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CASE STUDY: Dried Distillers Grains as Creep Feed for Yearling Beef Cattle Grazing Sandhill Range[1]

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ABSTRACT

Seventy-nine crossbred steers and heifers born in June or August were stratified by weight, calving group, and sex and assigned to treatment or control. Yearlings in the treatment group (TRT; n = 40) grazed native summer Sandhill range and had access to ad libitum dried distillers grains (DDG) pellet in a creep feeder for 54 d of a 63-d grazing period. Control (CON; n = 39) yearlings grazed in an adjacent pasture without DDG. Immediately after the grazing period, yearlings were placed in a feedlot and fed to a similar finish end point. Individual forage and DDG intake estimates and animal ADG and carcass characteristics were used to determine the value of DDG to TRT yearlings at the end of the grazing period and at harvest. Intake of DDG averaged 4.99 kg/d DM. Summer ADG was greater (P < 0.01) for TRT (1.27 kg/d) than CON (0.88 kg/d). Yearlings previously allowed access to DDG gained more (P < 0.01) during the first 30 d in the feedlot (1.32 vs. 1.10 kg/d for TRT and CON, respectively). Yearlings allowed access to DDG were harvested 14 d before CON (138 d on feed). Final weight, feedlot ADG, and carcass characteristics were similar between TRT and CON. There was a tendency (P = 0.15) for TRT cattle to have a higher percentage grading choice, (67 vs. 51% for TRT and CON, respectively). The value of DDG to yearlings grazing Sandhill range was greater than the estimated cost at both the grazing and harvest endpoints.

Key words: beef cattle, distillers grains, grazing, yearlings

INTRODUCTION

Costs of grazed forage continue to rise in many areas throughout the United States, including Nebraska. At the same time, economic trends and environmental incentives favoring the production of ethanol are likely to continue. Dried distillers grains (**DDG**), a coproduct of the ethanol industry that is high in energy and protein and low in starch, is typically priced relative to the price of corn. Because of unique feed characteristics, DDG may be an economical replacement for a portion of the grazed forage in cow-calf or backgrounding operations. Previous research has demonstrated improved performance of yearling heifers grazing smooth brome pastures (MacDonald and Klopfenstein, 2004) and yearling steers grazing Sandhill range (Morris et al., 2006) when individually supplemented differing levels of distillers grains. Objectives of this study were to determine intake and ADG of yearling cattle offered DDG ad libitum while grazing Sandhill range. Subsequent feedlot and carcass characteristics were used to make an economic evaluation of utilizing DDG as a free choice supplement in yearling cattle.

MATERIALS AND METHODS

Experimental Procedure

Fifty-three crossbred (5/8 Red Angus, 3/8 Continental) June-born steers and 26 crossbred (5/8 Red Angus, 3/8 Continental) August-born steers and heifers were stratified by weight, calving group, and sex and assigned to 1 of 2 treatments. Yearlings in the treatment group (TRT; n = 40) grazed native summer Sandhill range and had access to ad libitum DDG pellet in a creep feeder for 54 d of a 63-d grazing period (June 2 to August 2, 2005). The analysis for the pellet was 88% DM, 28% CP, and 11.2% ether extract (DM basis). Control (CON; n = 39) yearlings grazed in an adjacent pasture without DDG. Two consecutive weights were taken before and at the end of the grazing period prior to starting on a finishing diet. Yearlings were placed in a feedlot at the University of Nebraska West Central Research and Extension Center, North Platte, where CON and TRT groups were fed separately in 2 pens. Cattle were fed step-up diets for 21 d, and

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Table 1. Finishing diet, ingredient composition, and total amount fed (DM) per animal previously allowed access to ad libitum dried distillers grains (TRT) or not (CON)

Item	DM (%)	TRT (kg)	CON (kg)
Corn	48	1,355	1,511
Corn gluten feed	40	1,182	1,307
Alfalfa	7	284	295
Supplement	5	148	163
Corn	58.25	—	—
Limestone	29.60	—	—
Salt	5.60	—	—
Ammonium chloride	4.65	—	—
Trace mineral	0.930	—	—
Rumensin-80	0.349	—	—
Tylan-40	0.250	—	—
Thiamine	0.238	—	—
Vitamin premix[1]	0.214	—	—

[1]Contained 30,000 IU of vitamin A, 6,000 IU of vitamin D, and 7.5 IU of vitamin E/g of permix.

