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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 the implant level. 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, or Ralgro). Data collected were weights, hair coat scores, hair length, rectal temperature (every 28 days), and ultrasound carcass characteristics when steers were coming off grass. Steers on High Endophyte had the lowest average daily gain (ADG) and final weight and smallest loin muscle 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. Steers that were implanted with Synovex One Grass had a greater gain, final weight, and lower hair score as compared to non-implanted steers. For many of the other measures, steers implanted with Ralgro or Revalor-G resulted in changes between non-implanted steers and those receiving Synovex One Grass. Steers on high endophyte fescue had greater final weight and ADG than non-implanted steers or those receiving Ralgro, with Synovex One Grass being intermediate. Gains for steers on endophyte free pastures were also impacted by the type of implant where Synovex One Grass steers had greater gains than non-implanted and Revalor-G steers, with Ralgro being intermediate. In this second year of research, the use of low to no endophyte fescue and the addition of implants increased gains.

Keywords

fescue toxicity, growth, gain, endophyte-free, non-toxic

Authors

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2022 SEREC AGRICULTURAL RESEARCH

Evaluation of Implants, Clover, and Fescue Variety on Stocker Steers – Year 2

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Summary

Sixty-four growing steers were used in a split-plot experiment, where the whole plot was pasture, and the split-plot was the implant level. 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, or Ralgro). Data collected were weights, hair coat scores, hair length, rectal temperature (every 28 days), and ultrasound carcass characteristics when steers were coming off grass. Steers on High Endophyte had the lowest average daily gain (ADG) and final weight and smallest loin muscle 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. Steers that were implanted with Synovex One Grass had a greater gain, final weight, and lower hair score as compared to non-implanted steers. For many of the other measures, steers implanted with Ralgro or Revalor-G resulted in changes between non-implanted steers and those receiving Synovex One Grass. Steers on high endophyte fescue had greater final weight and ADG than non-implanted steers or those receiving Ralgro, with Synovex One Grass being intermediate. Gains for steers on endophyte free pastures were also impacted by the type of implant where Synovex One Grass steers had greater gains than non-implanted and Revalor-G steers, with Ralgro being intermediate. In this second year of research, the use of low to no endophyte fescue and the addition of implants increased 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 its 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, including fescue development, the addition of clover,

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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 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 April 1, 2021, and grazed until November 11, 2021. Pastures were fertilized according to recommendations of soil test results in February 2021. Legumes were interseeded into pastures in 2014. Seedheads were clipped in all pastures June 2021.

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 were 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 was measured and scored, and rectal temperature read.

Results and Discussion

In this second year of data collection, there was one interaction between grass type and implant where final weights and ADG were different ($P < 0.10$). Steers on novel and low endophyte fescue pastures did not have different final weights or ADG when combining pasture type and implant type (Figure 1). However, steers grazing endophyte free fescue pastures and receiving the Synovex One Grass implant had greater gains, final weight, and ADG than those implanted with Rev-G or receiving no implant. Steers receiving Ralgro while grazing endophyte free fescue had intermediate gains (Figure 1). Steers grazing high endophyte fescue and being implanted with Rev-G had

greater gains, final weight, and ADG as compared to non-implanted and Ralgro steers, with Synovex One Grass implanted steers being intermediate (Figure 1).

Rectal temperature and measured hair length were not different on any dates based on grass type, addition of legume, nor implant type ($P > 0.10$; data not shown).

Steer Performance: Fescue Types

Fescue type had an 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, 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 and were the lowest through the entire period.

Steers grazing high endophyte fescue had smaller loin muscle depth than endophyte free and novel variety of fescues, with low endophyte concentrations being intermediate (Table 1). There were no differences in marbling score or backfat when measured by ultrasound.

Steer Performance: Legumes

The addition of legumes did not impact the steers' performance. Legumes had no impact on the ADG of the steers throughout the course of the grazing period (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). The average legume percentage for endophyte free fescue pastures was 23.75%; novel endophyte pastures was 24.25%; low endophyte was 12.25%; and high endophyte was 7.5%.

Steer Performance: Implants

Steers implanted with Synovex One Grass had greater total gains than non-implanted steers and steers implanted with Ralgro, with Rev-G being intermediate (Table 3). The type of implant started showing differences in ADG at day 112 where non-implanted steers had lower cumulative ADG than Ralgro and Synovex One Grass, with Rev-G being intermediate (Figure 2).

