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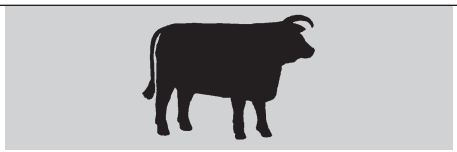

Influence of yeast cell wall supplementation during the finishing phase on feedlot steer performance, carcass characteristics, and postmortem tenderness

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ABSTRACT

Our objectives were to evaluate the benefits of yeast cell wall (YCW) supplementation on performance, carcass characteristics, and tenderness of steers finished with zilpaterol hydrochloride. A randomized complete block design was used. British × Continental steers (n = 72; initial BW = 305 ± 13 kg) were blocked by BW and allotted randomly to 24 pens (8 pens per treatment; 3 pens per block; 3 steers per pen). Treatments were (1) control (CON); (2) YCW containing 100,000 IU of vitamin D_2 per gram (5.0 g per steer per d; Y-D); (3) YCW C (5.0 g per steer per d; Y-C). Steers were supplemented 55 d, and zilpaterol hydrochloride was fed on d 30 to 49. Carcass data and strip loins were obtained. Strips were cut into steaks and assigned to 1 of 4 aging periods (7, 14, 21, or 28 d). Tenderness was examined using Warner-Bratzler shear force. Carcass-adjusted ADG from d 21 to 55 was 0.29 kg greater for Y-D and 0.35 kg greater for Y-C, when compared with CON (P = 0.04 and 0.01, respectively). Additionally, YCW increased G:F from d 21 to 55 by 28.46% for Y-C over CON (P = 0.01). Treatment Y-C displayed Warner-Bratzler shear force values 0.30 kg higher than CON and 0.29 kg greater than Y-D (P < 0.01). Within 7 d of aging, Y-C steaks were 0.62 kg (P = 0.005) and 0.54 kg (P = 0.014) less tender than CON or Y-D, respectively. For 14 d of aging steaks, Y-C Warner-Bratzler shear force values were 0.58 kg greater than CON (P = 0.008). These data indicate YCW supplementation could improve performance of finishing steers, and vitamin D_2 supplementation at the current dosage did not improve tenderness.

Key words: cattle, tenderness, yeast cell wall, zilpaterol hydrochloride

INTRODUCTION

Efficiency dictates the success of the feedlot segment of beef cattle production. In an effort to increase profitability, technologies have emerged to promote growth and maintain health during the feeding phase. Unfortunately, some of these products (antibiotics or growth promotants) have a negative connotation with some consumers. There are natural options, such as yeast products, available to producers that aim to increase efficiency through modification of the gastrointestinal environment. *Saccharomyces cerevisiae* is a yeast culture evaluated for its effects on swine performance and immune function (Jurgens et al., 1997). Performance data from yeast supplementation research are conflicted. Because of its immune modification properties, yeast feed additives have most often been researched during the receiving

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period; however, there are times of stress during the finishing phase as well. Strydom et al. (2009) reported a significant decrease in DMI by cattle fed zilpaterol hydrochloride (**ZH**) compared with control cattle. Therefore, the application of yeast products during times of metabolic stress is of interest. Multiple studies have reported decreased tenderness with ZH (Brooks et al., 2009; Strydom et al., 2009; Rathmann et al., 2012). It has been postulated that supplemental vitamin D may rectify these effects on meat quality. Of the 2 forms of the vitamin available, vitamin D_3 has been the most extensively researched in terms of improving tenderness of steak (Swanek et al., 1999; Montgomery et al., 2002; Hansen et al., 2012). Little research exists concerning the use of vitamin D_2 in livestock, creating a need for more data to establish its value in beef cattle production. In the case that both vitamin D forms can be used interchangeably, these data indicate that a yeast product high in vitamin D_2 may provide advantages in performance and tenderness while feeding ZH. The objective of this research was to evaluate the benefits of yeast cell wall (**YCW**) and vitamin D_2 supplementation on performance, carcass characteristics, and tenderness of steers finished with ZH.

MATERIALS AND METHODS

All procedures involving live animals were approved (#12047–06) by the Texas Tech University Animal Care and Use Committee.

