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Strategic Supplementation of Dried Distillers Grains Plus Solubles to Yearling Steers Grazing Smooth Bromegrass

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Summary

Data from seven consecutive years were summarized from 2005 through 2011 to evaluate dried distillers grains plus solubles (DDGS) supplementation strategies on yearling performance when grazing smooth bromegrass pastures. Steers supplemented daily with DDGS on nonfertilized smooth bromegrass pastures had ADG 0.59 lb/day greater than unsupplemented steers. Steers strategically supplemented with DDGS gained 2.47 lb/day while steers supplemented daily at 0.6% of BW gained 2.68 lb/day, both greater than unsupplemented steers at 1.99 lb/day. Strategic supplementation with increasing levels of DDGS as forage digestibility declined did not improve cattle performance over steers supplemented at 0.6% of BW with DDGS daily.

Introduction

Supplementing dried distillers grains plus solubles (DDGS) to grazing cattle throughout the grazing season (April through September) has shown increased ADG and BW gain with decreased forage intake (*2005 Nebraska Beef Cattle Report,* p. 18; *2007 Nebraska Beef Cattle Report,* p. 10). As forage quality of smooth bromegrass declines with maturity, ADG response to DDGS supplementation increased quadratically (*2011 Nebraska Beef Cattle Report,* p. 24). We hypothesized overall ADG would increase for steers strategically supplemented with lower levels of DDGS early in the grazing season followed by greater levels of DDGS with the declining forage quality through the remainder of the season. The objective was to determine the effect of DDGS supplementation strategies of yearling steers grazing smooth bromegrass pastures in eastern Nebraska.

Procedure

One hundred and fifty yearling crossbred steers (BW = 659 ± 23 lb) were used to evaluate strategies of supplementing DDGS to cattle grazing smooth bromegrass during the 2010 and 2011 grazing seasons at the University of Nebraska–Lincoln Agriculture Research and Development Center (ARDC) near Mead, Neb. The four treatments of grazing and supplementation strategies tested were: 1) paddocks fertilized in the spring with 80 lb N/acre and stocked at 4 AUM/acre (FERT); 2) nonfertilized paddocks with steers supplemented at 0.6% of BW daily with DDGS (DM) and stocked at 4 AUM/acre (SUPP); 3) nonfertilized paddocks with steers strategically supplemented daily with DDGS (DM) at increasing amounts over the grazing season and stocked at 4 AUM/acre (STRAT); and 4) nonfertilized control paddocks with no supplementation and stocked at 2.8 AUM/acre, or 69% the rate of the other three treatments (CONT).

Annually, 75 yearling steers were stratified by BW and allocated to treatment paddocks. Pastures were grazed starting in late April for 147 days and 168 days in 2010 and 2011, respectively. Treatment paddocks were divided equally into six strips in which treatment steers grazed rotationally in each of five grazing cycles. Steers grazed 24 day during cycle 1. Cycles 2, 3, and 4 were 36 days in length. Cycle 5 was 24 days and 36 days in 2010 and 2011, respectively. Similar grazing pressures were maintained with the addition of "put-and-take" steers. Initial and ending BW were collected on three consecutive days following a 5-day limit feeding period. During the limit feeding period, steers were fed a 50:50 blend of alfalfa hay and *SweetBran*® at 2% BW to reduce variation in gut fill. In 2010 and 2011, steers were implanted with Revalor®-G on day 1. Interim BW were collected on the morning of the first day of each of the five cycles and shrunk 4%.

Steers supplemented at 0.6% BW received DDGS supplement (CP 28.9%, fat 11.9%, and NDF 31.7%) amounts based on BW collected over the grazing period. Strategically supplemented steers received 2.0 lb/day DDGS (DM) during cycle 1 to meet MP requirements and increased 1.5 lb/day (DM) during cycles 2, 3, and 4. Cycle 5 supplementation was adjusted so STRAT steers received an equal amount of DDGS lb/steer (DM) over the entire grazing season as SUPP steers (Table 1).Using ruminally fis-

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Table 1. DDGS treatment supplementation amounts (lb of DM/steer) for 2010 and 2011.

	2010		2011	
Cycle	SUPP[1]	STRAT[2]	SUPP[1]	STRAT[2]
1	3.88	2.00	4.07	2.00
2	4.24	3.50	4.48	3.50
3	4.82	5.00	5.08	5.00
4	5.42	6.50	5.17	6.50
5	5.77	7.15	5.65	6.77
Average	**4.83**	**4.83**	**4.95**	**4.95**

[1]SUPP – DDGS at 0.6% of BW supplementation.
[2]STRAT – Strategic DDGS supplementation.

tulated steers, diet samples were collected and analyzed for IVDMD for all treatments to estimate diet quality throughout the grazing season.

