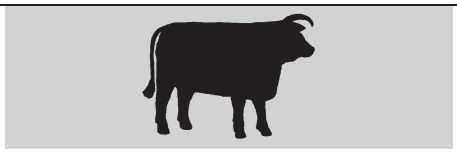
The Professional Animal Scientist 30 (2014):285–295



Natural beef production and growth of Bonsmara steers stocked on rye and ryegrass pastures at humid and semiarid environments

F. M. Rouquette Jr.,*[1] PAS, T. D. A. Forbes,† R. K. Miller,‡ K. R. Hawks,‡ C. C. Santos,§ E. F. Delgado,§ J. W. Holloway,# B. G. Warrington,# and C. R. Long,* PAS

*Texas A&M AgriLife Research, Overton 75684; †Texas A&M AgriLife Research, Uvalde, 1619 Garner Field Road, Uvalde 78801; ‡2471 TAMU, Department of Animal Science, Texas A&M University, College Station 77843-2471; §Department of Animal Sciences, University of São Paulo—Escola Superior de Agricultura Luiz de Queiroz, Piracicaba, SP 13418-900, Brazil; and #Retired and formerly at Texas A&M AgriLife Research, Uvalde 78801

ABSTRACT

Natural, organic, and grass-fed beef provides alternative products for consumers. During 2 consecutive yr, Bonsmara steers (n = 130) grazed winter pasture at 2 environments [semiarid, Uvalde (UVL), and humid, Overton (OVT)] and received pasture only (PAS) or pasture plus 0.8% BW/steer per day corn (SUPL) to quantify growth and carcass traits. Each year, 8 steers each from UVL and OVT were slaughtered off pasture and after a 90-d feedlot (FED) period. From initiation to termination (mid-May) of stocking on Maton rye (Secale cereale L.) plus TAM-90 annual ryegrass (Lolium multiflorum Lam.) at OVT and irrigated TAM-90 at UVL, ADG was greater (P < 0.01) for steers receiving SUPL (1.16 kg) compared with PAS (1.04 kg). During grazing, ADG was greater (P < 0.01) at OVT, 1.18 kg, compared with UVL at 1.03 kg. During FED, ADG was greater (P < 0.01) for steers previously on PAS (1.35 kg) compared with SUPL (1.18 kg). Pasture environment did not affect (P > 0.05) FED ADG. Growth in BW was linear (P < 0.05) during the pasture and FED period. The FED period increased (P < 0.01) HCW, LM area, marbling, QG, KPH, and adjusted fat thickness and reduced Warner-Bratzler shear force. Carcass traits were not affected (P > 0.05) by SUPL. Tenderness was enhanced (P < 0.05) for PAS and FED by electrical stimulation, blade tenderization, and days aging from 0, 14, and 28 d. Bonsmara steers had acceptable BW (500 kg) and carcass and tenderness traits when slaughtered off pasture or after FED and met industry considerations for a natural beef product.

Key words: Bonsmara, natural beef, ryegrass, supplementation, carcass

[1] Corresponding author: m-rouquette@tamu.edu

INTRODUCTION

Although a large percentage of beef consumed in the United States has been finished in a feedlot with grain-based concentrate diets, there has been a growing segment of the industry that produces forage-finished beef for niche marketing. In the past, forage-finished beef had limited consumer acceptance that was attributed to perception and factual documentation that non-fed beef was tougher than grain-fed beef and that yellow fat was thought to be a reliable indicator of toughness (Kelly, 1977). Forage-finished beef can be produced from several geographical-vegetational zones in the United States. Areas that combine favorable climatic-rainfall conditions with sufficient cow-calf numbers create the basic infrastructure to produce forage-finished beef that can be profitable to the producer, palatable and flavorful, available,

and affordable for the consumer. Value-added muscle-processing technology can be applied to forage-finished beef products, and this creates opportunities for new beef products and marketability (Martin and Rogers, 2004). More recently, certified natural and organic forage-finished beef has experienced a growing demand among certain consumers. The primary objectives of this experiment were to quantify and document growth, development, and carcass characteristics of the Bonsmara breed by using steers slaughtered directly off winter-annual grass pastures or after a 90-d feedlot period. Additionally, we wanted to compare animal gain and carcass attributes for steers from pastures with and without corn supplementation, and from 2 diverse vegetation zones that included humid and semiarid environments in the southern region of the United States.

MATERIALS AND METHODS

Environment and Pastures

During 2 consecutive yr, cool-season annual grass pastures were established at Texas A&M AgriLife Research and Extension Centers representing a humid environment at Overton, Texas (**OVT**; 32°18′N, 94°59′W) and a semiarid environment at Uvalde, Texas (**UVL**; 29°13′N, 99°45′W). At OVT, Maton rye (*Secale cereale* L.) plus TAM-90 (*Lolium multiflorum* Lam.) annual ryegrass was sod seeded into four 2.1-ha bermudagrass pastures in mid-October. At UVL, TAM-90 annual ryegrass was established in early to mid-September on four 2.0-ha prepared seedbed pastures that received supplemental irrigation as warranted.

