

# Potential Use of Fescue in Grazing Systems Using Graze-Out Small-Grain Forages and Bermudagrass

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## Story in Brief

The objective of this study was to determine if stocker calves backgrounded on endophyte-infected tall fescue compared to small-grain forages could achieve sufficient compensatory growth during subsequent grazing of either graze-out small-grain forages in spring or bermudagrass in summer to offset the expected reduced performance for fescue. A total of 40 steer calves in year 1 and 32 in year 2 grazed either fescue or wheat/rye pastures from November to the end of January, after which all calves grazed wheat/rye pastures to the end of graze-out in April. Similarly, 48 steer calves grazed either fescue or wheat/rye pastures during the graze-out period and were then moved to bermudagrass pasture for summer grazing. Calves grazing small-grain forages during graze-out gained more weight (91 lb in year 1 and 55 lb in year 2,  $P < 0.01$ ) than calves on fescue. Subsequent weight gain during bermudagrass grazing was similar for both groups in both years. Calves grazing small-grain forages from November through January gained 51 lb more than calves grazing fescue ( $P < 0.01$ ). However, no compensatory gain was observed during subsequent grazing on small-grain forages during graze-out. No compensatory gain was observed in spite of the significantly greater BW gain for calves that grazed small-grain forages compared to fescue.

## Introduction

Small-grains are high-quality cool season forages for cattle in the South (Daniels et. al., 2002). Typically, one group of calves grazes in fall and winter while a second group is used for the spring graze-out. While gain per animal and per acre during graze-out is excellent, total gain is limiting for stocker programs. Endophyte-infected tall fescue will remain the predominant cool season perennial forage in the South. Integrated grazing systems are needed that capitalize on the consistent forage production, but poor performance of tall fescue, and the excellent productivity, but short duration, of graze-out small-grain forages. If sufficient compensatory gain is realized when cattle are moved from fescue to either graze-out small-grain forages in spring or to bermudagrass in summer, fescue may serve as a low-cost forage for back grounding stocker calves. If the rapid gains on small-grain forages are carried over to graze-out small-grains or to summer bermudagrass, then small-grain forages may be a good alternative to tall fescue in areas compatible with their growth. The objective was to compare season-long grazing systems utilizing tall fescue or small-grain forages as precursors to spring graze-out on small-grain forages or summer grazing on bermudagrass.

## Experimental Procedures

*Trial 1.* Forty bull and steer calves in 2002 and 32 in 2003 were purchased from a local auction barn in late January and received at the Livestock and Forestry Branch Station near Batesville in north-east Arkansas. Calves were vaccinated, bulls were castrated by banding, and sick calves were treated using protocols developed by a licensed veterinarian.

On March 14, each year, calves were allotted by weight, obvious breed characteristics, and sex status on arrival to two treatment groups; (1) Kentucky 31 fescue; or (2) wheat/rye pasture (60 lb/acre

each of Elbon rye and Delta King 9027 wheat planted the previous September) until the end of “graze-out” that occurred on May 8. Fescue pastures had been established for seven years and had a 90% endophyte infection rate. Five replications of 4-acre pastures for each forage were used in 2002 and four replications were used in 2003. Stocking density was four calves per pasture and calves were not rotated between pastures. Pastures were separated by electric fencing and water was provided by automatic watering devices.

On May 8 of each year, all calves were moved to 40 acres of common Bermudagrass pasture and grazed as a single group until August 15, when the study was terminated. No supplemental feed was offered during the study. A mineral mix was offered free choice. All cattle weights were taken after overnight withdrawal from feed and water.

*Trial 2.* Forty-eight bull and steer calves purchased at a local auction barn were received in September 2002 using procedures described for Trial 1. On November 21, calves were allotted by sex (bull or steer at time of arrival), breed characteristics, and weight to either fescue or wheat/rye pastures. Pastures used were the same as used for Trial 1. Calves grazed 4-acre pastures of each forage until January 31, 2003. There were four replications of each forage type. Calves were then allotted by previous grazing treatment (fescue or wheat/rye) to fifteen 4-acre pastures of small-grain forage, with five each seeded by conventional drill, no-till drill or broadcast seeding. Calves grazed small grains pastures until the end of spring graze-out on April 22, 2003.

*Statistical Analysis.* Data for Trial 1 were analyzed as a completely randomized design, using PROC GLM of SAS (SAS Institute, Inc., Cary, N.C.). The model included treatment, year and the treatment x year interaction. Pasture within grazing treatment was used as the experimental unit. Data from Trial 2 were analyzed as a split plot using PROC MIXED of SAS. The whole plot was spring tillage treatment. Previous treatment (fescue or small grains) and previous treatment by tillage treatment were in the subplot. Random effects were tillage treatment within pasture and residual error.

