



# Western Beef Development Centre

Division of PAMI

## Wheat-Based Dried Distillers Grains Supplementation in Backgrounding and Stocker Programs

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### Introduction

Backgrounding fall-weaned calves is commonly considered by cow-calf producers who want to retain ownership of their calves. Primary alternatives for backgrounding calves include winter grazing, pasture programs, or placing them in a feedlot or growing lot. As the price of grain and roughages used in feedlot backgrounding situations increases, producers are likely to focus more on extended winter grazing or pasture backgrounding. However, the cost of gain in grazing backgrounding programs has also increased as land prices (i.e., rental rates for pasture) have risen dramatically. Typically, in Saskatchewan, backgrounding or stocker rations are based on 60-70% forage in the ration with the rest of the diet being supplemented with grains.

Supplementation is a necessity when stockpiled forages are fed in the fall, winter, and summer to meet growing animals' nutritive requirements. The goal in beef cattle production is to maximize production efficiency. The efficiency of production involves optimizing production while taking into account the production costs. In previous research at Western Beef Development Centre (Lardner and Kelln 2008), considerable labour and cost savings were obtained and production efficiency improved from swath grazing (40% less) and bale grazing (20% less) cows compared to managing cows in drylot pens during the winter.

These results indicate extended grazing systems for wintering pregnant cows can result in reduced costs; however, the question is, "Can weaned beef calves produce similar results?" To date, most research on distiller's by-products has been focused on feedlot diets. Today, there's an expansion in non-confined or non-conventional backgrounding and stocker programs where supplementation is an important consideration. Efforts to reduce backgrounding costs have led to increased use of forages in backgrounding programs. These types of programs, which may utilize stockpiled pasture or extensive winter systems, require supplementation in order to meet the growing animal's requirements (NRC 1996). Wheat dried distillers grains with solubles (DDGS) are nutritionally dense and high in crude protein, and are also considered high in energy due to the highly digestible fibre and high fat content (Schingoethe 2006).

In 2008, Western Beef Development Centre at Lanigan, SK and Semi-Arid Prairie Agricultural Research Centre at Swift Current, SK initiated a joint research program with studies evaluating wheat-based DDGS as a supplement in backgrounding diets for stocker beef cattle utilizing winter bale grazing, fall pasture grazing, or grazing summer pasture.

### Objective:

Specific objective was to evaluate and compare performance of weaned, cross-bred beef calves in extended winter bale grazing, fall pasture, or summer pasture programs, with wheat DDGS or barley grain supplements.

### Study Site Description

Lanigan SK: At the Termuende Research Ranch, a 45-acre crested wheatgrass pasture (>40 yr old) was divided into nine, five-acre paddocks. These paddocks were grazed summer 2009. The winter study was conducted on a 13.5-acre field further divided into nine, 1.5-acre paddocks for the winter bale-grazing trial.

Swift Current SK: At the Semi-Arid Prairie Agricultural Research Centre (SPARC), a 24-acre bromegrass pasture (seeded 2007) was divided into four, six-acre paddocks and used for the fall-grazing study. In the summer-pasture study, two pasture types were managed. The first pasture was a 28-acre crested wheatgrass pasture (seeded 2003), and the second pasture was the same bromegrass pasture used in the fall grazing study. This pasture was grazed in the summer of 2009. There was no winter bale grazing at the Swift Current location.

### Trial Management

Calves were allocated feed and supplement in each study based upon environmental conditions and forage quality. All stocker diets were formulated using CowBytes (NRC 1996) ration formulation program targeting a 1.8 lb (0.82 kg) weight gain per day. At Lanigan, three supplementation strategies were compared in each experiment to meet the nutritional needs of the growing calves. At Swift Current, two supplementation strategies were compared to meet the nutritional requirements of the steers.

Portable windbreaks in the bale-grazing trial at Lanigan were provided for each group of calves according to the guidelines of the Canadian Council for Animal Care (1993). Water was supplied in stock troughs. All pastures at Swift Current were supplied with water.

### Winter Bale-Grazing Study - Lanigan

In November 2008, a field study was initiated to evaluate the performance of fifty-four weaned beef calves in a winter backgrounding program. The study managed crossbred beef calves on a bale-grazing system during the winter months. Bales were set out on the wintering site and animal access to feed was controlled with electric fences. The calves were supplemented with either (i) 100% processed barley grain (CONTROL); (ii) 100% wheat dried distillers grains with solubles (DDGS), or (iii) a blend of 50% barley, 50% wheat DDGS (BAR\_DDGS). Animals were evaluated for body weight (BW) change and system economics were calculated.



Feed quality (grass-legume hay) was analyzed and rations were formulated for calves to gain 2.0 lb per day over the study period. Hay bale quality averaged 10% crude protein and 59% total digestible nutrients. Supplements were fed at 0.8% BW at start of trial, increasing to 1.0% BW at trial end. Energy and protein requirements for a 500 lb growing calf are 11.4% crude protein (CP) and 62.5% total digestible nutrients (TDN) to achieve an estimated 2.0 lbs/day gain.



**Table 1.** Effect of supplementation on performance of beef calves in a winter bale grazing system (Lanigan)

Item	Control	DDGS	BAR DDGS
Initial Body weight (lbs)	483	484	492
Final Body weight (lbs)	696	717	713
Body weight gain (lbs)	213	223	221
Average daily gain (lb/day)	1.96	2.04	2.03

Calculated cost of gain was \$0.74, \$0.75 and \$0.76 per lb for CONTROL, DDGs and BAR\_DDGS supplemented calves, respectively. Barley and wheat DDGs were priced at \$150 and \$155 tonne, respectively (September 2008).