Table 2. Carcass grid price, using $153.08/45.36 kg as base price[1]

Item	Adjustment
Prime-choice price spread	+17.50
Choice-select price spread	−9.95
Yield grade 1	+6.50
Yield grade 2	+2.50
Heavy carcasses[2] (>1,000 lb)	−15.43
Heifer	−0.07

[1]Adjustments from choice yield grade 3 steer.

[2]All yield grades with heavy carcasses were priced $137.65.

then were switched to the final finishing diet (Table 1). Steers were given a single implant (Revalor S;Intervet, Millsboro, DE) 30 d after arrival in the feedlot; heifers were given Revalor H (Intervet) at the same time. Cattle were weighed at implant time, approximately 50 d after implant, and at harvest. Harvest date was determined by weight upon entry into feedlot, past cattle performance of similar genetics, and intermediate BW gain to optimize marketing grid value. Cattle in both groups were finished to a similar final BW and 12th rib fat thickness. Final BW were calculated using hot carcass weight adjusted to a common dressing percent (63%). This adjusted final weight also was used to calculate ADG.

Cattle were harvested at a commercial packing plant and carcass characteristics were determined following a 24-h chill. Carcass measurements included hot carcass weight, marbling score, kidney, pelvic, and heart fat, 12th rib fat thickness, and ribeye area. Data were analyzed using PROC GLM of SAS (1990). The final model included treatment, birth month, and gender. The treatment × birth month × gender interaction was tested for but was not significant for any variable tested; therefore, it was removed from the model.

Economic Analysis

The value of DDG supplementation was calculated at 2 stages of production, when the cattle were taken off grass in early August and at harvest in December. For the August analysis, cattle were valued using Cattle-Fax (2005) prices, which ranged from $108.97/45.36 kg for 340 kg steers to $135.70/45.36 kg for 204 kg steers. Price differences for heifers ranged from −$9.00/45.36 kg for 340 kg heifers to −$12.50/45.36 kg for 204 kg heifers. Actual carcass prices received for the TRT group were used in the harvest analysis (Table 2). Weighted averages were used to calculate the group revenues used in the analysis. Grazing costs were calculated using a rate of $28.30 per animal unit month (Johnson and Raymond, 2005). An animal unit month was defined as 308 kg of DM (Waller et al., 1986). Forage intake for nonsupplemented animals was estimated using the calf equation from the NRC (1996). Individual DDG intakes were estimated using the following formula, which was derived using the NRC (1996):

$$\text{individual DDG} = \left(\frac{\text{individual calf weight}}{\text{average calf weight}}\right)^{0.75} \times \text{average DDG}$$

Estimates of forage savings by TRT animals were calculated by reducing the amount of forage DMI by 0.5 kg/kg of estimated DDG consumed based on previous estimates of forage replacement by DDG (Morris et al., 2005). It should be noted the maximum amount of DDG supplementation by Morris et al. (2005) was 2.7 kg/d per head, approximately one-half the DDG consumed in the current study.

Individual feed costs during the finishing period were also estimated using the following formula, derived from NRC (1996).

$$\text{individual feed cost} = \left(\frac{\text{individual calf weight}}{\text{average calf weight}}\right)^{0.75} \times \text{average feed cost}$$

The value of DDG for feeder cattle was determined by adding the value of the replaced forage and the difference between average revenues of TRT and CON groups. The value of DDG for feedlot cattle also accounted

Table 3. Effect of ad libitum access to dried distillers grains while grazing pasture (TRT) and season of birth on grazing BW change and subsequent feedlot gain and carcass characteristics

	TRT	Control	*P*-value	June steer	August steer	August heifer	*P*-value
n	40	39		53	15	11	
Initial BW (kg)	294	292	0.71	310[a]	291[b]	278[b]	<0.01
Final BW (kg)	374[a]	347[b]	<0.01	385[a]	362[b]	335[c]	<0.01
Grazing ADG (kg)	1.27[a]	0.88[b]	<0.01	1.19[a]	1.13[a]	0.91[b]	<0.01
1st 30-d ADG (kg)	1.32[a]	1.10[b]	<0.01	1.34	1.12	1.17	0.07
Final weight (kg)	565	564	0.97	614[a]	570[b]	510[c]	<0.01
Feedlot ADG (kg)	1.54	1.56	0.67	1.75[a]	1.58[b]	1.28[c]	<0.01
Hot carcass wt. (kg)	356	355	0.97	386[a]	359[b]	321[c]	<0.01
Marbling score[1]	518	503	0.43	506	476	551	0.07
Choice (%)	67	51	0.15	57	39	81	0.10
Back fat (mm)	8.89	8.64	0.73	8.64	7.87	9.65	0.21
Ribeye area (cm^2)	93.49	95.94	0.30	97.68	95.10	91.29	0.16
Yield grade	2.21	2.07	0.29	2.24	2.07	2.11	0.54

