

# **IMPLANT PROGRAM EFFECTS ON FEEDLOT PERFORMANCE, CARCASS TRAITS AND SENSORY RATINGS OF SERIALY SLAUGHTERED HEIFERS**

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## **Story in Brief**

This study examines feedlot efficiency and carcass characteristics of 1200 crossbred and straightbred English and Continental heifers administered anabolic implants and serially-slaughtered at 110, 130 or 150 days. Of those 1200 heifers, steaks from 600 heifers were used to determine WBS values and meat palatability attributes. Treatments included: non-implanted control=CONT, trenbolone acetate (140 mg) and estradiol (14 mg)=Revalor-h<sup>®</sup>, melengestrol acetate (.40 to .45 mg/hd/d)=MGA<sup>®</sup>, Revalor-h + MGA, and trenbolone acetate (200 mg) + MGA=Finaplix-h<sup>®</sup> + MGA. Implants were administered one time at the onset of the feeding trial; MGA was incorporated in the feed and fed daily. These data indicate using implants containing endogenous androgenic and estrogenic quantities, as in Revalor-h, result in increased feed efficiency and an increased red meat yield. Proper aging (at least 14 d) should be implemented to minimize differences in tenderness. (Key Words: Heifers, Tenderness, Anabolic Implants.)

## **Introduction**

Anabolic implants have been used commercially for the past 30 years in different production scenarios. Using androgenic implants (trenbolone acetate) combined with estrogenic implants (estradiol), or endogenous estrogenic additives (melengestrol acetate) enhances feedlot performance more than if used alone (Bartle et al., 1988; Hartman et al., 1989). Therefore exogenous or endogenous forms of estrogen will enhance the use of androgens as a growth promotant in heifers. As factors such as final weight, carcass weight, ribeye area and red meat yield increase and percentage yield grade 4 and 5 decrease, carcasses become more profitable assuming quality is held constant. Because of the beneficial effect on performance and profitability, utilization of anabolic combinations have increased among feedlot operators. However, Smith et al. (1992) observed that the use of androgenic compounds may have a detrimental

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effect on carcass quality and beef tenderness. Because palatability (juiciness, tenderness and flavor) relates to consumer satisfaction, it is important to know if levels of anabolic hormones implemented at the production level would create adverse effects on palatability. Research in this area is limited. Therefore, it is not clear whether or not a consistent effect due to anabolic use is detrimental to meat tenderness or quality. The objective of this trial was to evaluate performance and carcass characteristics, as well as tenderness and sensory ratings relative to different anabolic treatments.

## **Materials and Methods**

**Animals:** English and Continental straightbred and crossbred yearling heifers (n = 1200) were fed in separate locations (CO: n = 600; TX: n = 600) and were assigned to finishing blocks (110, 130 and 150d) based on body weight and breed type. Each finishing period contained five pens with eight hd/pen. On day 0 heifers were introduced to a finishing diet (alfalfa hay 2.8%, corn silage 8.2%, flaked corn 78.9%, soybean meal 3.2% and liquid supplement 6.9%), and five treatments were randomly assigned to each pen within a block. Treatments included: non-implanted control (CONT), Revalor-h<sup>®</sup> (REV)=trenbolone acetate (140mg) and estradiol (14mg), MGA<sup>®</sup>=melengestrol acetate (.4 to .45 mg/hd/d), Revalor-h + MGA (REV+MGA), and Finaplix-h<sup>®</sup> + MGA (FIN+MGA)=trenbolone acetate (200mg) + MGA, with forty animals per block.

**Data Collection:** Performance data were collected by feedlot personnel at each location. Records of feedlot performance were sent to Oklahoma State University (OSU) for further comparisons.

Heifers were serially slaughtered at a commercial packing plant. Yield and Quality Grade data were collected by West Texas A&M University personnel at approximately 36 hours postmortem. Using a subsample from the Colorado location, ribeye rolls corresponding with the 10th, 11th and 12th ribs were removed and transported to OSU Meats Laboratory and further fabricated into three 1.0 inch steaks per ribeye roll. Ribeye steaks were vacuum packaged and aged for 7 or 14 d at 36°F. Individual steaks were randomized by aging period, frozen (-22°F) and stored for further analysis.

**Tenderness and Sensory Ratings:** Steaks were thawed at 36°F for a period of 24 hours and were cooked to an internal temperature of 158°F on an impingement oven.

Once steaks reached 158°F, they were stored at room temperature for 2 hours prior to coring. An average of six .5 inch diameter cores were removed from each longissimus dorsi muscle to determine Warner-Bratzler shear (WBS) values using an Instron Universal Testing Machine.

Sensory analyses were completed on 14 d aged steaks only. A six member sensory panel was trained using eight point descriptive rating scales to determine the palatability attributes (tenderness, juiciness, and flavor), as well as connective tissue amount. Panelists were served a sample (1.27cm × 1.27cm × thickness of the steak), as well as crackers and water while seated in individual columns under red lighting.

**Statistical Analysis:** Sensory data were analyzed to determine the effects of finish period (DOF) and implant protocol (IMP) as well as interaction between DOF and IMP. Shear force data were analyzed using a split-plot design including IMP, DOF and the interaction between IMP and DOF within the whole plot, using individual steaks within IMP by DOF as the error term. The sub-plot consisted of aging period and all appropriate two-way and three-way interactions. Least Squared Means were partitioned to assess main effects and interactions upon obtaining a significant F-Test. Upon finding significance, comparisons of treatment means were assessed using LSD tests.

