Western Beef Development Centre
Division of PAMI

Effects of Supplementing Beef Cows Grazing Stockpiled Pasture with Dried Distillers' Grains

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Introduction

Efforts to lower feeding costs have led to increased use of low-quality forages in beef cow diets. These types of forages, which are characterized by high fibre and low protein content, require supplementation in order to meet cow requirements, especially during the second and third trimester of pregnancy (McCartney et al. 2006). With expansion in the North American ethanol industry, there is an increasing supply of the distillers' co-products. Dried distillers' grains with solubles (DDGS), the most common co-product, has potential as a supplement for beef cows consuming low quality forages. DDGS are nutritionally dense and high in crude protein. DDGS are also considered high in energy due to their highly digestible fibre and high fat content, particularly in corn DDGS (Schingoethe 2006). The near absence of starch may eliminate the incidence of subacute ruminal acidosis, thus, feeding DDGS has little to no negative associated effects (Larson et al. 1993). There are some concerns when feeding DDGS, as the high levels of crude protein and available phosphorus pose the risk of increased nitrogen and phosphorus excretion if DDG's are fed in excess. Additionally, the high sulphur content of DDGS may increase the risk of polioencephalomalacia if sulphur from other feed or water sources is not considered when formulating rations (Walker 2003).

Objectives

This study evaluated DDGS as a supplement for beef cows grazing stockpiled fall pasture. The objectives of this study were to (1) evaluate the effects of supplementation on beef cow performance; and (2) determine grazing costs for cows supplemented with either DDGS, range pellet or no supplement.

Study Site Description

This two-year study was conducted at the Western Beef Development Centre's Termuende Research Ranch located at Lanigan, Saskatchewan, during 2007 and 2008. Forty-eight dry pregnant Black Angus cows (BW = 1368 ± 32 lbs; BCS = 2.4 ± .24 units) grazed a pasture of stockpiled predominantly crested wheatgrass from October 3 to November 6, 2007.

Trial Management

The cows were randomly allocated using body weight and days pregnant to maintain homogeneity within replicate groups. The standard system used by the ranch, managing dry cows on fall pasture, served as control and included access to stockpiled crested wheatgrass pasture. Treatments included an unsupplemented control (CON; eight hd) and two supplemented groups (eight hd/group). Supplemental treatments were a commercial range pellet (COMM) and dried distiller's grains + solids (DDGS). Pasture and supplement samples were collected and results were used to formulate diets of cows according to NRC (1996) requirements **(Table 1)**. Average forage quality of the pasture was 6% crude protein and 49% TDN (total digestible energy). Supplemental treatments were chosen to supply additional energy and equivalent levels of protein. Supplements were provided to cows in the supplemental treatments three times a week. Supplemental intake was limited to 2.8 lbs/hd per day or 8.4 lbs/hd per feeding. Each group was assigned to one

of the six pastures, which were further sub-divided into four three-acre paddocks. The cows had *ad libitum* access to trace mineral and cobalt-iodized salt during the trial. Water was supplied in troughs in each pasture.

At the start and end of the trial, cows were weighed, ultrasonically measured for backfat at the rib and rump locations, and body condition scored (BCS) using the Scottish system where 1=emaciated and 5=grossly fat (Lowman et al. 1976). Additionally, cow body weights (BW) were taken every 14 days throughout the trial. Weights were taken in the morning following early grazing to avoid "gut fill" variability. Guidelines for animal care (Canadian Council on Animal Care 1993) were followed at all times.