### Summer Pasture Study - Lanigan

In May 2009, a study was initiated to evaluate the performance of stockers in a summer backgrounding program. The same 54 animals from the bale grazing trial were managed on a summer-grazing trial. The calves were supplemented with either (i) 100% processed barley grain (CONTROL); (ii) 100% wheat dried distillers grains with solubles (DDGS), or (iii) a blend of 50% barley, 50% wheat DDGS (BAR\_DDGS). Animals were evaluated for body weight (BW) change and cost of gain was evaluated.

Pasture quality (crested wheatgrass) was analyzed and rations were formulated for calves to gain 2.0 lb per day over the study period. Pasture quality average 8% CP and 51% total digestible energy. Supplements were fed at 0.5% of body weight. Energy and protein requirements for a 800 lb growing calf are 9.3% crude protein (CP) and 63.5% total digestible nutrients (TDN) to achieve an estimated 2.0 lbs/day gain.

**Table 2.** Effect of supplementation strategy on pasture performance of beef calves grazing crested wheatgrass (Lanigan)

Item	Control	DDGS	BAR DDGS
Initial Body weight (lbs)	797	792	798
31-day bodyweight (lbs)	895	882	890
Body weight gain (lbs)	98	90	92
Average daily gain (lb/day)	3.1	2.9	3

### Fall Pasture Study – Swift Current

In October 2008, a study was initiated to evaluate the performance of weaned calves in a fall backgrounding program. Crossbred steers were managed on a grazing system during the fall period. The calves were supplemented with either (i) 100% processed barley grain (CONTROL) or (ii) 100% wheat dried distillers grains with solubles (DDGS). Calves were evaluated for body weight (BW) change.

Pasture quality was analyzed and rations were formulated for calves to gain 2.0 lb per day over the study period. Pasture quality was 4-5% crude protein and 53-58% total digestible nutrients. Supplements were being fed at 0.8% of body weight. Energy and protein requirements for a 500 lb growing calf are 11.4% crude protein (CP) and 62.5% total digestible nutrients (TDN) to achieve an estimated 2.0 lbs/day gain (NRC 1996).

**Table 3:** Effect of supplementation strategy on pasture performance of beef calves grazing fall bromegrass pasture (Swift Current)

Item	Control	DDGS
Initial Body weight (lbs)	474	474
36-day bodyweight (lbs)	568	571
Body weight gain (lbs)	94	97
Average daily gain (lb/day)	2.6	2.7



### Summer Pasture Study – Swift Current

In May 2009, a grazing study was initiated to evaluate the performance of calves in a summer backgrounding program at Swift Current. Steers averaging 775 lb were allocated to one of two supplement strategies on pasture. The calves were supplemented with either (i) 100% processed barley grain (CONTROL); or (ii) 100% wheat dried distillers grains with solubles (DDGS). Calves were evaluated for body weight (BW) change.

Pasture quality was analyzed and rations were formulated for calves to gain 2.0 lb per day over the study period. Pasture quality was 10-12% crude protein and 62-69% total digestible nutrients. Energy and protein requirements for a 800 lb growing calf are 9.3% crude protein (CP) and 63.5% total digestible nutrients (TDN) to achieve an estimated 2.0 lbs/day gain (NRC 1996). Supplements were fed at 0.5% of body weight.

**Table 4:** Effect of supplementation strategy on pasture performance of beef calves grazing summer crested wheatgrass and bromegrass pasture (Swift Current)

Item	Control	DDGS
Initial Body weight (lbs)	775	775
31-day bodyweight (lbs)	874	894
Body weight gain (lbs)	99	119
Average daily gain (lb/day)	3.2	3.8

### Observations

- Stocker cattle bale grazing during winter months at Lanigan and supplemented with either 100% DDGS or 50% DDGS:50% barley blend gained 4% and 3.5% more respectively, compared to calves supplemented with 100% barley.
- Cost of gain for calves winter bale grazing under three different supplement strategies at Lanigan was similar.
- Performance of stockers grazing crested wheatgrass pasture at Lanigan during May and June was similar.
- Over 36 days, DDGS-supplemented steers grazing fall pasture at Swift Current had similar gains compared to steers supplemented with barley grain.
- Steers supplemented with DDGS performed consistently better grazing summer pasture at Swift Current compared to barley supplemented animals. Good gains were observed in the summer, possibly due to compensatory gain.
- When wheat-based DDGS is priced similar to barley, DDGS appears to be an excellent energy or protein supplement for fall, winter, or summer backgrounding programs, due to increased animal gains.

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### References

- Lardner, H.A. and Kelln, B. 2008.** Low-cost Winter Feeding Systems for Cow-Calf Producers in Saskatchewan - Final Report 2008 (Saskatchewan Agriculture Development Fund Project #20040529).
- National Research Council (NRC) 1996.** Nutrient Requirements of Beef Cattle. 7th edition. National Academy Press, Washington, DC.
- Schingoethe, D. J. 2006.** Feeding ethanol by-products to dairy and beef cattle. Proc. 2006 California Animal Nutrition Conference, Fresno, CA, USA. May 10-11, 2006. pg 49-63.