

## **Deferred-Type Grazing Systems Reduce Grass Plant Density and Animal Performance**

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Keeping cattle off grass to promote grass seed production decreases livestock and grassland productivity, says a North Dakota State University range scientist.

"Early rangeland managers believed that grass seed production was necessary for grassland health, and they developed deferred rotation grazing strategies specifically to allow grasses to flower and set seed," says Lee Manske, range scientist at NDSU's Dickinson Research Extension Center. "Grass plants do not need to produce seed for grasslands to remain healthy. Controlled grazing studies have not shown positive vegetation response to deferred strategies in the Northern Plains."

"In fact," Manske says, "research over the past 20 years has demonstrated that effective grazing strategies are those designed to stimulate vegetative reproduction rather than seed production in grass plants."

Very few young grass plants mature from seed in an established grassland, Manske says. He notes that he has found only 12 true seedlings in a six-year period. Almost all young grass plants are formed vegetatively, when axillary buds on the plant crowns develop into tillers that are initially connected to the root systems of parent tillers. This support provides a competitive advantage for tillers over seedlings, which have separate, less developed root systems.

Under the deferred grazing strategy, producers withhold grazing from one or two pastures until the lead tillers of grass plants develop through the vegetative stage and the sexually reproductive stage. During this period, each lead tiller produces hormones that prevent the six to eight axillary buds located on its crown from developing into tillers. At about the flower stage, the lead tiller reduces its production of these inhibitory hormones. This reduction permits the growth of one axillary bud into a secondary tiller, which in turn produces inhibitory hormones to prevent growth of the other axillary buds.

Manske explains that this process allows the plant to focus its energy on seed production rather than vegetative reproduction.

At this stage, cattle are usually permitted to start grazing on the deferred pasture. As the seeds on the lead tiller mature, the leaves age and dry, and their nutritional quality decreases substantially. Because the crude protein content of the forage is below the 9.6 percent required by lactating cows, the animals use body fat for some of their milk production, and their weight decreases, Manske explains. The loss of weight leads to decreased milk production, which in turn results in lower calf average daily gain.

The secondary tillers that began growing at the flowering stage of the lead tiller have good nutritional quality but have not yet produced sufficient leaf material to support traditional stocking rates, he notes.

Deferred grazing also decreases grass plant density and reduces herbage production the following year. Generally, cattle are turned onto deferred pastures before secondary tillers have reached the third-leaf stage. Tillers grazed before that stage are severely damaged, Manske says.

Cool-season grasses start the next spring's growth during the late summer and fall of the previous year. Many secondary tillers and most fall tillers overwinter and continue growth as lead tillers the following year. The leaf cells that have intact cell walls regreen early the following spring and continue to grow. Manske explains that when cattle graze the leaves of these young tillers during the fall, the plants do not have adequate leaf area to produce enough carbohydrates to survive the winter and resume growth in the spring. Measurements show that live grass density decreases on deferred pastures after only one year of the strategy's use.

"Twenty or so years of deferred grazing treatment decrease grassland productivity to below acceptable levels," Manske says. "Producers can restore the health of grasslands managed with deferred treatments by changing to grazing management practices that stimulate vegetative reproduction by tillering."

Grazing strategies that remove a small amount of leaf material between early June and mid July, when lead tillers are between the third-leaf stage and the flowering stage, can stimulate tillering, he says. Grazing during these growth stages can also activate other biological processes that contribute to greater herbage production that summer and the following year, and the production of secondary tillers extends by two to two and a half months the period during which grass nutritional quality meets the requirements of lactating cows.

Rotation management strategies that coordinate grazing periods with growth stages of grass plants and meet the plants' biological requirements show a 23 percent greater calf average daily gain and a 36 percent greater calf gain per acre than do deferred strategies. These rotation strategies have a 75 percent greater net return per cow-calf pair over pasture costs and a 73 percent greater net return per acre over pasture costs than do deferred grazing practices.

"These numbers show that producers can use such rotation strategies to maintain healthy, productive native prairie ecosystems and improve livestock performance," Manske says.