

## **Project Summary**

**Effects of Optaflexx Feeding on Animal Performance, Carcass Traits, Yields of Carcass Primals and Value-Cuts and Meat Tenderness in Ovariectomized Heifers**

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### **Background**

Improving the efficiency of lean muscle growth is one way the industry can reduce costs of gain and positively impact carcass composition and yield. Ractopamine hydrochloride (RAC; Optaflexx®, Elanco Animal Health, Greenfield, IN) is a phenethanolamine with beta-adrenergic properties that has been shown to increase lean meat production in many animal species. RAC feeding appears to have its greatest impact in steers on carcass muscling. However, the response of feedlot heifers to RAC has not been predictable. Ovariectomization (OVX) is one way to potentially control the hormonal changes which could be responsible for variations in beef heifer's response to RAC supplementation.

The objective of this study was to determine the effects of Optaflexx feeding to intact and ovariectomized feedlot heifers by measuring its effects on:

1. Live animal performance;
2. Carcass yield and quality traits;
3. Carcass primal and subprimal yields;
4. Beef value-cut yields; and
5. *Longissimus* and value-cut tenderness.

### **Methodology**

Forty-eight heifers, of predominantly British breeding, were used in this study to investigate the effects of Ractopamine (RAC) supplementation and ovariectomization (OVX) on feedlot performance, carcass yield and quality traits, and subprimal and value-cut yields and meat tenderness. The heifers were randomly assigned to pens (n = 8 pens with 6 heifers per pen) and half of the pens were randomly selected for OVX, performed by a veterinarian. Within a gender subclass (OVX vs. intact; INT), half of the pens were randomly selected to receive a daily RAC supplement of 0.41mg/kg of BW, top dressed using a corn carrier, during the last 31 d of feeding. Cattle not receiving RAC were fed additional ground corn, top dressed as an equal amount to that added to the RAC-fed heifers.

At the initiation of feeding, cattle were treated with Ivermectin pour-on and implanted with Component TE-IH at the beginning of feeding trial. Cattle were then fed a 54:46 concentrate: corn silage TMR for 130 d (group 1; n = 4 pens) and 144 d (group 2; n = 4 pens). At the beginning of the RAC supplementation period (last 32 days of feeding), cattle were weighed on consecutive days to determine starting weight. Weights were also recorded after 14 days on treatment and at the end of the feeding period (32 days of supplementation). The amount of RAC top dress added to each pen was determined by the average pen weight at the start of the trial and it was adjusted on day 14, based on the 14-day average pen weight. In addition, pen feed intake was monitored in order to calculate feed efficiency. At the completion of the 32-day feeding period, the cattle were weighed on consecutive days and then transported to either Athens, GA (n = 24) or Auburn, AL (n = 24) and harvested.

Slaughter weight and hot carcass weight (HCW) were collected at harvest. Following a 18-24 h chill, chilled carcass weight (CCW) was recorded and carcasses were ribbed for collection of USDA yield and quality grade data, pH, and Hunter  $L^*$ ,  $a^*$ , and  $b^*$  values. Carcass yield and quality grade traits were measured by three trained, university personnel. After carcass data were collected, the strip loin was removed from the left side of each carcass and a 2.54-cm steak was removed from the anterior end, trimmed of all visible external fat, vacuum-packaged and frozen for subsequent intramuscular lipid analysis. Five additional steaks (2.54 cm) were then fabricated from the anterior end of the strip loin, vacuum-packaged and randomly assigned to aging times of 2, 4, 7, 14 and 21 days. Upon completion of the aging process at 2°C, steaks were frozen and stored for subsequent tenderness determination using slice shear force.

For carcass yield calculations, the KPH fat was removed from the right sides of carcasses and they were weighed to determine the cold side weight (CSW). Sides were then fabricated into the following thirteen NAMP sub-primals and one additional sub-primal: 112 ribeye roll, 114 shoulder clod, 116A chuck roll, 120 brisket, 189A tenderloin, 180 and 180 PSO 4 strip loin, 167 and 167A knuckle, 168 inside round, 170A gooseneck round, heel and 193 flank steak. Each sub-primal was weighed and recorded. In addition, the 114 shoulder clod, 120 brisket, 184 top sirloin, 168 inside round and 170A gooseneck round were trimmed to 0.64 and 0 cm fat trim and weighed at each trim level. Recorded weights from the fourteen subprimals were compared to the CSW to determine yields on a percentage basis.

