Cow and Calf Performance While Grazing Tall Fescue Pastures with Either the Wild-Type Toxic Endophyte or a Non-Toxic Novel Endophyte

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Story in Brief

Fescue (Festuca arundinacea, Schreb.) pastures are common in Northwest Arkansas but cattle performance has declined due to the toxicity caused by the wild-type endophyte Neotyphodium coenophialum in the fescue plant. Gelbvieh x Angus crossbred cows (n = 52; 1,023 lb initial BW) were allocated randomly by weight and age to one of four 25-acre pastures of tall fescue containing either the wild-type toxic endophyte (E+) or a non-toxic novel endophyte (HM4; 2 replicates each). Cows confirmed as pregnant began grazing the experimental pastures on October 15, 2004. Extremely dry summer conditions resulted in depleted forage reserves. Cows were then moved to a bermudagrass pasture and fed bermudagrass hay. Pastures with HM4 were removed before those with E+ and were offered 1,808 lb more hay (P = 0.20) than on E+. Cow weight and BCS changes during the year were not different (P > 0.20) between HM4 and E+, but a greater percentage (P < 0.01) of cows grazing HM4 were pregnant at the time of weaning. Calf birth date and birth weight were not different (P > 0.37) between forages, but actual and adjusted weaning weights, and calf gain from birth to weaning tended to be greater (P < 0.06) by 41, 44, and 38 lb, respectively, from HM4 compared with E+ pastures. Therefore, Arkansas producers could improve performance of their cows and calves by using new novel endophyte technology, but should weigh the cost against the benefits before renovating large acreages of existing E+ pastures.

Introduction

Fescue (Festuca arundinacea, Schreb.) pastures are common in Northern Arkansas as well as much of the southeastern US, because they are persistent and need little maintenance. This persistency is attributed to an indwelling fungus (Neotyphodium coenophialum). Although this fungus is beneficial to the plant, it produces toxins that cause fescue toxicity, a disorder characterized by reduced DM intake, decreased weight gains, decreased pregnancy rates, vasoconstriction, fescue foot, increased body temperature, and rough hair coats (Realini et al., 2005). Although research has been performed to rid the endophyte from the tall fescue plant, it was not beneficial to producers because plant persistence declined (Parish, 2003). Fescue plants infected artificially with a non-toxic endophyte maintained their vigor but did not have detrimental effects on cattle (Bouton et al., 2003; Parish et al., 2003; Niihse et al., 2004). The objectives of this study were to observe animal production and forage availability from a tall fescue, friendly endophyte association (HM4) compared with tall fescue with the toxic wild-type endophyte (E+).

Experimental Procedures

This study was conducted at the Livestock and Forestry Branch Station located near Batesville, Ark. Gelbvieh x Angus crossbred cows (n = 52; 1,023 ± 22.5 lb initial BW) were stratified by weight and age and allocated randomly to one of four 25-acre pastures of tall fescue containing either the wild-type toxic endophyte (E+) or a non-toxic novel endophyte (HM4; 2 replicates each). Cows began grazing the experimental pastures October 15, approximately 2 wk following weaning of their calves and were confirmed pregnant via rectal palpation prior to allocation.

Cow weight and BCS were evaluated at the beginning of the trial, at calving, and at weaning, and cow pregnancy rates were determined by rectal palpitation at weaning. Calf weights were obtained at birth, then monthly from mid-May until weaning in early October. Calves were weaned using a low-stress weaning program where they were gathered, vaccinated, and placed directly across an electric fence from their dams for 14 d. After this time, calves were moved to a new location.

Forage availability was measured once a month using disk meters, and forage samples were gathered at that time. Hay was harvested during the spring from approximately one third of each pasture for subsequent feeding. Extremely dry summer conditions forced feeding of the winter hay supply during the summer. Once the hay from a particular pasture was depleted, cows were moved to a bermudagrass pasture and fed bermudagrass hay. Early fall rainfall allowed resumed forage growth and all cows were returned to their respective pastures 7 d prior to weaning.

Cow weight and BCS, calf weights, and forage availability were analyzed using PROC MIXED of SAS (SAS Inst., Inc., Cary, N.C.). Cow pregnancy rates were analyzed by Chi-square using the PROC FREQ of SAS.

Results and Discussion

Average available forage and the amount of hay offered to the different groups of cows are shown in Table 1. The available forage did not differ (P = 0.73) between forages when averaged across the sampling dates. As mentioned previously, dry summer conditions
necessitated feeding of hay harvested from those pastures during the spring. Cows on HM4 depleted their hay supplies earlier than those on E+ and were removed from their pastures earlier (one pasture removed July 29, the other removed September 3), resulting in those cows being offered 1,808 lb more hay (P = 0.20) than those on E+. The reason for lower available forage on HM4 pastures may be due to an increase in forage intake, lower forage production, or a combination of these two factors. Crude protein concentrations did not differ (P = 0.92) for these two forage types (data not shown). Crude protein concentrations did vary across harvest dates with highest levels occurring in November of 2004 and October of 2005 and the lowest levels occurring in June and August of 2005.

Cow weight and BCS during the year were not different (P > 0.20) between HM4 and E+ forages, although HM4 cows were numerically heavier (P = 0.20) at weaning (Table 2). A greater percentage (P < 0.01) of cows grazing HM4 was pregnant at the time of weaning. Body condition scores at calving and breeding were at approximately 6. At a BCS of 6, cows should have been cycling and reproductive rates should have been high, based on previous research. Therefore, differences in pregnancy rates observed in this study are likely due to tall fescue toxins independent of BCS.

Calf birth date (data not shown) and birth weight (Table 3) were not different (P = 0.37) between forages, but actual and adjusted weaning weights, and calf gain from birth to weaning were greater (P ≤ 0.05) from HM4 compared with E+ forage. The daily gain differences between HM4 and E+ for calves in our study were similar to those reported by Parish (2003) for another ‘friendly endophyte’- tall fescue association (Max Q) compared with E+.

## Implications

In the first year of a 2-year study, cows grazing fescue pastures with a novel endophyte had higher pregnancy rates and their calves had heavier weaning weights than cows grazing the wild-type fescue pastures. Therefore, novel endophyte technology could prove to be beneficial for producers in Northern Arkansas. However, further evaluations are needed to determine plant vigor and persistence and potential economic benefits of novel endophyte – tall fescue associations compared with wild-type fescue pastures.

## Literature Cited