Effects of Supplementing Dried Distillers Grains to Steers Grazing Summer Sandhill Range

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Summary

Yearling steers continuously grazed summer native Sandhill range, with supplementation of varying levels of dried distillers grains with solubles (DDGS): 0.26, 0.51, 0.77, and 1.03% BW. Forage intakes were predicted using an equation based on TDN. Forage intakes linearly decreased as level of DDGS increased. Average daily gain linearly increased as level of DDGS increased. Steers were finished and slaughtered. No significant differences were found in feedlot performance or carcass data. Economical analyses were conducted and suggest supplementing DDGS is profitable. Increased gain from supplementing yearling steers DDGS while grazing summer range did not affect feedlot performance and can be economical.

Introduction

Increased production of ethanol in Nebraska is increasing the availability of distillers by-products for producers. Distillers grains plus solubles (DGS), is an excellent supplement for cattle in grazing situations, due to its high energy, protein, and phosphorus levels. In grazing situations or for producers not in close proximity to an ethanol plant, dried DGS (DDGS) are easier to transport, store, and handle than the wet product. The cost of grazing forages is increasing, while the cost of DDGS is decreasing. This increased cost of grazing may encourage producers to look for a substitution or supplemental source for their forages, in which DDGS may be a good fit. The objectives of this trial were to predict forage intake, determine rate of replacement of forage, and determine effects on animal performance by increasing supplemental DDGS, as well as evaluate economics of supplementing DDGS.

Procedure

Grazing

Fifty-six yearling steers (686 ± 54 lb) were stratified by weight and randomly assigned to one of five treatments in a completely randomized design. Treatments were supplementing varying levels of DDGS to steers continuously grazing native summer Sandhill range. Trial duration was 88 days, divided into three periods. Weights were obtained at the beginning and end of the trial. Levels of DDGS were on a percent BW basis. To determine DDGS levels the highest level was set at 7.5 lbs (DM), with the intention steers would consume 7.5 lbs (DM) during days 31-60. The four remaining lower levels were determined as a percent, 0, 25, 50, and 75%, of the highest level. Treatment levels were 0, 0.26, 0.51, 0.77 and 1.03 %BW. Weights were projected at the beginning of each period, and DDGS offered adjusted to account for weight gain. Steers continuously grazed except during supplementation six days/week. Steers were gathered in the morning (six days/week) and individually supplemented, in feeding crates, their respective amount of DDGS. Distillers grains offered and any refusals were weighed out daily to determine DDGS intake.

Feedlot and Carcass

All steers were placed into a feedlot at West Central Research and Extension Center at North Platte, where they were fed for 113 days. Steers were placed into two pens per treatment, for a step up period of 21 days and a period of 37 days on finisher to estimate individual intakes. All animals were combined into one pen for the remaining 55 days. Three animals were removed from the feedlot study due to death or sickness. The animals were slaughtered and carcass data were collected.

Prediction of Individual Intakes

Three esophageally fistulated cows were used to collect monthly diet samples to determine TDN of the pasture. To predict forage intake, total TDN intake was calculated using an equation developed by Winchester, based on ADG and BW, $TDN = 0.0553 BW^{2/3}(1 + 0.805GAIN)$. The predicted total TDN intake was adjusted using a regression equation obtained from a previous growing trial (*2005 Nebraska Beef Report*, pp 18-20) where TDN intake, BW, and ADG were known. This regression equation was acquired by predicting total TDN intake using Winchester's equation and regressing it against known total TDN intake; without nonsupplemented cattle. The resulting equation is as follows, where *adjusted TDN intake = (known TDN intake - 2.069) ÷ 0.936* (R^2 = 0.754). The adjusted total TDN intake establishes the total TDN consumed by the animal. Total DDGS TDN intake was subtracted from the adjusted total TDN intake. The remaining TDN value was divided by the known diet TDN (57.22% TDN), resulting in forage DMI.