Even though there was no measured difference in hair length by implant type, when the three trained observers scored the steers, they found that beginning on day 140 of the study the steers implanted with Rev-G and Synovex One Grass had a lower hair score than non-implanted steers, with Ralgro being intermediate (Figure 3). This advantage was found through the end of the grazing period.

This study found that there were two management strategies for fescue toxicity. Use of non-endophyte or non-toxic varieties of fescue pasture improves cattle gain. Additionally, in the second year of the study the long-duration implant of Synovex One Grass did increase gains for the steers. Legumes did not improve steer 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	672	675	672	670	19	0.99
Final wt, lb	1025[a]	1016[a]	1060[a]	889[b]	16.5	< 0.001
Grazing ADG, lb/d	1.77[a]	1.73[a]	1.93[a]	1.14[b]	0.08	< 0.001
Loin muscle depth, mm	55[a]	56[a]	53[ab]	50[b]	1.5	0.07
Marbling score[1]	4.72	4.79	4.86	4.89	0.11	0.75
Backfat, in.	0.16	0.16	0.16	0.15	0.01	0.68

SEM = standard error of the mean. ADG = average daily gain.
[ab] Different letters indicate $P < 0.05$.
[1]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*).

Table 2. Steer performance measures based on legume presence

Item	No legume	Legume	SEM	*P*-value
Initial wt, lb	672	675	13.5	0.96
Final wt, lb	1001	995	11.8	0.71
Grazing ADG, lb/d	1.66	1.63	0.05	0.71
Loin muscle depth, mm	52	55	1.1	0.14
Marbling score[1]	4.89	4.75	0.08	0.25
Backfat, in.	0.16	0.15	0.006	0.86

SEM = standard error of the mean. ADG = average daily gain. Legume = ladino clover seeded at 6 lb/acre.
[1]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*).

Table 3. Steer performance measures based on implant

Item	No Implant	Ralgro[1]	Revelor-G[2]	Synovex One Grass[3]	SEM	*P*-value
Initial wt, lb	672	675	670	673	11.5	0.95
Final wt, lb	970[b]	988[b]	1006[ab]	1027[a]	13.7	0.02
Grazing ADG, lb/d	1.52[b]	1.60[b]	1.68[ab]	1.78[a]	0.06	0.03
Loin muscle depth, mm	55	52	53	55	1.6	0.67
Marbling score[4]	4.86	4.94	4.70	4.76	0.09	0.20
Backfat, in.	0.16	0.16	0.15	0.16	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.
[ab] Different letters indicate $P < 0.05$.
[4]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*).

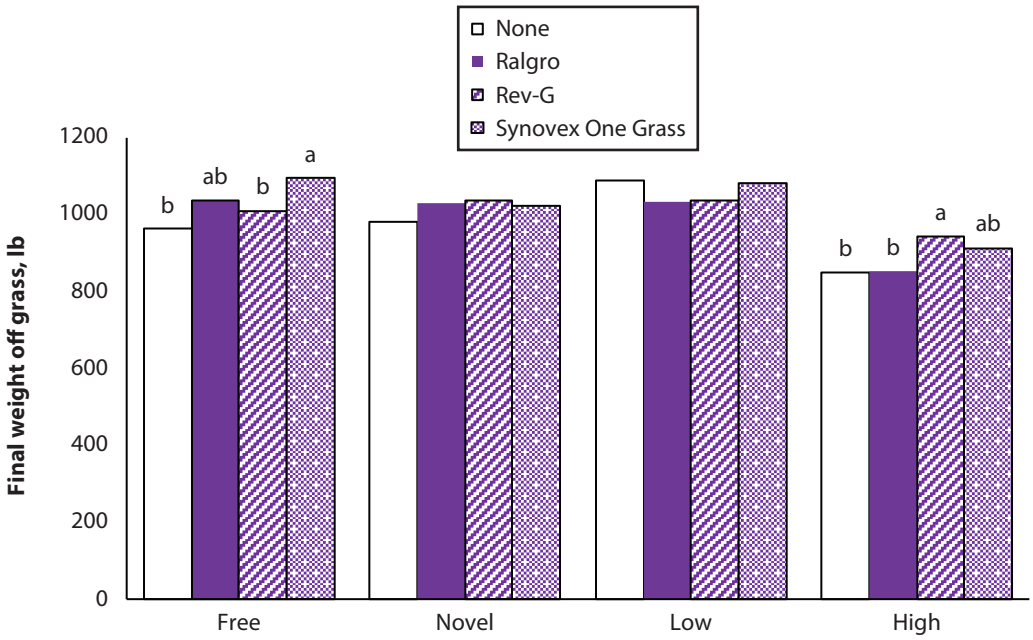

Figure 1. Final weight of steers based on pasture type and type of implant.
[ab] Different letters within forage type indicate differences at $P < 0.05$.

