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Endophyte-infected, tall fescue hay utilization by exercised, yearling horses

Abstract

Fescue toxicity causes substantial production losses in sheep, cattle, and horses. These losses are attributed to an endophyte, *Acremonium coenophialum*. However, our results indicate that Quarter horse yearlings can be fed endophyte-infected tall fescue hay for at least 106 days with no detrimental effects on either growth or exercise performance. However, these findings have not been substantiated in other classes of horses or in horses consuming endophyte-infected fescue for longer durations.

Keywords

Cattlemen's Day, 1993; Kansas Agricultural Experiment Station contribution; no. 93-318-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 678; Beef; Tall fescue; Endophyte; Yearling horses; Exercise

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ENDOPHYTE-INFECTED, TALL FESCUE HAY UTILIZATION BY EXERCISED, YEARLING HORSES

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K. K. Bolsen, and F. K. Brazle¹

Summary

Fescue toxicity causes substantial production losses in sheep, cattle, and horses. These losses are attributed to an endophyte, *Acremonium coenophialum*. However, our results indicate that Quarter horse yearlings can be fed endophyte-infected tall fescue hay for at least 106 days with no detrimental effects on either growth or exercise performance. However, these findings have not been substantiated in other classes of horses or in horses consuming endophyte-infected fescue for longer durations.

(Key Words: Tall Fescue, Endophyte, Yearling Horses, Exercise.)

Introduction

Livestock consuming tall fescue frequently show poor growth performance. Several studies also indicate poor reproduction performance in broodmares consuming tall fescue infected with an endophyte fungus (*Acremonium coenophialum*). However, there are few data on the effects of feeding endophyte-infected tall fescue hay on performance of young growing horses. Our objectives were to measure growth and exercise performance in yearling horses fed endophyte-infected hay.

Experimental Procedures

Twelve Quarter horse yearlings were blocked initially by age (12 to 16 months) and sex (six geldings and six fillies) and randomly assigned to one of three hay treatments:

native prairie (P), endophyte-free tall fescue (EF), or endophyte-infected tall fescue (EI). The ergovaline concentration in the EI hay was 190 ppb, with none detected in either the P or EF hays. Yearlings were fed their respective hays and a corn and oat-based concentrate (Table 1) in a 55:45 ratio to meet NRC (1989) recommended nutrient requirements for growth. Rations were fed twice daily for 106 days (July 1 to October 14, 1991) in dry lots that averaged 80 by 100 ft. Initially and at 14 day intervals, the horses were weighed, measured for wither and croup heights, and evaluated for body condition score.

The four horses in each group were

Table 1. Composition of the Concentrate and Supplement Portion of the Concentrate

Ingredients	%, as fed basis
Corn, cracked	40
Oats, rolled	37
Supplement pellet ¹	20
Cane molasses	3

¹Composition of the supplement (% as fed basis): soybean meal, 55.5; dehydrated alfalfa, 33.4; dicalcium phosphate, 4.6; limestone, 2.4; trace mineral salt, 2.7; vitamin premix, 1.3; and copper sulfate, .03.

¹Southeast Area Extension Office, Chanute.

exercised biweekly at noon by a mechanical walker. Exercise duration started at 10 min and increased by 5 min every 4 weeks until the final exercise period. Respiration, heart rate, and body temperature were recorded at the start of exercise and at 5, 30, and 60 min post-exercise. Daily rectal body temperature was taken between 3:30 and 4:30 p.m.

Blood was collected from the jugular vein at the start of the study and at 28-day intervals. Serum was harvested and stored at -20°C until assayed for calcium, phosphorus, prolactin, thyroxine (T_4), and triiodothyronine (T_3). Apparent nutrient digestibilities were measured using chromic oxide as a marker. Fecal grab samples were taken for 3 days at 3-hour intervals after the 7:00 a.m. feeding to represent a 12-hour collection period.

Data were analyzed by analysis of variance as a split plot over time, and significant differences were separated using Fisher's LSD test.

Results and Discussion

The chemical compositions of the three hays were similar. Crude protein ranged from 5.7 to 7.2% and acid detergent fiber, from 40.0 to 42.2% (dry basis). Nutrient digestibilities were not affected ($P > .05$) by the endophyte in fescue hay. In fact, crude protein digestibility was highest ($P < .05$) for the infected-hay ration. Average daily gain, changes in wither and croup heights, and body condition scores were all similar ($P > .05$) for the three hay sources (Table 2). In addition, serum calcium, phosphorus, T_3 , T_4 , and prolactin concentrations were similar ($P > .05$) and all within normal ranges among hay treatments. Exercise performances, as measured by respiration rate, heart rate, and rectal temperature, were also similar for all three hay rations.

These data suggest that, for at least 106 days, young growing horses can be fed endophyte-infected tall fescue hays without degrading growth or performance. Further studies should examine the apparent differences between the way horses and cattle react to endophyte, and how horses react long-term.

Table 2. Growth Performance of Yearling Horses Fed the Three Hay Treatments

Item	Hay			SE ^a
	Prairie	Endophyte-free	Endophyte-infected	
Initial wt, lb	745	741	729	10.2
Final wt, lb	902	924	908	10.2
Average daily gain, lb	1.52	1.72	1.61	.6
Final body condition score ^b	6.25	6.25	6.13	.09
Growth in croup height, in.	2.19	1.75	2.19	.22
Growth in wither height, in.	1.50	1.88	2.25	.24

^aStandard error of the mean.

^b1 = extremely thin; 9 = extremely fat.