A System for Wintering Beef Heifers Using Dried Distillers Grains

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Summary

A two-year experiment compared two systems for wintering pregnant heifers. The standard system used by the ranch served as the control (CON) and the treatment system (TRT) included a dried distillers grains based supplement. Heifers in the TRT system were heavier and had greater body condition score at end of supplementation. Calving difficulty, percentage of live calves weaned and subsequent pregnancy rate were similar between systems. Calves born to heifers in the TRT system were heavier at birth and weaning. The TRT system cost $10.47/heifer less than the CON system and resulted in equivalent or improved heifer and calf growth performance.

Introduction

Purchased and harvested feeds represent a major component of the annual operating costs in cow-calf operations. Mechanically harvesting and feeding of forage is expensive and significant improvements in economic efficiency may be gained by extending the grazing season (*2001 Nebraska Beef Report*, pp.10-12). However, effective supplementation programs are required if optimal animal performance is to be achieved in extended grazing production systems.

Previous research has demonstrated the value of meeting animal nutrient requirements in extended grazing heifer wintering systems (*2004 Nebraska Beef Report*, pp. 7-9). This study showed feeding a dry corn gluten feed based supplement in an extended grazing system reduced winter costs by $6.91 compared to a conventional wintering system dependent upon hay feeding.

We hypothesized dried distillers grains (DDG) would be an acceptable supplement in an extended grazing heifer wintering system. The nutrient profile of DDG makes it attractive in forage based production settings. Dried distillers grains is an excellent source of total digestible nutrients, containing digestible fiber and relatively high levels of fat. Dried distillers grains is also high in crude protein (approximately 32%), the majority of which (65%) is undegraded in the rumen. Additionally, DDG is a good source of phosphorus (0.6%), a nutrient commonly deficient in forage based diets.

The objective of this experiment was to reduce costs in an extended grazing heifer wintering system using a DDG based supplement without decreasing heifer reproductive or calf growth performance compared to a conventional system.

Procedure

Spring-calving, crossbred heifers (n = 657, yr 1; n = 696, yr 2) were used in a two-year experiment at a commercial ranch (Rex Ranch, Abbott Unit) near Ashby, Neb. In August of each year (Aug. 21 yr 1; Aug. 26 yr 2) pregnant heifers were assigned randomly to control or treatment systems. The standard system used by the ranch for wintering pregnant heifers served as control and included access to native upland range, dry corn gluten based supplement (Table 1), and meadow hay. Hay feeding in the CON system began in December and amount fed increased as gestation advanced such that hay completely replaced range as calving approached. The treatment system included access to native range and a DDG based supplement with no hay fed. In the TRT system heifers had ad libitum access to native upland range for the entire treatment period.

Table 1. Composition of supplements.

	Composition, %DM	
Ingredient	CON[a]	TRT[a]
Dry gluten feed	72.0	—
Dried distillers grains	—	60.0
Sunflower meal	22.4	5.0
Wheat middlings	—	20.0
Milk, NFD-USDA	—	11.0
Molasses	2.5	4.0
Binder[b]	3.1	—

[a]CON is ranch standard wintering system; TRT is extended grazing system using dried distillers grains based supplement.
[b]Included to improve pellet quality.

Systems were designed to supply similar amounts of energy and meet degraded intake protein and metabolizable protein requirements. Data collected from previous research (*2004 Nebraska Beef Report*, pp. 7-9) served as a guide for predicting forage intake. Predicted forage intake, changes in forage quality and historic hay feeding records were used as inputs into the NRC (1996) model to create a supplement feeding schedule. Supplement feeding schedules (Table 2) were designed to begin in October of each year but actual starting dates were at the discretion of the ranch manager and depended on weather and forage availability. Supplement feeding was terminated at onset of calving. Average calving date was March 22. Upon termination of treatments, heifers were managed in a common group during calving and the subsequent summer grazing season.

Heifer weight and body condition score (scale 1= emaciated, 9 = obese), evaluated independently by two technicians, were recorded upon initiation of the experiment (August 21 year 1; August 26 year 2), termination of treatments (February 26, year 1; March 1, year 2), and the subsequent fall (October 14, year 1). Calves born to heifers following application of treatments were weighed at birth and

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weaning (August 28, year 1). To evaluate carry over effects of treatments on subsequent pregnancy rate, heifers were examined for pregnancy by rectal palpation in the fall (October 14, year 1). The second year of this study is still in progress; therefore, weaning weight of calves and fall weight and BCS of heifers from year 2 are not included.

Diet quality was estimated at the beginning, middle and end of the treatment period in both systems (Table 3) from masticate samples obtained from esophageally fistulated cows external to the experiment.

Costs associated with both systems in year 2 were compared using partial budget analysis. Costs from year 2 were used because management in year 1 did not closely match the prescribed feeding schedule. Actual amount of hay and supplement fed was used in the budget. Amount of grazed forage consumed was calculated from intake predictions. Hay was valued using a 10-year average price (Crop and Livestock Prices for Nebraska Producers, 2005) and winter range valued at half the current average rate for a summer AUM, according to published data (Nebraska Farm Real Estate Market Developments, 2003-2004), while actual purchase price of supplements was used in the budget. Labor costs associated with feeding were obtained from historic ranch records.