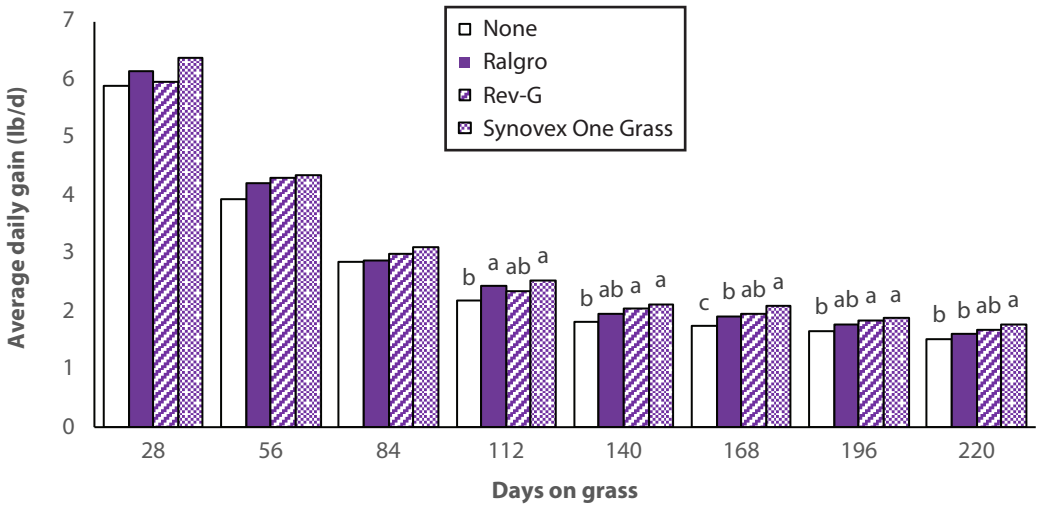

Figure 2. Average daily gain for steers based on implant type across days on grass.
[abc] Different letters within forage type indicate differences at $P < 0.05$.

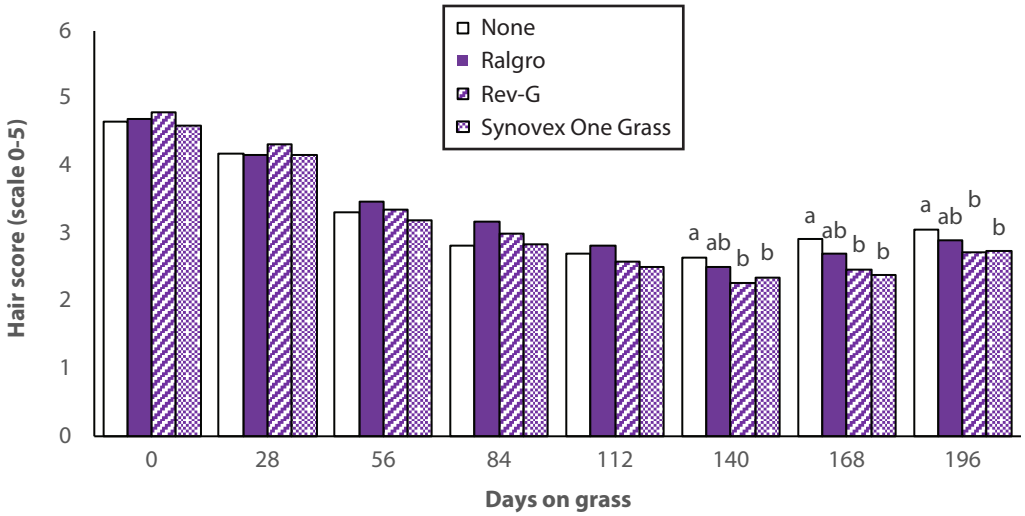

Figure 3. Average hair score for steers based on implant type across days on grass.
[ab] Different letters within forage type indicate differences at $P < 0.05$.
Hair scoring was completed by three individual scorers about every 28 days and based on a scale of 1-5 where a value of 1 is a steer that is 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.