Consumption and Performance by Beef Heifers Provided Dried Distillers Grains in a Self-Fed Supplement Containing Either 10 or 16% Salt While Grazing Flint Hills Native Grass

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Introduction

Optimizing cattle performance and maintaining pasture health are important considerations when striving to maximize profitability and sustainability on a Flint Hills pasture yearling grazing operation. The two growing seasons prior to initiation of this study were droughty and stressful to pastures. This situation provided an opportunity to evaluate the value of dried distillers grains with solubles (DDGS) as a self-fed supplement to ensure that nutritional resources were adequate for a 78-day grazing period. Grazing density was increased from 200 to either 225 or 250 lb of beef while simultaneously providing salt-limited DDGS supplements containing 10 and 16% salt, respectively.

Experimental Procedures

One 78-day grazing study was conducted at the Kansas State University Beef Stocker Unit starting in May 2013 to determine the consumption and resulting growth from supplemental DDGS when provided at two levels of salt addition. All heifers used in this study (n = 279) were previously involved in a receiving study that focused on mass medication programs at arrival. Off-test weights collected at the conclusion of the receiving study were used to randomly assign each animal to grazing treatments. Heifers were assigned to three grazing treatments with four pasture replicates per treatment. All calves were tagged, dewormed with LongRange (Merial Limited, Duluth, GA) for control of internal and external parasites, and sorted to their pre-assigned paddock groups.

The typical stocking rate is 250 lb of beef per acre, but this study employed lower stocking rates to account for drought conditions and the addition of DDGS. The control (CONT) treatment was stocked conservatively at 200 lb of beef per acre, whereas the HIGH and LOW treatments were more heavily stocked (225 and 250 lb of beef per acre, respectively).

To accommodate the heavier stocking rates for the HIGH and LOW treatments, the daily targeted DDGS consumption allowances were set at 0.6% and 1.0% of body weight (3.3 and 5.7 lb DDGS daily on a dry matter basis) for the HIGH and LOW treatments, respectively. The daily intake levels targeted for the LOW and HIGH DDGS treatments were based upon previous research conducted at the K-State Beef Stocker Unit. A publication by Rich et al. (1976)[1] was consulted to determine the salt level required to achieve desired intakes.

[1] "Limiting Feed Intake With Salt." Great Plains Beef Cattle Handbook, GPE-1950, 1976. Great Plains States Cooperative Ext. Service, Oklahoma St. Univ., Stillwater, OK.

All pasture treatments received a free-choice mineral formulated with Rumensin (Elanco Animal Health, Greenfield, IN; 200 mg per head daily). The mineral in the feeder of each paddock was checked weekly for manure, water, or other foreign matter that could interfere with normal supplement consumption. Bull Master feeders (Mann Enterprises, Inc., Waterville, KS) were used for mineral delivery in all paddocks. When inclement weather was forecasted, rubber flap covers on all feeders were closed to minimize exposure to moisture. All flaps were reopened immediately after the threatening storm event. Each mineral feeder was weighed weekly, and the readings were recorded and used to calculate mineral consumption during the previous week. If mineral intake was beyond target, the feeder was moved further away from the primary water source. If this initial action did not effectively reduce mineral intake, salt blocks were placed next to the mineral feeders.

Supplementation with DDGS commenced on June 17 and was provided through portable creep feeders to the designated LOW and HIGH DDGS pastures for the remainder of the study. All feeders were weighed weekly to determine consumption of DDGS during the previous week. If DDGS intake was beyond target, the feeder was moved further away from the primary water source.

Data were analyzed as a completely randomized design with pasture as the experimental unit. All response variables were analyzed in a one-way ANOVA model with treatment as a fixed effect using the GLM procedure in SAS (SAS Institute, Cary, NC). Levene's test for unequal treatment-group variances was performed for each response variable, but no differences among treatment-group variances were detected for any variable.

Results

Overall and as anticipated, the consumption rates of DDGS between paddocks provided with the LOW and HIGH DDGS treatments were different (Table 1). Changes in nutritional composition of native prairie throughout the study period are shown in Table 2. Cattle in the LOW treatment consumed approximately 3 lb/day more DDGS than their counterparts in the HIGH group.

The level of salt recommended by Rich et al. (1976) resulted in acceptable supplement consumption rates for the HIGH treatment targets, but supplement intake for the LOW treatment exceeded our target by approximately 12%. Compared with CONT, both LOW and HIGH treatments resulted in significantly greater average daily gain ($P < 0.001$); however, gains were not different for the LOW and HIGH groups ($P > 0.17$). No differences in efficiency of supplement utilization were detected between LOW and HIGH groups ($P = 0.27$; 11.2 vs. 7.7 lb DDGS per pound of added gain for LOW and HIGH groups, respectively). As expected, mineral consumption declined markedly in the LOW and HIGH treatments when the DDGS supplements were fed (Figure 1).

