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Abstract

Sixty-four growing steers were used in a split-plot experiment, where the whole plot was pasture, and the split-plot was implants. Whole plot treatment was a 4 × 2 factorial with four levels of fescue (High Endophyte, Low Endophyte, Novel, or Endophyte Free) and two levels of legume (Legumes or No Legumes). The split-plot included four implant levels (No Implant, Synovex One Grass, Revalor-G, Ralgro). Data collected were weights, hair coat scores, hair length, rectal temperature (every 28 days), and ultrasound carcass characteristics coming off grass. Steers on High Endophyte had the lowest average daily gain (ADG), longest hair, and highest temperature as compared to steers on all other fescue types. The gain differentiation was observed beginning at day 56 through the end of the study. Overall, ADG was not impacted by the addition of legume nor implant type. Steers that were not implanted had a longer hair length throughout many measurement dates. Steers grazing pastures with legumes tended to have a higher ultrasound-measured marbling score and less muscle depth. This study found that the best management strategy for fescue toxicity is to use non-endophyte or non-toxic varieties of fescue pasture. Contrary to previous research, the addition of implants and legumes for this project showed no improvement in cattle gains.

Keywords

fescue, clover, implant, cattle gain, hair score, fescue toxicity, pasture, grazing

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Evaluation of Implants, Clover, and Fescue Variety on Stocker Steers

Z.T. Buessing¹ and J.K. Farney

Summary

Sixty-four growing steers were used in a split-plot experiment, where the whole plot was pasture, and the split-plot was implants. Whole plot treatment was a 4×2 factorial with four levels of fescue (High Endophyte, Low Endophyte, Novel, or Endophyte Free) and two levels of legume (Legumes or No Legumes). The split-plot included four implant levels (No Implant, Synovex One Grass, Revalor-G, Ralgro). Data collected were weights, hair coat scores, hair length, rectal temperature (every 28 days), and ultrasound carcass characteristics coming off grass. Steers on High Endophyte had the lowest average daily gain (ADG), longest hair, and highest temperature as compared to steers on all other fescue types. The gain differentiation was observed beginning at day 56 through the end of the study. Overall, ADG was not impacted by the addition of legume nor implant type. Steers that were not implanted had a longer hair length throughout many measurement dates. Steers grazing pastures with legumes tended to have a higher ultrasound-measured marbling score and less muscle depth. This study found that the best management strategy for fescue toxicity is to use non-endophyte or non-toxic varieties of fescue pasture. Contrary to previous research, the addition of implants and legumes for this project showed no improvement in cattle gains.

Introduction

Fescue makes up a large portion of pastureland in the United States. Kentucky 31 (K31) is the most commonly planted fescue type due to hardiness and easy stand maintenance. Kentucky 31 is hardy due to the symbiotic relationship with a fungus commonly known as endophyte. The endophyte allows the fescue to be less susceptible to flood, drought, pests, and other environmental impacts. However, the endophyte produces ergot toxins that can cause metabolic issues and possibly vasoconstriction. Vasoconstriction can lead to increased respiration rates, sloughing of hoof wall and/or tails, pregnancy loss, breeding issues, and reductions in stocker calf gains.

A variety of options have been discovered and tested to help combat the issues pertaining to cattle performance included fescue development, the addition of clover, or implants. The other fescue varieties have shown improvements to cattle gains, but may come at the cost of stocking rates, pasture persistence, grazing days, or grazing management. Legumes often improve cattle gains but may impose a problem with return on

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investment. Implants have been proposed as a way to control the fescue toxicity issues. The use of implants in cattle during grazing has shown improved gains compared to cattle grazing without implants.

The purpose of this study is to identify management practices that result in the greatest economic return to the stocker operation and determine which management techniques reduce toxicity issues.

Experimental Procedures

Sixty-four growing steers were weighed on two consecutive days and allotted to one of sixteen fescue pastures. Four levels of fescue pastures were used: K31—high endophyte (HIGH); K31—low endophyte (LOW); endophyte free fescue (FREE); and novel endophyte fescue (NOVEL). Eight of the pastures also had ladino clover (6 lb/acre) to serve as an interseeded legume (two pastures per fescue type). Four steers were assigned to each pasture. The steers in each pasture were assigned to one of four implant treatments. The implant treatments included no implant, Ralgro (Merck Animal Health), Revalor-G (Merck Animal Health), and Synovex One Grass (Zoetis).