After weights of the primals and subprimals were recorded, the shoulder clod, knuckle and gooseneck round were fabricated into value-cuts. The shoulder clod was fabricated into the shoulder center (*triceps brachii* long head), shoulder top (*triceps brachii* lateral head), top blade (*infraspinatus*) and shoulder tender (*teres major*). The knuckle was fabricated into the tip center (*rectus femoris*) and the tip side (*vastus lateralis*). The gooseneck round was fabricated into the bottom round trimmed flat (*biceps femoris*) and the bottom round ischiatic head (*biceps femoris* ischiatic head). After fabrication of the beef value-cuts, weights of each cut were recorded. Yields of value-cuts were expressed as a percentage of the subprimal from which it originated and from the CSW for analysis. Finally, three 2.54-cm steaks were cut from each value-cut. Steaks were vacuum-packaged and one was frozen for subsequent lipid analysis. The remaining steaks were randomly assigned to be aged for either 7 or 14 days and then frozen under tenderness was evaluated by slice shear force.

## Findings

Feeding RAC (0.41 mg/kg BW) for the final 31 days of the finishing period did not affect feedlot performance in intact or OVX heifers. RAC-fed heifers had higher dressing percentages and tended to produce heavier cold carcasses with larger ribeye areas. However, since 12<sup>th</sup> rib backfat was similar across treatments, USDA Yield Grade was not different between RAC-fed and control heifers. The average USDA Quality Grade for the heifers harvested in this study was low Choice, and RAC feeding did not affect either carcass maturity or marbling. Ovariectomized heifers had lower dressing percentages and smaller ribeye areas than intact heifers. Additionally, the intact heifers tended to have less backfat and lower USDA Yield Grades than OVX heifers, while carcasses from OVX heifers tended to have lower carcass bone maturity scores. Instrumental (Hunter Lab) color measurements and pH taken in the *longissimus dorsi* were not affected by either RAC feeding or sex class.

Carcass fabrication data revealed that RAC feeding increased the weight of every primal or subprimal measured. The ribeye roll, shoulder clod and gooseneck round were significantly heavier

and the tenderloin and knuckle tended to be heavier in the RAC-fed heifers than controls. However, when primal and subprimal yields were expressed as a percentage of cold side weight (CSW; KPH removed) there were no effects of RAC feeding in the study. In contrast, the ribeye roll was significantly heavier and the strip loin tended to be heavier, as a percentage of CSW, in the intact heifers compared to the OVX heifers.

Sex class did not affect value cut yields on an actual weight, percent of subprimal or percent of cold side weight basis. Likewise, RAC feeding did not impact value cut yields from the knuckle, or gooseneck round. However, the weight of flat iron (*infraspinatus*) and shoulder top (*triceps brachii*, lateral head) cuts were heavier in RAC-fed heifers than controls. Neither RAC feeding nor sex class impacted the intramuscular lipid content of strip loin, flat iron, tip center or bottom round steaks.

For tenderness evaluation, strip loin steaks were aged 2, 4, 7, 14, and 21 days, while flat iron, shoulder center, shoulder top, tip center, tip side, bottom round and bottom round ischiatic head steaks were aged 7 and 14 days. Thaw loss was not different across either RAC treatment or sex class. However, thaw loss was decreased as aging time increased in the strip loin, shoulder center, tip side and bottom round ischiatic head. Cook loss was not affected by either RAC feeding, sex class or aging time in this study. *Longissimus* slice shear force was not different across RAC feeding or sex class. Tenderness in the value cuts was also not affected by either RAC feeding or sex class, except in the flat iron steaks where non RAC-fed heifers produced more tender product than those receiving 0.41 mg/kg BW RAC.

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