



SOUTH DAKOTA  
STATE UNIVERSITY

Department of Animal Science

# Beef Day 2020

## Feedlot

### Effects of increasing doses of trenbolone acetate and estradiol on finishing phase growth performance and carcass trait responses in beef steers

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#### Objective

Evaluate the effects of increasing doses of trenbolone acetate and estradiol as terminal implants on finishing phase growth performance and carcass trait responses in beef steers.

#### Study Description

Two hundred and forty Continental x English beef steers (BW = 805 lbs [SD 49.6]) were used to evaluate increasing doses of trenbolone acetate (TBA) and estradiol-17 $\beta$  (E<sub>2</sub>) during the finishing phase. Steers were assigned to 1 of 3 treatments: no implant (**NI**), Synovex Choice (100 mg TBA + ~10 mg E<sub>2</sub>; **CH**), or Synovex Plus (200 mg TBA + ~20 mg E<sub>2</sub>; **PL**). This experiment was part of a factorial experiment that included bedding application. No interactions between implant and bedding were detected ( $P \geq 0.09$ ). The basal diet consisted of dry-rolled corn, dried distillers grains plus solubles, oatlage or grass hay, and a liquid supplement that provided 30 g/ton of monensin sodium. The diet delivered 14.2% crude protein, 95.1 Mcal/cwt of NEm, and 63.7 Mcal/cwt of NEg. Cattle were on feed for an average of 124 d post-implantation before being marketed and harvested at a commercial abattoir when the population reached sufficient fat cover to grade USDA Choice.

#### Take home points

There was a linear increase for both ADG ( $P = 0.01$ ) and DMI ( $P = 0.02$ ) with increasing doses of TBA and E<sub>2</sub>. There was a quadratic effect ( $P = 0.01$ ) on carcass adjusted final BW. A quadratic effect on F:G was also noted, with NI being 21.1% and 19.5% less efficient than CH and PL, respectively ( $P \leq 0.01$ ). No linear ( $P \geq 0.14$ ) or quadratic ( $P \geq 0.40$ ) effects were observed for dressing percentage, BF, calculated yield grade, or marbling. Use of steroidal implants containing a combination of TBA + E<sub>2</sub> increased final BW, ADG, and DMI, improved feed efficiency, and increased HCW, and REA at equal BF accumulation without detriment to marbling score.

**Keywords:** estradiol, growth performance, terminal implant, trenbolone acetate

## Effects of increasing doses of trenbolone acetate and estradiol on finishing phase growth performance and carcass trait responses in beef steers

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### Abstract

Two hundred and forty Continental x English beef steers (BW = 805 lbs [SD 49.6]) were used to evaluate increasing doses of trenbolone acetate (TBA) and estradiol-17 $\beta$  (E<sub>2</sub>) in terminal implant during the finishing phase. Steers were assigned to 1 of 3 treatments: no implant (**NI**), Synovex Choice (100 mg TBA + ~10 mg E<sub>2</sub>; **CH**), or Synovex Plus (200 mg TBA + ~20 mg E<sub>2</sub>; **PL**). This experiment was part of a factorial experiment that included bedding application. No interactions between implant and bedding were detected ( $P \geq 0.09$ ). The basal diet consisted of dry-rolled corn, dried distillers grains plus solubles, oatlage, and a liquid supplement that provided 30 g/ton of monensin sodium. The diet delivered 14.2% crude protein, 95.1 Mcal/cwt of NEm, and 63.7 Mcal/cwt of NEg. Combination TBA + E<sub>2</sub> implants increased ( $P \leq 0.02$ ) final BW, ADG, DMI, and decreased F:G, and increased HCW, and REA at equal BF accumulation without detriment to marbling score.

### Introduction

There is currently no other technology available to cattle producers that can match the performance improvements following steroidal implant administration in finishing steers. Steroidal implants have been used in U.S. commercial beef production for over 60 y and have been shown to increase ADG and decrease F:G in feedlot cattle compared to non-implanted cattle (Reinhardt, 2007). In 2013, APHIS reported that more than 90% of cattle entering the feedlot are given at least one implant. In some situations, use of two sequential implants is preferred. This depends primarily on type of implant and implant window, typically a terminal implant window is considered to last for approximately 60 to 120 days. The objective was to evaluate the effects of increasing doses of TBA and E<sub>2</sub> on finishing phase growth performance and carcass trait responses.

