Western Beef Development Centre

STEER PERFORMANCE GRAZING HYBRID BROMEGRASS

Introduction

Pasture forage is an important part of beef production systems in western Canada and producers require species adapted to their region, which are high yielding and provide good nutritional quality. New species intended for pasture in Saskatchewan are routinely evaluated in trials involving simulated harvesting techniques (Knowles 1987). However, frequent mechanical harvests fail to impose animal effects on grasses such as trampling, pulling of plants, deposition of feces and urine and short stubble heights.

Beef producers need information on how new species perform under grazed conditions in order to decide whether to include the forage in their management plan. Choice of grass species and cultivars to include in a grazing system will influence both the forage quality and yield potential of a pasture both of which have a direct impact on livestock production because of their relationship to intake and digestibility of nutrients.

In western Canada, smooth bromegrass and crested wheatgrass have been widely utilized as pasture forages for grazing animals. Due to their wide adaptation to climate and soils, these two species have been recommended both for use in pasture and hay crops in Saskatchewan. Previous research has shown that crested wheatgrass begins growth early in the spring and is of high quality at this time (Hoffman et al. 1993). Steer weight gains on crested wheatgrass pasture reported in the literature, have ranged from 1.8 to 3.5 lb day (Hart et al. 1983; Hoffman et al. 1993; Vogel et al.1993; Karn et al. 1999). However, as crested wheatgrass matures, quality decreases at a rapid rate (Hart et al. 1983). It is for this reason that crested wheatgrass is often included in grazing plans as complementary forage, for early spring grazing.

Smooth bromegrass

Smooth bromegrass is a drought-tolerant, sod-forming, cool-season perennial, which has been included in many forage improvement trials over the past 50 years (Vogel et al. 1996). Average daily gains of 0.86 to 1.02 kg d^{-1} have been reported on pure stands of smooth bromegrass (Hoffman et al. 1993; Karn et al. 1999). However, due to the slow regrowth observed with this species, smooth bromegrass is better suited to hay production than pasture production.

Meadow bromegrass

More recently meadow bromegrass, a bunch-type species, has been introduced as a forage alternative for use in livestock production systems. This grass offers increased regrowth potential in comparison to smooth bromegrass, and is commonly recommended for pasture (Knowles et al. 1993). Past grazing research using meadow bromegrass has mainly compared mixtures of this grass with alfalfa, as there is little published information reporting performance of cattle grazing pure stands of meadow bromegrass. However, in earlier studies, meadow bromegrass produced animal gains of 1.6 to 2.0 pounds per day (Knowles et al. 1993).

Hybrid bromegrass

In the early 1980's, a program was initiated to incorporate desirable characteristics by crossing smooth bromegrass and meadow bromegrass cultivars into a hybrid bromegrass that could be use for both hay and pasture (Knowles and Baron 1990). The hybrid is mainly intermediate to the two parental species. However, it is closer to the reduced creeping habit of meadow bromegrass. Like meadow bromegrass, the hybrid is capable of elongating cut tillers, thus regrowth after a cut is superior to smooth bromegrass. The hybrid also carries its leaves somewhat higher in the sward than meadow bromegrass, making it more suitable for haymaking. This species was developed to offer increased flexibility in forage management systems. Early studies in small plot trials indicated that yield and forage quality of this grass showed potential for use in beef production systems. However, animal data are needed to adequately evaluate this grass species for pasture use.

Objectives

A two-year grazing trial was conducted on a 16-acre pasture located near Lanigan, Saskatchewan at the Western Beef Development Centre's Termuende Research Farm. Two, 2.0-acre replicates each of smooth bromegrass (*B. inermis* Leyss.), cv. Carlton, meadow bromegrass (*B. beibersteinii* Roem. & Schult.), cv. Paddock and hybrid bromegrass (*B. riparius X B. inermis*), cv. AC Knowles were established in July of 1999. Two replicates of long established crested wheatgrass (*Agropyron pectiniforme* R. & S.) (cultivar unknown) from an adjacent pasture were also included in the experiment. Topography at the pasture site is gently to moderately hummocky and the soils were a mixture of Oxbow Orthic Black and carbonated Oxbow with a loam texture. The objectives of this study were to evaluate animal performance and forage utilization of steers grazing hybrid bromegrass pasture in comparison to grazing smooth bromegrass, meadow bromegrass and crested wheatgrass.