Economical Analysis

Two economical analyses were conducted. The first analysis, estimated the added value of supplementing DDGS to animals on pasture, accounting for value in both added gain and reduced forage intake. The additional gain was valued by determining the income from selling the
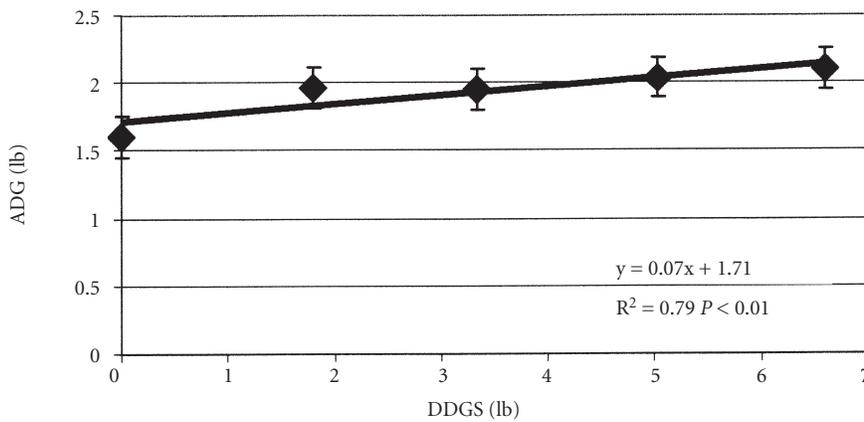
Figure 1. Effect of supplemental dried distillers grains on average daily gain.
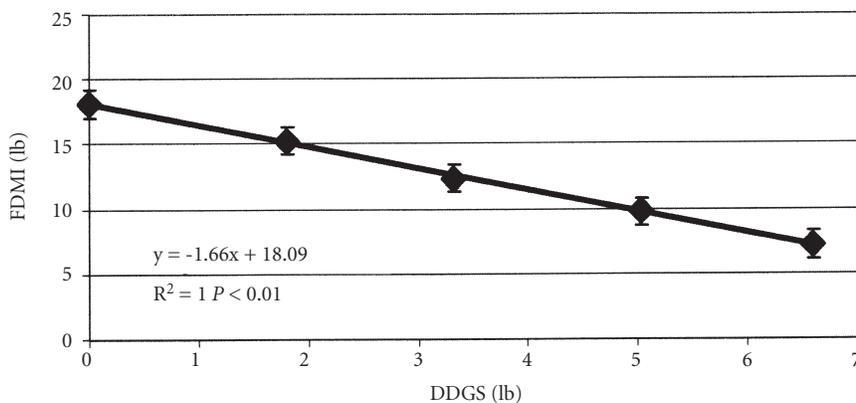

Figure 2. Effect of supplemental dried distillers grains on predicted forage dry matter intake.

Table 1. Feedlot performance; treatment applied during grazing.

| | Treatment (%BW) | | | | | | |
	0	0.26	0.51	0.77	1.03	SE	P-value
Avg DDGS intake, lb/day (DM)	0	1.80	3.33	5.03	6.60	0.19	
Initial BW, lb	836	867	872	875	876	31.96	0.64
Final BW, lb	1265	1314	1305	1284	1306	45.50	0.79
DMI, lb	23	23	23	23	22	0.46	0.12
ADG, lb	3.79	3.95	3.83	3.62	3.80	0.19	0.52
F:G	6.20	5.99	6.00	6.51	5.95	0.33	0.42

based off 10-year averages for corn and alfalfa, $2.27/bushel and $62.50/ton (as-is) respectively, wet corn gluten feed was priced at the cost of corn. Handling costs for all ingredients were accounted for in the analysis. Yardage was set at $0.30/day, and interest at 9%. Break even prices were calculated on $/cwt basis.

Statistical Analysis

All data were analyzed using the mixed procedure in SAS.

Results

Summer and Feedlot Performance

Summer ADG linearly increased ($P < 0.01$) as level of DDGS increased (Figure 1). Controls gained 1.71 lb per day with the rate of increased gain at 0.07 lb per lb of DDGS. Predicted forage DMI decreased linearly ($P < 0.01$) as level of DDGS increased (Figure 2). Forage intake for control steers was 18.09 lb per day, with the rate of decline in forage intake at 1.66 lb per pound of DDGS. These results suggest that supplementing DDGS replaces forage while increasing animal performance.

