Supplementation of Beef Cows Bale Grazing Grass Hay in Winter

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Ensuring that animals have adequate nutrition is important when bale grazing late in the season. For cows receiving poor-quality feed, this can be achieved by using supplementation methods that minimize labor and energy costs. This study examines methods of supplementing cows while bale grazing poor-quality hay. Preliminary results suggest that grass hay fed in severely cold winters may not contain adequate energy, protein and phosphorus to meet the requirements of pregnant beef cows in early to midgestation. Under such conditions, supplementation with good-quality alfalfa hay or liquid supplement is not adequate and high-energy supplements such as corn dried distillers grains with solubles (DDGS) will be required to meet the nutrient shortfall. Supplementation with good-quality alfalfa hay or grass hay treated with a liquid supplement may be an option during mild winters.

Summary

Four methods of supplementing beef cows bale grazing grass hay were investigated in a study conducted during the winters of 2016 and 2017 at the Central Grasslands Research Extension Center, Streeter, N.D. Starting in the fall of each year, non-lactating pregnant Angus cows (2016: n = 64, body weight [BW] = 1,312 ± 142 pounds, body condition score [BCS] = 5.5 ± 0.29; 2017: n = 80, BW = 1,368 ± 131 pounds, BCS = 5.4 ± 0.24) were divided into eight groups of similar total body weight and allowed to bale graze one of four bale grazing treatments: a) poor-quality hay, b) poor-quality hay supplemented with good-quality alfalfa hay, c) poor-quality hay supplemented with corn DDGS and d) poor-quality hay treated with a liquid supplement.

Two-day body weights were taken at the start and end of each grazing period. Two independent observers assigned BCS using a 9-point system (1 = emaciated, 9 = obese) at the start and end of each grazing period. Despite heavy snow accumulation from three blizzards in the first year, cows were able to graze for 70 days before termination of the grazing period.

Environmental conditions influenced animal performance, with the first year colder than the second year. In the first year, supplementation with good-quality alfalfa hay or grass hay treated with a liquid supplement did not improve animal performance relative to cows offered grass hay alone. In the second year, weight gain and BCS change were greater in supplemented cows relative to cows offered grass hay.

These preliminary results suggest that grass hay fed in severely cold winters may not contain adequate energy, protein and phosphorus to meet the requirements of pregnant beef cows in early to mid-gestation. Under such conditions, supplementation with good-quality alfalfa hay or liquid supplement is not adequate and high energy supplements such as corn DDGS will be required to meet the nutrient shortfall for such cows. Supplementation with good-quality alfalfa hay or grass hay treated with a liquid supplement may be an option during mild winters.

Introduction

Beef cattle in the northern Great Plains typically graze poor-quality forages in winter (Marshall et al., 2013). Poor-quality forages are generally low in energy, protein and minerals, impairing rumen microbial function, which leads to poor forage intake and digestion (Köster et al., 1996). Utilization of poor-quality forages can be improved through supplementation, which is especially important at critical times such as summer plant dormancy or fall and winter months (Caton and Dhuyvetter, 1997).

Effective supplementation requires regular supplement intake at levels that do not vary significantly on a daily basis (Garossino et al., 2003). Cost-effective supplement delivery methods help minimize feed costs by minimizing supplement delivery frequency (Schauer et al., 2005; Canesin et al., 2014; Gross et al., 2016) or eliminating pasture visits altogether (Klopfenstein and Owen, 1981).

Supplementation techniques that minimize or eliminate pasture visits in extended grazing systems will further the goal of minimizing winter feed costs. This study was conducted to investigate methods of supplementing cows bale grazing poor-quality hay in winter. The study examined beef cow performance and cost effectiveness of bale grazing supplementation strategies.

Procedures

This study was conducted during two winters: 2016 and 2017. Starting in the fall of each year, nonlactating pregnant Angus cows (2016: n = 64, BW = 1,312 ± 142 pounds, BCS = 5.5 ± 0.29; 2017: n = 80, BW = 1,368 ± 131 pounds, BCS = 5.4 ± 0.24) were divided into eight groups of similar total body weight and kept on a bale-grazing pasture in winter. The cows were pregnancy-checked prior to the start of the study to eliminate open cows. Cows were treated with IVOMEC (Ivermectin) pour-on during sorting.

