PEER REVIEWED

Effects of a Growth-promoting Implant Containing Tylosin Tartrate on Performance, Buller Incidence and Carcass Characteristics of Feedlot Steers

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Abstract

A total of 13,732 animals were allotted to 64 pens (average 215 head per pen) in two commercial feedyards to compare the effects of growth-promoting implants with and without tylosin tartrate on performance, carcass merit and buller incidence in yearling steers. Implant formulations used in the study included 120 mg trenbolone acetate and 24 mg estradiol with 29 mg of tylosin tartrate (120/24 T) and 120 mg trenbolone acetate and 24 mg estradiol (120/24). Steers implanted without tylosin tartrate tended to have a lower incidence of bullers (1.17 vs 1.49%; P=0.08), and had a greater percentage of USDA quality grade Prime and Choice carcasses (42.51 vs. 40.26%; P=0.02) than steers given an implant with tylosin tartrate. No other differences in performance or carcass characteristics were noted (P>0.10). Under the conditions of this study, there was no benefit to using tylosin tartrate in generically comparable growth-promoting implants.

Keywords: bovine, bullers, implants, Tylan®, tylosin

Résumé

Un total de 13 732 animaux ont été distribués dans 64 enclos (215 têtes en moyenne par enclos) dans deux parcs d'engraissement commerciaux afin de comparer les effets d'implants hormonaux promoteurs de croissance contenant ou non du tartrate de tylosine sur la performance, la catégorie de rendement des carcasses et l'incidence de monte chez les bouvillons de l'année. La formulation de base des implants utilisés dans cette étude contenait 120 mg d'acétate de trenbolone et 24 mg d'œstradiol avec l'addition ou non de 29 mg de tartrate de tylosine (120/24 T versus 120/24). Les bouvillons avec des implants sans tartrate de tylosine étaient montés un peu moins souvent (1.17 versus 1.49%; P = 0.08) et leurs carcasses étaient plus souvent de catégorie de rendement USDA Prime et Choice (42.51 versus 40.26%; P = 0.02) que les bouvillons avec des implants contenant du tartrate de tylosine. Il n'y avait pas d'autre différence au niveau de la performance ou des caractéristiques de la carcasse (P>0.1). Dans le cadre de cette étude, il n'y avait pas de bénéfice à utiliser le tartrate de tylosine dans des implants promoteurs de croissance équivalents.

Introduction

Previous trial data suggest there could be economic benefits associated with using growth-promoting implants containing tylosin tartrate in feedlot cattle.[1,5] These benefits included increased average daily gains (2.3, 1.2 and 1.9% improvement with respective P-values of 0.07, 0.06 and 0.09), improved feed conversion (1.2%, P=0.04) and reduced buller rate (3.83 versus 1.71%, P=0.04). It has been hypothesized that performance benefits noted in cattle administered growth-promoting implants containing tylosin tartrate may be attributed to a reduction in the loss of implants associated with implant-site bacterial infections (abscesses) and reduced fibrous encapsulation of the implant.[6,8] Utilizing an implant-site abscess induction model, abscess rate was lower (P<0.0001) in cattle administered an implant containing 120 mg trenbolone acetate/24 mg estradiol with a tylosin tartrate[a] pellet compared to animals treated with a 120 mg trenbolone acetate/24 mg estradiol formulation[b] alone (maximum incidence of abscesses of 5% and 100%, respectively).[6] However, implant-site abscesses do not necessarily result in production losses. In studies that differentiated among normal, abscessed and missing implants, no difference in weight gain was found between steers

with abscessed implant sites and steers with normal implant sites.[2,4] Steers with missing implants, however, had significantly lower weight gain than steers with normal or abscessed implant sites. Other studies have demonstrated reduced weight gain for cattle with abnormal, missing or abscessed implants compared to cattle with normal implants; however, these studies did not differentiate among the implant site irregularities to determine which might be responsible for the loss of performance.[3,7]

A theory has not been postulated as to why tylosin tartrate-containing implants may reduce buller incidence. While enhanced performance is the primary purpose of growth implants, bulling activity can be an expense to feedlot operators because of animal performance loss, increased morbidity and mortality, and the additional animal care resources required to manage this behavior issue. The purpose of this study was to compare the effects of growth implants with and without tylosin tartrate administered at feedlot arrival on performance, buller incidence and carcass characteristics of medium-weight yearling steers fed in a commercial setting.

