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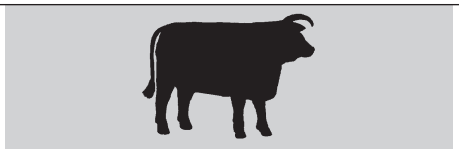

Ractopamine hydrochloride and estradiol–trenbolone acetate implants alter live performance and carcass components of heifers during the finishing phase[1]

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ABSTRACT

The objectives were to evaluate the interaction of ractopamine hydrochloride (Optaflexx, OPT) and terminal implant (TI) on growth performance, carcass characteristics, and meat quality of finishing beef heifers. A 3 × 2 factorial randomized complete block design was used with 2 levels of OPT and 3 durations of TI. British × Continental heifers (n = 216; 341.6 kg) were blocked by BW and randomly allotted to 54 pens (9 pens per treatment; 6 pens per block; 4 heifers per pen). The main treatment effects were implant [TE-200 with Tylan (tylosin phosphate; 200 mg of trenbolone acetate + 24 mg of estradiol-17β) administered 140, 100, or 60 d from slaughter] and OPT (0 or 200 mg per head per day). No implant × OPT interactions were detected, so only main effects are reported. Average daily gain (0.14 kg difference), predicted carcass ADG (0.24 kg difference), and HCW (5.6 kg difference) were increased (P < 0.05) by OPT, but DMI was not affected. Supplementation with OPT decreased (P < 0.05) Prime and Choice carcasses by 16.5%. No differences (P > 0.10) in Warner-Bratzler shear force were detected at d 3, 7, and 21 aging postmortem, although the shear force values of the OPT steaks at d 14 were higher (0.45 kg; P < 0.05). Results from this experiment demonstrated that OPT, when fed to heifers, increased ADG, calculated carcass ADG, and HCW with minimal effect on carcass quality. Furthermore, this experiment indicated that the duration of the TI window did not affect overall performance, final BW, or carcass quality.

Key words: anabolic steroid, beef cattle, beta-agonist, carcass, performance

INTRODUCTION

Beta adrenergic agonists (**BAA**) and steroidal growth implants have both demonstrated the ability to increase live performance and lean tissue accretion through muscle fiber growth. Although the 2 growth promotants both promote lean tissue accretion, the mode of action differs greatly. Johnson et al. (1998) observed an increase in satellite cell proliferation in steers implanted with trenbolone acetate + estradiol-17β ($\mathbf{E_2}$). Utilizing a combination trenbolone acetate–and–E_2 implant will increase ADG over 20% in heifers (Johnson et al. 1996). Galyean et al. (1999) observed a 36.7-kg increase in heifers administered an implant compared with nonimplanted heifers.

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Table 1. Ingredient composition and analyzed nutrient content of the final diet (DM basis)

	Diet		
Item	Before Optaflexx	Optaflexx	Control
Ingredient, %			
Steam-flaked corn	74.99	74.49	74.49
Alfalfa hay	4.8	4.8	4.8
Cottonseed hulls	4.94	4.94	4.94
Cottonseed meal	4.28	4.28	4.28
Urea	0.8	0.8	0.8
Cane molasses	4.64	4.64	4.64
Fat (yellow grease)	2.47	2.47	2.47
Supplement[1]	2.08	2.08	2.08
Limestone	1	1	1
Control premix[2]	—	—	0.5
Optaflexx premix[2]	—	0.5	—
Analyzed composition, %			
DM	83.8	83.2	83.8
CP	12	12.2	12
Crude fat	3.7	2.9	3.7
NE_m	0.93	0.96	0.93
NE_g	0.63	0.66	0.63
Ca	0.48	0.49	0.48
P	0.32	0.30	0.32

[1]Supplement supplied (DM basis) 33 mg/kg Rumensin (Elanco Animal Health, Indianapolis, IN); 11 mg/kg Tylan (Elanco Animal Health); 2,200 IU/kg vitamin A; and17.5 IU/kg vitamin E.

[2]The control premix contained (DM basis) 100.0% ground corn. The Optaflexx (OPT) premix contained 3.5% OPT (Elanco Animal Health) Type A medicated article and 96.5% ground corn and supplied OPT at 200.0 mg per head per day.

A common practice in the industry is the utilization of a secondary implant to again enhance muscle growth and lean tissue accretion. Nichols et al. (2005) reported that heifers entering the feedlot as weaned calves typically receive an initial implant at processing and a terminal implant 70 to 120 d before slaughter. Beta adrenergic agonists increase muscle growth through hypertrophy. They increase skeletal muscle mass by increasing protein accretion and decreasing protein degradation (Johnson et al., 2013). Schroeder et al. (2005a) observed an improvement in ADG, F:G, and HCW in heifers fed ractopamine hydrochloride (**OPT**) in the final finishing phase. Supplementation with BAA along with an implant in the final finishing phase can negatively affect QG and tenderness (Avendaño-Reyes et al., 2006; Dikeman, 2007). Implants and OPT increase muscle size and mass through different mechanisms, indicating the effects could be synergistic, but no data have confirmed this theory when fed to heifers. Therefore, the objectives were to evaluate the interaction of OPT and timing of terminal implant (**TI**) administration on growth performance, carcass characteristics, and meat quality of finishing beef heifers.

MATERIALS AND METHODS

Animals

All procedures involving live animals were approved by the Texas Tech University Animal Care and Use Committee.

Four trucks with a total of 264 heifers of predominantly British and British × Continental crossbred heifers were received (May 6 and May 7, 2011) at the Texas Tech University Beef Center at New Deal, Texas. The heifers were obtained from various sources and geographical origins. Upon arrival they were provided access to drinking water, grass hay, and a moderate-concentrate mixed diet in dirt pens. At initial processing (May 8, 2011) each heifer was weighed individually, ear tagged with a unique individual identification, vaccinated with a modified live virus vaccine (Titanium 3, Agri Laboratories, St. Joseph, MO) and a clostridial bacterin toxoid (Vision 7 with SPUR, Merck Animal Health, Summit, NJ), treated for internal parasites with Ivomec Plus (ivermectin and clorsulon; Merial, Duluth, GA), and treated metaphlactically with Micotil at 1.5 mL/30 kg (Tilmicosin injection; Elanco Animal Health, Greenfield, IN). Heifers were fed step-up diets over the 3-wk period before experiment initiation date. The finishing diet (Table 1) was introduced on d 0, and intake was stable at 2.4 percentage units of BW before experiment initiation using a slick bunk feeding method (Pritchard, 1993).

Experimental Design, Treatment, and Pen Assignment

Heifers were individually weighed for stratification on May 28 and June 11, 2011. Heifers were weighed again and placed on experiment on May 30 and June 13. The 2 individual BW were averaged together to provide the initial weight. Longissimus dorsi muscle biopsy samples (from one heifer per pen alternating blocks; results not presented in this manuscript) and serum samples (from 2 heifers per pen; results not presented in this manuscript) were collected on 0, 40, 80, 112, and 140 d. Because of the logistics of muscle sample collection and the requirement that collections be similar relative to the time of implanting, it was necessary to split the blocks into 2 groups. Two groups (heavy and light) of heifers (120

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