Bonsmara Steers. Crossbred-Bonsmara steers, (7/8) in yr 1, and purebred Bonsmara steers, (15/16) in yr 2, were born and reared at UVL, and management guidelines outlined by Bonsmara Natural Beef LLC were adhered to. The Bonsmara breed was developed in South Africa from a cross-breeding program that combined 5/8 Afrikaner and 3/8 Shorthorn-Hereford (Bonsma, 1980). The composite breed has been introduced into North America as Bonsmara and into Australia as Belmont Red. Steers at UVL received vaccination and dewormer at weaning but were not given growth-promoting implants as per Bonsmara Natural Beef LLC guidelines. At weaning in October at UVL, steers weighed 248 ± 38 kg in yr 1 and 224 ± 23 kg in yr 2. Each year at UVL, steers were stratified into 2 groups based on age and BW. Groups were randomly selected for backgrounding and growth on pasture at OVT or UVL. A total of 130 steers (36 for yr 1 and 38 for yr 2) were transported 775 km to OVT, and 28 steers each year were stocked on pastures at UVL. At both locations, steers were backgrounded on bermudagrass [*Cynodon dactylon* Pers. (L.)] pasture, hay, or both and received 1 kg/d per steer until onset of grazing winter pastures. During the winter pasture phase, steers were allotted to pastures, reweighed after a 7-d adjustment period, and weighed during 0800 to 1000 h without a shrink period at 28-d intervals. The BCS was visually assessed (Herd and Sprott, 1985) at initiation and termination of stocking. The pasture and feedlot experiments were conducted in compliance with principles and guidelines approved by the Institutional Animal Care and Use Committee.

Humid Environment. In early to mid-October of each year, bermudagrass pastures were lightly disked to <10 cm and drilled at approximately a 5-cm depth (18-cm drill spacing) with 112 kg/ha Maton rye plus 34 kg/ha TAM-90 annual ryegrass. Each year, fertilizer was split applied 3 applications with a total of 211-22-48 kg/ha, respectively, of N-P_2O_5-K_2O in yr 1 and 230-0-0 kg/ha in yr 2. Initiation of stocking rye + ryegrass in yr 1 was delayed until 1 March because of drought and cold temperatures during December and January. In yr 2, near-normal climatic conditions allowed initiation of stocking on 25 January. Steer BW at initiation of winter pasture grazing was 292 ± 24 kg in yr 1 and 270 ± 28 kg in yr 2. A fixed stocking rate was continuous from 1 March until 22 May in yr 1 (82 d) and from 25 January to 8 May in yr 2 (103 d). A moderate stocking intensity of 4.8 steers/ha was set to allow ad libitum, selective grazing of rye + ryegrass. Forage mass DM ranged from 1,500 to 2,500 kg/ha with a resultant forage allowance of 1.0 to 1.2 kg of DM:kg of BW, which provided for maximum gain per animal (Rouquette et al., 2012).

Semiarid Environment. In late September of each year, TAM-90 annual ryegrass was planted at 34 kg/ha on prepared seedbed at UVL. Each year, pastures received nitrogen fertilizer in September and in January for a total of 130 kg/ha N. All pastures were subject to irrigation applied via center pivot during moisture-deficit periods. Replicate pastures received 33 cm of supplemental water irrigation during yr 1 and 48 cm of water in yr 2. In yr 1, pastures were stocked from 26 January to 1 May (95 d), whereas in yr 2, grazing was initiated on 8 December and terminated on 8 May (151 d). At initiation of grazing, steer BW was 295 ± 31 kg in yr 1 and 279 ± 24 kg in yr 2. A moderate-low, fixed stocking intensity was continuous and set at 5.5 stockers/ha on each 2.0-ha pasture for the duration of stocking. Forage DM ranged from 1,800 to 2,800 kg of DM/ha with a resultant forage allowance of about 1.0 to 1.5 that allowed for selective intake and maximum gain (Rouquette et al., 2012).

Supplementation. During both years and at each location, Bonsmara steers were stratified into groups based on BW and randomly assigned to 2 replicate pastures each of PAS or pasture plus a daily ration of 0.8% of BW/steer of corn (SUPL). Level of corn that was group fed to steers in each replicate pasture was adjusted to 0.8% of BW after each weigh period. Steers were trained to the supplement during the preexperimental backgrounding period. Throughout the winter pasture-grazing period, consumption was complete within 10 to 15 min and without orts. Two replicate 2.1-ha pastures per treat-