Materials and Methods

Cattle and Processing

A total of 13,732 yearling steers were utilized to evaluate the effect of a growth-promoting implant with tylosin tartrate on feedlot performance, buller incidence and carcass characteristics of medium-weight steers. Forty-eight pens at Cimarron Feeders (one-time capacity of 65,000 cattle and located in the Oklahoma Panhandle) and 16 pens at Grant County Feeders (one-time capacity of 112,000 cattle and located in southwest Kansas) were utilized to conduct the study. The two feedyards are separated by approximately 80 linear miles (128.8 km). Pen design and size were similar between feedyard locations, with pen capacity ranging from 105 to 300 head. Annual weather conditions for the Oklahoma Panhandle and southwest Kansas are similar with 15 to 17 inches (38.1 to 43.2 cm) of precipitation, with average high temperatures of 66 to 69°F (18.9 to 20.6°C) and average low temperatures of 38 to 39°F (3.3 to 3.9°C). Weather during the study initiation period was typical of the High Plains area.

Cattle were delivered to the feedyards from May 3 to August 11, 2005, with average purchase in-weights ranging from 711 to 916 lb (323 to 416 kg). The cattle were primarily Continental x Brahman crossbreds that originated from Mexico, and had been grazed on Texas and Oklahoma wheat pastures prior to feedlot arrival. Prior to wheat grazing, steers were processed and provided animal health products and procedures standard to stocker operations.

Following receipt at the feedyards, cattle were processed within 24 hours, and received a standard regimen which was similar across the two locations. At processing, cattle were administered the following:

- Lot tag
- Modified-live infectious bovine rhinotracheitis (IBR) virus – bovine viral diarrhea (BVD) virus vaccine[c] given IM in the left neck (2 mL)
- Ivermectin[d] (7 mL given SC in the left neck)

In addition, steers were randomized (described in subsequent section) to one of two growth-implant treatments: 1) 120 mg trenbolone acetate and 24 mg estradiol with 29 mg of tylosin tartrate (120/24 T)[a] or 2) 120 mg trenbolone acetate and 24 mg estradiol (120/24).[e] All cattle were given a single terminal implant using product directions for placement and method. After each animal was processed, implant needles were inserted into and cleaned by means of a roller sponge device saturated with a preparation of one part 2% chlorhexidine solution to three parts clean tap water. Cattle ears that were wet or covered in dirt or manure were scrubbed and cleaned prior to implanting using a soft plastic brush dipped in a preparation of one part 2% chlorhexidine solution to three parts clean tap water. Cattle ears were not palpated following implant administration to check for abscesses.

Treatment Assignment and Experimental Design

Prior to initiation of the trial, a coin side (head or tail) was randomly assigned to treatment to determine which group was processed first. At the two facilities, steers were allocated to treatment by two different methods. At Cimarron Feeders, cattle are routinely sorted into outcome groups based on weight at arrival. An outcome group is cattle having a similar arrival weight, consequently requiring approximately the same number of days-on-feed to achieve an acceptable harvest weight. To maintain the benefit of sorting at arrival, multiple weight groups (light, middle and heavy) were utilized to complete the trial. Steers were randomized through the processing barn in an alternating 10 x 10 fashion into the two treatments, regardless of sort-weight group, across the three sort-weight groups until each pair was completed. Therefore, cattle were sorted into one of six pens (three weight groups x two treatments). A coin flip was used to determine which treatment the first 10 animals received. The treatments were then alternated after each set of 10 animals. The allotment scheme described for Cimarron Feeders has been used for previous studies and has proven to be a random process.

