Western Beef
Development Centre

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REJUVENATION OF CRESTED WHEATGRASS

Introduction

Once a forage stand has been established, yearly maintenance costs are relatively low. Productivity tends to decline over time as nutrients become bound up in the plant biomass and other less productive species invade the stand. This process becomes a challenge to producers, wildlife conservationists and land reclamation programs.

Traditional renovation of these areas involves breaking and reseeding, resulting in the loss of valuable wildlife habitat and is an expensive technique that can increase the risk of soil erosion and degradation. Less costly rejuvenation methods utilizing present forage species and minimal disturbance to the area are an attractive alternative. These minimal disturbance methods can reduce herbicide, fuel and energy inputs and prevent erosion through elimination of breaking and subsequent summer fallowing.

It is important that rejuvenation has both continued and carryover effects on forage production and quality. To consider any rejuvenation method of tame forages, information regarding yield, quality and the effect on botanical composition are required. There is also a need for data on animal response to changes in forage production and nutritive value.

Crested Wheatgrass Pasture

In April 1998 rejuvenation treatments were carried out on a 40-yr-old, crested wheatgrass pasture. The 80-acre site, at Termuende Research Farm, was located 5 miles east of Lanigan, Saskatchewan.

Treatments

Pastures were spiked using a 35 ft cultivator attached with 3/4 inch anhydrous applicator knives. Cultivator shanks were spaced 8 inches apart and initial depth was set at 4 inches. Spiking was compared to the check and combined treatments of spiking and knifed nitrogen (N) urea (46-0-0) applied at 50 lb N/ac. or 100 lb N/ac.

Pastures were then evaluated for forage yield, quality, animal utilization and production. Comparisons are between treatments and against the check areas.

Animals

Sixty crossbred steers, averaging 633 lb. were grazed June 23 to August 26 (64 days) to determine animal performance on the rejuvenated pastures. Ten steers were allocated to each of six paddocks. Stocking density was 10 steers/13 acres and stocking rate was 1.35 AUM/acre.

Results

Timely rains in May and June improved seasonal pasture growth and may have resulted in above average forage response and subsequent animal gains. The summer of 1998 had adequate rainfall before and after fertilizer was applied to the pastures, which also improved forage production.

Spiking with a 3/4 inch knife caused minimal disturbance to the soil surface, however other studies have reported spiking with 2 to 4 inch chisels leave the soil surface rough and a further leveling or rolling of the pasture needs to be done. When pastures were spiked alone, forage production increased 45% over control (Table 1). The combined treatments, spike+50 lb N/ac and spike+100 lb N/ac increased yield 100 and 190% over control, respectively. However rejuvenation treatments had minimal effect on animal utilization of available forage. Fertilizing with 100 lb N/ac had a greater affect on crude protein and TDN of the forage than applying 50 lb N/ac.

Table 1. Effect of Pasture Rejuvenation on Forage Yield

Treatments	kg/ha	lbs/ac	% of Check
Check	1741	1553	100
Spike	2526	2253	145
Spike+50 lb N/ac	3506	3127	202
Spike+100 lb N/ac	5028	4485	289

Table 2. Effect of Pasture Rejuvenation on Forage Quality

Treatment	Crude Protein				Total Digestible Nutrients (%)			
	June 30	July 14	July 28	August 11	June 30	July 14	July 28	August 11
Spike	16.6	13.2	11.0	9.5	66.0	62.1	61.2	59.2
Spike+50 lb N/ac	17.9	14.4	10.9	8.0	68.3	63.1	62.5	60.0
Spike+100 lb N/ac	21.1	16.8	13.3	11.7	68.6	64.4	61.8	61.1

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Table 3. Steer Production on Rejuvenated Pastures

Treatment	Average daily gain (lbs/day)	Gain/steer (lbs)	Gain/acre (lbs)
Spike	2.33	150	114
Spike+50 lb N/ac	2.70	172	132
Spike+50 lb N/ac	2.74	176	135

Animal Gains

Average daily gain of the steers on crested wheatgrass pastures was high in this study (Table 3). Individual steer gain was generally greater on pastures receiving the combined treatment of spike+50 lb N/ac or spike+100 lb N/ac the spiking alone, probably because forage quality was higher (Table 2). However, steer gains were similar between animals on pastures spiked+50 lb N/ac and spiked+100 lb N/ac. This may limit the decision to add the 50 lb more nitrogen per acre.

Costs

Costs associated with this project were $26/acre for the spike, $40/acre for spike+50N, and $55/acre for the spike+100N. These costs include custom rates for equipment rental and land taxes.

Fertilizer Rate

The decision to fertilize with a rejuvenation program must be based on yield potential of the soils in your area and percent of productive species present in the existing pasture. Nitrogen (N) is the primary nutrient limiting in forage production, but phosphorous also may be limited in some soils. In this study, mid-April application of fertilizer was timely with spring rainfall to produce a positive growth response. Spiking alone resulted in a 50% increase in forage produced, addition of 50 lb N/ac doubled production while 100 lb N/ac nearly tripled yields.

Conclusions

Shallow tillage with a shank implement and 3/4 inch knife did have a positive affect on forage yields in old crested wheatgrass stands. The application of fertilizer combined with knifing resulted in greater forage quality and yield. This increase was then reflected in above average steer gains from these pastures. Adequate soil moisture appears to be the most limiting factor when long established pastures are rejuvenated. This is primary when applying fertilizer or imposing a mechanical disturbance to the sod. A positive response can be expected in moist years however, rejuvenation should not be considered in below average rainfall years.