Fact Sheet 2006-01

Western Beef Development Centre

WINTER FEEDING BEEF COWS

FEED WASTE & FEED SITE FORAGE PRODUCTION

By: Dr. Bart Lardner, Research Scientist, WBDC

Introduction

Producers are seeking ways to reduce winter feeding costs by managing beef cows in extensive (field) systems. Today, fewer cows are wintered in drylot pen systems where feed is hauled into pens and manure is hauled out. In extensive systems cattle are wintered on field feed sites and the manure nutrients are distributed over the site. There is the potential to more efficiently utilize these nutrients for pasture growth the following spring. This study evaluated feed waste in winter feed systems and the subsequent forage production from manure deposition on winter feeding sites.

Site Description and Management

The study was conducted at the Termuende Research Farm, Lanigan, SK, over 2 winter periods, 2003-04 and 2004-05. The winter feeding site was a Russian wild ryegrass (*Psathyrostachys juncea*) pasture situated on an Orthic Black soil (Saskatchewan Soil Survey, 1992). The site was divided into 4, 2.5-acre replicate areas located opposite each other with a centralized winter watering system. No fertilizer was applied to the study area the previous 2 years, however, in 2000 and 2001 the site received 30 ton/acre of cattle manure and 50 lb N/acre (46-0-0), respectively.

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.

In the BG system, straw and hay 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 and straw bale every 3 days, with feeding areas rotated throughout the paddock over the course of the trial. In the DL system, cows were fed daily with a feed wagon and tractor. In all systems the amount of feed was varied according to weather conditions. All feeds were sampled and analyzed for moisture, protein and energy to determine rations for each feeding system (Lardner 2005b). Daily rations were based on 3% of body weight, consisting of 16 lbs of oat straw and 24 lbs grass/legume hay or greenfeed, calculated at 40 lbs per head per day (NRC 1996). Salt and 1:1 trace mineral was supplied free choice.

Figure 1. Beef cows on bale grazing system (January 2004)

Manure Application

In the fall of 2003, cattle manure and compost from the DL system was mechanically applied to the study site in a replicated complete block design with 4 replicates per treatment. Treatment rates, manure at 30 ton/acre and compost at 10 ton/acre, were based on the amount of manure deposited by cows over the feeding period. Treatments were laid out in 100ft X 16ft strips and consisted of control (no manure), raw manure, and composted manure.

Results

Feed ration ingredients and composition and beef cow performance are reported in Lardner (2005b). Effect of feed system and manure treatment on soil nutrient levels are reported in Lardner (2005a). The results in this fact sheet will focus on feed waste in each system and subsequent forage production from research sites where cows were wintered compared to sites receiving manure applied with equipment.

Forage Production

Forage production was estimated from each winter feeding site and manure treatment area. Forage estimates were collected using 0.25 m^2 quadrats; samples were then dried and weighed and presented on a dry matter basis (DMY) (Table 1). In 2004, DMY was estimated at two harvest dates, 19 July and 26 September and on 15 July in 2005. Production varied significantly between treatment areas (Table 1).

Table 1. Forage dry matter yield (kg/ha).

	2004	2005
Bale Processing	4714*a*	4941*a*
Bale Grazing	3720*b*	3411*b*
Manure	2337*c*	1052*c*
Compost	2757*c*	1191*c*
Control	1585*d*	1069*c*

Within a column means having the same letter do not differ significantly ($P < 0.05$)

Increased DMY was observed on all treatment areas compared to the control site. Where cows were winter fed on either bale graze or bale process sites, DMY were 2.3 to 3.0 times greater compared to the control areas, respectively. Where manure was applied as either compost or solid, DMY was 1.7 to 1.5 times greater than the control yield, respectively. In addition, pasture growth was significantly greater where cattle were wintered compared to sites receiving manure spread with equipment. There was a similar trend observed for DMY in the second year after winter feeding. Where cows were winter fed on either bale graze or bale process sites, DMY were 3.0 to 4.0 times greater compared to the control areas, respectively. Where manure was applied as either compost or solid, DMY was similar to control plots. This would suggest that the significant concentration of nutrients deposited by the animals had a carryover effect on subsequent pasture production in the following years. Pasture growth was concentrated, either where bales were placed (BG system) or where processed feed was placed (BP system) on the cattle wintering sites. However, by the second year after wintering cows on these sites grass growth appeared more evenly distributed.

Feed Waste

Feed residue (waste) was estimated the following spring using a series of sampling points (n=45) along a grid pattern on each feed site area. Round cores were extracted from all sites and material was separated into hay, straw, manure and other material. Estimates were then made for amount of hay and straw remaining after the winter feeding period (Table 2). Hay and straw left by the cows, as measured in the spring, was similar between the feeding systems, with little hay left and considerable straw remaining.

Table 2. Amount fed and wasted in each feeding system.

	Amount fed lbs/cow/day	Amount wasted %	Amount wasted lbs/cow/day
Hay (BP System)	23.2	7.7	1.8
Hay (BG System)	24.2	4.5	1.1
Straw (BP System)	15.6	38.0	5.9
Straw (BG System)	15.2	44.4	6.7

Hay waste between systems was minimal over the study periods. Straw consumption by the cows was affected due to the animals using some of the straw as bedding material. Straw was included in the ration to reduce overall feed costs, however the amount remaining in the spring

was significant. The remaining feed residue (waste) on the sites helped to improve organic matter and acted as litter to further trap nutrients and moisture for new pasture growth.

Conclusions

Considerable benefits can result from winter feeding beef cows on pre-selected sites due to increased capture and utilization of manure nutrients. Deposition of nutrients with animals vs. machinery indicates more efficient cycling of nutrients for subsequent pasture growth the following spring. This response can be observed even into the second year. Results also indicate that benefits from wintering cows on feeding sites can be managed to reduce daily costs with minimal impacts on cow performance (Lardner 2005a; Lardner 2005b).

Acknowledgements

Appreciation is extended to the Saskatchewan Cattle Marketing Deductions Fund for monetary support for this project. Acknowledgement is also given to Termuende Research Farm staff for collection of data and to Paul Jungnitsch for information provided in this fact sheet.

References

Lardner, H.A. 2005a. Winter feeding beef cows – managing manure nutrients. Western Beef Development Centre Fact Sheet. Pub. No. 2005-02. 4 pp.

Lardner, H.A. 2005b. Effect of winter feeding systems on beef cow performance. Western Beef Development Centre Fact Sheet. Pub. No. 2005-03. 4 pp.

National Research Council. 1996. Nutrient requirements of beef cattle. 7th Ed. National Academy of Sciences, Washington, D.C.

Saskatchewan Soil Survey. 1992. Saskatoon Institute of Pedology. University of Saskatchewan. Saskatoon, SK.