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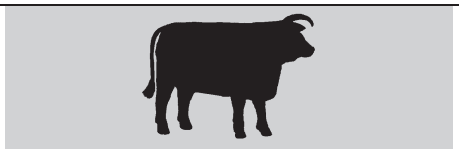

Using tall fescue in a complementary grazing program for spring-calving beef cows in southern Arkansas[1]

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ABSTRACT

Over 3 yr, spring-calving beef cows (n = 108, yr 1; n = 72, yr 2 and 3; initial fall BW = 480 ± 8.6 kg, BCS = 5.5 ± 0.07; age = 6 ± 2.6 yr) were allocated by parity, breed composition, and BW to 4.8 ha (n = 6) of warm-season pastures and limit grazed 2.4 ha of tall fescue (Festuca arundinacea) during the winter and spring to determine the effect of endophyte toxicity or clover additions on cow performance (BW, BCS, and reproductive rates) and calf growth. Limit-grazed pastures were nontoxic endophyte-infected tall fescue (NE) and toxic endophyte-infected tall fescue (TEF), or toxic endophyte-infected tall fescue established with white, red, and crimson clovers (TECL). Calving BCS tended to be less (P = 0.09) for NE than for TEF and TECL but was greater (P = 0.02) for NE than for TEF and TECL in April, before breeding. At weaning, BCS of NE was less (P = 0.05) than TEF and TECL. Pregnancy percentage was greater (P = 0.02) for NE than TEF and TECL and was greater (P = 0.05) for TEF than TECL. Calf BW was unaffected (P ≥ 0.17) by treatment, but weaning BW per cow exposed to a bull was greater (P = 0.02) for NE than TEF and TECL. This experiment indicates that improvements in pregnancy percentages led to increased calf BW at weaning per cow exposed to a bull, an important profitability indicator. Pastures with TECL did not improve cow and calf performance or pregnancy percentages compared with TEF.

Key words: beef cow, bermudagrass, clovers, limit grazing, tall fescue

INTRODUCTION

Complementary forage systems based on warm-season perennial grasses and cool-season annual grasses have shown promise for maintaining BCS and BW of spring-calving cowherds in the southeastern United States (Hill et al., 1985; DeRouen et al., 1991; Gunter et al., 2002), while reducing the reliance on stored forages and concentrate supplements. Although most cool-season perennial grasses are short lived in the South, tall fescue (*Festuca arundinacea* Shreb.) infected with the naturally occurring endophyte *Neotyphodium coenophialum* has the benefit of improved persistence and high nutritive value during the fall and early spring (Beck et al., 2006). Grazing livestock performance is limited by fescue toxicosis (McMurphy et al., 1990; Thompson et al., 1993; Gunter and Beck, 2004). Toxic endophyte tall fescue (**TEF**) has been responsible for millions of dollars in economic losses (Strickland

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et al., 2011) because of reduced BW gains, weaning BW, and reproductive rates. Endophyte strains (**NE**) have been identified that are nontoxic to livestock and bestow tall fescue with the dual advantages of stand persistence and improved animal performance. Research with these selected endophyte tall fescues indicates that this pairing is persistent with improved animal performance in a wide range of environments (Parish et al., 2003; Hopkins and Alison, 2006; Beck et al., 2008).

There are relatively few published reports of incorporation of NE tall fescue into cow-calf production systems. Watson et al. (2004) found that cows grazing NE tall fescue from March to September had increased BW, BCS, serum prolactin, and calf weaning BW, yet no differences in calving rate or interval were measured because each year cows were selected from groups that had not been previously exposed to TEF. Caldwell et al. (2013) reported that limited use of NE (25% of pasture area) increased cow BW, BCS, weaning BW, and calving rate in spring-calving herds in tall fescue–based pasture systems in northern Arkansas. The objective of this experiment was to investigate the use of NE or TEF as a forage complement to a warm-season grass pasture system for cow-calf production in the extreme southwestern range of tall fescue adaptation in North America.

MATERIALS AND METHODS

Animal Management and Forage Management

All procedures in the following experiments were approved by the University of Arkansas Institutional Animal Care and Use Committee (protocol #12043). This research was conducted at the University of Arkansas Southwest Research and Extension Center in southwestern Arkansas (latitude: 33°40′4″N, longitude: 93°35′24″W, elevation 107 m).

