Effects of Distillers Dried Grains Supplementation of Fall-calving Cows or Calves Grazing Stockpiled Forage Over Winter on Performance of Calves in a Pasture-based Finishing Program in the Subsequent Summer (Progress Report)

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Summary and Implications

In April 2006, 24 weaned fall calves from cows that grazed stockpiled forage in the previous winter with minimal supplementation of the cows or calves, minimal supplementation of the cows, but supplementation of the calves with a distillers dried grains (DDGS) and soy hull-based creep feed, or supplementation of the cows with DDGS to maintain a BCS of 5 were moved to a 40-acre smooth bromegrass pasture divided into eight 5-acre paddocks. Calves were rotationally stocked as one group for 56 days. Their dams grazed after the calves in a first-last grazing system for the last 28 days of this period. Steers were separated into the original treatment groups, allotted to six of the 5-acre paddocks, and supplemented with DDGS-based supplement at up to 16 lb/hd/d. Steers were harvested when 75% of the steers in each pen were estimated to achieve a choice quality grade with ultrasound. Average daily gains of calves when stocked in pastures were not affected by winter supplementation treatment. But when fed in feedlot pens, average daily gains of calves were greater ($P < 0.10$) for creep-fed calves than calves from the other winter treatments. Mean live weight and carcass weights, backfat thickness, ribeye area, and marbling score were 1329, 785 lb, 0.38 in, 12.4 in.^{2}, and Small^{20} and did not differ between treatments. Results imply that fall-calving cows grazing stockpiled forage may receive minimal supplementation during the winter without adversely affecting subsequent performance of their calves in a growing-finishing system.

Introduction

Grazing of stockpiled forage by fall-calving cows can reduce feed costs by reducing the needs for harvested and stored feed. Energy and protein supplementation to fall-calving cows or their calves may reduce the potential for reduced body weight gains of fall calves compared to spring calves. While supplementation of fall-calving cows and calves may enhance calf body weight gains to weaning, the effects on subsequent performance of the calves are unknown.

With the recent and the expected future growth in the ethanol industry, the supply of co-products may continue to become more readily available and economical to feed. There has been a significant amount of research done to validate co-product use in finishing rations. But most of this research has evaluated the use co-products in total mixed rations. Less research has focused on the potential of ethanol co-products as an energy and protein supplements for grazing steers in a pasture finishing system.

The objective of this research was to evaluate body weight gains and carcass characteristics of calves finished in a system using grazing of smooth bromegrass pastures with distillers dried grains with solubles (DDGS) supplementation after weaning from fall-calving cows that grazed stockpiled forage with different DDGS supplementation treatments in the previous winter.

Materials and Methods

On April 28, 2006, 24 weaned fall calves from cows that grazed stockpiled forage with minimal supplementation of cows or calves (Minimal), supplementation of the calves with a DDGS-based creep feed (Creep), or supplementation of the cows with DDGS to maintain a body condition score of 5 on a 9-point scale (DDGS) were moved to a 40-acre smooth bromegrass pasture divided into eight 5-acre paddocks at the ISU Beef Nutrition Farm near Ames, Iowa. Calves were rotationally stocked as one group with daily movement for 56 days. After 28 days, calves were rotationally stocked in a first-last grazing system in which calves grazed until 20% of the live DM was removed followed by the pregnant fall-calving cows that removed an additional 30% of the forage. Forage masses were estimated with a falling plate meter (8.8 lb/yd^2) as cattle entered and were removed from each paddock. Calves continued to lead-graze ahead of the cows until calves failed to meet a target body weight gain of 2 lb/d over a 28-day period, which occurred on July 14th.