[a–c]Means without a common superscript differ ($P < 0.01$).

[1]Marbling score: 400–499 = Slight (Select), 500–599 = small (Low Choice).

for differences in finishing costs between the 2 groups to a similar 12th rib fat thickness end point.

RESULTS AND DISCUSSION

Average beginning BW was 293 kg and did not differ between treatments. Intake of DDG averaged 4.99 kg/d (DM basis). Summer ADG was greater ($P < 0.01$) for TRT (1.27 kg/d) than CON (0.88 kg/d) as was BW at the end of the grazing period (374 and 347 kg for TRT and CON, respectively). June-born steers were heavier ($P < 0.01$) at the beginning and end of the grazing period than either August-born steers or heifers (Table 3). June-born steers also had greater ADG during the grazing period than August-born heifers. August-born steers gained more than August-born heifers and weighed more at the end of the grazing period. Yearlings previously allowed access to DDG gained more ($P < 0.01$) during the first 30 d in the feedlot (1.32 vs. 1.10 kg/d for TRT and CON, respectively). Yearlings with previous access to DDG were harvested 14 d before the CON group at 124 vs. 138 d on feed, respectively. Total feedstuff amounts for TRT and CON are presented in Table 1. Final weight, feedlot ADG, and carcass characteristics were similar between TRT and CON (Table 3). There was a tendency ($P = 0.15$) for TRT cattle to have a higher percentage grading choice (67 vs. 51% for TRT and CON, respectively), even though TRT cattle were on a finishing diet for a shorter period. Allowing suckling calves access to creep feed has been shown to improve subsequent quality grade (Deutscher and Slyter, 1978; Faulkner et al., 1994). Limited data exists on effects of allowing yearling cattle access to creep feed during the grazing period prior to a feedlot finishing diet.

Morris et al. (2005) fed yearling steers different levels of DDG while grazing similar range. Control steers gained 0.77 kg/d, with incremental increases in gain (0.07 kg/kg DDG) up to a supplementation rate of 2.7 kg DDG. In the Morris et al. (2005) study, the steers were harvested on the same date with no differences in feedlot performance or carcass characteristics, unlike the animals in this study. Final weight, feedlot ADG, and hot carcass weight was greatest ($P < 0.01$) for June steers followed by August steers and August heifers (Table 3). August-born heifers tended ($P = 0.10$) to have a higher percentage choice than steers born in June or August (Table 3). It was a challenge to feed cattle differing in age and sex together to an optimum end point for the entire group. In evaluating backfat and yield grade data, it appears both groups could have been fed longer. However, carcass weights were reaching upper limits in June steer calves, as there was a June steer in each group with a carcass weight in excess of 454 kg. Total feed and yardage costs were $16.76/hd greater for CON to reach a similar carcass weight and 12th rib fat thickness end point.

Economic Analysis

The overall value of DDG for the TRT cattle through the grazing period was $161.88/metric ton and was $153.24/metric ton for animals retained to harvest. This indicates DDG had a value in excess of its estimated cost of $137.80/metric ton. Using these forage costs and cattle prices, DDG was an economically viable feed source for yearling cattle grazing Sandhill range.

It was estimated the TRT yearlings consumed 30% less forage than the CON yearlings. Assuming this reduced forage consumption, the area of pasture required to support a single CON yearling would support approximately 1.4 TRT yearlings. If pasture were a limiting resource, the carrying capacity of a given area may be extended with ad libitum use of DDG.

IMPLICATIONS

As ethanol production expands in the Midwest, additional distillers grains will be available to beef cattle producers. Feedlots are utilizing much of this product at the present time; however, feeding DDG to yearling cattle grazing summer Sandhill range may be profitable depending on pasture and DDG prices and feeder and fed cattle market prices.

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