Western Beef
Development Centre

EFFECT OF WINTER FEEDING SYSTEMS ON BEEF COW PERFORMANCE

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Introduction

Beef cattle producers in western Canada compete at an economic disadvantage relative to other regions in North America due to high winter-feeding costs. Producers are seeking ways to effectively reduce these costs by managing manure nutrients more efficiently, yet still maintain acceptable levels of beef cattle production. Producers are moving from drylot wintering systems where cattle are housed in pens and manure is hauled out to systems where cattle are wintered on feeding sites and the manure nutrients are distributed over the site. Beef cattle, typically, do not retain the majority of feed nutrients. Erickson and Klopfenstein (2001) reported that feedlot steers only retained 10% of the nitrogen (N), excreting the remaining 90% in the urine and feces. In addition, most of the nitrogen excreted was then lost to volatilization. There is the potential to more efficiently utilize N if losses can be reduced. This study compared drylot versus field wintering systems evaluating cow gain and performance and feed system economics.

Site Description

The study was conducted at the Termuende Research Farm, Lanigan, SK, over two consecutive winters, 2003-2004 and 2004-2005. The site was a Russian wild ryegrass (*Psathyrostachys juncea*) pasture situated on an Orthic Black soil (Saskatchewan Soil Survey, 1992). The cattle wintering site was four 2.5 acre replicate areas placed diagonally opposite each other with a winter watering system in the center. Animals were controlled access to feed using solar powered electric fencing. Portable wind shelters were used to provide protection from the wind. In addition, cows were also housed in drylot pens at the research farm.

Winter Feeding Systems

Ninety-six (96) crossbred pregnant beef cows were randomly allocated to 1 of 3 replicated (n=2) winter feeding systems. Feeding systems included (1) field bale grazing (BG), round straw + grass-legume hay bales fed *ad libitum* every 3 days; (2) field bale process feeding (BP), round straw + grass-legume hay bales processed and windrow fed *ad libitum* every 3 days; and (3) drylot feeding (DF), round straw + barley greenfeed bales processed bunk fed in drylot daily. Each replicate group of cows (n=16) was weighed and body condition scored (BCS) (Lowman 1975). Body condition was assessed using the scale where 1 = emaciated and 5 = grossly fat (Lowman et al. 1976). All cows were condition scored at the start and end and every 30 days during the trial. In the BG system, bales were set out on the site in fall in 18 rows of 8 bales each. Access to feed was controlled with electric fence allowing 1 hay and straw bale every three days. The BP system utilized a Highline 6800 bale processor to feed 1 hay bale and

1 straw bale every 3 days, with feeding in different areas of the paddock each time. In both systems, the amount of feed was varied according to weather conditions. Daily rations were based on 3% of body weight, calculated at 40 lbs/day, which consisted of 16 lbs of oat straw and 24 lbs grass/legume hay or greenfeed. All feeds were sampled and analyzed for moisture, protein, and energy. Salt and trace mineral was supplied free choice.

Results

Feed ingredients and composition are summarized in Table 1. Forage quality was adequate for beef cows in the 2nd trimester of pregnancy (Table 1). Beef cows in mid pregnancy require 54% TDN and 9% CP on a daily basis (NRC 1996).

Table 1. Ingredients and chemical composition of diets for beef cows.

Ingredients, *(% as fed)*	**Drylot**	**Bale Process**	**Bale Graze**
Grass-legume hay	-	60.8	60.8
Barley greenfeed	56.1	-	-
Oat Straw	43.8	39.1	39.1
Salt and trace minerals[z]	0.05	0.05	0.05
Chemical composition of diets *(% DM)*			
Total digestible nutrients (TDN)	52.7	52.4	52.4
Crude protein (CP)	8.9	9.7	9.7

[z]1:1 mineral contained: 16.0% Ca, 16.0% P, 12,000 mg/kg Zn, 200 mg/kg I, 9,000 mg/kg Mn, 70 mg/kg Co, 1,000,000 IU/kg vitamin A, 150,000 IU/kg vitamin D3, and 1,000 IU/kg vitamin E; fortified TM salt contained: 38.5% Na, 150 mg/kg I, 100 mg/kg Co

For all systems, the amounts of feed, minerals, and salt as well as labour and machinery costs were recorded throughout the feeding season.

Animal Performance

Cow performance is shown in Table 2. Ninety-six (96) cross bred pregnant cows, at start of test averaged 1,367 and 1,331 lbs in 2003-04 and 2004-05 respectively. Average cow weight coming off the study was 1,412 and 1,428 lbs in 2003-04 and 2004-05 respectively.

Table 2. Effect of winter feeding system on cow performance

	ADG[z]		TG		∆BCS	
	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05
DRYLOT	0.27	1.14	25	112	+0.08	-0.04
BALE GRAZE	0.33	0.57	44	76	+0.20	+0.26
BALE PROCESS	0.17	0.77	23	103	-0.03	+0.17

[z]ADG=average daily gain; TG=total gain; ∆BCS=change in body condition score

In the first year, cows were winter fed 105 days, November 22, 2003, to March 5, 2004, and in the second year cows were fed 112 days, November 15, 2004, to March 7, 2005. In 2003-04 cows fed in drylot, bale graze, and bale process gained 0.27, 0.33, and 0.17 pounds per day, respectively. In 2004-05 animals fed in drylot, bale graze and bale process gained 1.14, 0.57, and 0.77 pounds per day, respectively. Body condition varied slightly between feeding systems in each year (Table 2). Total gain was greater in second year due to a longer feeding period. This would suggest the nutrient value of the diets not only met cow maintenance needs but also allowed the animals to put on body condition. There were minimal differences between systems for cow gain or cow condition. On average, cows entering the study and at the end maintained a body condition of 3.0.

Costs

Costs associated with the project include labor, equipment, feed, and custom work. All costs were calculated in total then reported as cost per cow per day. Feed costs including trucking were hay at $68.95 per bale, oat straw at $23.00 per bale, and greenfeed at $37.70 per bale. Labour for feeding was charged at $15.00 per hour. Equipment costs were calculated using a guide to machinery rates (Saskatchewan Agriculture, Food and Rural Revitalization, 2004). Therefore, in 2003-04 system costs of DL, BP, and BG were $1.42, $1.04, and $1.06 per cow respectively. In 2004-05, costs for DL, BP, and BG were $1.53, $0.96, and $0.95 per cow respectively.

Conclusions

Crossbred pregnant beef cows (n = 96) were allocated to one of three replicate (n = 2) wintering systems. Cow body weight and condition over the two-year trial was not affected by feeding systems. Cow cost per day was lower for field feeding than wintering cows in drylot pens. Results indicate that benefits from wintering cows on feeding sites can be managed to reduce daily costs with minimal impacts on cow performance.

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