At this point, cows were removed from the pastures. Calves were separated into the six pasture groups from the previous winter grazing treatments and allotted to one of six 5-acre paddocks within the smooth bromegrass pastures. Calves grazed the paddocks by continuous stocking with supplementation of a DDGS-based supplement (97.7% DDGS, 1.8% limestone, and 0.5% other mineral and vitamin premix). Supplemental feed was increased from 0 to

1.5% BW with bunks being scored daily and DDGS supplementation adjusted as necessary. Because pasture forage became deficient, steers were moved to six pens in a feedlot on November 30th and fed tub-ground smooth bromegrass hay and the DDGS-based supplement until 75% of the cattle reached a choice grade determined as minimum averages of 0.4 inches backfat and 3.91% intramuscular fat as estimated by ultrasound. During growing and finishing, calves did not receive implants or ionophores.

Cows and calves were weighed at 28 day intervals. Cows were also condition-scored at 28 day intervals. After finish, cattle were harvested at a commercial facility and carcass data obtained.

Pastures were sampled every 28 days from ten locations in each 5-acre paddock of the pasture that was grazed during that 28 days. Pasture forage samples were composited by paddock, weighed, dried at 140° F for 48 hours, ground, and analyzed for DM, NDF, ADF, and CP.

Both forage and carcass data was analyzed using the Mixed procedure of SAS with block and treatment as the model. Contrast statements were used to determine significance between means with significant treatment effects.

Results and Discussion

In the pre-weaning period, average daily gains of calves from the Minimal, Creep, and DDGS treatments were 2.0, 3.2, and 2.6 lb/d ($P < 0.01$), resulting in BW changes of 263, 413, and 330 lb over the 129-day winter grazing period (Table 1). As a result of these BW gains, unadjusted weaning weights were 538, 700, and 615 lbs. for calves from the Minimal, Creep, and DDG treatments on March 23, 2006. During the backgrounding and the pasture periods the ADG of steers were 1.8 and 2.1 lbs, respectively, resulting in total gains of 60 and 464 lbs with no significant differences between treatment groups.

The average forage mass over the season was greater in pastures stocked by steers in the Minimal treatment (2,842 lb/ac) than steers in the DDGS (2,127 lb/ac) and Creep (2,592 lb/ac) treatments. There were no significant differences in sward height (13 cm) and forage allowance (58.6 lb forage DM/100 lb body weight). Forage allowances ranged from 26.3 lb forage DM/100 lb body weight in April to 78.6 lb forage DM/100 lb body weight in September and should have been adequate to prevent limitation of forage intake (Figure 1). Although grazing was managed to maintain forage quality through early season first-last grazing, forage quality may have limited steer performance while stocked on pasture (Table 2). Mean concentrations of CP (11.4%), ADF (40.1%), NDF (65.0%), and IVDMD (42.0%) in forage did not differ between the treatments. The lower than expected forage quality can be attributed to dryer and hotter than average summer weather conditions.

Mean body weight gains of all treatment groups were 3.5 lbs/day during the feedlot period. Mean body weight gains of steers in the Creep treatment were 5.0 lbs/day compared to the Minimal and DDGS treatments, averaging 2.7 lbs/day ($P=0.064$). Although creep-fed steers had a tendency toward a higher ADG during the feedlot period, the total weight gain (187 lbs) did not differ between treatments because steers whose dams were in the Minimal and DDGS treatment remained in the feedlot for greater periods of time.

In the pre-weaning period, the amounts of DDGS-based supplements fed to cows or calves in each treatment totaled 112, 1026, and 863 lbs for the Minimal, Creep, and DDGS treatments respectively ($P<0.05$). The mean amounts of supplements fed to steers by period were 38 and 2021 lbs/steer for the backgrounding and pasture periods, respectively, and did not differ significantly between treatments. During the feedlot period there was a trend toward lower supplement intake by the Creep treatment ($P=0.24$) 651 lbs/steer for the Creep compared with 1158 lbs/steer for the DDGS and Minimal treatments. A total of 3713 lbs of DDGS-based supplements/steer were fed from pre-weaning through finishing.