The bale grazing site was a 26-acre field that was historically cropland, using a corn and small-grain rotation. In the two years prior to commencement of this study, the site was planted to cool-season cover crops, mainly annual rye grass and brassicas. The site was sprayed with 2, 4-D and glyphosate in late April 2016 and seeded to a meadow brome grass in early May 2016.

The field then was divided into eight three-acre paddocks using four-strand, high-tensile wire electric fencing. One water tank was installed between two paddocks. The site was mowed prior to bale placement to reduce the possibility of cows grazing standing forage.

Forty round hay bales were placed in each paddock in two rows in the fall. Net wrap was removed prior to feeding. Bales were placed on their sides to reduce waste and loss of liquid supplement.

Cows were allotted four bales at a time, and access to new bales was controlled using portable electric fencing. Cows were moved to a new set of bales when the depth of waste feed remaining across the diameter of each bale was less than four inches. Windbreaks were placed in each paddock for protection.

Cows were assigned to one of four bale grazing treatments as follows: a) poor-quality hay (control), b) poor-quality hay supplemented with alfalfa hay, c) poor-quality hay supplemented with corn DDGS and d) poor-quality hay treated with a liquid supplement (Table 1). Poor-quality hay was obtained from a Conservation Reserve Program (CRP) field of mixed cool-season grasses that had not been harvested for several years.

Cows supplemented with alfalfa hay received one bale of alfalfa hay for every three bales of poor-quality hay. Cows supplemented with DDGS were fed four pounds of DDGS/head/day twice weekly. For the liquid supplementation, approximately nine gallons of liquid supplement (Quality Liquid Feeds Inc.) was poured onto upright bales. This amount was calculated to increase hay protein content by approximately three percentage points. Bales were allowed to sit upright after pouring until the supplement had seeped into the bale, after which the bales were flipped on their sides.

Cows had *ad libitum* access to water. Cows on the control, alfalfa hay and liquid supplement hay treatments were fed a 6-12+ mineral supplement (CHS Inc., Sioux Falls, S.D.). All cows were offered a salt block. Two-day body weights were taken at the start and end of each grazing period. Two observers assigned BCS using a 9-point system (1 = emaciated, 9 = obese; Wagner et al., 1988; Rasby et al., 2014) at the start and end of the period. Animal handling and care procedures were approved by the NDSU Animal Care and Use Committee.

Results

Initial cow BW and BCS were similar ($P > 0.05$) among treatments in both years. In the first year, supplementation with

Table 1. Composition of grass hay alone (control) and grass hay supplemented with alfalfa hay (ALF), a liquid supplement (QLF) or distillers dry grain with solubles (DDGS).

	Control[1]	ALF[2]	QLF[3]	DDGS[4]
Dry matter (DM), %	94.3	94.1	86.4	93.7
Nutrient composition, % DM				
Crude protein	7.5	9.9	8.8	11.1
Total digestible nutrients	51.7	54.1	51.0	55.2
Neutral detergent fiber	66.3	63.5	65.9	60.9
Acid detergent fiber	47.8	44.7	48.7	42.6
Calcium	0.56	0.91	0.51	0.48
Phosphorus	0.10	0.11	0.16	0.25
Potassium	0.77	1.03	0.93	0.84
Magnesium	0.18	0.23	0.15	0.21

[1]Grass hay, [2]grass hay + alfalfa hay, [3]liquid supplement-treated hay and [4]grass hay + DDGS.

good-quality alfalfa hay or grass hay treated with a liquid supplement had no impact on improving animal performance. With the exception of cows supplemented with DDGS, cows lost weight and body condition (Figures 1 and 2).

In the second year, weight gains and BCS change were greater in supplemented cows relative to cows offered grass hay only. Cow weight gains and BCS change were positive on all diets but greater on supplemented diets relative to the control (Figures 1 and 2).