Table 1. Steer performance grazing four pasture types

	Grazing Period	CWG[z]	SBG	MBG	HBG	SEM[y]
Average daily gain (ADG) (lb/acre)						
2000	**1**	**2.28*b***	**2.77*ab***	**3.02*ab***	**3.6*a***	**0.07**
2001	**1**	**3.48*a***	**1.18*b***	**1.73*b***	**1.64*b***	**0.10**
	2	**-**	**2.26**	**2.44**	**3.08**	**0.07**
	Mean	**3.48*a***	**1.71*b***	**2.08*b***	**2.37*b***	**0.07**
Animal grazing days (AGD) (days/acre)						
2000	**1**	**86**	**95**	**83**	**88**	**3.44**
2001	**1**	**64**	**73**	**70**	**91**	**5.68**
	2	**-**	**54**	**66**	**70**	**4.14**
	Total	**64*b***	**127*ab***	**136*ab***	**161*a***	**17.17**
Total beef production (TBP) (lb/acre)						
2000	**1**	**196**	**263**	**251**	**317**	**15.09**
2001	**1**	**223*a***	**86*b***	**121*b***	**149*b***	**7.77**
	2	**-**	**122**	**161**	**216**	**10.60**
	Total	**223**	**208**	**282**	**365**	**13.30**

[z]CWG=crested wheatgrass; SBG=smooth bromegrass; MBG=meadow bromegrass; HBG=hybrid bromegrass
[y]SEM=standard error of the mean
a-b Means in the same row with different letters are different (P<0.05)

Forage Management

Prior to seeding, the site was sprayed with glyphosate [(N-phosphono-methyl) glycine] at 2.0 lb/acre active ingredient to facilitate weed control. All bromegrass pasture species were established July 1999. Seeding rates were 8 lb/acre for smooth bromegrass, and 10 lb/acre for meadow bromegrass and hybrid bromegrass due to the larger seed size of these species. The crested wheatgrass pastures were long established stands located adjacent to the newly established bromegrass pastures.

Soil samples collected in the spring of 2000 and 2001 indicated available N levels of 134 and 44 lb/acre, P_2O_5 at 67 and 43 lb/acre, K_2O at 1070 and 1080 lb/acre, and S levels of 86 lb/acre, respectively. Nitrogen fertilizer (46-0-0) was applied prior to each growing season in early spring at 50 lb N acre. The herbicide Kerb 50-W (Rohm and Haas Canada Inc.) was spot sprayed (1.0 lb/acre) to control foxtail barley in the fall of 2000. Refine Extra Toss-N-Go (DuPont Canada Inc.) was surface applied spring 2001 at 8 gm acre to control broadleaf weeds.

Weather records were obtained from a weather station located on the Termuende Research Farm. Monthly precipitation for May, June, July, August and September 2000 was 1.1, 3.7, 1.1, 1.2 and 0.8 inches, respectively. Monthly precipitation for May, June, July, August and September 2001 was 1.2, 0.4, 3.1, 0.1 and 0.9 inches, respectively. Long-term average yearly precipitation for the Lanigan area is 257 mm (1960 – 1999) (Environment Canada 1999). Mean average daily temperatures, May, June, July, August and September 2000 were 18.1, 22.7, 25.5, 24.0 and 18.6 ^oC, respectively. Mean average daily temperatures, May, June, July, August and September 2001 were 19.6, 22.5, 26.6, 27.9 and 21.6 ^oC, respectively.

