Improving The Productivity Of Beef Pastures In Northwest Minnesota

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Pastures are an underutilized and under-managed resource on many beef operations. Is it worthwhile to place more management emphasis on pastures? One might think that given the long winters we face in northwest Minnesota, we have to rely so heavily on conserved forages anyway that better management of pastures during the relatively short window they are useable may not be worth the effort. However, this argument is not valid for producers who are 1) interested in increasing profits and 2) willing and able to commit more management effort.

In Minnesota, feed costs represent over 50% of the cost in a cow-calf operation. Well-managed pasture typically costs about one-third as much as home-grown hay to produce and feed. Thus, every additional day of grazing substantially reduces feed costs. In addition, grazed forage is typically higher in quality than stored forage. With pasture, animals graze the highest quality plant parts first; with conserved forage, unfortunately, the highest quality plant parts are what are typically lost to some degree during the conservation process. Pasture can be managed to produce better performance per animal or more output per acre, or sometimes both. Lastly, well-managed pasture begins growth earlier in the spring and continues to grow later in the fall, thereby extending the length of the grazing season.

There are a number of factors that should be considered in pasture improvement. Three of the key factors are 1) grazing management, 2) soil fertility, and 3) forage species selection.

Grazing Management

Implementation of controlled rotational grazing is the single most important step to improving long-term pasture productivity. Controlled rotational grazing involves the subdivision of large pastures into smaller pastures or paddocks and rotation of cattle through them. The word "controlled" is included to emphasize that the grazing system is controlled or managed by the producer, and not a rigid rotation that ignores the dynamics of plant growth and animal demand. Benefits of a controlled rotational grazing include:

1. Rest and recovery opportunity for plants, thus better forage production
2. Greater persistence and vigor of desirable species
3. More uniform defoliation of pastures which means less wasted forage and better control of residual height, thus less overgrazing
4. Higher forage quality
5. Reduced weed encroachment
6. Better manure and urine distribution, thus lower maintenance fertilizer requirements.
When planning a controlled rotational grazing system, the goal is to graze a paddock for no more than 7 consecutive days (i.e. grazing periods 7 days or less). This minimizes the amount of new regrowth that is grazed, ensuring more vigorous regrowth during each paddock's rest period. During spring when pasture growth rate is at its highest, rest periods of 2 to 3 weeks are adequate. In contrast, as growth slows during summer, rest periods should be extended to 4 to as many as 8 weeks depending upon climatic conditions. Thus, when planning a controlled rotational grazing system, plan on grazing cycles (grazing period plus rest period) averaging about 5 weeks.

The appropriate target heights at which to begin and end grazing in each paddock varies by forage species, time of year, animal, and goals. In general, from a pasture health standpoint, tall-growing grass-legume mixtures should be grazed when they reach 8-10", and cattle removed when grazed down to 3-4". The exception is an orchardgrass-legume pasture, which should be grazed down to 2-3" in order to reduce the tendency for orchardgrass to outcompete legumes. A bluegrass-white clover paddock should be grazed at 4-6" down to about 2".

What is the "ideal" number of paddocks for a controlled rotational grazing system for beef? The answer to this question depends primarily on the ability and interest of the producer to commit management time. At the most basic level, 2 pastures are better than 1; in other words, any level of pasture subdivision is beneficial. For cow-calf operations, 5 to 8 paddocks are probably enough to optimize animal and pasture performance. However, producers should consider creep grazing calves, especially as paddock numbers increase, in order to ensure that calves have "first dibs" at the highest quality forage. Stocker cattle pasture systems require 8 or more paddocks in order to ensure that high quality forage is available at all times.

One of the most challenging times of year to manage pasture is during the spring flush. This is actually the time of year when a controlled rotational grazing system enables the producer to capture the most out of pasture. Approaches to effectively utilized the spring flush include 1) making hay off some of the paddocks, 2) increasing stocking rates, and/or 3) rotating through paddocks more rapidly.

**Soil Fertility**

Improving and maintaining soil fertility in pastures in another key step to increasing pasture productivity. Implementation of a controlled rotational grazing system is a key component of soil fertility management, because it "forces" grazing animals to distribute their manure and urine more uniformly across the entire pasture. Since ruminants excrete most of the fertilizer nutrients that they consume, this helps to maintain soil fertility levels, thereby reducing maintenance fertilizer costs. Potassium (K), phosphorus (P), and pH are the soil fertility parameters that are probably of greatest importance to pasture improvement, primarily because of their influence on legume persistence. Legumes are an essential component of productive pastures because they fix atmospheric nitrogen, are high in quality, and are more productive during the summer than grasses. Sensitivity to low pH, and low P and K is greatest for alfalfa; intermediate for red clover, kura clover, and Ladino clover; and least for birdsfoot trefoil and white clover.

Mid to late summer is the key time to consider application of nitrogen fertilizer, since summer and fall more frequently experience pasture shortage than spring. Nitrogen fertilizer should not
be applied in spring unless you plan to make hay or increase stocking rates. In pasture systems, we often have more growth than we can effectively utilize during the spring; application of N fertilizer in spring only makes this worse. Nitrogen should be used on grass pastures or grass-legume pastures where the legume component is not contributing significantly to pasture forage yield.

**Forage Species Selection**

Use of forage species and varieties adapted to the soils on the farm is critical to ensuring productive pasture. There are several strategies with regard to pasture species composition improvement. The most passive approach is to simply allow more productive, adapted species to express themselves by implementing controlled rotational grazing. The traditional, and probably most common approach is to introduce new forages alone or in simple mixtures. A third approach is to seed "shot-gun" mixtures.

There are a number of things to keep in mind when "building" mixtures to seed. First, if a sod-forming grass such as smooth bromegrass or quackgrass is not already present in the pasture, it is best to include one in the mixture, especially on wetter soils, in order to give the pasture a solid foundation tolerant of animal traffic during a range of weather conditions. Bunch grasses like orchardgrass or timothy are best used in combination with sod-forming grass. Although tall fescue has a number of positive features that warrant its use, it is one grass species that should NOT be seeded in combination with other grasses due to its lesser palatability. In most cases, a legume(s) should be included in the seed mixture as well, choosing the legume adapted to the soil conditions in the pasture.

**Extending the Grazing Season**

Even though the pasture season in northwest Minnesota may seem relatively short, there are opportunities to extend its duration. Implementation of controlled rotational grazing will extend the grazing season as healthier pasture plants will begin growing earlier in the spring and continue to growth later in the fall. Applying nitrogen fertilizer to some grass paddocks during mid-summer and stockpiling the growth until fall is an effective way to extend grazing later into the fall months.

Any perennial forage species can be stockpiled, but grasses, and in particular tall fescue, are best adapted to this management practice. The process is initiated by taking a hay cutting or removing cattle from the area to be stockpiled and applying 50 to 75 lb N/ac. This is a good time to apply P and K, if needed, too. Strip-grazing should be implemented to utilized the stockpiled growth. This can be accomplished via portable electric fencing. Allocate no more than 7 days of stockpiled feed per grazing period; this will increase the carrying capacity of the area by as much as 40%. Yield and forage quality of the stockpiled growth will begin to decline after the first hard frost; rate of this decline is slowest with tall fescue and most rapid with legumes. It is important to be aware that energy content will decline more rapidly than protein content, thus supplementation strategies should be focused on meeting energy requirements.