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## Results and Discussion

*Trial 1.* Because a significant year x forage type interaction was found for graze-out gain ( $P < 0.05$ ), results of each year are shown separately (Table 1). Although graze-out gains were significantly greater for small-grain forages than for fescue both years, the difference in year 1 (91 lb) was less than in year 2 (55 lb). Regardless of significant differences in graze-out gain, no compensatory gain was observed during the summer grazing period when all calves grazed bermudagrass. The weight gain advantage observed for wheat/rye calves at the end of the spring graze-out period was maintained through the end of the study in mid-August.

*Trial 2.* In agreement with Trial 1, calves that grazed small-grain forages from November to the end of January gained significantly faster (51 lb) than calves grazing fescue (Table 2). However, as observed in Trial 1, there was no compensatory gain by calves that had grazed fescue when all calves were moved to small-grain forages for graze-out. Gains during the graze-out period when all calves grazed small-grain forages were virtually identical for calves that previously grazed fescue or small-grain forages.

These studies show a substantial advantage in weight gain for calves grazing small-grain forages; this occurs regardless of whether the grazing occurs during the fall, winter, or spring months. Furthermore, the advantage in gain from grazing small-grain forages can be expected to carry over through subsequent grazing of small-grain forages during spring graze-out or on bermudagrass during the summer. This suggests that any advantage from use of fescue compared to small-grain forages will have to come from lower production costs for the perennial fescue. The phenomenon of compensatory growth is difficult to predict. Jordan et al., (2001) reported that steers back grounded in Nebraska at restricted rates of gain from 0.5 to 1.0 lb/day compared to 1.5 lb/day for controls, only compensated for 25 to 32% of this difference when they subsequently grazed summer forages. They stated that previous work showing full compensation following summer grazing was not supported in four consecutive years of compensatory gain research.

The relative performance of calves grazing tall fescue, small-grain forages and bermudagrass forages in this study is consistent with other studies with these forages (Daniels et al., 2002, Parish et al., 2003). It is reasonable, therefore, to assume that the differences in performance between small-grain forages and tall fescue observed in the present study are consistent with previous findings and that the advantages for calves grazing small-grain forages will be carried over through grazing either on small-grain forages during the graze-out phase or on bermudagrass in the summer.

It is probable that the degree of restricted growth observed for endophyte-infected fescue in our study was not severe enough to trigger the classical definition of compensatory growth, which is a period of efficient growth following growth restriction. Drouillard and Kuhl (1999), in their review stated that extending the period of growth restriction decreases the likelihood of enhancing profitability in integrated systems because maintenance costs during the low-input phase become an increasing proportion of overall costs of production.

## Implications

Poorer gains on fescue than for small-grain forages were not compensated when calves subsequently grazed small-grain forages during graze-out or bermudagrass in summer. Since reduced performance on fescue was carried through the entire grazing system, costs of reduced performance on fescue must be offset by reduced costs of forage production from the perennial tall fescue forage.

## Literature Cited

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 Drouillard, J.S. and G.L. Kuhl. 1999. J. Anim. Sci. 77. Suppl. 2:136.  
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**Table 1. Effects of grazing fescue or small-grain forages during graze-out on subsequent performance on bermudagrass, 2002 and 2003, Trial 1.**

Item	Winter-spring forage <sup>a</sup>		SE <sup>b</sup>
	Tall fescue	Wheat/rye	
2002			
Body wt, March 13, lb	444	443	
Graze-out gain, March 13 to May 8 (56d), lb	56 <sup>c</sup>	147 <sup>d</sup>	5.5
Summer gain, May 8 to Aug 15 (99 d), lb	198	188	6.1
Season gain, March 13 to Aug 15 (155 d), lb	254 <sup>c</sup>	335 <sup>d</sup>	8.3
2003			
Body wt, March 13, lb	503	508	
Graze-out gain, March 13 to May 8 (56 d), lb	65 <sup>c</sup>	120 <sup>d</sup>	5.5
Summer gain, May 8 to Aug 15 (99 d), lb	146	149	6.1
Season gain, March 13 to Aug 15 (155 d), lb	211 <sup>c</sup>	268 <sup>d</sup>	8.3

<sup>a</sup>Forage type during graze-out period, March 13 to May 8.

<sup>b</sup>n=5 for 2002 and 4 for 2003.

<sup>c,d</sup>Least squares means with no superscript in common differ ( $P < 0.05$ ).

**Table 2. Effects of fall-winter grazing on fescue or wheat/rye on small grains graze-out performance, Trial 2.**

Item	Fall-winter forage <sup>a</sup>		
	Tall fescue	Wheat/rye	SE <sup>b</sup>
Body wt, November 21, 2002, lb	493	496	
Gain Nov 21 to Jan 31 (70 d), lb	80 <sup>c</sup>	131 <sup>d</sup>	6.7
Graze-out gain, Jan 31 to Apr 22 (81 d), lb	210	209	7.0
Season gain, Nov 21 to Apr 22 (151 d), lb	290 <sup>d</sup>	340 <sup>c</sup>	10.9

<sup>a</sup> Forage type grazed from Nov 21 to Jan 31

<sup>b</sup> n = 5

<sup>c,d</sup> Least squares means with no superscript in common differ (P < 0.05)