

Using Orchardgrass and Endophyte-Free Fescue Versus Endophyte-Infested Fescue Overseeded on Bermudagrass for Cow Herds: Three-Year Summary of Cattle Performance

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Story in Brief

A trial was initiated in January 2000 to evaluate endophyte-free tall fescue (*Festuca arundinacea* Schreb.) or orchardgrass (*Dactylis glomerata* L.) overseeded into dormant common bermudagrass [*Cynodon dactylon* (L.) Pers.] sods for spring-calving cows. Two management systems were evaluated in an effort to help these cool-season grasses persist; these include rotations to new paddocks twice weekly or twice monthly. To serve as controls, pastures (n = 4) containing approximately 50% endophyte-infested fescue, with the balance mainly in bermudagrass and other warm- and cool-season annuals, were evaluated concurrently. This type of pasture, with approximately 50% dilution of fescue, represents a common grazing situation in northern Arkansas. Actual weaning weight, adjusted 205-day weaning weight, total gain from birth to weaning, and average daily gain from birth to weaning were greater ($P < 0.04$) for calves on non-toxic forages (endophyte-free fescue or orchardgrass) than for those on endophyte-infested fescue pastures. Calves raised on both orchardgrass grazing systems and endophyte-free fescue rotated twice monthly exhibited a 51- to 62-lb advantage in actual weaning weight over those on endophyte-infested fescue pastures. It is not clear why calves raised on endophyte-free fescue pastures rotated twice weekly did not exhibit this type of advantage. Cows grazing orchardgrass and endophyte-free fescue pastures exhibited higher ($P < 0.10$) body weights and body condition scores at calving, breeding, and weaning than cows grazing endophyte-infested fescue pastures. We intend to monitor these pastures for at least one additional year prior to conducting a final summary.

Introduction

Many cow-calf enterprises in the Ozarks are maintained on pasture systems that are mixtures of endophyte-infested tall fescue and common bermudagrass. The association of the fungus *Neotyphodium coenophialum* with tall fescue has a positive effect on plant persistence, but the toxins produced by this fungus affect live-stock performance negatively. A trial was initiated in January 2000 to evaluate the effectiveness of overseeding endophyte-free fescue or orchardgrass into dormant common bermudagrass sods for spring-calving cows. Orchardgrass and endophyte-free tall fescue pastures were rotated either twice monthly or twice weekly in an effort to help these forages persist. Our objective was to compare the cattle performance on these forage management systems with a typical mixture of endophyte-infested fescue and common bermudagrass that was managed on a twice monthly rotation schedule. This report includes data from the initial 3 years of the study.

Experimental Procedures

A detailed description of the establishment of endophyte-free fescue and orchardgrass forages and all forage management practices are reported in a companion report (Coblenz et al., 2003). Sixty-five spring-calving cows (1208 ± 150 lb) were stratified by weight, age, and breeding and assigned to one of the thirteen pastures (five per pasture) on January 11, 2000. Initially, at least one cow per pasture had a Hereford sire and Brahman x Angus dam; the balance of the cows were purebred Angus. Cows and calves were not supplemented other than with hay when forage was limiting, but a commercial mineral mix was offered free choice throughout the trial. From mid-May through mid-July of each year, one Gelbvieh bull

was assigned to each pasture. Cows were weighed and evaluated for body condition score on a monthly basis. Calves were weighed monthly and weaned in early October. Actual and 205-day adjusted weaning weights were obtained and analyzed as response variables. Milk production was evaluated by the weigh-suckle-weigh method in May and July of each year.

Cows initially assigned to each pasture remained on their assigned pasture continuously throughout the trial in order to assess the cumulative effects of each grazing system on animal performance. Cows were checked for pregnancy by rectal palpation in January of each year, and any open cows were replaced with pregnant first-calf heifers. Similarly, any cows without calves at the end of the calving season (May 1) were replaced with a primiparous cow and her calf. All data presented are 3-year averages, except for milk production and pregnancy rate, which include data from the 2000 and 2001 seasons only. Means were compared with four contrast statements that evaluated: 1) endophyte-infested fescue vs. non-toxic forages (orchardgrass and endophyte-free fescue); 2) endophyte-free fescue vs. orchardgrass; 3) twice weekly vs. twice monthly rotation (excluding endophyte-infested fescue); and 4) the interaction of #2 and #3.

Results and Discussion

Birth weight of calves (Table 1) was not affected by grazing system ($P \geq 0.17$). Actual weaning weight, adjusted 205-day weaning weight, total gain from birth to weaning, and average daily gain from birth to weaning were greater ($P \leq 0.041$) for calves on non-toxic forages than for those on endophyte-infested fescue pastures. No other contrast was significant ($P \geq 0.13$) for any of these response variables. Calves raised on orchardgrass pastures managed with either system and endophyte-free fescue rotated twice monthly

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exhibited a 51- to 62-lb advantage in actual weaning weight over those on endophyte-infested pastures. It is not clear why calves raised on endophyte-free pastures rotated twice weekly did not exhibit this advantage. Generally, calves raised on endophyte-infested pastures with 50% dilution (Coblentz et al., 2003) exhibited a level of performance that may be quite acceptable to the many part-time producers operating in northern Arkansas, but this performance was poorer than observed for calves raised on non-toxic forages.