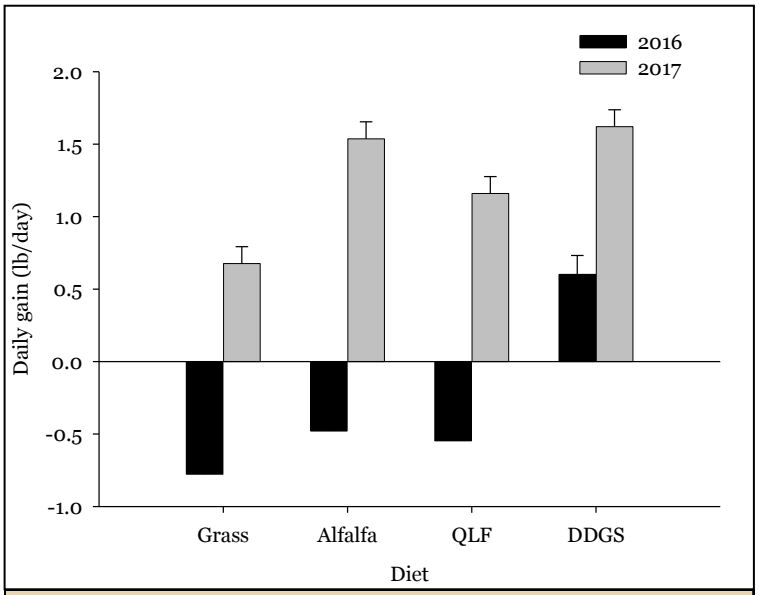

Figure. 1. Cow daily gains following bale grazing grass hay and grass hay supplemented with alfalfa hay (alfalfa), a liquid supplement (QLF) or dried distillers grains with solubles (DDGS).

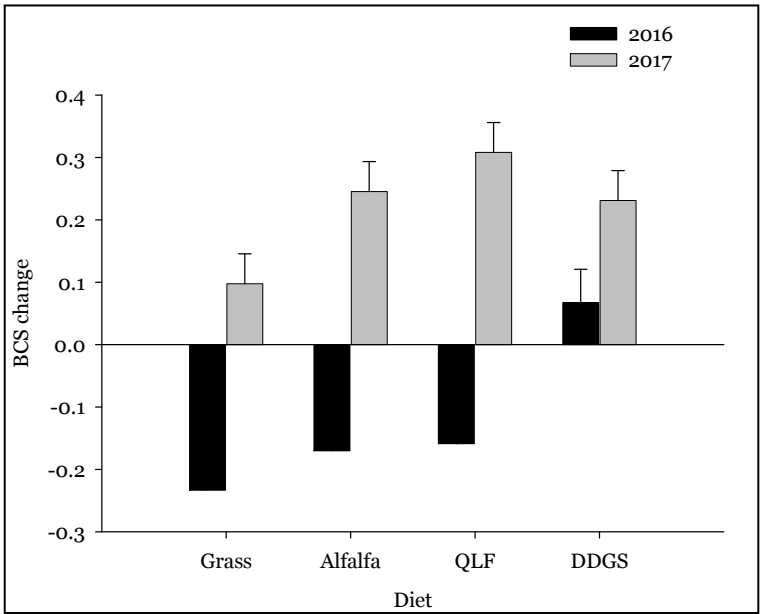

Figure. 2. Cow BCS changes following bale grazing grass hay and grass hay supplemented with alfalfa hay (alfalfa), a liquid supplement (QLF) or dried distillers grains with solubles (DDGS).

Discussion

Environmental conditions will play a part in determining the success of supplementing cows bale grazing grass hay in winter. During the first year of this study (2016), three blizzards occurred, which led to heavy snow accumulation in the paddocks. Despite snow depths greater than 20 inches in some places, cows were able to bale graze for 70 days. The grazing period was terminated when the cows no longer were able to reach water sources.

When winters are harsh, grass hay may not contain adequate energy, protein and phosphorus to meet nutritional requirement of cows in early to midgestation. In the first year, cows supplemented with DDGS maintained BW and BCS, while cows supplemented with alfalfa hay or hay treated with a liquid supplement lost BW and BCS, suggesting that cow nutrient requirements were met by DDGS supplementation but not alfalfa hay or liquid supplementation. With more favorable winter conditions, as in the second year, supplementation with alfalfa hay, a liquid supplement and DDGS all improved animal performance.

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