The objective of this experiment was to determine the effect of endophyte toxicity and clover addition to tall fescue pastures used as a limit-grazed complement to warm-season grass pastures. Replicate tall fescue pastures (n = 2/treatment) were randomly assigned to treatment and established to NE (cv. Texoma MaxQII, infected with the AR584 endophyte, Pennington Seed Inc., Madison, GA); TEF (cv. Texoma, Noble Foundation, Ardmore, OK), tall fescue managed with commercial fertilizer N sources; or TEF established with (**TECL**) clovers [white (*Trifolium repens* cv. Regal Graze, Cal/West Seeds, Woodland, CA, 3 kg/ha seeding rate), red (*Trifolium pratense* cv. Kenland; Allied Seed LLC, Murfreesboro, TN, 7 kg/ha seeding rate), and crimson (*Trifolium incarnatum* cv. Dixie, 14 kg/ha seeding rate)] planted in September of yr 1 of the experiment.

Over 3 yr, beef cows (n = 108, yr 1; n = 72, yr 2 and 3; initial fall BW = 480 ± 8.6 kg; BCS = 5.5 ± 0.07; age = 6 ± 2.6) grazed 4.8 ha (n = 6) warm-season grass pastures in the summer and fall and were fed warm-season grass hay and limit grazed 2.4 ha of tall fescue in the winter and spring. Cows were allowed access to tall fescue paddocks for 8 h/d for 2 d/wk in December and January, 3 d/wk in February, and 4 d/wk in March and were given ad libitum access to tall fescue paddocks in April, May, and early June. Access to tall fescue and tall fescue clover paddocks by cows was restricted through the summer to 2 periods of flash grazing for approximately 1 wk in July and August to remove warm-season grass forage mass. Calves were allowed creep access to respective tall fescue and tall fescue clover pastures at all times during the experiment. Tall fescue pastures were fertilized with P and K to meet soil test requirements for moderate level of production annually in September, and bermudagrass pastures were fertilized with P and K to meet soil test requirements for moderate level of production annually in May (Espinoza et al., 2006). Nitrogen (56 kg of N/ha as ammonium nitrate) was applied to bermudagrass pastures in May and June each summer (112 kg of total N/ha). All tall fescue pastures were fertilized with N at a rate of 56 kg of N/ha in September, whereas only NE and TEF received N (56 kg of N/ha) each year in March.

Cow BW and BCS (1 to 9 point scale, 1 = thin and 9 = obese; Richards et al., 1986) were collected (unshrunk) in November (following weaning), January (before calving), April (following the calving season and before bull turnout), and October (at separation of calves from dams for weaning). At each weighing, cows were gathered from pastures at 0700 h, separated from calves and weighed, reunited with their calf, and returned to pastures within 5 h. Within 24 h of birth, calves were weighed to determine birth BW, navels were treated with iodine, and male calves were castrated. Calf BW were also collected (unshrunk) in April and October (weaning).

Cows were of predominantly English breeding (75% Angus or Hereford) with some *Bos indicus* and Continental (Simmental) influence. Cows were assigned to treatments based on parity, breed composition, and BW by randomly assigning cows within each parity, breed type, and BW group to pastures. In yr 1, cows were stocked at 2.5 cow-calf units per total system hectare (3.6 cow-calf units/ha of bermudagrass). Because of limited forage production during yr 2 and 3, cow stocking rate was decreased to 1.6 cow-calf units per total system hectare (2.5 cow-calf units/ha of bermudagrass). The reduction in stocking rate was conducted by removing of all cows that were not pregnant, failed to raise a calf to weaning, or were in excess of 10-yr of age. Cows originally allocated to each pasture remained on pasture throughout the 3-yr experiment (except cows removed between yr 1 and 2) unless culled for reproductive failure or failure to wean a live calf. Cull cows were replaced with second-parity cows of similar breeding to maintain similar stocking rates among pastures. Cows from each group were exposed to an Angus bull that had passed a breeding-soundness examination for natural service during May and June. Cows calved during a