At Grant County Feeders, steers were randomized to treatment by means of a 5 x 5 alley sort from arrival pens containing one to three loads within the

same source immediately prior to processing. For each set of cattle, a coin flip determined which treatment group was processed first.

Initial pen weights for the study were accumulated individual animal scale weights taken at initial processing and adjusted (pro-rated) to purchase payweights. At initial processing, all trial cattle at both feedyards received either an implant containing 120 mg trenbolone acetate and 24 mg estradiol with 29 mg of tylosin tartrate[a] or an implant containing 120 mg trenbolone acetate and 24 mg estradiol[e] as their only growth-promoting implant administered during the feeding period.

At both feedyards, pen riding, hospital and feed crew personnel were masked to treatment. Following processing, cattle within pairs were moved to pre-assigned pens in close proximity to each other. Average pen size utilized for the study was 215 animals. Pens within replicate were similar in bunk space, water tank capacity and square footage per head.

Steers were transitioned to a standard finishing diet formulated by the same cattle nutritionist at both feedyards. The diet contained steam flaked corn as the grain source and corn silage (9%, dry matter basis) as the roughage source. Diets were balanced to meet National Research Council (NRC) requirements with 13% crude protein and a net energy for gain (NEg) of 68 Mcal/100 pounds of feed (dry matter basis). Monensin[f] and tylosin[g] were fed for the entire feeding period. Routine ingredient and diet nutrient analyses were conducted to verify diet formulations. Since this was a large pen study, feed bunk weigh backs (orts) were not collected. If an excessive amount of feed was delivered to a pen, later feed deliveries were reduced until the feed bunk was clean. This procedure was used for both treatments across all replicates. The same pen rider was used across treatments within pairs to minimize bias.

Pens within pairs were marketed at equal days-on-feed according to normal feedlot operating protocols and were managed similarly regarding procedures for final weighing (group weight by pen utilizing a ground scale and a 4% shrink), shipment and harvest. Shipment order was randomly determined by a coin flip. Steers were harvested at either the Swift plant in Cactus, Texas or the National Beef plant in Liberal, Kansas. Cattle were harvested between September 23, 2005, and March 14, 2006, with both pens in each pair being shipped on the same day and to the same plant.

Statistical Analyses

Data collection was the responsibility of feedyard management, administrative and research personnel. Internal software proprietary to Five Rivers Cattle Feeding was utilized for data storage. All performance data were analyzed using PROC MIXED procedure of SAS as a randomized complete block design with pen as the experimental unit. All categorical data, such as mortality, buller incidence and carcass parameters, were analyzed using PROC GLIMMIX procedure of SAS as a randomized complete block design with pen as the experimental unit. For all analyses, pair, feedyard and treatment were included in the model as class variables. Treatment was considered a fixed effect. Pair and feedlot were considered random effects.

Results and Discussion

Performance and carcass data are presented in Tables 1 and 2, respectively. A total of 6,876 steers were allotted to the 120/24 treatment, and 6,856 steers to the 120/24 T treatment. Initial weight did not differ (P=0.53) between treatments and averaged 809 lb (368 kg) for 120/24 cattle and 810 lb (368 kg) for the 120/24 T cattle. Steers were fed for an average of 168 days. The study cattle had similar (P=0.68) mortality incidence across the two implant treatments, as is typically observed in cattle of similar types, weights and background.

