faucitano et al. 2008). However, beef from grass-fed cattle is generally leaner than beef from cattle fed grain, especially when compared at the same age. Therefore, cattle finished on grass typically have lower USDA quality grades, an indication of fat within the muscle, than grain-fed cattle (Mathews and Johnson 2013). For some consumers, less fat may be a desirable trait. The reduction in total fat found in grass-fed beef has been lauded as one of the benefits for consumers looking to cut cholesterol,
for example. While no difference in cholesterol concentrations have been reported between beef from grass-fed and grain-fed cattle (Mathews and Johnson 2013), consumers being advised to lower their total fat consumption may find grass-finished beef or USDA Select grain-finished beef to be a better fit in their diet.

Regardless of the personal choices consumers may have for purchasing grass-fed beef, producers must first manage the cattle, and the grass they are consuming, to produce the product. Therefore, in a grass-fed beef system, grazing management and forage quality are both essential factors to consider.

Grass-fed Beef Management

Forage Quality

Forage quality, as it relates to grass-fed beef production, is really a discussion of the energy supply. If adequate energy is supplied to the grazing cattle, cattle may be expected to gain 2 to 2.5 pounds per day. The greatest average daily gains in grass-finished cattle can be expected when the forage provided is more than 65 percent digestible and supplies between 14 to 18 percent crude protein (CP), more than 20 percent dry matter (DM), and more than 20 percent water-soluble carbohydrates (WSC). Forages supplying the aforementioned nutritive values are considered very good quality. In any grass-fed production system, a minimum of 2 pounds average daily gain (ADG) should be the goal in order to keep cattle on a trajectory toward appropriate finishing. Because of the high forage quality necessary to meet or exceed these gains, forage nutritive value should be monitored and managed accordingly.

Forages grown for livestock production can have a wide range of nutritive values, based on how they are managed and when they are harvested or grazed (Figures 1 and 2). Because of the wide variation that exists in nutritive value, quality should always be monitored. As a general rule of thumb, the less mature the forage, the greater the nutritive value. Therefore, if grazing, or feeding, growing cattle—either stockers or feeders—forages should be maintained at a vegetative stage and not be allowed to set seed. When plants go into a reproductive stage, after seedhead emergence, forage quality declines rapidly.

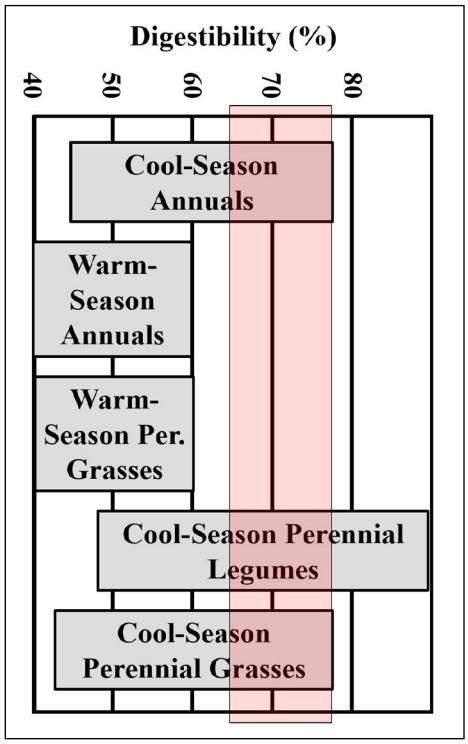

Figure 1. *Ranges in percent digestibility of common forages found in the northeastern United States. Actual digestibility largely depends on maturity of the forage at the time of feeding as well as grazing and harvest management. The red bar indicates range that forages should fall within for optimal growth in a grass-fed system.*

