
Grazing of Spring and Winter Cereals in Southwest Saskatchewan

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Abstract

A pasture system that combines the early high productivity of a spring cereal and the late-season growth ability of a winter cereal vegetative tillers may provide an important forage/pasture resource in southwestern Saskatchewan. At the Semiarid Agricultural Research Centre-Agriculture and Agri-Food Canada, SK, two annual cereals, a spring barley, cultivar AC Lacombe, and a winter rye, Prima, were seeded in early May of 2001 into four pastures each 1.3 ha. Two pastures utilized steers that were implanted (Component™ E-S) and had received CRC rumensin while the other two pastures utilized steers with no implant or CRC rumensin. Results found that the implanted and CRC rumensin treated steers were more efficient in converting the cereal forage to gains than the control steers. Average daily gains of treated steers were higher than the control group and were 1.2 kg d⁻¹ vs 0.7 kg d⁻¹, respectively. Grazing days and total kg of livestock production per ha for treated verses control treatments were 133 verses 131 and 12.1 verses 5.5, respectively. It is possible that a synergistic and/or additive effect may have occurred through the use of the implant and rumensin treatments and resulted in a higher than expected improvement in animal performance.

Background

A pasture system that combines the early high productivity of the spring cereal floral tillers and the late-season growth ability of winter cereal vegetative tillers could provide an important forage/pasture resource in southwestern Saskatchewan. The use of inter-seeded annual pastures fit well into complementary grazing systems and can reduce the grazing pressure applied to permanent pastures, especially during periods of poor moisture conditions. In addition, utilization of inter-seeded annual pastures can provide increase flexibility or choices to the producer by providing grazing from early spring to late fall and early spring the next year.

To maximize animal performance on grazing pastures many producers utilize feed additives and implants as non-nutritive products that improve the rate and/or efficiency of gain in animals and prevent certain animal health issues (i.e., bloating). Rumensin controlled release capsule is a feed additive that alters rumen fermentation and can result in a 10% increase in feed efficiency and increase rates of gain on high roughage diets. The growth implant Component™ E-S (progesterone USP 200 mg and estradiol benzoate 20 mg) should be similar to other hormone combinations formulated for steers (Synovex-S® and Implus-S®) that are registered for use in Canada. Improvement in average daily gain (ADG) and feed efficiency of 5 to 25% and 4 to 11%, respectively, has been reported (Gould 1996). The modes of action of these two growth

promoters are quite different, thus the combination of the two treatments could be at least additive.

Objective

To determine beef steer performances when grazing inter-seeded winter rye and barley pastures under two treatments: either implanted with a growth implant (Component™ E-S) and with boluses (CRC rumensin) (I+CRC) or not implanted and without boluses (Control).

Materials and Methods

Two annual cereals, barley AC Lacombe and winter rye Prima, were seeded during the first week of May in 2001 at the Agriculture and Agri-Food Canada - Semiarid Prairie Agriculture Research Centre (AAFC-SPARC), Swift Current, Saskatchewan. Four pastures, each 1.3 hectares in size (@ 3.1 acres), were seeded using a 50:50 mixture of barley and winter rye at a seeding rate of 90 kg ha⁻¹ (80 lbs ac⁻¹). Stocking rate for each pasture was 10 Hereford/Red Angus crossbred steers (Fig. 1). Grazing steers were weighed prior to the start of the grazing and at the end after a 12 hour fast. Two pastures utilized steers (742 ∓ 42 lb) that were implanted (Component™ E-S) and received CRC rumensin boluses (I+CRC) and the two other pastures contained steers (724 ∓ 16 lb) with no implant or CRC boluses (Control). Forage samples (four samples per pasture) were taken at the beginning of July to determine available yields prior to grazing period and at the end of July to measure residual forage yields. Forage chemical constituents (four samples per pasture) were determined for the winter rye and barley at the time of grazing for OM, OMD, NDF, ADF and CP. Nitrate-nitrogen (NO₃-N) levels were determined at the time of grazing for winter rye and barley. The experimental design was completely randomized and treatment effects (I+CRC and Control) were analysed using the GLM procedure of SAS Institute, Inc. (1996).



Figure 1. Beef steers grazing a winter rye and barley pasture in 2001.

Results and Discussion

Although it was expected that animal performance of the I+CRC treated steer groups would be higher than the Control steer groups, the magnitude of difference was surprising (Table 1.). Average daily gains ($P = 0.08$) and total live production (TLP) ($P < 0.01$) were higher for I+CRC treated steers versus Control steers. Research has shown that a 15 to 20% improvement in growth rate can be expected when using implants on steers grazing on pastures (Gould 1996). The additional effect of CRC rumensin with the implant treatment is uncertain, however it is possible that a synergistic and/or additive effect may have occurred through the use of the implant and rumensin and resulted in higher than expected improvement in animal performance. To date the author is not aware of any research evaluating the effect on grazing beef steers treated with both a Component™ E-S implant and CRC rumensin bolus, therefore further research is needed. One study by Wagner et al. (1984) reported an increase in average daily gain (ADG) of more than 27% due to an additive response when both monensin (rumensin®) and an estradiol implant was used in grazing steers. Utley et al. (1978) reported that data suggested that the response to monensin and implantation was synergistic. However, other studies (Utley et al. 1976; Corah 1977) have reported no synergistic or additive effect from combining monensin and an implant compound.

The poorer than expected performance of the Control steer groups is unclear. Research has found that the optimal time to graze spring cereals is at the boot stage and once seed heads are produced, the grazing performance of animals declines. Grazing of the cereal barley occurred mostly at heading as a result of the barley maturing rapidly due to poor moisture conditions. Results show that the implanted and CRC rumensin treated steers were more efficient in converting annual cereal feed to gain than the control steer groups. In support of this, pasture utilization for the non-treated versus the treated steer groups were similar or slightly higher and were 77.2 versus 66.9%.

