Strategies of Supplementing Dried Distillers Grains to Yearling Steers on Smooth Bromegrass Pastures

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Summary

Steers supplemented with dried distillers grains with solubles (DDGS) daily on nonfertilized smooth bromegrass pastures gained 0.55 lb/day more than cattle on nonsupplemented treatments. Steers supplemented at 0.6% BW DDGS gained 2.59 lb/day compared to 2.36 lb/day for steers fed a similar total amount of DDGS at increasing levels over the growing season.

Introduction

Over the grazing season, in five previous years of research on smooth bromegrass pastures, forage quality and cattle ADG declined, but cattle ADG response to DDGS supplementation increased quadratically (*2011 Nebraska Beef Cattle Report*, p. 24). Therefore, feeding lower levels of DDGS, to meet steer MP requirements, early in the grazing season and increasing to greater levels later in the season should increase ADG of grazing steers. The objective of the current study was to determine effects of supplementing strategies of DDGS to yearling steers as the forage quality of smooth bromegrass declines over the grazing season.

Procedure

Seventy-five yearling steers (647 ± 13 lb) were used to evaluate dried distillers grains with solubles (DDGS) supplementation strategies on cattle ADG and pasture production. Steers were stratified by BW and assigned to five smooth bromegrass (SBG) pastures at the University of Nebraska–Lincoln Agriculture Research and Development Center. Three of the five SBG pastures were grazed in 2010 for the sixth consecutive year as part of a long-term study. In 2010, two brome pastures were added for increased replication and addition of the strategic supplementation treatment. Three treatments were applied within four SBG pastures (block) with three treatment paddocks (experimental unit) per pasture for a total of four replications per treatment. Treatments included were 1) brome paddocks fertilized in early spring with 80 lb N/acre stocked at 4 AUM/acre (FERT); 2) nonfertilized brome paddocks stocked at 4 AUM/acre supplemented with DDGS (DM) at 0.6% of BW daily (SUPP); 3) nonfertilized brome paddocks stocked at 2.76 AUM/acre (CONT) or 69% stocking rate of FERT and SUPP; and 4) a nonfertilized pasture with three replication paddocks stocked at 4 AUM/acre strategically supplemented with DDGS (DM) at incremental levels (STRAT). Incremental levels of DDGS were based on declining forage quality with smooth bromegrass maturation. At the start of the grazing season, steers on strategic supplementation received 2.0 lb/day DDGS (DM) to meet MP requirements; thereafter, supplement incrementally increased to 7.15 lbs/day/head (Table 1). Steers supplemented on SUPP treatment received 0.6 % BW supplement based on cycle BW taken throughout trial. The STRAT and SUPP treatments were designed to receive the same overall average amount of DDGS over the grazing season through adjustment of cycle 5 STRAT supplement to meet overall average of SUPP (Table 1).

Treatment paddocks were equally divided into six strips that were rotationally grazed. The grazing season was from April 20 through Sept. 14, 2010, divided into five cycles. Cycles 1 and 5 were 24 days in length and cycles 2, 3, and 4 were 36 days in length. Similar grazing pressure among treatment paddocks was maintained over the grazing season with the use of put-and-take yearling steers. Initial and final BW were taken on three consecutive days after a limit fed period. During the limit fed period, steers were fed at 2% BW for five days to reduce variation due to gut fill. Steers were implanted with Revalor®-G on Day 1 of the grazing season. Interim BW were measured early morning at the start of each cycle and pencil shrunk 4% to account for gut fill. Pasture quality was determined using ruminally fistulated animals to collect diet samples during each cycle at the mid-point of grazing rotations. Samples were analyzed for forage CP and IVDMD.

Cattle performance and diet samples were analyzed using the MIXED procedure of SAS (Version 9.2, SAS Inst., Inc., Cary, N.C.) in a randomized complete block design with block treated as a random effect. Model effects were treatment, cycle, and treatment by cycle interaction. Treatment paddock was the experimental unit.

Results

Ending BW and ADG were different among treatments ($P < 0.01$; Table 2). Steers supplemented with DDGS daily on nonfertilized smooth bromegrass

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Table 1. DDGS supplementation.

Cycle	SUPP (lb DM/head/day)	STRAT (lb DM/head/day)
1	3.88	2.0
2	4.24	3.5
3	4.82	5.0
4	5.42	6.5
5	5.77	7.15
Average over grazing season	4.83	4.83

pastures gained an average of 2.48 lb/day compared to the 1.93 lb/day of steers on the nonsupplemented treatments. At the end of the grazing season, the greater ADG of supplemented steers resulted in an 81 lb increase in ending BW over control and fertilized treatment steers. The increase in ADG of supplemented steers can be attributed to the UIP and energy provided by the DDGS (*2006 Nebraska Beef Cattle Report*, p. 27). Steers supplemented with DDGS at 0.6% BW daily gained 0.23 lb/day over steers supplemented strategically over the growing season. Steers in both SUPP and STRAT treatments received an average of 4.83 lb/day of DDGS (DM).