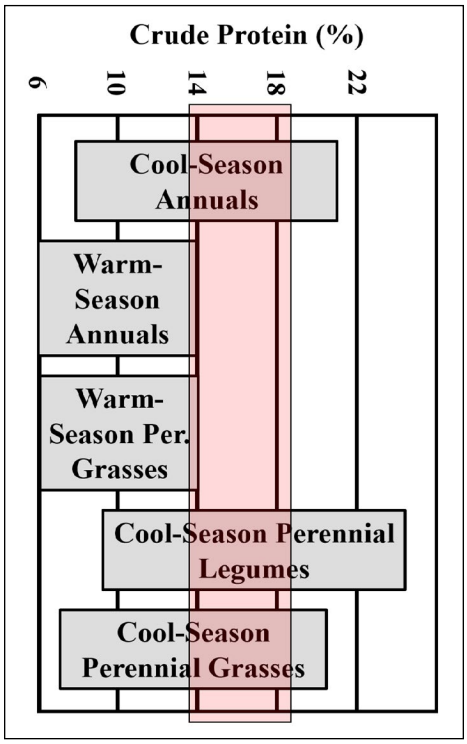

Figure 2. *Ranges in percent crude protein of common forages found in the northeastern United States. Actual crude protein largely depends on maturity of the forage at the time of feeding as well as grazing and harvest management. The red bar indicates range that forages should fall within for optimal growth in a grass-fed system.*

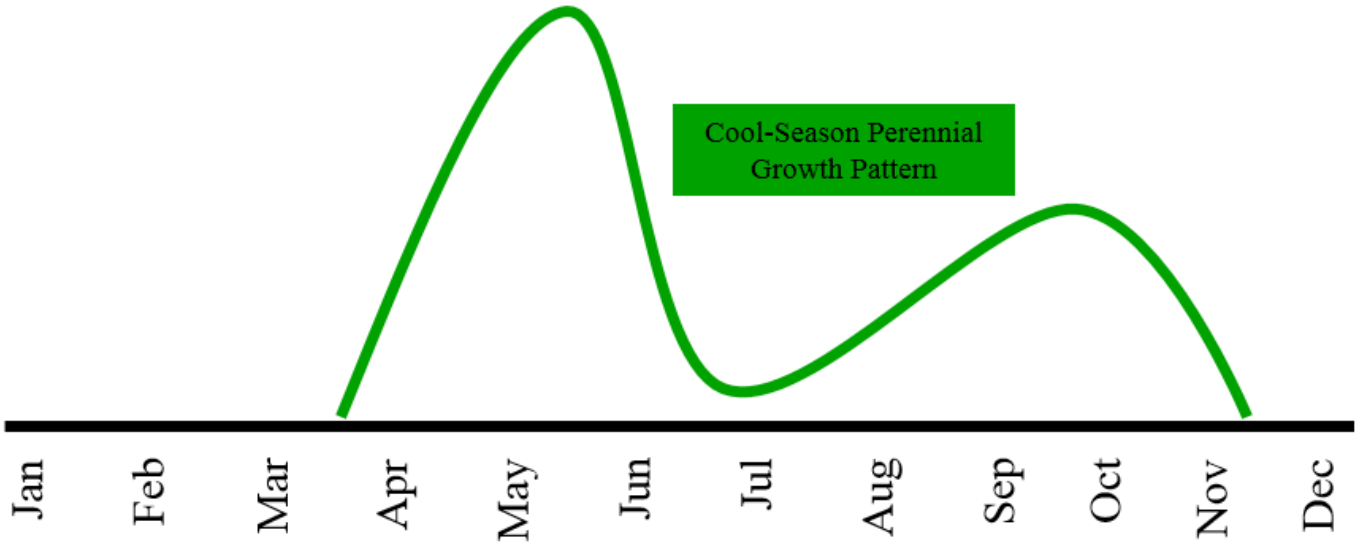

Figure 3. *Growth pattern of cool-season perennial forages. Most rapid growth occurs during spring "green-up," or May through the first part of June. After the weather turns warm and dry, forage growth dramatically slows as plants go into dormancy to survive the summer. As the days cool and precipitation increases in the early fall, cool-season perennial growth increases until the first killing frost, when the plants go back into dormancy to survive the winter.*

In addition to quality of forage, producers of grass-finished beef need to be concerned with quantity of forage consumed by the cattle. Cattle need to be given the opportunity to maximize their consumption of forages throughout the whole production process. At no time should cattle be restricted in their intake of forage. For example, overgrazed pastures will not only result in poor long-term pasture productivity but also cause the cattle to have restricted forage intake and result in poor average daily gains.

