Implementation of Biologically Effective Grazing Management Strategies

Llewellyn L. Manske PhD
Range Scientist
North Dakota State University
Dickinson Research Extension Center
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Management of grasslands for a "use", whether for livestock forage, wildlife habitat, or aesthetics, is management of the use, not management of the grassland resources. The typical grassland management for a use is not sustainable on a long-term basis. Plant-friendly grassland management that meets the biological requirements of the plants and facilitates ecological processes enhances the grassland ecosystem as a natural resource for numerous simultaneous uses. A healthy grassland ecosystem managed by biologically effective practices produces more livestock forage, better wildlife habitat, and inspirational beauty. The same results cannot be achieved through practices based on management-for-a-use concepts.

Three biologically effective management practices that benefit the grassland resources and improve plant health are recommended:

- Begin grazing in the spring only after plants have reached the 3.5 new leaf stage (early May for crested wheatgrass and smooth bromegrass and early June for native rangeland).
- Coordinate grazing rotation dates with grass growth stages. Plant density increases when secondary tiller growth is stimulated by grazing for 7 to 17 days during the period between the 3.5 new leaf and flowering growth stages (early June to mid July for native rangeland).
- Do not graze spring and summer pastures or haylands during the fall. Fall grazing decreases the carryover secondary tillers and the new fall growth tillers and reduces the amount of herbage biomass produced the following season.

Implementation of biologically effective grazing management strategies that meet the biological requirements of the plants and the rhizosphere organisms, enhance plant health status, and facilitate the operation of ecological processes is the long-term solution to management-caused herbage reduction problems. The result of these management effects is sustained high performance levels of healthy grassland ecosystems. The performance levels of the plant component of a grassland ecosystem regulate the performance levels of all the other components of the ecosystem. Plants are the primary producers, converting light energy into chemical energy during photosynthesis. This captured solar energy is the primary force driving all ecosystem functions and provides the foundation for all uses of grasslands. The renewable forage plant nutrients produced on the land are the original source of new wealth generated by livestock agriculture.

The twice-over rotation system is a biologically effective grazing management strategy developed for use in the Northern Plains. It was designed to manipulate processes that result in beneficial changes to plant growth, soil rhizosphere organisms, and biogeochemical cycles in the ecosystem. The twice-over rotation system on native rangeland with complementary domesticated grass spring and fall pastures coordinates defoliation periods with grass phenological growth stages to enhance vegetation, livestock, and wildlife performance.

The twice-over rotation system begins grazing in May, on a spring pasture of crested wheatgrass or other early growing domesticated cool-season grass that has reached the 3.5 new leaf stage, the earliest plant-growth stage at which grasses can be grazed without damage. Native grasses begin seasonal development more slowly, and the use of domesticated grass pastures in May protects native pastures by delaying grazing on them until the plants have reached the 3.5 new leaf stage.

A 3- to 6-pasture native range rotation system is used from early June until mid October, with each pasture grazed for two periods. Each native rangeland pasture is grazed for 7 to 17 days during the first period, the 45-day interval from 1 June to 15 July. The number of days each pasture is grazed during the first period is the same percentage of 45 days as the percentage of the total season's grazeable forage each pasture contributes.

During the first period, grasses are between the 3.5 new leaf stage and flower phenophase.

Grazing that removes 25% to 33% of leaf area from grasses between these stages of plant development stimulates both tillering from axillary buds and enhanced activity of rhizosphere organisms. Increased vegetative reproduction by tillering contributes to the production of greater herbage weight and nutrient quality, and increased activity of the symbiotic soil organisms supplies the plants with greater quantities of nutrients to support additional grass tiller growth. During the second period, after mid July and before mid October, each pasture is grazed for double the number of days it was grazed during the first period. Increasing the number of secondary tillers improves herbage quality and extends the period of improved livestock performance two to two and a half months, until late September or mid October. The biology of native grass plants does not permit extending these conditions beyond mid October, when native rangeland herbage quality is insufficient to meet the nutritional requirements of lactating cows.

Cows and calves graze a fall pasture of Altai wildrye or spring seeded winter annual cereal from mid October until weaning in early or mid November. Wildryes are the only perennial grasses that retain nutrient quality in the aboveground portions of the plant later than mid October. Removing livestock from native rangeland pastures at the end of the perennial-plant growing season allows native grasses to conserve stored nutrients that will maintain plant processes over the winter and early spring and to retain the leaf area of secondary tillers and the fall vegetative growth that will become next season's lead tillers. This practice ensures healthy plants in the spring and greater herbage production during the following growing season. Spring seeded winter cereal pastures provide adequate nutrient quality for lactating cows from mid October until mid or late November; some years until mid December.

The twice-over rotation system's elevation of plant health and stimulation of beneficial ecosystem processes result in increased plant basal cover and aboveground herbage biomass and improved nutritional quality of forage. The twice-over rotation grazing management system with complementary domesticated grass pastures has a grazing season of more than 6.5 months, with the available herbage above, at, or only slightly below the nutritional requirements for a lactating cow for the entire grazing season.

The increase in quantity and quality of herbage on the twice-over rotation system permits an increase in stocking rate levels; improves individual animal performance; increases total accumulated weight gain, weight gain per acre, and weight gain per day; reduces acreage required to carry a cow-calf pair for the season; improves net return per cow-calf pair; and improves net return per acre. The increase in basal cover and herbage biomass reduces the number and size of bare soil areas and increases the quantity of residual vegetation. These changes in vegetation produce conditions favorable to the limitation of grasshopper pestiferous species populations. The increase in plant density, herbage production, residual vegetation, and ecosystem health improves the habitat for prairie grouse, ducks, and other waterfowl and ground nesting birds.

Effective management practices meet the biological requirements of the plants and rhizosphere organisms helping the ecosystem processes function at their full potential. These management practices improve the performance levels of all grassland ecosystem components, elevate plant health status, and increase productivity of grassland ecosystems. The result is sustained greater herbage weight production, higher quality habitat for wildlife, and stronger livestock weight gain performance.

The benefits of biologically effective grazing practices are both ecological and economic. By implementing the twice-over rotation grazing management strategy, producers protect rangeland health, increase their profits, and help to ensure that the grassland will sustain their cow-calf operation for years to come.

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