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Abstract

Heifers developed on high-endophyte, tall fescue gained half as much weight (56 vs 117 lb; $P < .01$) and had a lower 35-day pregnancy rate (15 vs 58%; $P < .01$) compared to heifers fed low endophyte, tall fescue. Based on progesterone serum concentrations and visual determination of estrus, the proportion of heifers that had attained puberty by the start of the breeding season tended ($P = .11$) to be greater when fed oxytetracycline (55 vs 68%).

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; Reproduction; Puberty; Beef heifers; Oxytetracycline

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GROWTH AND REPRODUCTIVE CHARACTERISTICS IN HEIFERS FED ENDOPHYTE-INFECTED TALL FESCUE AND OXYTETRACYCLINE¹

C. W. Peters, F. K. Brazle², and L. R. Corah

Summary

Heifers developed on high-endophyte, tall fescue gained half as much weight (56 vs 117 lb; $P < .01$) and had a lower 35-day pregnancy rate (15 vs 58%; $P < .01$) compared to heifers fed low endophyte, tall fescue. Based on progesterone serum concentrations and visual determination of estrus, the proportion of heifers that had attained puberty by the start of the breeding season tended ($P = .11$) to be greater when fed oxytetracycline (55 vs 68%).

(Key Words: Tall Fescue, Reproduction, Puberty, Beef Heifers, Oxytetracycline.)

Introduction

Tall fescue is excellent in terms of yield and persistence; however, growth and reproductive performance by animals grazing tall fescue have generally been inferior to those of animals grazing other cool-season grasses. Tall fescue occupies approximately 35 million acres across the middle and southeastern U.S., including the eastern one-third of Kansas. About 22% of the nation's cows grazes tall fescue, approximately 80% of which is infected with an endophytic fungus, *Acremonium coenophialum*. Endophyte-infected tall fescue reduces feed intake and weight gain by growing cattle. One objective of this study was to determine the effect of endophyte-infected tall fescue on growth, onset of puberty, and reproductive performance by crossbred beef heifers. Because antibiotics

improve performance in grazing and feedlot cattle, our second objective was to determine if feeding the antibiotic, oxytetracycline, during the growing period would prevent the detrimental effects of endophyte.

Experimental Procedures

During a 160-d study (January to June), 136 Angus crossbred heifers were used in a completely randomized design with a 2×2 factorial experiment. Treatment diets consisted of low-endophyte (< 15% infection) or high-endophyte (> 90% infection) tall fescue hay and bromegrass seed (0% infection) or high-endophyte (> 90% infection) tall fescue seed with or without 240 mg/hd/d oxytetracycline. Heifers were offered forage *ad libitum* on a pen basis each day along with 5.9 lb/day of a 16.8% crude protein supplement of milo and soybean meal. Onset of puberty was determined by measuring serum progesterone in blood collected every 10 d during the study, coupled with visual confirmation of estrus. Heifers were weighed every 28 d. The breeding season started on May 15. The two blood samples immediately prior to that date were used to determine puberal status at the start of breeding. During the 35-d breeding period, heifers were inseminated artificially with semen from one sire, approximately 12 h after visual detection of estrus; at least two services were allowed per heifer and no cleanup bulls were used. Rectal temperature was recorded at the time of insemination. Pregnancy was determined by uterine palpation

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per rectum following trial completion.

Results and Discussion

Levels of crude protein and crude fiber in hay and seed fed to heifers are presented in Table 1. Table 2 details average hay and seed intake for the four treatments.

Initial heifer weights among the four treatments were similar at the beginning of the study (Table 3). However, heifers fed the high endophyte diet gained less than half as much ($P < .01$) as heifers fed the low- endophyte diet. Onset of puberty was not affected by endophyte infection, but feeding oxytetracycline tended ($P = .11$) to increase

the number of heifers puberal at the start of the breeding period. Consumption of high-endophyte diets decreased ($P = .02$) the percentage of heifers detected in estrus during the breeding season and decreased ($P < .01$) first service and overall pregnancy rates, possibly because of increased ($P = .04$) rectal temperature and lower ($P = .08$) serum progesterone at first service.

As expected, heifers consuming high-endophyte, tall fescue hay gained less weight and were less fertile than heifers consuming low-endophyte, tall fescue. The antibiotic oxytetracycline may help alleviate some of the negative effects of endophyte-infected tall fescue, especially in terms of puberty attainment prior to the breeding season.

Table 1. Crude Protein and Crude Fiber Content of Low- and High-Endophyte Fescue Fed to Developing Heifers

Item	Diet components ^a			
	LE Hay	LE Seed	HE Hay	HE Seed
Crude protein, %	8.0	12.3	8.8	13.1
Crude fiber, %	34.8	25.5	33.8	22.3

^aLE Hay= low-endophyte, tall fescue hay; LE Seed= grass seed; HE Hay= high-endophyte, tall fescue hay; HE Seed= high-endophyte, tall fescue seed.

Table 2. Average Hay, Seed, Supplement, and Antibiotic Intake by Heifers Fed High- or Low-Endophyte, Tall Fescue

Item	Treatments ^a			
	LE-OTC	LE+ OTC	HE-OTC	HE+ OTC
Intake, lb/d				
Hay	9.8	10.0	8.9	8.9
Seed	1.1	1.1	1.3	1.3
Supplement	5.9	5.9	5.9	5.9
Antibiotic intake, mg/d				
Oxytetracycline	0	240	0	240

^aLE= low-endophyte; HE= high-endophyte; OTC= oxytetracycline.

Table 3. Effect of Endophyte-Infected Tall Fescue and Oxytetracycline on Heifer Growth, Puberty, and Reproductive Performance

Item	Treatments ^a				SE	Effect ^b
	LE-OTC	LE+ OTC	HE-OTC	HE+ OTC		
No. of heifers	34	34	34	34		
Initial wt, lb	558	562	571	556	11	-
Wt gain, lb	115	119	53	59	7	E
Puberty, % ^c	56	71	53	65		OTC (P= .11)
P ₄ , ng/ml ^d	1.9	1.6	1.5	1.4	.2	E
Estrus, % ^e	85	88	65	77		E, E× OTC
RT, ^f	103.1 ^g	104.2 ^{hi}	104.9 ⁱ	103.6 ^{gh}	.4	E, E× OTC
Pregnant (based on number serviced)						
1 st service, %	45	27	5	12		E, E× OTC
Overall, %	52	63	18	12		E, E× OTC

^aLE= low-endophyte; HE= high-endophyte; OTC= oxytetracycline.

^bDenotes a significant (P< .10) effect of endophyte level (E), oxytetracycline (OTC) or their interaction (E× OTC).

^cPercentage of heifers that attained puberty prior to the breeding period.

^dAverage serum progesterone prior to the breeding period.

^ePercentage of heifers that were detected in estrus during the breeding period.

^fRectal temperature at time of insemination.

^{ghi}Means within a row without a common superscript letter differ (P< .05).