Forage Management

Cool-season perennial forages, which are the most common permanent forages used in the northeastern United States, should not be grazed or mowed lower than 3 inches during the most rapid growing season (Figure 3), and no lower than 4 inches during the slower growing time of the year, the hot summer months. Warm-season annuals and perennials should typically be grazed to a higher grazing height than cool-season perennials—warm-season annuals and perennials should usually be grazed no lower than 8 inches. Leaving adequate residual height ensures there will be enough leaf mass left for the plant to continue photosynthesis, allowing for regrowth to occur as quickly as possible.

Rotational grazing—moving animals into another ungrazed paddock after they have grazed the forage down to the desired height in one paddock—has been shown to increase stocking rate and carrying capacity, as well as reduce the incidence of selective grazing (Williamson et al. 2016). Selective grazing over time will reduce the pasture productivity and cause the selected-against forage to become overmature, causing a severe decline in forage quality and a proliferation of the undesirable species.

In the Northeast, it is rare to be able to extend the grazing season across the entire calendar year, regardless of management practices. Therefore, feeding harvested forages is necessary to provide nutrition to cattle during the time of year when grazed forages are not available. In a grass-fed beef operation, high-quality forage is a necessity for obtaining targeted gains of at least 2 pounds per day. Just as with grazing, forages should be harvested before seedhead emergence while still in the vegetative stage, regardless of whether it is being harvested as dry hay, haylage, or baleage. Generally, the more mature a forage, the lower the feeding value, which results in poorer animal performance.

Common Forage Species, Growing Seasons, and Life Cycles in the Northeastern United States

Species	Growing Season	Life Cycle
Alfalfa	Cool-season	Perennial
Annual ryegrass	Cool-season	Annual
Barley	Cool-season	Annual
Big bluestem	Warm-season	Perennial
Browntop millet	Warm-season	Annual
Cereal rye	Cool-season	Annual
Gamagrass	Warm-season	Perennial
Indiangrass	Warm-season	Perennial
Oats	Cool-season	Annual
Orchardgrass	Cool-season	Perennial
Pearl millet	Warm-season	Annual
Perennial ryegrass	Cool-season	Perennial
Red clover	Cool-season	Perennial
Reed canarygrass	Cool-season	Perennial
Smooth brome	Cool-season	Perennial
Sorghum × sudan	Warm-season	Annual
Sudangrass	Warm-season	Annual
Switchgrass	Warm-season	Perennial
Tall fescue	Cool-season	Perennial
Timothy	Cool-season	Perennial
Wheat	Cool-season	Annual
White clover	Cool-season	Perennial

Other Management Considerations

Every scenario is a little bit different. In some grass-fed situations, intensively managed perennial pasture may be the best option. The land may be too steep, too rocky, or have soil that is too shallow to support profitable production of annual crops. However, in other situations, annual grazing crops may be a better option. In the United States, there has been gradual adoption of

no-till crop production practices for the past 50 years. In more recent times, there has been an explosion of interest in the use of cover crops, as no-till crop growers have realized that an effective cover crop system can make no-till crop production work even better. Following the interest in cover crops has been an uptick of interest in using the cover crops for grazing livestock. Farmers who have integrated cattle into cropping systems are seeing positive results from an agronomic standpoint. This type of production would be ideal for finishing cattle on annual forages integrated into a crop rotation. In addition to agronomic benefits, this scenario adds revenue directly to the cropping budget via livestock, and when combined with the crop revenue, would make more efficient use of expensive cropland.

Producing grass-fed beef may not be for everyone. Cattle managers interested in grass-finishing need to assess the resources available to them to decide how to best finish cattle on their particular farm. One resource that should not be forgotten is the cattle themselves. In most grass-fed situations, small to medium-framed British-based breeds are most ideal. These cattle tend to mature faster (at an earlier age) and have a lighter finishing weight than large-framed Continental types of cattle. Large-framed Continental cattle tend to be more suited to grain-fed, feedlot scenarios.

Conclusion

Demand for grass-fed beef is greater than the supply in the United States due to land values and other constraints. Even though all beef may be considered "grass-fed" for the majority of their lives, finishing cattle on grass takes a great deal of management and requires good-quality forages to achieve gains of at least 2 pounds per day. Cool-season perennial forages are the most common permanent forages used in the northeastern United States and will likely supply the most benefit in terms of digestible energy and protein to cattle finishing on forages. Finishing cattle on grass can be a way for producers to maintain a pastoral setting on their farms and fill the niche market for grass-fed beef that consumers are demanding.

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