Livestock Management

Steer production was evaluated using a 'put and take' grazing system with 3 tester animals per paddock to balance pasture production with animal demand. Steers were added to each pasture to maintain similar forage availability in all pastures. British X Continental steers were weighed and randomly assigned to one of four pasture types according to body weights. Steers began grazing pastures when sufficient herbage was available, at an approximate plant height of 8 to 10 inches. Stocking rates varied from 5 steers/acre in June to 3 steers/acre in July and August. Steers remained on each pasture until plants were grazed to a uniform level of approximately 3 inches. Crested wheatgrass pastures were grazed in May due to early maturity characteristics of this species. Paddocks were grazed for two grazing periods in 2001 and one grazing period in 2000 due to insufficient forage regrowth. Crested wheatgrass paddocks were grazed May 23 to July 6 and May 23 to June 13 in 2000 and 2001, respectively. The grazing season for all the bromegrass pastures was from June 23 to August 3 in 2000 and June 6 to June 27 (period 1) and August 7 to August 28 (period 2) in 2001. Pastures were allowed an adequate rest period and animals were returned when sufficient forage was available. Between grazing periods, all steers grazed in a common holding pasture.

Results

Weight gain was greater for steers grazing hybrid bromegrass than other pasture types. Average daily gain (2.28 lb/day) for crested wheatgrass pastures were similar to those described in other studies (Hart et al. 1983; Vogel et al. 1993). Weight gains on the smooth bromegrass pastures (2.77 lb/day) were higher than those reported by Hoffman et al. (1993) and Karn et al. (1999), where no fertilizer was applied, whereas in the present study, fertilizer was applied each spring. Average daily gain on the meadow bromegrass paddocks were higher than those reported by Knowles et al. (1993) where heifers were used for grazing, whereas the current study used steers. Total beef production in 2000 was greatest (317 lb/acre) from animals grazing hybrid bromegrass paddocks.

In 2001, ADG and TBP data reflected differences in period of use of the different pasture types (Table 1). Crested wheatgrass pastures were grazed in May when pastures received 1.2 inches rainfall, compared to 0.4 inches precipitation recorded in June when bromegrass paddocks were grazed. Weight gain during the first

grazing period in 2001 was greater on the crested wheatgrass pasture than any bromegrass species (Table 1). No differences were observed between bromegrass species for average daily gain in any grazing period. However, in grazing period 2, weight gains were numerically greater than period 1 performance for all bromegrass pastures. This increase may have been due to recommended mid season use of bromegrass from regrowth (Knowles and Baron 1990; Knowles et al. 1993), or may have been related to compensatory gain of the animals. However, steer weight gain tended to be greater (2.37 lb/day) but not significant on hybrid bromegrass paddocks compared to gains from smooth bromegrass (1.71 lb/day) or meadow bromegrass (2.08 lb/day) pastures in year two.

Animal grazing days between pasture species were similar within grazing periods in 2001 (Table 1). However, for total AGD over the grazing season, hybrid bromegrass was greater than crested wheatgrass, but not different from the parent species. This would suggest that hybrid bromegrass is a suitable pasture species and performs similar to the parent species under grazing conditions. More AGD were observed on all pastures in grazing period 1 of 2001 compared to grazing period 2.

Total beef production was greater from the crested wheatgrass pastures in grazing period one in 2001. This was a reflection of the greater average daily gain of steers observed from these paddocks. However, hybrid bromegrass pastures did have the highest numerical value (365 lb/acre) for total beef production in 2001.

Conclusions

This two-year grazing study indicates the potential of hybrid bromegrass as a pasture species for use by commercial beef producers. The animal performance data showed comparable average daily gains, animal grazing days, and total beef production to existing pasture species already in use in Saskatchewan. In the first year, greater weight gain was recorded from grazing hybrid bromegrass pastures compared to grazing crested wheatgrass pasture. More animal grazing days and total beef production were obtained from the hybrid bromegrass pastures in 2001 than on the crested wheatgrass pastures. This would indicate that hybrid bromegrass could fit well into a livestock grazing system. Finally, the performance of steers grazing hybrid bromegrass pastures at Lanigan, Saskatchewan; indicate that this grass species is a viable alternative for use as pasture forage.

References

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