Live Performance and Carcass Characteristics

Cattle. On April 24, 2012, British × Continental crossbred steers (n = 80; 305 ± 13 kg) were delivered to the Texas Tech University Beef Center in New Deal, Texas. Steers were placed in a large pen and offered ad libitum access to prairie hay on the day of arrival. The following day, steers received a 65% concentrate receiving diet and were stepped up over the next 50 d onto a 90% concentrate finishing diet (Tables 1 and 2). Cattle had been processed and implanted (Revalor-XS, Merck Animal Health, Summit, NJ) before arrival and were treated metaphylactically (Excede, Zoetis Animal Health, Madison, NJ) 7 d after arrival. Steers were weighed once again on August 1, 2012, with continued housing in the pen.

Table 1. Dry matter composition of 90% concentrate finishing diet

Ingredient	%, DM basis
Steam-flaked corn[1]	73.51
Cottonseed hulls	5.25
Chopped alfalfa	5.22
Cottonseed meal	4.71
Urea	0.94
TTU supplement[2]	2.33
Calcium carbonate	0.89
Molasses	4.19
Animal fat	2.69

[1]A 0.5% ground corn–based zilpaterol hydrochloride premix was substituted for steam-flaked corn on d 30 to 49.

[2]Provides 27.2 g/t Rumensin (monensin; Elanco Animal Health, Greenfield, IN) and 9.1 g/t Tylan (tylosin; Elanco Animal Health).

Experimental Design, Treatment, and Pen Assignment. Steers were reweighed on d 0 (September 12, 2012) with a Silencer squeeze chute (Moly Manufacturing Inc., Lorraine, KS; accuracy of ±0.5 kg) and blocked by BW using a 4% shrink (n = 8; 534 ± 28 kg). Within a block, 3 treatments were assigned to pens using a randomized block design (24 pens; 8 pens per treatment; 3 steers per pen). Of the 80 steers delivered, the 72 animals most uniform in BW and frame size were selected for this experiment. Treatments were as follows: (1) control diet (**CON**); (2) YCW derived from *Saccharomyces cerevisiae* containing 100,000 IU of vitamin D_2 per gram (5.0 g per steer per d; **Y-D**); (3) YCW C, a YCW derived from *Saccharomyces cerevisiae* (5.0 g per steer per d; **Y-C**). Once BW was recorded cattle were sorted into their home pen (3 × 9.1 m pipe feedlot pens with a dirt floor and concrete aprons around water troughs and feed bunks).

Management and Treatment Application. Cattle were fed once daily in the morning (0900 to 1000 h), and feed delivery was adjusted to provide ad libitum access to feed while reducing waste. The feeding order throughout the experiment was in numerical pen order. Feed was mixed and delivered daily in a drag-type Rotomix feed wagon (Dodge City, KS). Cattle were fed a 90% concentrate diet throughout the experiment. Treatments were top-dressed in feed bunks daily at a rate of 5.0 g of YCW per steer.

All premixes were made at the Texas Tech University Burnett Center Feed Mill in a paddle-type mixer (Marion Mixers Inc., Marion, IA). The supplement premix included standard trace minerals, vitamins, monensin (Rumensin 90, Elanco Animal Health, Greenfield, IN), and tylosin (Tylan 40, Elanco Animal Health). Ingredients for the YCW premix included ground corn and YCW (excluded in the control premix). Yeast cell wall was measured out into a clean bowl on a Mettler (Novatech

Table 2. Nutrient analysis of 90% concentrate finishing diet on a DM[1] basis

	Feeding period	
Item	d 0 to 29	d 30 to 54[2]
DM, %	83.2	83.7
CP, %	13.6	14.1
Crude fiber, %	7.8	7.4
Crude fat, %	5.1	5.0
TDN, %	87.0	87.7
NE_m, Mcal/kg	2.16	2.18
NE_g, Mcal/kg	1.48	1.50
DE, Mcal/kg	3.84	3.88
ME, Mcal/kg	3.15	3.18
Ca, %	0.43	0.49
P, %	0.30	0.30

[1]All values provided on a DM basis except % DM.

[2]Zilpaterol hydrochloride feeding period and withdrawal.