Average daily gains were measured and summarized for yearling steers on treatments supplemented with DDGS or nonsupplemented, grazing smooth bromegrass pastures for six consecutive years from 2005 through 2009 and year 2010 (Table 3). Average daily gains were greater for 2010 treatment steers; however, similar differences in ADG of steers on supplement at 0.6 % BW and nonsupplement treatments were measured with only a 0.03 lb and 0.05 lb ADG difference between cycles 1 and 2; and cycles 3, 4, and 5, respectively. Strategically supplemented steers performed better than nonsupplemented steers; however, STRAT gained less than steers on SUPP treatment for the 2010 grazing season.

Over the grazing season, the lower steer ADG measured in cycle 3, 4, and 5 correspond with the decline in forage digestibility ($P < 0.01$, Figure 1). IVDMD of pasture diet samples did not differ between treatments ($P = 0.19$). In cycle 1, CP of pasture diet samples was highest for FERT and SUPP pastures at 21.3 and 19.7 %, respectively, when compared to CONT at 14.8 % (Figure 1). There was a CP cycle by treatment interaction ($P < 0.01$); at cycle 2, all treatments had similar CP amounts at 15.2 %. As IVDMD and ADG declined over the growing season, cattle ADG response to DDGS supplementation increased (*2011 Nebraska Beef Cattle Report*, p. 24). As in previous research, forage quality and cattle ADG in the 2010 grazing season declined with an increased ADG response to DDGS supplementation. The strategic supplementation of increasing DDGS over the grazing season did not perform better than DDGS supplementation at 0.6 % BW.

Table 2. 2010 pasture performance of steers grazing smooth bromegrass.

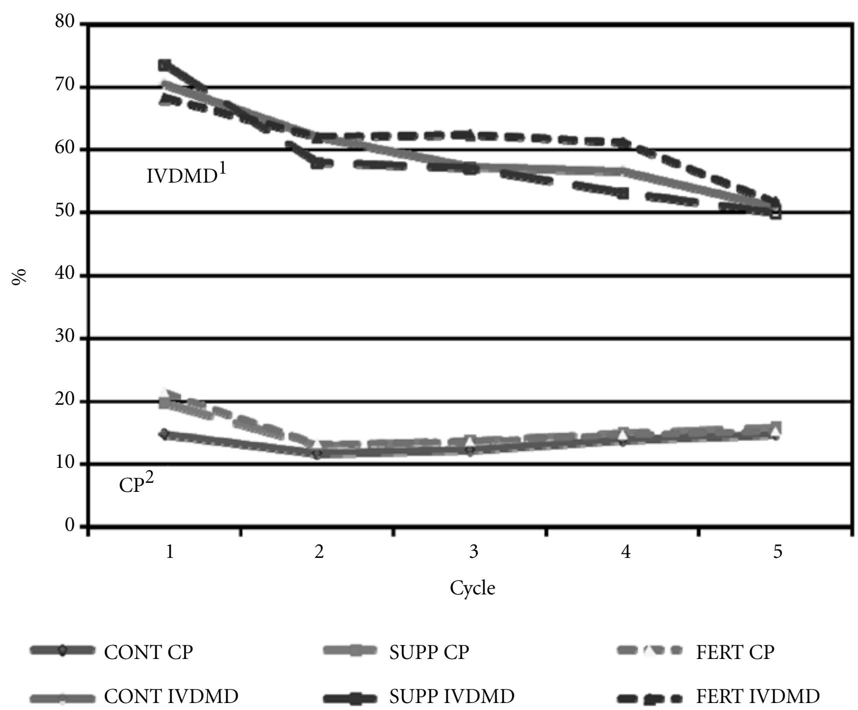
	CONT	FERT	SUPP	STRAT	SEM	*P*-value
Days	147	147	147	147		
Initial BW, lb	649	645	648	640	2.7	0.14
Ending BW, lb	959[a]	933[a]	1048[c]	1006[b]	12.3	< 0.01
ADG, lb/day	2.00[a]	1.86[a]	2.59[c]	2.36[b]	0.077	< 0.01

[a,b,c]Means in a row without a common superscript differ ($P < 0.05$).

Table 3. Nonsupplemented vs. supplement strategies cattle ADG.

	Cycle 1 and 2		Cycle 3, 4, and 5	
	ADG, lb	Difference[3]	ADG, lb	Difference[3]
Nonsupplemented[1]	2.09	0.40	1.17	0.85
Supplemented,[1] 0.6% BW	2.49		2.02	
Nonsupplemented[2]	2.60	0.37	1.65	0.90
Supplemented,[2] 0.6% BW	2.97		2.55	
Supplemented,[2] strategy	2.71	0.11	2.33	0.68

[1]2005-2009 cattle ADG.
[2]2010 cattle ADG.
[3]Difference between nonsupplemented and supplemented cattle ADG.



[1]Trt*Cycle $P = 0.17$, Trt $P = 0.19$, Cycle $P < 0.01$, Quad P = 0.02, Quart $P < 0.01$[a]
[2]Trt*Cycle $P < 0.01$, Trt $P < 0.01$, Cycle $P < 0.01$

Figure 1. *In vitro* dry matter digestibility (IVDMD) and crude protein (CP) content of 2010 SBG pastures over grazing season

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