Feedlot ADG, DMI, and F:G (Table 1) were not significantly different. In addition, no significant differences were found in any carcass data collected. These results suggest additional gain attained from DDGS supplementation during the summer does not affect cattle performance in the feedlot or carcass traits.

Economical Analyses

Supplementing DDGS to cattle in grazing situations appears to be profitable through increased selling weight and decreased forage costs. Table 2 shows the value of supplementing all levels of DDGS. Total DDGS value averaged over all levels of supplementation was $163.51. The systems approach of evaluating the economics of supplementing DDGS during the summer versus through the feedlot (Table 3) suggests that if

additional weight at the end of the grazing period. The selling price was estimated using the following regression equation, *y = -0.0498x + 136.15* where y = price paid and x = animal weight (lb). This equation was developed using the five year average of feeder calf prices for September, and accounts for lower prices at heavier weights. The forage replaced by DDGS was valued at the 2004 grazing price

(animal unit month) in Nebraska.

The second analysis evaluated the profitability of selling the animals after the summer grazing period versus the feedlot period. The purchase price was based off of the five-year average for feeder calf prices at 700 lb during April ($98.44/cwt). Price of DDGS was based on $110/ton (as-is) with labor and delivery costs accounted for. Feedlot diet costs were

cattle were sold off pasture, lowest breakeven would be at the highest level of supplementation (1.03%BW) at $90.03/cwt. In contrast if the cattle were retained through the feedlot, breakeven costs would decrease, with lowest breakeven at the third level (0.51%BW) of supplementation at $78.62/cwt. These results suggest supplementing DDGS is profitable for either selling cattle off grass or retaining ownership through the feedlot.

In conclusion, DDGS appear to be a viable supplement to cattle in grazing situations with increased animal performance and decreased forage intake, with no adverse effects in feedlot performance or carcass traits. Economical analysis evaluating added value of DDGS, suggest supplementing DDGS is economical in grazing situations. Evaluation of economics from a systems standpoint, suggest supplementation of DDGS is economically advantageous during both the grazing and feedlot periods.

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Table 2. Value of dried distillers grains and solubles (DDGS) due to improved animal performance (IAP) and reduced forage intake (RFI).

	Treatment (% BW)				
	0	0.26	0.51	0.77	1.03
Supplemental DDGS, avg lb per day (DM)	0	1.80	3.33	5.03	6.60
Beginning wt, lb[a]	689	687	688	682	683
End wt, lb[b]	832	840	850	853	863
Sale Price, $ per 100 lbs[c]	94.70	94.30	93.84	93.65	93.15
Revenue, $[d]	788.22	792.48	797.29	799.23	804.28
DDGS value from IAP, $ per ton[e]	—	56.49	64.97	52.12	58.02
DDGS value from RFI, $ per ton[f]	—	105.61	105.61	105.61	105.61
Total DDGS value, $ per ton[g]	—	162.09	170.58	157.73	163.63

[a]Average start weight for each treatment.
[b]Expected weight after 84 days based on the equation $y = 0.07x + 1.71$ where y = ADG and x = DDGS intake.
[c]Sale price per 100 lb determined from the equation $y = -0.0498x + 136.15$ where y = sale price and x = sale weight (lbs).
[d]Revenue determined by multiplying end weight and sale price/100.
[e]DDGS value (DM) due to improved animal performance. Calculated from additional revenue over 0 DDGS/ level/day (84).
[f]DDGS value (DM) due to reduced forage intake assuming a forage cost of $21.65 per animal unit month.
[g]Total DDGS Value (DM) from IAP + RFI.

Table 3. Economic evaluation using systems approach calculating breakeven costs for selling cattle after supplementation of distillers grains off grass or after retaining ownership through the feedlot.

	Treatment (% BW)				
	0	0.26	0.51	0.77	1.03
Avg DDGS intake, lb/d (DM)	0	1.80	3.33	5.03	6.60
Breakeven selling off grass[a]	95.26	91.61	91.11	90.05	90.03
Breakeven selling after feedlot[b]	81.53	78.81	78.62	80.12	79.81

[a]Selling price can be calculated using the equation used in Table 2 to determine selling price.
[b]Selling price can be calculated using the 5-year average for fat cattle in December at $78.26/cwt live weight basis.