Table 1. Performance of stocker heifers provided free-choice supplements of dried distillers grains with solubles (DDGS) containing 16 or 10% salt while grazing Flint Hills native summer pastures

		(Percentage salt) in DDGS			
Item	CONTROL	HIGH (16%)	LOW (10%)	SEM	*P*-value
No. of pastures	4	4	4		
No. of cattle	85	100	94		
Initial weight, lb	582	580	579	1.08	0.17
Final weight, lb	730	768	784	6.71	0.001
Average daily gain, lb/day	1.91	2.41	2.62	0.09	0.001
Total DDGS per heifer, lb (dry basis)		162	304	22.4	0.004
DDGS/heifer, lb/day (dry basis)		(3.4)	(6.4)		
lb DDGS/lb added gain		7.69	11.15	2.00	0.27

Table 2. Nutritional quality of native pastures at the Kansas State University Beef Stocker Unit[1]

	Sampling date					
	May 17	June 3	June 20	July 2	July 16	August 2
Dry matter, %	50.60	46.18	45.55	43.97	47.85	49.35
Crude protein, %	8.03	7.50	7.79	7.26	7.01	5.69
Acid detergent fiber, %	43.72	43.77	42.76	41.95	42.70	42.01
Neutral detergent fiber, %	64.14	64.90	63.71	62.99	64.55	64.29
Net energy gain, Mcal/cwt	0.17	0.16	0.18	0.20	0.18	0.19
Net energy maintenance, Mcal/cwt	0.49	0.49	0.51	0.52	0.51	0.52
Total digestible nutrients, %	47.31	47.25	48.44	49.40	48.52	49.33
Calcium, %	0.54	0.52	0.56	0.63	0.58	0.53
Phosphorus, %	0.14	0.15	0.15	0.15	0.15	0.13
Potassium, %	0.97	1.00	0.94	0.99	0.97	0.67
Magnesium, %	0.10	0.11	0.11	0.14	0.11	0.13

[1] Average of four pastures.

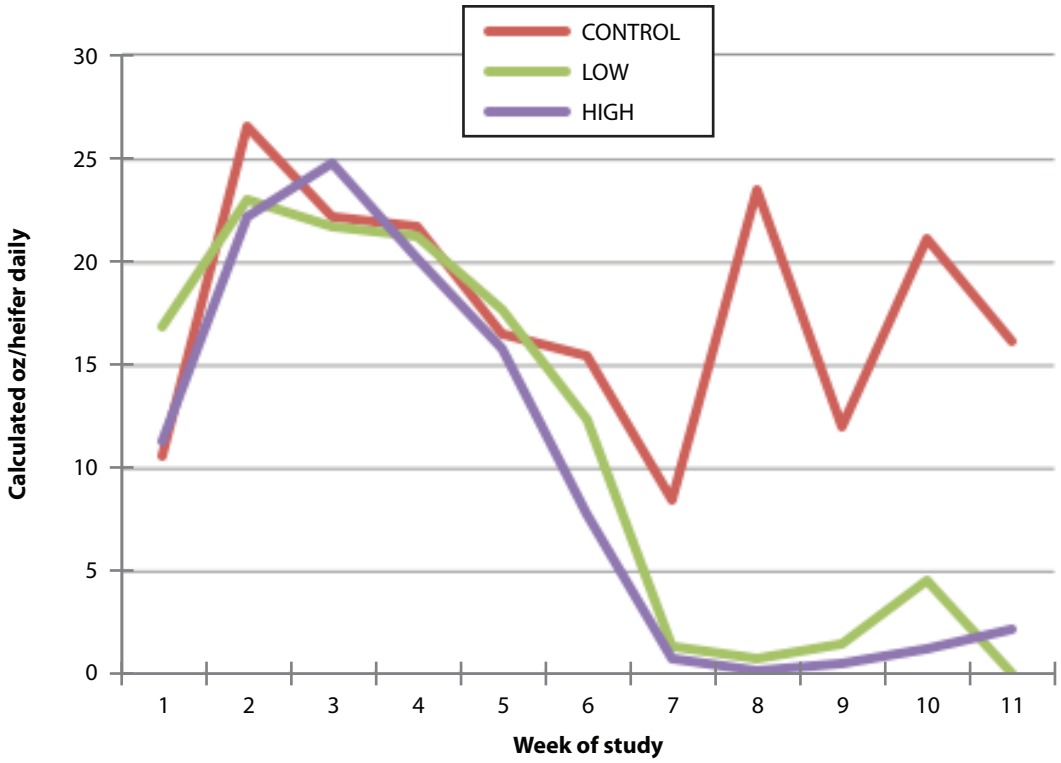

Figure 1. Calculated intake of mineral provided to heifers.