Results

Body weight ($P < 0.001$) and BCS ($P < 0.001$) were greater at the end of the supplementation period for heifers in the TRT system (Table 4). This was because ADG ($P < 0.001$) was greater and less BCS ($P = 0.03$) was lost for heifers in the TRT system. Systems were designed to result in similar performance. Heifers in the TRT system performed similarly to designed objectives. Observed differences between systems may be a result of deviations by the ranch manager from the prescribed feeding schedule for CON heifers and because forage and hay quality were different than predicted

Table 2. Predicted intakes and feeding schedules for two systems of wintering pregnant heifers in the Nebraska Sandhills

	DMI, lb/day					
	CON			TRT		
Period	Range[a]	Supplement	Hay	Range[a]	Supplement	Hay
November 1 to 30	19.0	0.9	0.0	19.0	0.9	—
December 1 to 31	13.2	1.5	5.0	18.2	1.5	—
January 1 to 31	4.8	3.0	12.0	16.9	2.9	—
February 1 to 14	—	3.5	17.0	15.0	4.2	—
February 15 to 28	—	3.5	19.0	14.2	5.6	—

[a]Predicted from NRC (1996).

Table 3. Nutrient composition of grazed forage collected by esophageally fistulated cows and hay fed in two systems for wintering pregnant heifers (mean ± standard deviation)[a]

	Year 1		Year 2	
Item	CP	IVDMD	CP	IVDMD
Range				
October	8.6 ± 0.6	63.0 ± 0.04	7.1 ± 0.7	51.2 ± 0.03
December	6.8 ± 0.6	57.9 ± 0.06	6.2 ± 0.4	52.3 ± 0.02
February	6.7 ± 0.7	49.8 ± 0.11	6.0 ± 1.8	48.0 ± 0.05
Hay	10.2 ± 0.1	56.5 ± 0.01	10.9 ± 0.1	50.6 ± 0.02

[a]Standard deviations are computed for the mean nutrient content of samples obtained from multiple esophageally fistulated cows, not across laboratory duplications; n = 3.

Table 4. Weight, body condition and subsequent reproductive and calf growth performance of heifers from two wintering systems

	Treatment			
Item	CON	TRT	SE	P-value
Heifer				
Aug. BW, lb	832	831	3	0.91
Feb. BW, lb	950	989	3	<0.001
Oct. BW, lb[a]	981	993	4	0.06
ADG, Aug to Feb., lb/day	0.63	0.83	0.01	<0.001
ADG, Feb to Oct., lb/day	0.02	0.01	0.006	<0.001
ADG, Aug to Oct, lb/day	0.07	0.08	0.004	0.003
Aug. BCS	5.5	5.5	0.02	0.39
Feb. BCS	5.1	5.2	0.01	<0.001
Oct. BCS[a]	5.0	5.2	0.1	0.30
Calving day of year	82	82	0.3	0.87
Calving difficulty[b]	1.3	1.4	0.03	0.16
Pregnancy rate, %[c]	97.1	96.5	2.3	0.64
Wean, %[d]	92.7	93.0	0.2	0.91
Calf				
Birth wt, lb	81	84	0.4	<0.001
Wean wt, lb	387	394	3	0.07
Adj. wean wt, lb[e]	386	394	2	0.03
ADG, lb/day	1.94	1.97	0.01	0.06

[a]Measured in October following application of treatments the previous winter.
[b]Calving difficulty score; 1 = no assistance, 2 = easy pull.
[c]Percentage of heifers pregnant with second calf; P-value represents chi-square analysis.
[d]Percentage of live calves at weaning; P-value represents chi-square analysis.
[e]Weaning weight adjusted to 205 days of age.

Table 5. Feed and labor costs associated with two systems for wintering pregnant heifers.

	Treatment			
	CON		TRT	
Item	$/heifer	% total	$/heifer	% total
Feed Costs				
Supplement[a]	24.29	30.6	28.44	41.2
Grazing[b]	21.67	27.3	39.70	57.8
Hay[c]	25.85	32.5	—	—
Labor Costs[d]				
Supplement	0.53	1.0	0.60	1.0
Hay	6.87	8.6	—	—
Total	79.21	100.0	68.74	100.0

[a]Delivered price to the ranch
[b]Standing winter forage valued at $13.83/AUM
[c]Hay valued at $60.87 per ton as-fed
[d]Includes ranch values of costs associated with feed delivery

values. The CON system was the standard management system employed by the operation and involved subjective management decisions made by an experienced manager. These results indicate knowledge of forage quality dynamics and application of advancements in understanding of nutrition requirements, such as the NRC (1996) model, are of value in designing management systems.

During the interval between end of supplementation and pregnancy determination, heifers in the CON system gained more weight ($P <$ 0.001) than heifers in the TRT system. However, weight gain from initiation of treatments to the following October was greater ($P = 0.003$) for TRT heifers.

Calving date ($P = 0.68$) was not affected by system. Calves born to heifers in the TRT system were ($P <0.001$) heavier at birth but calving difficulty was not different ($P = 0.16$).

Actual weight ($P = 0.07$) and ADG ($P = 0.06$) of calves tended to be greater and weaning weight adjusted to 205 d of age was greater ($P = 0.03$) for calves born to heifers in the TRT system. Several studies have shown an increase in weaning weight of calves born to cows in better nutrient status during gestation (*2005 Nebraska Beef Report*, pp. 7-9). These results suggest the increased weight may persist beyond weaning.

Subsequent pregnancy rate ($P =$ 0.64) and percentage of live calves at weaning ($P = 0.91$) were similar between systems. Pregnancy rates of heifers in both treatments averaged 97%.

Analysis of costs associated with wintering heifers in both systems indicated costs were reduced by $10.47/heifer in the TRT system (Table 5). Hay and labor associated with feeding hay comprised nearly 41% of costs in the CON system. Grazed forage was the major cost in the TRT system. Labor costs account for approximately half the difference in costs between the two systems. On cow/calf operations were labor could be devoted to other enterprises the TRT system may be more attractive compared to operations were labor is not limiting.

Conclusion

These results indicate extended grazing systems for wintering pregnant heifers can result in reduced costs without sacrificing heifer and calf performance. Opportunity exists to incorporate by-products from corn milling into forage based production systems as a method of reducing costs.

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