VALUE OF RALGRO® IMPLANTS IN FEEDLOT STEERS PREVIOUSLY MAINTAINED ON A HIGH ENDOPHYTE-INFECTED FESCUE HAY[1]

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Summary

Steers previously fed high-endophyte fescue hay showed a greater response to Ralgro® implants than those fed a low-endophyte hay. The mode of action for this response was not explained by cellular immune system responses or variability in prolactin levels.

(Key Words: Stockers, Finishing, Endophyte, Fescue, Ralgro.)

Introduction

Tall fescue is an important cool-season forage utilized by Kansas beef producers, with over 700,000 acres in the state. Unfortunately, most fescue pastures contain sufficient endophyte fungus to depress animal performance. Typically, stocker cattle grazed on fescue pastures have been discounted by feedlots in the high plains.

One solution to the problem is renovation of infected pastures by reseeding with endophyte-free varieties. Another solution is to find ways to manage cattle that will allow better use of high-endophyte pastures.

Recent Kansas research has indicated that the response to Ralgro (zeranol) implants is influenced by the endophyte content in fescue, with a greater improvement in average daily gain observed in steers grazing high-endophyte pastures.

The objectives of this study were 1) to determine the effect of Ralgro in feedlot steers that were previously maintained on endophyte-infected hay and 2) to elucidate possible modes of action for the zeranol response.

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[1]Appreciation is expressed to Pitman-Moore, Terre Haute, Indiana, for partial funding of this trial.

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Experimental Procedures

Ninety-six crossbred steers were allotted initially (forage phase) to two treatments: 1) fed to appetite a low (L) endophyte (approximately 20% infestation) hay or 2) fed to appetite a high (H) endophyte (approximately 80% infestation) hay and fescue seed mixture (Table 8.1).

After 73 d on the L or H hay diets, the steers were re-allotted within hay treatments to a 65-d feedlot trial (Table 8.2). At the start of the feedlot trial, half of the steers on each hay treatment were implanted with 36 mg of zeranol.

To determine if the Ralgro implants influenced the animals' immune systems, blood samples were taken from 24 steers (six head per implant and hay treatment) at the start of the feedlot phase and 28 d later. From these samples, lymphocyte proliferation responses to phytohemagglutin (PHA), concanavalin A (Con A), and pokeweed mitogen (PWM) were determined. Lymphokines, such as interlukin 2 (IL-2), which are physiologically active proteins or glycoproteins, are secreted by antigen-sensitized T-cells and can be used to evaluate immune function. Yet another indicator of immune system response is the percentage specific lysis of virus-infected cells (% SL). Potential influ-

Table 8.1. Nutrient Analysis of Hay and Seed Fed during the Forage Phase

Item	Low endophyte hay	High endophyte hay	High endophyte seed
Dry matter, %	8.5	8.5	9.2
Crude protein, %	8.0	9.1	12.8
Crude fiber, %	32.7	34.0	23.8
Acid detergent fiber, %	36.9	40.9	30.3
Calcium, %	1.06	.88	.62
Phosphorus, %	.24	.19	.33

Table 8.2. Ingredient Composition of Feedlot Diets

Ingredient	Starter ration[a], % of DM	Final ration, % of DM
Grain sorghum	28.6	78.4
Forage sorghum silage	62.3	16.2
Soybean meal	3.9	—
Protein supplement[b]	5.2	5.4

[a]Steers were offered 10 lb prairie hay/head/day the first day and then over 3 d adapted to silage-based diet. Starter ration was gradually adjusted over 32 d to reach the level of concentrate in the final ration.

[b]Composition: 65.4% soybean meal, 19.3% limestone, 5.25% salt, 5% urea, 3.53% potassium chloride, 1.0% soybean oil, .35% Z-10® trace mineral and .175% Vitamin A-30®.

ences on the endocrine system were determined using prolactin hormone levels obtained from blood samples taken at the start of the forage phase and at 3-d intervals at the beginning of the feedlot phase. Body temperatures, indicators of endophyte stress, were monitored during the trial.

Results and Discussion

During the forage (hay) feeding phase, steers on the high endophyte hay lost more weight (−.54 vs −.19 lb/d) and had an increased body temperature at the end of the 73-d hay feeding period. Blood prolactin was 734 ng/ml at the start of the trial and was suppressed to an average of 23.9 ng/ml in steers across both hay treatments.

During the 65-d feedlot period, steers previously fed the high endophyte hay showed a greater response to Ralgro (.49 vs .20 lb/d) than steers previously fed the low endophyte hay (Table 8.3). However, this implant response was not explained by differences in the animals' cellular immune functions (Table 8.4) or by differences in serum prolactin levels.

Table 8.3. Effect of Fescue Hay Endophyte Level on Animal Performance and Subsequent Response to Ralgro Implants during the Feedlot Period

Item	Level of endophyte in the hay	
	Low	High
Forage phase—73 d		
Starting wt, lb	674.3	673.4
Daily weight change, lb	−.19[b]	−.54[a]
Body temp at end of trial, °F	100.3[b]	101.4[a]
Blood prolactin, ng/ml[1]	32.6[a]	15.2[b]

	Control	Implanted	Control	Implanted
Feedlot phase—65 d				
Daily gain, lb	2.17[a]	2.37[ab]	2.48[b]	2.97[c]
Body temp at 28 d, °F	102.2	102.2	102.4	102.4
Blood prolactin, ng/ml[2]	16.6[a]	25.0[ab]	35.9[b]	25.0[ab]

[1]Average of two sampling times.
[2]Average of six sampling times.
[abc]Values in a row without a common superscript differ ($P<.05$).

Table 8.4. Effect of Hay Endophyte Level and Ralgro Implants on the Animals' Cellular Immune Systems

Item	Low endophyte hay		High endophyte hay	
	Control	Ralgro	Control	Ralgro
Mitogen[1]				
Con A	64	176	57	129
PHA[2]	276	204	194	202
PWM[2]	226[a]	150[b]	196[ab]	212[ab]
% SL	6.7	7.9	3.6	5.3
IL-2, U/ml	6.5	14.4	7.9	5.3

[1]See text for discussion of mitogens.
[2]Net CPM× 10^3.