### Experimental Procedures

Steers were housed at the Ruminant Nutrition Center in Brookings, SD in 25 ft x 25 ft concrete surface pens with 37.2 in of bunk space/hd. Continental x English steers (n = 240, BW = 805 lbs [SD 49.6]) were allotted to 30 pens 36 d prior to being implanted. Initial processing included weighing, ear tagging, and rectal temperature measurement along with vaccination for bovine respiratory syncytial virus (BRSV), bovine rhinotracheitis (IBR), bovine viral diarrhea (BVD) Types 1 and 2, parainfluenza 3 (PI3), Mannheimia haemolytica (pasteurella), and clostridium perfringens type A. Cattle were re-vaccinated 36 days after initial processing for clostridium perfringens type A and were poured with a paraciticide. Pens were assigned to 1 of 3 treatments: 1) No implant (**NI**), 2) Synovex Choice (100 mg TBA + ~10 mg E<sub>2</sub>; **CH**), or 3) Synovex Plus (200 mg TBA + ~20 mg E<sub>2</sub>; **PL**) on d 1. The first 6 pen replicates began on test 14 d prior to the last 4 pen replicates due to weather challenges at the time of cattle acquisition.

A common diet consisting of dry-rolled corn, dried distillers grains, and oatlage or grass hay was fed that contained 14.2% crude protein, 95.1 Mcal/cwt of NEm, and 63.7 Mcal/cwt of NEg. A

liquid supplement was provided to add 30 g/ton of monensin sodium to diet DM along with supplemental vitamins and minerals to meet NASEM (2016) requirements. Feedstuff samples were taken weekly and analyzed for DM, CP, NDF, ADF, and ash using AOAC procedures.

Cattle were on feed for an average of 124 d post-implantation before being marketed and harvested at a commercial abattoir when the population reached sufficient fat cover to grade USDA Choice. Carcass data including ribeye area, hot carcass weight, 12th rib BF, kidney, pelvic, and heart fat percent, and USDA marbling score were collected by trained personnel. Yield grade was calculated by using the USDA regression equation (USDA, 1997).

Statistics were analyzed using the GLIMMIX procedure of SAS 9.4. The study was a randomized complete block design and fixed effects included in the model were implant and block. Pen served as experimental unit; an  $\alpha$  of 0.05 determined significance.

### Results

No interactions between implant and bedding were detected ( $P \geq 0.09$ ). There was a quadratic effect ( $P = 0.01$ ) on carcass adjusted final BW (Table 1). There was a linear increase for both ADG ( $P = 0.01$ ) and DMI ( $P = 0.02$ ) with increasing doses of TBA and E<sub>2</sub>. A quadratic effect on F:G was also noted, with NI being 21.1% and 19.5% less efficient than CH and PL, respectively ( $P \leq 0.01$ ). No linear ( $P \geq 0.14$ ) or quadratic ( $P \geq 0.40$ ) effects were observed for dressing percentage, BF, marbling, or calculated yield grade.

### Implications

Use of steroidal implants containing a combination of TBA + E<sub>2</sub> increased final BW, ADG, and DMI, improved feed efficiency, and increased HCW, and REA at equal BF accumulation without detriment to marbling score.

### Acknowledgements

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### References

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**Table 1. Effect of implant on cattle performance and carcass characteristics<sup>1</sup>**

Item	Implant						Contrast <i>P</i> -value	
	NI	CH	PL	SEM	L	Q		
<b>Pens</b>	10	10	10	-	-	-		
<b>DOF</b>	124	124	124	-	-	-		
<b>Initial BW, lb</b>	882	876	875	7.4	0.51	0.79		
<b>Cx adjusted FBW, lb</b>	1220	1275	1287	5.6	<0.01	<0.01		
<b>Cx adjusted ADG, lb/d</b>	2.76	3.26	3.35	0.048	<0.01	0.10		
<b>DMI, lb/d</b>	21.27	21.87	22.79	0.433	0.02	0.77		
<b>Cx F:G</b>	7.75 <sup>a</sup>	6.75	6.82	0.119	<0.01	<0.01		
<b>Dress, %</b>	62.64	62.82	62.92	0.246	0.44	0.89		
<b>HCW, lbs</b>	762	797	805	3.67	<0.01	<0.01		
<b>REA, in<sup>2</sup></b>	12.37	12.88	13.32	0.143	<0.01	0.86		
<b>BF, in</b>	0.44	0.46	0.45	0.013	0.66	0.56		
<b>Marbling</b>	463	458	447	10.4	0.28	0.83		
<b>EBF, %</b>	28.64	28.71	28.52	0.205	0.70	0.61		
<b>YG</b>	2.92	2.92	2.79	0.062	0.14	0.40		
<b>RY, %</b>	50.62	50.64	50.92	0.142	0.15	0.45		

<sup>1</sup>Treatments: no implant = NI; Synovex Choice (100 mg TBA + ~10 mg E<sub>2</sub>) = CH; Synovex Plus (200 mg TBA + ~20 mg E<sub>2</sub>) = PL.

BW = Body weight, Cx = Carcass, DMI = Dry matter intake, EBF = Empty body fat, F:G = Feed to gain ratio, HCW = Hot carcass weight, REA = Ribeye area, YG = Yield grade, RY = Retail yield