No statistical differences (P>0.10) between treatments were noted in cattle performance. This finding does not agree with earlier work which showed improvements in average daily gain and feed conversion for cattle administered implants containing tylosin tartrate.[1] Potential factors that may have contributed to variation of results among studies are the relative study size and the incidence of abnormal implant injection sites. Previous studies have been comparatively small (approximately 2,000 total animals across three trials) versus the current work involving 13,732 cattle. Commercial feedyard conditions may be represented differently for this study compared to earlier investigations. The incidence of abnormal implants was not observed in the current study; however, the rate of improper implants in earlier studies was low, with an average across treatments (tylosin tartrate and non-tylosin tartrate) of 1.7% (range: 0.5 to 2.4%).[1] Steers receiving an implant without tylosin tartrate tended to have a lower buller incidence compared to steers receiving an implant containing tylosin tartrate (1.17 vs. 1.49%; P=0.08). These results contradict an earlier study demonstrating a reduction in buller incidence associated with tylosin tartrate-containing implants.[5] In that study, buller rates were higher than reported in the current study, with the non-tylosin tartrate steers having a 3.83% incidence compared to 1.71% for cattle receiving a growth implant containing tylosin tartrate. Growth-promoting implants are only one factor involved in the buller syndrome. Other factors that may influence and interact to provide variation in level of

Table 1. Effect of implant treatment on cattle performance (LS Means).

Item	120/24[a]	120/24 T[b]	SE	*P*-value
Initial weight[c], lb	809	810	10.84	0.53
Final weight[d], lb	1,314	1,316	13.07	0.50
Days-on-feed	168	168	0.00	1.00
Death loss, %	0.38	0.34		0.68
DMI, lb/day	19.9	20.0	0.26	0.15
Gain[e], lb/day	3.02	3.03	0.02	0.54
Feed:Gain[e]	6.71	6.71	0.31	0.92
Buller rate, %	1.17	1.49		0.08

[a]Revalor®-S, Intervet Inc., Millsboro, DE.
[b]Component® TE-S with Tylan®, Vetlife, Overland Park, KS.
[c]Pro-rated purchase pay-weight (individual scale weight at initial processing adjusted back to purchase pay-weight).
[d]Shrunk (4%) weight at feedyard of cattle that were harvested.
[e]Deads-in (gain calculated as total weight gain of the pen not adjusted for those that died).

Table 2. Effect of implant treatment on carcass traits (LS Means).

Item	120/24[a]	120/24 T[b]	SE	*P*-value
Hot carcass weight, lb	847	848	11.40	0.46
Dressing percentage[c], %	64.53	64.57	0.20	0.71
Prime and Choice, %	42.51	40.26		0.02
Sub-Select, %	2.52	2.51		0.98
Yield Grade 1 and 2, %	67.49	68.48		0.22
Yield Grade 4 and 5, %	3.73	3.59		0.60
Dark cutters, %	0.49	0.35		0.18

[a]Revalor®-S, Intervet Inc., Millsboro, DE.
[b]Component® TE-S with Tylan®, Vetlife, Overland Park, KS.
[c]Based on shrunk final weight at feedyard.

buller activity include cattle management procedures (handling, cattle movement, commingling, feeding), stress, climate – environment (seasonal), social (group size), cattle weight and age, cattle health and environmental estrogens.

From a carcass perspective, cattle receiving the 120/24 implant had a greater percentage of Prime and Choice carcasses (42.51 vs. 40.26%; P=0.02) compared to those in the 120/24 T group. No other statistical differences (P>0.10) were observed for carcass traits between treatment groups.

Conclusions

The addition of tylosin tartrate to a comparable generic growth implant did not enhance performance or carcass traits, and did not decrease buller incidence in feedlot steers.

Endnotes

[a]Component® TE-S with Tylan®, Vetlife, Overland Park, KS
[b]Component® TE-S, Vetlife, Overland Park, KS
[c]Bovi-Shield Gold® IBR-BVD, Pfizer Animal Health, New York, NY
[d]Promectin, Phoenix Scientific, St. Joseph, MO
[e]Revalor®-S, Intervet Inc., Millsboro, DE
[f]Rumensin®, Elanco Animal Health, Indianapolis, IN
[g]Tylan®, Elanco Animal Health, Indianapolis, IN

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