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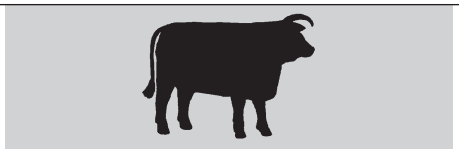

Deferred rate of gain effects on growth, body composition, and concomitant blood metabolites in yearling Angus and Brangus heifers

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ABSTRACT

Deferred supplementation of subtropical forage diets may be a viable nutritional strategy to elicit compensatory growth of growing heifers. This experiment evaluated delayed BW gain on body composition of yearling heifers fed bermudagrass round bale silage (RBS) and dried distillers grains (DDG) for 140 d. Angus (n = 30; 273 ± 24 kg) and Brangus (n = 30; 277 ± 30 kg) heifers, mean age of 277 ± 25 d, were allocated to 1 of 12 pastures. On d 0, heifers were assigned to either (1) RBS + DDG fed to gain 0.84 kg/d from d 0 to 140 (control) or (2) RBS offered ad libitum from d 0 to 70 and RBS + DDG fed to gain 1.4 kg/d from d 70 to 140 (DL). On d 70, control heifers were heavier (P < 0.05) and had greater (P < 0.05) BCS, ultrasound rib fat, rump fat, and LM area (LMA) than DL heifers, whereas intramuscular fat (IMF) was not different (P > 0.05). On d 140, BW tended to be (P = 0.06), and LMA, BCS, and rump fat were, greater (P < 0.05) for control than DL, and rib fat, IMF, and LMA as a percentage of BW were not different (P > 0.05). Irrespective of treatment, hip height, pelvic area, and IMF increased (P < 0.05) over time. Delayed BW gain affected BCS, LMA, and blood metabolites but did not affect skeletal measurements, IMF, and LMA as a percentage of BW during realimentation. Deferred supplementation and delayed growth can be a viable management practice for developing heifers on forage systems.

Key words: beef, dried distillers grains, growth, heifer

INTRODUCTION

Most beef cattle in subtropical regions of the world are raised on forage-based systems. Available forages include grazed pastures or stored forages such as hay or round bale silage (**RBS**). However, subtropical forages are typically low in CP and TDN and are not sufficient to meet nutrient requirements for growing beef heifers compared with forage from temperate regions (Moore et al., 1991). To meet the nutrient requirements of yearling heifers raised on subtropical forage diets, either an energy or protein supplement, or both, may be necessary, depending on forage species and applied management practices.

Dried distillers grains (**DDG**) have become a common corn substitute in the beef cattle diet (Leupp et al., 2009). Dried distillers grains may serve as a supplement for beef cattle raised in forage-based systems because it provides both the energy and protein needed by cattle to meet their nutrient requirements (MacDonald et al., 2007), and DDG have been used as an effective supplement in developing yearling *Bos taurus* replacement heifers (Martin et al., 2007).

It is also imperative that yearling beef heifers are of adequate BW (≥60% mature BW; Patterson et al., 1992) at the initiation of the breeding season so most the heifers are pubertal. This is true whether heifers are on a constant rate of gain or on a stair-step method of gain before breeding. The stair-step method is a practice used when producers are trying to minimize feed inputs during a major portion of the developmental period with the idea that additional BW gain can be achieved by compensatory gain just before the start

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of breeding (Clanton et al., 1983; Lynch et al., 1997). Moreover, feed is the primary input cost of developing replacement heifers (Hersom et al., 2010). As a result, understanding how compensatory effects can be implemented in forage based heifer development programs and what effect restricted nutrient intake and subsequent realimentation have on body composition and physiological status of heifers during the peripubertal period is essential.

Therefore, the objectives of this research were to evaluate the effect of growth restriction and breed on BW gain, body composition, and blood metabolites in yearling Angus and Brangus heifers fed bermudagrass RBS compared with heifers fed RBS + DDG and to evaluate the potential compensatory effects that realimentation with DDG in RBS only has on BW gain, body composition, and concomitant blood metabolites during the peripubertal period.

