

EFFECTS OF FESCUE ENDOPHYTE ON PERFORMANCE OF GRAZING STEERS

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Story in Brief

Seventy five Angus, Brahman X Angus, Angus X Brahman-Angus and Simmental X Brahman-Angus 7 to 12-month-old steers (500 lbs) were used to study effects of endophyte and clover on performance of steers grazing fescue. The study was conducted at the Kerr Center near Poteau in eastern Oklahoma. Pasture treatments were: (1) 83% endophyte infected Kentucky 31 fescue, (2) 76% infected Kentucky 31 interseeded with clover and (3) reseeded endophyte-free Kentucky 31 fescue. Each pasture was replicated 3 times. Steers grazed 197 days from November 6, 1986 to May 21, 1987. Weights and rectal temperatures were taken at 42 day intervals except for the April-May period which was 28 days. Steers grazing endophyte-free fescue gained 364 lbs/steer compared to 247 lbs for infected fescue and 369 lbs for fescue-clover steers. Body temperature was higher for endophyte-infected fescue only at the May weight.

(Key Words: Fescue, Endophyte, Stockers)

Introduction

Performance of cattle grazing fescue has typically been much poorer than predicted from analyses of the forage. Toxic factors have long been suspected but not identified until 1976 when a fungus endophyte living within the cell structure of the fescue plant was isolated. Since then, research has shown that fescue stands with little or no infection of the endophyte produce significantly better animal performance than infected stands. The objective of this study was to evaluate performance of stocker steers grazing endophyte-free and infected stands of fescue and also infected stands interseeded with clover.

Materials and Methods

A grazing study with stocker cattle was initiated at the Kerr Center near Poteau, Oklahoma in the fall of 1985. Pasture treatments were (1) endophyte infected Kentucky 31 fescue, (2) infected Kentucky 31 interseeded with clover and (3) reseeded endophyte-free Kentucky 31 fescue. Pastures were established by interseeding existing endophyte infected Kentucky 31 fescue with clover and reseeding endophyte-free Kentucky 31 fescue. Reseeded pastures were established by spraying infected fescue three times with Paraquat beginning in the spring of 1984 to prevent seed production. Seed had been purchased one year earlier, stored for a year and then tested to ensure a zero endophyte level. Fertilization consisted of 0-50-50 (N, phosphate, potash) for fescue-clover, and 104-45-54 for infected and endophyte-free pastures. Each pasture type was replicated 3 times based on soil type to provide 9

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pastures in a wagon wheel arrangement around a central weighing facility.

Individual performance data were obtained from seven to ten steers initially allotted to each fescue-clover pasture and ten steers per pasture for the other treatments based on weight and breed. Additional steers were added as needed to equalize forage utilization between pastures with data from added steers only used to establish stocking rates. No supplemental hay was fed. By April 9, forage growth in some pastures began to exceed the amount being grazed and additional steers were added.

Clovers used were Redland red, Regal ladino, Mt. Barker subterranean and Yucci arrowleaf clover with red clover the dominant clover in the pastures. Pastures ranged from 10.6 to 13.9 acres. All steers were implanted with Ralgro at the initiation of the study. Cattle weights were taken after overnight withdrawal from forage and water.

Results and Discussion

Results of the 1986-87 grazing season are shown in Table 1. Analysis of forages showed an endophyte infection rate of 83 percent for infected pastures and 76 percent for clover-fescue pastures. One of three pastures established to be endophyte-free showed a 6 percent infection rate. An explanation for this is not apparent at this time.

Steers grazing endophyte-free fescue gained 122 lb more ($P < .01$) over the 197 day period than steers grazing infected fescue. Individual gains of steers grazing fescue-clover pastures were similar to gains on endophyte-free pastures. Higher gains on endophyte-free pastures compared to infected pastures were observed at every weigh period. Increased gains between infected and endophyte-free pastures were also

Table 1. Weights and gains of steers grazing fescue.^a

	Treatments		
	Endophyte Infected Fescue	Infected Fescue & Clover	Endophyte Free Fescue
No. Steers	29	19	27
Initial wt. (Nov. 6)	508	491	510
Gains, lb.			
Nov-Dec, 42 days	78 ^d	85 ^c	104 ^b
Dec-Jan, 42 days	30 ^c	47 ^b	42 ^b
Jan-Mar, 42 days	29 ^d	62 ^b	51 ^c
Mar-Apr, 42 days	66 ^d	96 ^b	86 ^c
Apr-May, 28 days	44 ^c	80 ^b	82 ^b
Total fescue gain	247 ^c	369 ^b	364 ^b
Final Wt., May 21	755 ^c	860 ^b	874 ^b
Stocking rate (acres per steer)	1.1	1.4	1.5

^aLeast squares means.

^{bcd}Means on the same line with different superscripts differ ($P < .05$)

seen during the previous (1985-86) grazing season (71 lb) although no differences were noted during the months of December and March.

Interseeding infected pastures with clovers produced individual gains similar to those seen on endophyte infected pastures. As ambient temperatures increased in the spring and growth of both clover and fescue accelerated, it was obvious that clover was making up an increasing percentage of the total diet at the expense of fescue. Stocking rates (Table 1) on clover-fescue pastures were lower than for other treatments until spring, however, because of reduced nitrogen fertilization rates on clover pastures. Compared to endophyte infected pastures, endophyte free pastures were grazed more closely and uniformly, especially during the spring months. The combination of over 100 lb/head higher gain and more complete utilization of the forage shows that forage intake was greater with endophyte free fescue. A much greater amount of forage was left ungrazed on both fescue-clover and endophyte infected pastures at the end of the grazing season compared to endophyte-free pastures.

Elevated body temperature is commonly reported for cattle grazing infected pastures. Rectal temperatures (Table 2) taken at each weighing showed that body temperature was only elevated for cattle grazing infected pastures at the May final weight. This was also seen in the first year of the study. Cattle grazing clover-fescue pastures had temperatures intermediate between the other treatments at the May weighing. Rectal temperatures of some individuals were as high as 107 F at 7:30 AM and severe stress was noted in several steers from infected pastures. Steers grazing endophyte infected pastures showed the typical signs of "fescue cattle", rough haircoats, gaunted, and high respiration rates. Mud covered the backs of many of these steers and was caused by standing in mudholes and swatting the back with a mud-covered tail. Steers from endophyte-free pastures were in excellent condition with smooth, clean haircoats and apparently full rumens.

In summary, the presence of fescue endophyte at an 83 percent infection rate severely reduced steer gains during the Nov-May period. Forage utilization was reduced especially during the spring months. Interseeding clover into infected pastures increased daily gain but at the expense of stocking rate because of limitations that clover puts on the nitrogen fertilization program.

Table 2. Effects of fescue endophyte on rectal temperature of grazing steers.

	Treatments		
	Endophyte Infected Fescue	Infected Fescue & Clover	Endophyte Free Fescue
Temperatures			
December	101.8	102.1	102.0
January	102.0	102.5	102.3
March	102.2	102.2	102.0
April	102.1	102.1	101.9
May	103.9 ^C	103.5 ^D	102.8 ^A

abc Means on the same line with different superscripts differ ($P < .05$)