Steers in the Creep treatment were harvested after 41 days in the feedlot. In comparison, steers in the Minimal and DDGS treatments were harvested after 72 days in the feedlot. There were no significant differences in steer live or hot carcass weights, percentage with a quality grade of choice, yield grade, percent kidney, heart, and pelvic fat, ribeye area, marbling, or fat cover (Table 2). While it seems that the goal of harvesting lots of cattle at an equal quality grade was achieved, the percentage of cattle with the choice quality grade in the Minimal treatment tended to be lower than the Creep treatment

In this study, while stocked on pasture, no significant differences in body weight gains were observed in daily gains of steers that had been raised by fall-calving cows grazing stockpiled forage with minimal or DDG supplementation of the cows or creep feeding of the calves in the previous winters. However, creep-fed calves had greater body weight gains than calves from the other winter treatments during the pre-weaning and feedlot phases. Results of the first year of this study suggest that while supplementing fall-calving cows only to manage the risks of excessive ice and cold will reduce winter feed costs, finishing their calves to an equivalent carcass quality grade may require greater feed and/or time during the finishing phase.

Table 1. Pooled means of body weight gains and supplement intake by production period of steers finished in a pasture-based system with DDGS supplementation after being raised by different supplementation treatments pre-weaning.

Period	Days	ADG, lb	Total BW gain, lb/steer	Total DDGS-based supplement and creep intake, lb/steer	DDG: BW gain
Preweaning	128	2.6[a]	335[b]	667[c]	1.99[d]
Backgrounding	35	1.8	60	38	0.66
Pasture	217	2.1	464	2021	4.38
Feedlot	62	3.5[e]	187	989[f]	5.3
Total Pasture & feedlot	279	2.8	651	3010	4.62
Total	441	2.4	1045	3713	3.54

[a]Average daily gains were 2.0, 3.2, and 2.6 for steers in the Minimal, Creep, and DDGS treatments (P=0.013)
[b]Average total gains were 263, 413, and 330 for steers in the Minimal, Creep, and DDGS treatments (P=0.013)
[c]Preweaning cow DDGS + creep feed intake was 112, 1026, and 863 for Min, Creep, and DDGS treatments and (P=0.0003)
[d]Preweaning cow DDGS + creep feed:gain was 0.42, 2.48, and 2.62 for Min, Creep, and DDGS treatments (P=0.0043)
[e]Average daily gains were 2.7, 5.0, and 2.7 for steers in the Minimal, Creep, and DDGS treatments (P=0.064)
[f]Total DDGS intake were 1157, 651, and 1159 for steers in the Minimal, Creep, and DDGS treatments (P=0.24)

Table 2. Carcass characteristics of steers finished in a pasture-based system with DDGS supplementation after being raised by different supplementation treatments pre-weaning.

	Minimal	Creep	DDGS	Average
N	7	8	8	
Live weight, lb	1259.6	1365.6	1362.5	1329.2
Carcass weight, lb	750	795	812	785.3
Choice quality grade, %	57	75	62.5	64.9
Yield Grade	2.0	2.4	2.3	2.2
Kidney, Pelvic and Heart fat, %	2.1	2.3	2.2	2.2
Ribeye Area, in^2	12.3	12.2	12.6	12.4
Marbling score	Slight[80]	Small[50]	Small[30]	Small[20]
Fat cover, in	0.32	0.42	0.39	0.38

Table 3. Mean mass and composition of forage in pastures stocked with steers fed DDGS.

Component	Seasonal mean	Significance
Forage mass, lb DM/ac	2520.6 [a]	0.041
Forage, lb DM/ 100 lb Steer	58.6	0.33
Sward Height, cm	13	0.55
% of DM		
CP	11.4	0.49
ADF	40.1	0.71
NDF	65.0	0.20
IVDMD	42.0	0.44

[a]Forage masses were 2842.1, 2592.4, and 2127.3 lb DM/acre for the Minimal, Creep, and DDGS treatments, respectively (P= 0.041)

Figure 1. Mean forage mass of pastures grazed by steers supplemented with DDGS.