



Effect of adding rumen-degradable protein to a dried distillers grain supplement on growth, body composition, blood metabolites, and puberty in yearling Angus and Brangus heifers

E. N. Alava, A. M. DeLucia, C. Welchons, M. J. Hersom, PAS, and J. V. Yelich¹

Department of Animal Sciences, University of Florida, Gainesville 32611

ABSTRACT

The objective of the study was to determine whether adding soybean meal (SBM), a source of RDP, to a dried distillers grain (DDG) and bermudagrass round bale silage (RBS) diet would enhance growth, body composition, and onset of puberty in Angus ($n = 30$; 234 ± 19 kg) and Brangus ($n = 30$; 252 ± 28 kg) heifers (mean age 259 ± 21 d). On d 0, heifers were assigned to (1) RBS + DDG at 0.75% BW; (2) RBS + DDG at 0.75% BW + SBM at 7.5% of DDG; or (3) RBS + DDG at 0.75% BW + SBM at 15% of DDG for 140 d. There were no treatment or breed ($P > 0.05$) effects for BW, BCS, or ADG by d 140. Moreover, there were no ($P > 0.05$) treatment or treatment \times breed effects on change in body composition from d 0 to 140 for ultrasound LM area (LMA), LMA as a percentage of BW, LMA intramuscular fat, rib fat, or rump fat. Although, Angus had greater ($P \leq 0.05$) LMA intramuscular fat on d 140 than Brangus. Brangus tended ($P = 0.08$) to have greater rump fat and LMA and greater ($P \leq 0.05$) LMA as a percentage of BW than Angus on d 140. Blood metabolites were not different ($P > 0.05$) among treatments from d 0 to 140. Percentage of heifers pubertal by d 140 were not different ($P > 0.05$) between treatments. In conclusion, addition of SBM at either 7.5 or 15% of the total DDG supplement had no beneficial effects compared with DDG alone on heifer growth, body composition, or onset of puberty.

Key words: beef, *Bos indicus*, dried distillers grains, heifer, management

INTRODUCTION

The majority of replacement beef heifers in the southeastern United States are developed on forage-based diets. Most forages are warm-season perennial grasses that are grazed or fed as conserved forage in the form of hay or round bale silage (RBS). Because of the low- to mid-

quality nutritive value of warm-season forages, CP and TDN requirements of growing heifers are not met (Moore et al., 1991) using forage alone as a feed resource. Therefore, growing heifers must be supplemented with protein and energy.

Development of ethanol plants across the country has provided a unique opportunity to use dried distillers grains (DDG), and they have become a substitute for corn in beef cattle diets (Leupp et al., 2009). Furthermore, DDG provide both energy and protein to cattle to meet their nutrient requirements, particularly in forage-based diets (MacDonald et al., 2007). Moreover, Martin et al. (2007) demonstrated DDG could be used as an effective supplement in growing *Bos taurus* beef heifers.

To optimize cattle performance when consuming forage, balancing energy supply and RDP in cattle consuming large amounts of supplement is important (Bodine and Purvis, 2003). Meeting RDP requirements is critical for the production of ammonia or amino acids, which are used by rumen microbes to produce microbial protein (Butler, 1998). Supplementation of additional RDP to forage-based diets has been associated with improved cattle performance through increases of forage digestibility and DMI and improvement of metabolizable energy (Owens et al., 1991).

Therefore, we hypothesized that adding soybean meal (SBM), a source of RDP, to a DDG supplement in a bermudagrass RBS feeding program would enhance the growth, body composition, and onset of puberty of yearling Angus and Brangus heifers.

MATERIALS AND METHODS

The experiment was conducted at the University of Florida Santa Fe Beef Research Unit, north of Alachua, Florida, starting in October through to the subsequent April. The experiment was conducted in accordance with acceptable practices as outlined by the *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching* (FASS, 2010) and University of Florida Institute of Food and Agricultural Sciences Animal Research System protocol number 011–09ANS.

¹Corresponding author: yelich@ufl.edu

Animals and Treatments

Angus ($n = 30$; 234 ± 19 kg) and Brangus ($n = 30$; 252 ± 28 kg) heifers (mean age 259 ± 21 d) were used for the experiment. A full BW was taken 7 d before the start of the experiment, and heifers were blocked by BW and breed, stratified by sire, and allocated to one of twelve 1.2-ha pens with 5 heifers per pen.