As expected, the forage quality composition differed between barley and winter rye due to differences in stage of maturity (heading versus vegetative) (Table 2) (Fig. 2). Since a winter cereal seeded in the spring will not head out, it could improve the overall grazing nutrition of the pasture. However, the available forage production of 224 kg ha⁻¹ of forage DM from winter rye only contributed about 10% of the forage available for grazing compared to 1,852 kg ha⁻¹ of forage DM from barley. Pasture production from annual crops is dependent on soil moisture at time of seeding, precipitation and fertility. The carrying capacity for the inter-seeded annuals in this study was estimated at about 1.4 animal unit month per acre. In agreement, Holt and Gerwing (1993) also reported AUM's per acre ranging from 1.2 to 2.0.

Due to the drought of 2001 there was not sufficient moisture available to produce any regrowth from the grazed winter rye for a fall grazing. Although the 2001 drought did affect the overall production of the inter-seeded cereals, the annual forage provided was an important emergency pasture resource. Due to the dry spring the forage production from other perennial pastures, (i.e., crested wheatgrass and Russian wildrye grass) were very low or zero. Drought conditions can result in potential NO₃-N toxicity concerns when grazing certain annual cereals. Manure was previously applied to all of the pastures and nitrogen (N) levels in the top 30 cm of the soil

ranged from 90 to 112 kg N ha⁻¹ (80 to 100 lbs N ac⁻¹). No NO₃-N toxicity problems were observed from grazing inter-seeded winter rye and barley, even though the NO₃-N level of the winter rye was above the recommended safe level. The combined grazing of the low NO₃-N concentration of the barley helped to dilute potential NO₃-N concerns associated with the winter rye.

Table 1. Cattle performance for treated (implant and CRC rumensin) versus Control (no implant and CRC rumensin) steer grazing barley and winter rye at AAFC-SPARC in 2001 (ten steers per group).

Performance indicators	Treatments		P value
	I+CRC	Control	
Average daily gain (kg d ⁻¹)	1.2	0.7	0.08
Total livestock production (kg ha ⁻¹)	12.1	5.5	0.005
Grazing days ha ⁻¹	133.5	131.0	0.44

Table 2. Forage quality composition of barley and winter rye sampled at AAFC-SPARC in 2001.

Nutritional parameters	Forage	
	Barley	Winter rye
OMD% ¹	61.1	74.0
ADF% ¹	25.6	19.7
NDF% ¹	52.0	39.9
CP% ¹	16.5	24.1
Nitrate-N ²	0.098	0.16

¹OMD = organic matter digestibility; NDF = neutral detergent fibre; ADF = acid detergent fibre and CP = crude protein.

²less than 0.15% nitrate nitrogen is safe for cattle to consume.

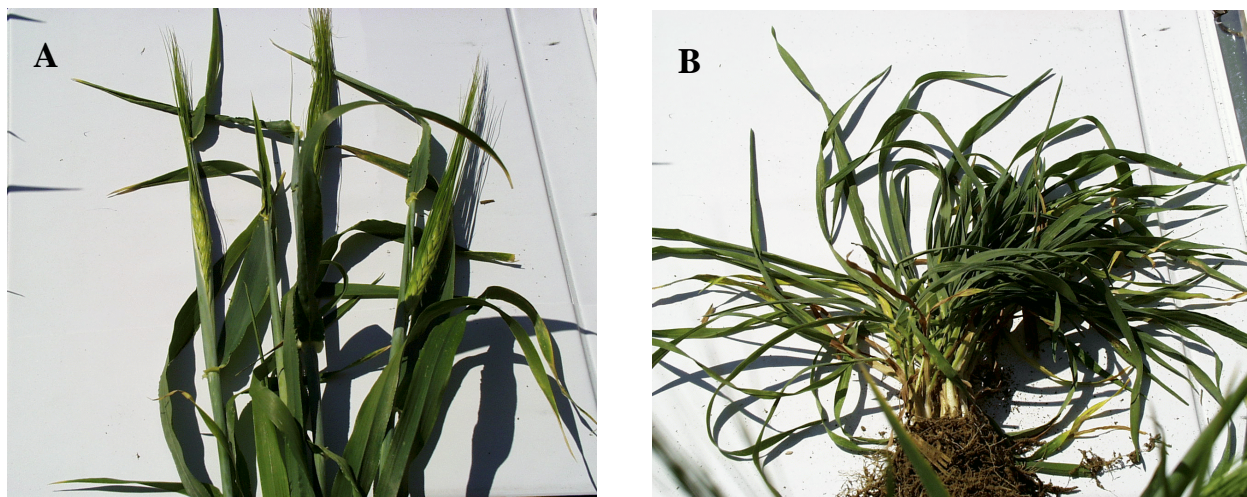


Figure 2. Growth stages at which the barley (A) and winter rye (B) were grazed at

Conclusions

This study showed that under drought conditions the use of inter-seeded annual cereals can provide an important pasture resource. However, good grazing management is needed when grazing a spring seeded cereal in order to prevent declining animal performance as the cereal matures. Although results showed that CRC rumensin and the estrogenic anabolic implant improved animal performance while grazing an inter-seeded cereal forage, further research is needed to determine if the relationships between the two growth promoters are additive and/or synergistic. The use of implants and fermentation products cannot only greatly assist producers to improve animal gains and feed efficiency but can also provide more flexibility on management decisions on when the cattle may need to start grazing.

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