Cow weights (Table 2) and body condition scores (Table 3) at calving, breeding, and weaning were lower ($P < 0.10$) for cows grazing endophyte-infested pastures than for those grazing orchardgrass and endophyte-free pastures. At breeding, body condition scores were higher ($P < 0.001$) for cows grazing non-toxic pastures rotated twice monthly than for those grazing non-toxic pastures rotated twice weekly. In addition, the interaction of rotation frequency and non-toxic forage also was significant ($P = 0.011$), largely due to the difference in body condition score (0.6 units) that was observed between twice monthly and twice weekly rotation schedules for endophyte-free fescue pastures, but was not observed for orchardgrass systems. Generally, milk production in May and July showed little response to treatment; respective 2-year averages were 11.7 and 7.9 lb/cow/day. Similarly, pregnancy rate exhibited little response to treatment, and the 2-year mean was 84%.

Implications

To date, calf weaning weights and cow weights and body condition scores at calving, breeding, and weaning for cattle grazing non-toxic forage systems have been greater than observed for cattle grazing endophyte-infested pastures with approximately 50% dilution. However, these differences have been marginal. Based on the returns demonstrated in this study, it remains unclear whether cow-calf producers will be willing to make the commitments necessary to establish and maintain these non-toxic forages.

Literature Cited

Coblentz, W.K., et al. 2003. Arkansas Anim. Sci. (submitted).

Table 1. Summary of calf performance at Batesville, AR, from 2000 through 2002.

System ¹	Birth	Actual	205-day	Total gain,	Average
	weight	weaning	adjusted	birth to	daily gain,
	----- lb -----	weight	weaning	weaning	birth to
					weaning
					lb/head/day
OG - HM	79.8	557	536	477	2.2
OG - LM	78.7	552	543	473	2.3
FF - HM	77.6	505	494	428	2.0
FF - LM	78.5	546	541	468	2.3
IF - LM	76.5	495	481	418	2.0
SE	1.6	21	16	9	0.1
Contrast					
IF vs. FF and OG	0.171	0.038	0.010	0.041	0.010
FF vs. OG	0.485	0.199	0.190	0.202	0.191
HM vs. LM ²	0.939	0.404	0.140	0.381	0.125
Interaction ³	0.534	0.288	0.228	0.291	0.233

¹ Abbreviations: OG, orchardgrass; FF, endophyte-free tall fescue; IF, endophyte-infested tall fescue; HM, cattle rotated to fresh paddocks twice-weekly; and LM, cattle rotated to fresh paddocks twice-monthly.

² The IF treatment is not included with LM systems.

³ Interaction of non-toxic forages (OG and FF) and grazing management (LM and HM). The LM grazing treatment does not include IF forage.

Table 2. Summary of cow weights at Batesville, AR, from 2000 through 2002.

System ¹	Calving	Breeding	Weaning	Weight	Weight
	weight	weight	weight	change, calving to breeding	change, calving to weaning
	----- lb -----			lb/head	lb/head
OG - HM	1243	1172	1192	- 67	- 64
OG - LM	1297	1249	1261	- 25	- 30
FF - HM	1286	1198	1185	- 73	- 110
FF - LM	1318	1267	1245	- 39	- 78
IF - LM	1179	1103	1067	- 62	- 105
SE	34	34	34	14	17
<i>Contrast</i>					
IF vs. FF and OG	0.004	0.040	0.035	0.579	0.169
FF vs. OG	0.314	0.547	0.799	0.642	0.103
HM vs. LM ²	0.192	0.071	0.179	0.109	0.235
Interaction ³	0.718	0.925	0.926	0.841	0.971

¹ Abbreviations: OG, orchardgrass; FF, endophyte-free tall fescue; IF, endophyte-infested tall fescue; HM, cattle rotated to fresh paddocks twice-weekly; and LM, cattle rotated to fresh paddocks twice-monthly.

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³ Interaction of non toxic forages (OG and FF) and grazing management (LM and HM). The LM grazing treatment does not include IF forage.

Table 3. Summary of cow body condition score¹ at Batesville, AR, from 2000 through 2002.

System ²	BCS at calving	BCS at breeding	BCS at weaning
	OG - HM	6.6	6.6
OG - LM	6.8	6.8	6.9
FF - HM	6.8	6.5	6.7
FF - LM	6.9	7.1	6.9
IF - LM	6.6	6.4	6.1
SE	0.1	0.1	0.1
<i>Contrast</i>			
IF vs. FF and OG	0.095	0.003	0.004
FF vs. OG	0.239	0.184	0.793
HM vs. LM ³	0.132	< 0.001	0.238
Interaction ⁴	0.631	0.011	0.418

¹ BCS = body condition score (1 = emaciated, 9 = obese).

² Abbreviations: OG, orchardgrass; FF, endophyte-free tall fescue; IF, endophyte-infested tall fescue; HM, cattle rotated to fresh paddocks twice-weekly; and LM, cattle rotated to fresh paddocks twice-monthly.

³ The IF treatment is not included with LM systems.

⁴ Interaction of non toxic forages (OG and FF) and grazing management (LM and HM). The LM grazing treatment does not include IF forage.