Pens were randomly assigned to 1 of 3 treatments: (1) supplementation with DDG at 0.75% of BW (control); (2) supplementation with DDG at 0.75% of BW plus SBM at 7.5% of the DDG amount (**7.5%SBM**); (3) and supplementation with DDG at 0.75% of BW plus SBM at 15% of the DDG supplement amount (**15%SBM**). The diets were formulated for nominal BW gain requirements for the heifers to reach a target BW based on the NRC (2000). Soybean meal amount of 7.5% was chosen to eliminate a RDP deficiency and 15% to provide a linear dose amount. Using the Beef Cattle NRC (2000), control heifers in our study averaged -1.74 g/heifer per d RDP balance with a range of -14 to 22 g/heifer per d. Heifers were supplemented 3 d/wk on Monday, Wednesday, and Friday, based on mean pen BW, and supplement amount was adjusted on a 28-d basis. All heifers also received ad libitum access to Tifton-85 bermudagrass (*Cynodon dactylon*) RBS, water, and custom-made mineral-vitamin mix (Ca 14%, P 6%, NaCl 21%, K 0.8%, Mg 1.0%, S 0.4%, Fe 0.40%, Cu 200 mg/kg, Co 200 mg/kg, Mn 2,200 mg/kg, I 175 mg/kg, Se 48 mg/kg). Round bale silage was offered as individual large round bales fed in a single bale ring feeder in each pen. Heifers were offered DDG at 1.81 kg/heifer per d from d -14 to -1 of the experiment and were maintained on treatment diets from d 0 to 168. The pens were composed of a mixture of dormant bahiagrass (*Paspalum notatum*) and bermudagrass (*Cynodon dactylon*). The pens received no fertilization before or during the experiment. Heifers remained in the same pens from d 0 to 168 of the experiment. After the initiation of the experiment, a Brangus heifer broke her leg and was removed from the experiment.

Feed Sampling

Samples of RBS were collected from each bale, frozen, and pooled monthly for analysis. Consumption of RBS was estimated for each pen using individual bale weights and a monthly weigh back weight. Samples of DDG and SBM were collected monthly. Pasture samples were also obtained in October, November, December, and April from each pen to estimate forage quantity and quality by hand clipping three 0.25-m² areas and compositing the samples. The mean forage mass per pen was estimated at 1,683 kg of DM/ha in October, 1,922 kg of DM/ha in November, 1,545 kg of DM/ha in December, and 763 kg of DM/ha in April. Pasture samples were not collected January through March because of insufficient forage growth. Samples were dried at 60°C in a forced-air oven for approximately 72 h. Dried samples were ground to pass through a 1-mm screen in a Wiley mill (Arthur H. Thomas Company, Philadelphia, PA). Samples were analyzed for residual DM and OM (AOAC International, 2000). Total nitrogen was determined by the combustion method using a macro N analyzer (Elementar Vario Max CN instrument, Elementar Americas, Mount Laurel, NJ) and used to calculate CP ($N \times 6.25$). In vitro dry matter digestibility of samples was determined using an ANKOM DAISYII incubator (ANKOM Technology Corp., Fairport, NY) using the ANKOM Technology Method for In Vitro Digestibility. Rumen fluid inoculum for this procedure was obtained from a ruminally fistulated, nonlactating Holstein cow consuming a diet of ad libitum bermudagrass hay and 450 g of soybean meal daily. Total digestible nutrient was calculated for RBS and pasture using a formula for warm-season grasses (Fike et al., 2003). Total digestible nutrient values for DDG and SBM were determined by a commercial laboratory (Dairy One Forage Laboratory, Ithaca, NY). The nutritional compositions for DDG, SBM, RBS, and pasture are presented in Table 1, and the amount of RDP and RUP provided by the supplements are presented in Table 2.

Table 1. Nutritional composition (least squares means \pm SE) of dried distillers grain (DDG), soybean meal (SBM), bermudagrass round bale silage (RBS), and pasture offered to yearling Angus and Brangus heifers throughout the experiment

Item	DDG	SBM	RBS	Pasture ¹
DM, %	91.5 \pm 0.00	91.0 \pm 0.01	44.2 \pm 0.12	49.1 \pm 0.21
DM basis				
CP, %	25.6 \pm 0.02	48.8 \pm 0.03	12.1 \pm 0.03	11.7 \pm 0.19
RDP, % CP	48.0 \pm 0.00	66.0 \pm 0.00	69.0 \pm 0.02	—
IVDMD, %	77.7 \pm 0.04	94.2 \pm 0.01	44.7 \pm 0.07	42.8 \pm 0.19
TDN, %	81.3 \pm 0.01	78.0 \pm 0.00	60.3 \pm 0.02	51.4 \pm 0.18
Sulfur, %	0.4 \pm 0.03	0.4 \pm 0.01	0.2 \pm 0.23	—

¹Mixture of dormant bahiagrass and bermudagrass forage.

Download English Version:

<https://daneshyari.com/en/article/8503768>

Download Persian Version:

<https://daneshyari.com/article/8503768>

[Daneshyari.com](https://daneshyari.com)