Steers were turned out on March 26, 2020, and grazed until November 4, 2020. Pastures were fertilized according to recommendations of soil test results in February 2020. Legumes were interseeded into pastures in 2014. Seedheads were clipped in all pastures June 2020.

On day zero of the trial, calves were implanted and wormed, and rectal temperature, hair coat length and score were recorded. Hair length was measured over the 10th rib in the upper 1/3 of the body using a hemming tape measure. Hair scoring was completed by three individual scorers about every 28 days and based on a scale of 1-5 where a value of 1 is a steer that is completely slick haired; 2 has 25% of body with long hair; 3 has 50% of body with long hair; 4 has 75% of body with long hair; and 5 has 100% of body with long hair coat. Steer weight, hair measurement, and rectal temperature was recorded every 28 days until the pastures no longer supported the steers.

At the end of the grazing period, steers were weighed off grass, scanned with ultrasound for body composition, hair scored and measured, and rectal temperature read. The steers were then placed into feedlot pens where they were implanted with a finishing implant (Revalor-XS) and fed a common finishing ration consisting of corn, corn silage, distillers grains, mineral pack, Rumensin, and Tylosin. For the first three weeks, hair coat scores were recorded by three independent evaluators to determine the rate of overcoming fescue toxicity. Steers were weighed every 28 days during the feedlot period until ~0.5-in. backfat was visually appraised and confirmed by ultrasound. Feedlot data and carcass measurements were not reported.

Results and Discussion

In this first year of data collection, there were no interactions between grass type and implant, thus only main effects have been reported.

Steer Performance Fescue Types

Fescue type had the greatest impact on the overall steer performance. Similar to past studies, High Endophyte Kentucky-31 Fescue resulted in the poorest performance by the steers. These steers had the lowest ADG, longest hair, and highest rectal temperature when compared to the steers grazing other types of fescue (Table 1). By 56 days on the fescue, the High Endophyte treatment steers had the lowest gain.

Hair length tended to have a little variation among Low Endophyte, Novel Endophyte, and Endophyte Free on which treatment produced the shortest hair length. One consistency among all measurement days for hair length is that High Endophyte always had the longest hair on the steers. When rectal temperatures were different, the calves on High Endophyte had the highest rectal temperature, yet that was not observed consistently through the measuring period.

Steer Performance Legumes

The addition of legumes did not present as great of an impact on the steers' performance as did the type of fescue. Legumes had no impact on the ADG of the steers throughout the course of the grazing period (Table 2). During the whole grazing period there were little to no individual weigh days that showed a significant difference between the two treatments of legume or no legume on the ADG. Steers that grazed legumes tended to have higher measured ultrasound marbling scores and less muscle depth (Table 2). The addition of legumes and effects on gain and mitigation of fescue toxicity may have been diluted as some of the high endophyte pastures with legumes had a very low stand count of legumes (< 5% of plant population was legume).

Steer Performance Implants

Implants proved to impact the hair length of the steers, where those that were not implanted had longer hair than those steers implanted throughout many of the measurement periods (Figure 1). Longer hair was consistently observed in those steers that did not receive an implant. The other three implant treatments proved to produce better results in minimizing the effects fescue toxicity had on the hair length of the steers. Implants did not have any effect on the steers' ADG (Table 3). Although there were different payout windows for each of the implants, a difference in ADG was not seen based on the results from this grazing period. There was some variability in ADG between implants, that were not statistically significant, and it will be interesting to see as the study continues for 2 more years with more replications.

This study found that the best management strategy for fescue toxicity is to use non-endophyte or non-toxic varieties of fescue pasture. Additionally, even though implants did not result in greater gains for the steers, the shorter hair coats may correspond to an economic incentive at marketing as calves that have the "look" of a fescue calf (long, rough hair coat), are reduced in price at market. Contrary to previous research, the addition of implants and legumes for this project showed no improvement in cattle gains.

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Table 1. Steer performance measures based on fescue type

Item	Endophyte Free	Novel Endophyte	Low Endophyte	High Endophyte	SEM	P-value
Initial wt, lb	605	613	605	607	8.0	0.88
Final wt, lb	928	943	937	835	14.0	< 0.0001
Grazing ADG, lb/d	2.11	2.17	2.18	1.65	0.08	< 0.0001
Loin muscle depth, mm	50	49	51	49	1.2	0.53
Marbling score ¹	5.10	4.90	5.10	5.07	0.14	0.75
Backfat, in.	0.17	0.17	0.19	0.17	0.01	0.68

SEM = standard error of the mean. ADG = average daily gain.

