

Forage Availability and Nutritive Composition of Bahiagrass and Bermudagrass Grazed by Steers With or Without Steroid Implants¹

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Story in Brief

Bermudagrass (*Cynodon dactylon*) is the predominant warm-season perennial grass used for cattle production in Arkansas. Bahiagrass (*Paspalum notatum*), also a warm-season perennial, is grown along the Gulf Coast but not utilized extensively in Arkansas because it does not persist in this colder environment. Objectives were to compare forage availability and nutritive composition of a more cold-tolerant bahiagrass variety, 'Sand Mountain' (n = 4 pastures) or 'Common' bermudagrass (n = 4 pastures) grown in west-central Arkansas, and to determine performance of crossbred steers (initially n = 48; last 54 days n = 32) with or without steroid implants grazing bahiagrass and bermudagrass pastures for 97 days. Forage availability during the entire grazing period was lower (P < 0.001) for Sand Mountain bahiagrass (1,043 lb dry matter (DM)/acre) than Common bermudagrass (2,042 lb DM/acre), and forage availability declined (P < 0.001) for both forages with time during the experiment. A forage x date interaction was present (P < 0.05) for acid detergent fiber (ADF) and crude protein (CP) content, and tended (P = 0.08) to influence neutral detergent fiber concentration. Percentages of CP were greater and ADF was lower in bermudagrass compared with bahiagrass in August following July fertilization. Forage type, steroid implant, and the interaction did not influence (P > 0.10) average daily gain (mean = 1.9 lb/day per steer) during the grazing period. Sand Mountain bahiagrass may be suitable as a warm-season grass in northern portions of the Southeast; however, several years of data are needed to determine the persistence of Sand Mountain bahiagrass in west-central Arkansas.

Introduction

Bermudagrass and bahiagrass are the predominant perennial warm-season grasses utilized for cattle grazing in the southeastern U.S. Winterkill is problematic for specific varieties of both forages and limits their use to adapted areas of the southeastern U.S. Bermudagrass is used extensively throughout the Southeast, usually at latitudes below 36° N (Taliaferro, 2005) while bahiagrass is widely used along the Gulf Coast up to southern Arkansas. Sand Mountain bahiagrass, a naturally selected bahiagrass developed by E. van Santen and Auburn University, is more cold-tolerant than other bahiagrass varieties and may be a suitable warm season grass for northern portions of the Southeast. To our knowledge, performance data of steers grazing bahiagrass as far north as west-central Arkansas are non-existent. Objectives of the current experiment were to 1) compare forage availability and nutritive composition of 'Sand Mountain' bahiagrass with 'Common' bermudagrass grown in west-central Arkansas, and 2) determine performance of steers with or without steroid implants grazing bahiagrass and bermudagrass pastures.

Experimental Procedures

This experiment was conducted near Booneville (35° 5' N; 94° 0' W) in west-central Arkansas. Crossbred steers (n = 48; initial body weight = 610 ± 57 lb) with (n = 24 steers) or without (n = 24 steers) steroid implants (Synovex STM) were randomly assigned to 2.5-acre pastures of Sand Mountain bahiagrass (n = 4 pastures) or Common bermudagrass (n = 4 pastures) for 97 days. Due to

drought conditions, the initial stocking rate of 6 steers/pasture (2.4 steers/acre) was reduced to 4 steers/pasture (1.6 steers/acre) on July 21 until termination of the experiment (September 13). Body weights were recorded at the initiation (June 8), day 56 (August 3), 84 (August 31), and at termination of grazing (September 13). Implanted steers were reimplanted at day 56 of grazing. Pastures were fertilized prior to initiation of grazing on May 5 (65 lb N/acre), and again on July 7 (51 lb N/acre) and August 22 (91 lb N/acre). Forage availability was evaluated every 2 weeks using a disk meter, and compressed forage height was recorded at 50 locations within pastures. To calibrate disk meter measurements, forage was clipped to ground level beneath the disk meter at 5 locations across each pasture monthly. Samples were dried (140°F) in a forced-air oven for 72 h and weighed for calculation of regression equations relating lb dry matter (DM)/acre with disk meter height. Random grab samples (10-12 samples/pasture) for nutritive analyses were collected monthly, ground to pass through a 0.04-inch screen, and analyzed for crude protein (CP; Leco[®] Nitrogen Determinator, St. Joseph, Mich.), acid detergent fiber (ADF), and neutral detergent fiber (NDF) using Goering and Van Soest (1970) procedures.

Forage availability and nutritive composition were analyzed as repeated measures using the MIXED procedure of SAS (SAS Inst., Inc., Cary, N.C.) with a compound symmetry covariance structure. The model included forage type, date, and the interaction. Least squares means were compared using the PDIF option in PROC MIXED of SAS when protected by a significant (P < 0.05) treatment effect. Effects of forage type, implantation, and the interaction on ADG of steers on day 56 and 84, and on overall ADG on day 97 was determined by the MIXED procedure of SAS using pasture as the experimental unit.

¹ Names are necessary to report factually on available data; however, the USDA does not guarantee or warrant the standard of the product, and the use of the name by the USDA implies no approval of the product to the exclusion of others that also may be suitable.