## Results and Discussion

**Performance and Carcass Characteristics:** Average days on feed of 127 indicated improved performance characteristics for all heifers receiving anabolic promoters over CONT (Table 1). Heifers receiving anabolic treatments showed an increase ( $P < .01$ ) in dry matter intake and were heavier than CONT; regardless of MGA, implanted heifers tended to be heavier than heifers not receiving implants. This may partially be explained by a significant improvement in ADG for implanted heifers over MGA and CONT treatments with MGA being intermediate from CONT. A similar pattern was observed for feed efficiency as implanted cattle showed a significant reduction in feed required per pound of gain over CONT while MGA treated heifers were not different from implant or CONT treatments.

Hot carcass weight followed live weight trends with anabolically treated heifers yielding heavier carcasses ( $P < .05$ ) than CONT. Carcasses from heifers receiving REV and REV+MGA were heavier ( $P < .05$ ) than heifers treated only with MGA while FIN+MGA heifers were intermediate. REV implants resulted in carcasses with larger ribeye areas (14.2 vs 13.4 sq in) than other anabolically treated or CONT carcasses. Fat thickness, final yield grade (YG) and percentage YG 4 and 5 appeared to be influenced by MGA; as carcasses from heifers receiving MGA had greater fat thickness measurements, higher numerical YG's and higher percentages of YG 4 and 5 carcasses. No differences were found among anabolic treatments and CONT for marbling, lean maturity, percentage Choice and percentage dark cutters.

***Tenderness and Palatability Characteristics:*** Regardless of postmortem aging period, mean WBS values for all treatments were acceptable in tenderness threshold values (Shackelford et al., 1991) and a majority of the steaks were classified as tender or better. Shear force values and sensory ratings are reported in Table 2. The length of finishing period (110, 130, 150 d) by treatment interaction was significant for WBS values (Figure 1). Moreover, the length of time heifers were fed during the finishing period as well as aging period (7 vs 14 d) had a significant effect on WBS values (Figure2). Heifers fed for 110 d had the highest ( $P<.05$ ) WBS values with steaks from heifers administered REV and REV+MGA being the toughest and steaks from CONT, MGA and FIN+MGA having similar WBS values. Groups fed for 130 or 150 d showed a similar pattern in that REV and REV+MGA steaks had the highest ( $P<.05$ ) WBS values within each feeding period; steaks from CONT, MGA, and FIN+MGA treatments were similar for 130 d while steaks from CONT and FIN+MGA were similar for 150 d. Regardless of finish period, aging steaks for an additional 7 days (7 vs 14 d aging) resulted in significantly improved WBS values. Shear force values were most desirable for steaks aged 14 d from heifers fed at least 130 d.

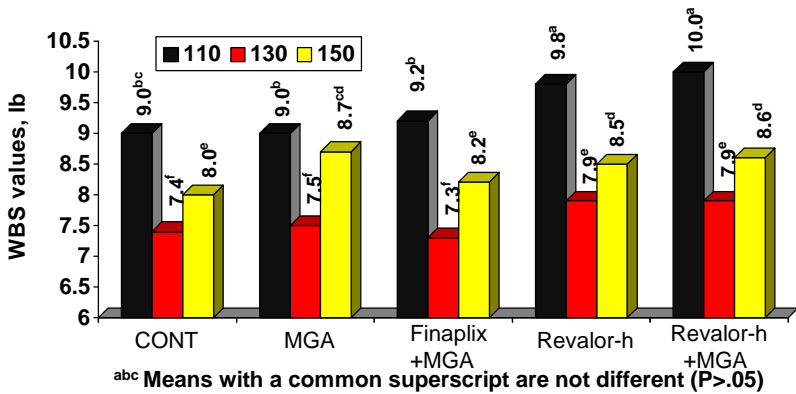
Sensory panelists observed tenderness differences as steaks from heifers receiving REV were rated tougher ( $P<.05$ ) than non implanted treatments. No differences were found for juiciness, flavor intensity or connective tissue among all treatments.

## **Implications**

Heifers receiving REV and REV+MGA treatments competed well with those receiving FIN+MGA and MGA alone in improving feedlot performance without having a detrimental effect on carcass quality. Even though REV and REV+MGA treatments resulted in steaks with higher (tougher) WBS values and sensory ratings, they were still within an acceptable tenderness range. REV and REV+MGA would enhance red meat yields, and with proper aging (at least 14 d), customer dissatisfaction could be avoided.

## **Literature Cited**

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**Figure 1. Average WBS values for treatment stratified by treatment.**

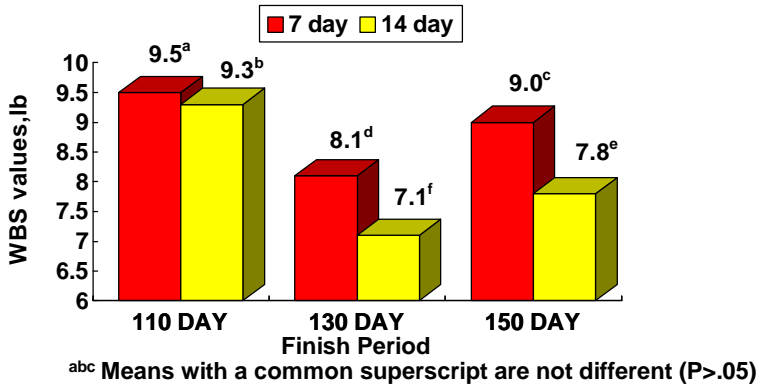


Figure 2. Average WBS values for 7 and 14 day postmortem aging period stratified by finish period.