¹Ultrasound marbling score: 4.5-4.9 is Slight 50-90; 5.0-5.9 is Small 00-90 (CUP labs, 2007; <https://www.cuplab.com/Files/content/V.%201%20IMF%20or%20Marbling%207-1-07.pdf>).

Table 2. Steer performance measures based on legume presence

Item	No legume	Legume	SEM	P-value
Initial wt, lb	608	608	5.6	0.96
Final wt, lb	907	914	9.9	0.63
Grazing ADG, lb/d	2.03	2.02	0.05	0.93
Loin muscle depth, mm	49	51	0.9	0.09
Marbling score ¹	5.15	4.91	0.10	0.08
Backfat, in.	0.18	0.17	0.006	0.86

SEM = standard error of the mean. ADG = average daily gain. Legume = ladino clover seeded at 6 lb/acre.

¹Ultrasound marbling score: 4.5-4.9 is Slight 50-90; 5.0-5.9 is Small 00-90 (CUP labs, 2007; <https://www.cuplab.com/Files/content/V.%201%20IMF%20or%20Marbling%207-1-07.pdf>).

Table 3. Steer performance measures based on implant

Item	No				SEM	P-value
	Implant	Ralgro ¹	Revalor-G ²	Synovex One Grass ³		
Initial wt, lb	609	607	609	607	7.8	0.99
Final wt, lb	900	904	910	928	14.0	0.53
Grazing ADG, lb/d	1.96	1.99	2.00	2.15	0.08	0.30
Loin muscle depth, mm	51	49	50	50	1.2	0.67
Marbling score ⁵	4.91	5.02	5.01	5.18	0.13	0.56
Backfat, in.	0.19	0.16	0.18	0.17	0.01	0.28

¹ Merck Animal Health, Madison, NJ.

² Merck Animal Health, Madison, NJ.

³ Zoetis, Parsippany, NJ.

SEM = standard error of means. ADG = average daily gain.

⁵ Ultrasound marbling score: 4.5-4.9 is Slight 50-90; 5.0-5.9 is Small 00-90 (CUP labs, 2007; <https://www.cuplab.com/Files/content/V.%201%20IMF%20or%20Marbling%207-1-07.pdf>).

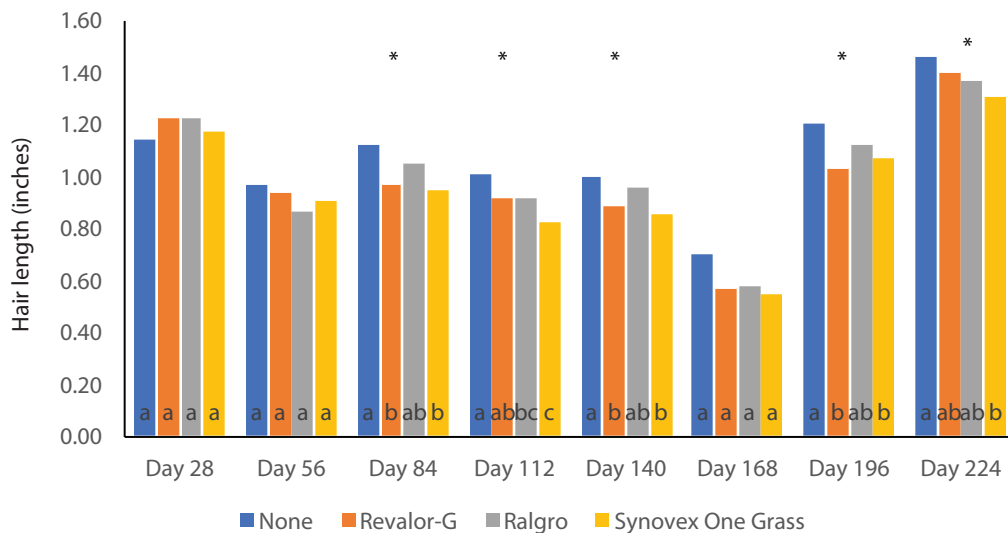


Figure 1. Effects of implant type on the hair length.

^{abc} Different letters within day indicate differences at $P < 0.05$.

* Indicate $P < 0.05$ for day of measurement.