MATERIALS AND METHODS

The experiment was conducted at the University of Florida Santa Fe Beef Research Unit starting in October until the subsequent March. 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 Institutional Animal Care and Use Committee protocol number F065.

Animals and Treatments

Thirty Angus (initial BW ± SD = 273 ± 24 kg; initial age ± SD = 279 ± 20 d) and 30 Brangus (initial BW ± SD = 277 ± 27 kg; initial age ± SD = 276 ± 30 d) heifers were used in the experiment. Heifers were stratified by initial BW, breed, and age, and allocated to one of twelve 1.2-ha pastures with 5 heifers per pasture, which was designated as d 0 of the experiment. The pastures were composed of a mixture of dormant bahiagrass (*Paspalum notatum*) and bermudagrass (*Cynodon dactylon*). The pastures received no fertilization before or during the experiment. Monthly forage samples were hand clipped from pastures to determine DM yield and chemical composition. The average nutritional value of forage samples collected from the pastures for the duration of the experiment was 11.9% CP and 52.3% TDN (Table 1). The mean forage mass at the start of the experiment was estimated at 1,840 kg of DM/ha. Heifers remained in their respective pastures from d 0 to 140 of the experiment.

Pastures were randomly assigned to 1 of 2 treatments: (1) heifers fed Coastal bermudagrass (*Cynodon dactylon*) RBS and supplemented with DDG 3 d a week on Monday, Wednesday, and Friday from d 0 to 140 (control); (2) heifers fed Coastal bermudagrass RBS from d 0 to 140 and supplemented from d 70 to 140 with DDG 3 d a week on Monday, Wednesday, and Friday (DL). Supplements were provided in a bunk in each pasture, and RBS was fed in a hay ring in each pasture. Amount of DDG delivered to each pasture on a feeding day was the total estimated weekly amount divided into 3 equal amounts. Previous research in our laboratory indicated that ADG and reproductive measures including age at puberty and breeding season pregnancy rates were not different between heifers fed DDG either daily or the same amount offered in 3 equal amounts on a 3 d/wk feeding schedule (Austin, 2009). Feeding yearling heifers 3 d a week is also a common labor saving practice used by many beef cattle producers. Heifers were adapted to pastures and RBS only from d −14 to −1 of the experiment. The diets were offered to allow control heifers to gain 0.84 kg/d throughout the experiment and to allow DL heifers to gain 0.28 kg/d from d 0 to 70 followed by 1.4 kg/d from d 70 to 140 of the experiment. Heifer gain was determined by the ADG necessary for heifers to achieve 60% of mature cow BW of the parent cowherd at the start of the breeding season. The quantity of DDG offered to heifers was adjusted every 2 wk based on animal performance to achieve the targeted ADG. Amount of DDG offered throughout the experiment to control and DL heifers is presented in Figure 1. From d 0 to 140 of the experiment, DL heifers received a total of 162 kg of DDG per heifer and control heifers received 228 kg of DDG per heifer. Round bale silage was conserved as large round bales stored in a plastic wrap. Bales were made when cut forage was estimated to be 45 to 55% DM in the field after the necessary wilting period. Forage was baled and wrapped on the same day. All forage for the experiment was obtained from a single cutting from a

Table 1. Nutritional value of round bale silage (RBS), dried distillers grain (DDG), and pasture offered to yearling Angus and Brangus beef heifers throughout the experiment

Item[1] (% DM basis unless otherwise specified)	RBS	DDG	Pasture
DM (%)	55.5	87.7	70.5
OM	95.3		95.9
TDN	62.0	81.7	52.3
CP	15.0	31.6	11.9
ADF	37.4	17.4	46.4
NDF	64.8	37.1	73.5
Ca	0.34	0.03	0.65
Fat	3.05	10.2	1.47
P	0.27	0.97	0.20
S	0.29	0.65	0.20

[1]Values determined by near-infrared spectroscopy analysis at a commercial laboratory (Dairy One, Ithaca, NY).