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Results and Discussion

Forage availability during the entire 97-day grazing period was lower ($P < 0.001$) for Sand Mountain bahiagrass (1,043 lb DM/acre) than Common bermudagrass (2,042 lb DM/acre). Overall, forage availability of both forages declined during the experiment from a mean initial availability of 2,556 lb DM/acre to 1,045 lb DM/acre at termination of grazing (Fig. 1) and was partially due to extremely dry conditions in the Booneville area. Rainfall during the experiment (5.4 in) was approximately 30% of the 30-yr norm (18 in; National Oceanic and Atmospheric Administration-National Weather Service, 2005). Nitrogen is frequently the most limiting factor for bahiagrass production but sufficient rainfall also is necessary for growth. A forage \times date interaction was present ($P < 0.05$) for CP and ADF content, and tended ($P = 0.08$) to influence NDF concentration (Table 1). Crude protein was greatest ($P < 0.05$) for bahiagrass on the initial collection date (June 15) while CP was greatest for bermudagrass in June and August (Table 1). Arthington and Brown (2005) reported CP decreased approximately 38% from week 4 to week 10 of maturity in both 'Pensacola' bahiagrass and 'Tifton 85' bermudagrass. Fertilization of pastures on July 7 with 51 lb N/acre during the current experiment increased CP of bermudagrass on August 10 compared with CP on July 12 (Table 1). However, CP for bahiagrass was similar ($P > 0.10$) before and after the July fertilization (Table 1). Percentage of ADF was greatest for bermudagrass on September 6; however, ADF was increased on August 10 and remained higher on September 6 (Table 1). Increased ADF is negatively correlated with digestibility (Van Soest et al., 1978). Averaged across all dates, bahiagrass contained 6.6% more ADF than bermudagrass which was similar to results reported by Johnson et al. (2001). Percentages of NDF were greatest for the August and September dates for both forages (Table 1).

Forage type, steroid implant, or the interaction did not influence ($P > 0.10$) cumulative ADG at days 56, 84, or total ADG during the entire 97-day grazing experiment. Total ADG was 1.9 lb/day (pooled standard error = 0.1) per steer for both bahiagrass and bermudagrass. Typically, steroid implants improve ADG in cattle by 9% to almost 18% in grazing cattle, and DM intake is increased in implanted animals (Rumsey et al., 1992). Consequently, sufficient available forage is necessary to achieve additional weight gain with steroid implants (Rumsey and Hammond, 1990). Rayburn

(1986) reported forage intake was maximized when forage availability was approximately 2,000 lb of DM/acre. Due to less than normal rainfall, forage availability for both forages may have been limited from the end of July until the termination of the experiment in September (Fig. 1), and may partially explain why ADG was not different ($P > 0.10$) between steers with or without steroid implants. Differences in forage quality between bahiagrass and bermudagrass at various times during the experiment, drought conditions, light stocking rates, cattle weighing schedule, and/or a limited number of animals also may have affected these results. Forage availability of bahiagrass was lower than bermudagrass during the entire grazing period. Further, CP was greater and ADF was lower in bermudagrass compared with bahiagrass in August following July fertilization. However, steers grazing either bahiagrass or bermudagrass had similar ADG (1.9 lb/day per steer) during the experiment. Bahiagrass may be suitable as a warm-season grass in northern portions of the Southeast. Several years of data are needed to determine the persistence of bahiagrass in west-central Arkansas.

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Table 1. Percentages of crude protein (CP), acid detergent fiber (ADF), and neutral detergent fiber (NDF) of 'Sand Mountain' bahiagrass and 'Common' bermudagrass harvested on four dates during the summer and early fall.

	CP	ADF	NDF
Bahiagrass			
June 15	12.9 ^{ab}	26.6 ^{de}	53.7 ^f
July 12	6.1 ^d	29.5 ^{bc}	57.1 ^{de}
August 10	8.4 ^{cd}	32.4 ^a	60.8 ^a
September 6	8.5 ^{cd}	31.0 ^{ab}	58.8 ^{bcd}
Bermudagrass			
June 15	10.2 ^{abc}	25.3 ^e	55.5 ^{ef}
July 12	6.8 ^{cd}	27.4 ^{cd}	57.7 ^{cd}
August 10	13.5 ^a	27.9 ^{cd}	59.4 ^{abc}
September 6	9.7 ^{bcd}	31.6 ^{ab}	59.5 ^{ab}
Pooled standard error	1.4	0.7	0.6

^{a,b,c,d,e,f} Means within a column without a common superscript differ; forage x date interaction (CP and ADF, P < 0.05; NDF, P = 0.08).

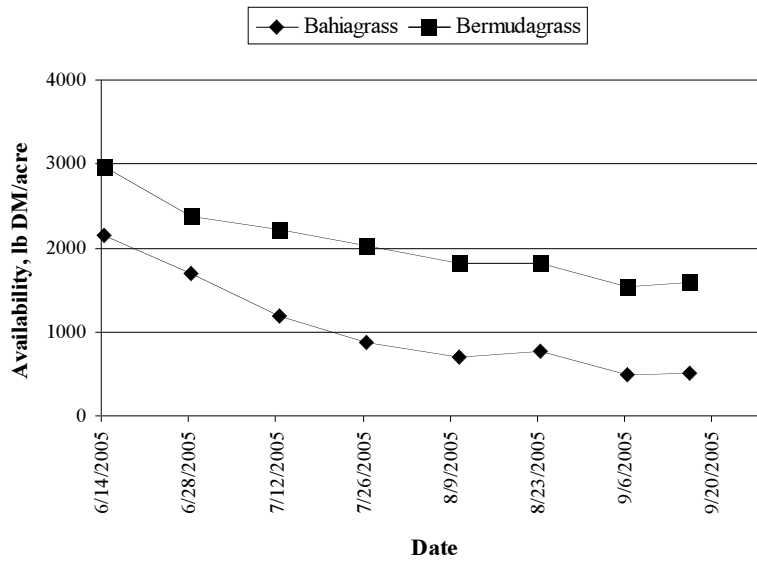


Fig. 1. Forage availability of 'Sand Mountain' bahiagrass and 'Common' bermudagrass during summer and early fall (forage effect, P < 0.05; date effect, P < 0.05).