Table 1: Feed Ingredients and chemical composition of beef cow rations

		Treatment		
Item[z]		DDGS	COMM	CON
Ingredients (% as fed)				
	Crested wheatgrass pasture	91	91	99.4
	DDGS	8.4	-	-
	Commercial supplement	-	8.4	-
	Salt and trace minerals[1]	0.6	0.6	0.6
Chemical Composition (% DM)				
	TDN	52.52	51.49	48.98
	Crude Protein	10.7	10.2	7.7
	NDF	68.6	68.1	73.3

[z] TDN=total digestible nutrients; NDF=neutral detergent fibre; 2:1 mineral contained 20.0% Ca, 10.0% P, 10 000 mg/kg Zn, 200 mg/kg I, 9000 mg/kg MN, 3000 mg/kg Co, 1 000 000 IU/kg vitamin A, 150 000 IU/kg vitamin D, and 1000 IU/kg vitamin E; fortified salt contained 38.0% Na, 150 mg/kg I, 100 mg/kg Co

RESULTS

Animal Performance:

The cows grazed stockpiled crested wheat grass pasture for 35 days. During the trial, all treatment groups gained body weight and condition **(Table 2)**.

Table 2: Effect of supplementation treatment on cow performance

		Treatment		
Item[z]		DDGS	COMM	CON
Cow Body Weight lbs	Average	1362*a*	1352*ab*	1331*b*
	Day 0	1319	1315	1323
	Day 14	1370	1358	1336
	Day 28	1406	1395	1330
	Day 35	1353	1341	1334
	Change	34	26	12
Cow BCS	Day 0	2.3	2.4	2.4
	Day 35	2.7	2.9	2.7
	Change	0.5	0.6	0.4
Ultrasound Rib (mm)	Day 0	3.8	4.2	3.3
	Day 35	4.8*a*	5.4*ab*	4.2*b*
	Change	1.1	1.8	0.6
Ultrasound Rump (mm)	Day 0	4.1	4.9	3.6
	Day 35	5.6	7.1	4.9
	Change	1.9	2.8	1

[a-b] Means with different letters in the same row are significantly different (P<0.05).

Cows supplemented with either DDGS or commercial pellets gained 34 and 26 lbs, respectively. Unsupplemented cows gained only 12 lbs over the trial period. While body weight change did not differ (P>0.5), the average body weight for each treatment group was significant over time, indicating long-term body weight changes may differ between treatments. Body condition score and ultrasound measures did not differ between treatments (P > 0.05). These results suggest DDGS may be used effectively as a supplement in fall grazing systems to maintain or enhance cow performance. The second year (2008-09) of this study is still in progress; therefore, body weights, BCS and fat measures are not included.

Project Costs:

Costs associated with the study included infrastructure establishment, feed costs (including pasture costs), yardage (which included labour, fuel, equipment use, maintenance, and depreciation). A rate of $0.25 per head per day was used for pasture cost, and this included repairs and depreciation. A rate of $15.00 per hour was used for labour. Equipment rates were obtained from the Saskatchewan Ministry of Agriculture rate guide. There were no bedding or veterinary costs associated with this trial. Total grazing costs for DDGS, COMM, and CON were $1.10, $1.36, and $0.75 per head per day, respectively **(Table 3)**.

Table 3. Costs of supplementation treatments

	Treatment		
Item[z]	DDGS	COMM	CON
Feed Costs ($/hd/day)			
Supplement[z]	$0.18	$0.45	-
Mineral	$0.17	$0.17	$0.17
Salt	$0.02	$0.02	$0.02
Pasture	$0.25	$0.25	$0.25
Yardage Costs			
Machinery Cost (incl. fuel)	$0.33	$0.33	$0.21
Labour	$0.15	$0.15	$0.09
Total Production Costs	$1.10	$1.36	$0.75

[z]DDGS priced at $140/tonne; Commercial supplement priced at $350/tonne

Conclusions

Stockpiling of forage from crested wheatgrass pasture for use in the fall is one method of extending the grazing season. Reducing daily costs per cow can be achieved by grazing low quality forages. However, supplementation may be required to meet increasing nutrient requirements, especially for cows in the second and third trimester of pregnancy. DDGS had no negative impacts on performance when used as a supplement for beef cows grazing stockpiled crested wheatgrass pasture. Additionally, lower costs were associated with DDGS as a supplement expressed as unit of body weight change. Finally, cows supplemented with DDGS put on more weight than cows supplemented with a commercial range pellet, at 20% less the cost per day.

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