There were four replications of the FERT, SUPP, and CONT treatments. Three of these replications were established in 2005 with treatments applied to the same smooth bromegrass pastures throughout 2011. There were three replications of STRAT applied in 2010 and 2011. Treatment paddocks (with six strips) were the experimental unit and smooth bromegrass pastures were the block. Cattle performance was analyzed using the MIXED procedure of SAS.

Table 2. Performance of steers grazing smooth bromegrass during 2010 and 2011.

	Treatments[1]					
	CONT	FERT	SUPP	STRAT	SEM	*P* –Value
Days	158	158	158	158		
Initial BW, lb	663	660	660	662	16	0.71
Ending BW, lb	984[b]	964[b]	1083[a]	1051[a]	37	< 0.01
ADG lb/day	2.04[b]	1.93[b]	2.68[a]	2.47[a]	0.07	< 0.01

[a,b]Means in a row without a common superscript differ ($P < 0.05$).
[1]Treatments consisted of nonfertilized paddocks (CONT), fertilized with 80 lb N/acre (FERT), nonfertilized paddocks grazed by steers supplemented daily at 0.6% of BW DDGS (SUPP) or strategic DDGS supplementation (STRAT).

Table 3. Supplementation treatment and seven-year treatment comparison.

		Period 1[4]		Period 2[4]	
Years[1]	Treatment[2]	ADG, lb/day	Difference[3]	ADG, lb/day	Difference[3]
2005-2009	Unsupplemented	2.09	0.40	1.17	0.85
	SUPP	2.49		2.02	
2010-2011	UnSupplemented	2.55	0.53	1.64	0.81
	SUPP	3.08		2.45	
	STRAT	2.79	0.24	2.28	0.64

[1]Cattle performance treatment avg during 2005-2009 and 2010-2011 smooth bromegrass grazing seasons.
[2]Treatments consisted of unsupplemented = avg of the CONT and FERT, SUPP – DDGS supplemented at 0.6% of BW, STRAT – strategic DDGS supplementation within respective year.
[3]ADG difference between unsupplemented and supplementation treatments (SUPP or STRAT) during respective years.
[4]Period 1 – Cycle 1 and 2 (approximately late-April through mid-June); Period 2 – Cycle 3, 4, and 5 (approximately mid-June through late September).

Results

Ending BW and ADG were greatest for steers supplemented daily ($P < 0.01$, Table 2) with no statistical difference between supplementation strategies. Supplementation at 0.6% BW and strategic supplementation resulted in gains of 2.68 and 2.47 lb/day, respectively, compared to the unsupplemented steers gaining 1.99 lb/day. The increased ADG from DDGS supplementation resulted in a 111 and 77 lb (SUPP and STRAT, respectively) increased ending BW compared to unsupplemented steers.

Average daily gains were summarized for seven consecutive years from 2005 through 2011 (Table 3). Grazing cycles were combined into two periods to correspond with the changes that occur in IVDMD of smooth bromegrass throughout the growing season. Over the grazing season, diet IVDMD and cattle ADG declined with the lower gains corresponding to lower IVDMD (*2010 Nebraska Beef Cattle Report*, p. 38). Diet IVDMD was greatest during period 1 (cycles 1 and 2) at 66.9% and declined to 51.4% in period 2 (cycles 3, 4, and 5). Therefore, ADG of unsupplemented vs. supplemented treatments were compared during period 1 and period 2 across years. Overall, ADG for steers grazing in 2010 and 2011 were greater than ADG for steers grazing during 2005 through 2009. The increased ADG is attributed to the implants (Revalor-G) and adequate moisture for grass growth. In period 1, SUPP response was 0.40 lb/day for 2005 through 2009 and 0.53 lb/day for 2010 and 2011 more than ADG for steers on unsupplemented treatments. In period 2, the decline in IVDMD resulted in an increased response to supplementation of 0.85 lb/day in 2005 through 2009 and 0.81 lb/day in 2010 and 2011. The increased response to DDGS with declining IVDMD from 2005 through 2009 suggested supplementation at key points during the grazing season would increase ADG (*2011 Nebraska Beef Cattle Report*, p. 24). In period 1, STRAT resulted in 0.24 lb/day gain response compared to the 0.53 lb/day gain increase of SUPP. The lower gain response to DDGS in period 1 was expected given that STRAT received approximately 72 and 85 lb DDGS/steer less than SUPP in 2010 and 2011, respectively. During period 2, the gain response to DDGS for STRAT cattle was 0.64 lb/day, less than the 0.81 lb/day gain increase of SUPP. The ADG response for STRAT in period 2 was expected to be greater than that of SUPP given the cattle received approximately 66 and 85 lb/steer more DDGS in 2010 and 2011, respectively.

Overall, when compared to supplementing cattle with DDGS at a constant 0.6% of BW daily throughout the grazing season, there was no advantage in cattle performance by strategically supplementing DDGS at increased levels to steers grazing smooth bromegrass during periods of low forage digestibility. However, the combination of adequate moisture for quality forage growth, with the use of implants and supplementing DDGS to cattle grazing smooth bromegrass did markedly improve ADG.

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