

## **Project Summary**

### **Carcass Quality and Longissimus Tenderness of Calf-Fed Steers and Heifers Produced Using Alternative Growth-Management Strategies**

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# **Carcass Quality and Longissimus Tenderness of Calf-Fed Steers and Heifers Produced Using Alternative Growth-Management Strategies: Project Summary**

## **Background**

The objective of this study was to determine the effects of alternative growth-management strategies for calf-fed steers and heifers, featuring a reduced number of growth-promoting implants, on feedlot performance, carcass quality and *longissimus* muscle tenderness.

## **Methodology**

Crossbred, calf-fed steers (n=231) and heifers (n=146) were selected for the study and received no growth-enhancement technologies before placement into a feedlot. Weaned calves were weighed individually and randomly assigned to one of 4 growth management treatments. These treatments included: (1) 1X-DEL – a single (1X), delayed (DEL) implant program in which cattle received no initial implant, but were implanted with a terminal finishing implant on day 63 of the test; (2) 1X-RAC – a single implant program in which cattle received an initial implant at the beginning of the test and were supplemented with ractopamine hydrochloride (RAC; Elanco Animal Health, Greenfield, IN) at a daily inclusion rate of 200 mg/animal during the final 28 days of finishing; (3) 2X-CONV – a conventional, 2-implant program in which cattle received an initial implant at the beginning of the test and, then, were re-implanted on d 63 of the test; 4) 2X-RAC – a conventional 2-implant program, identical to Treatment 3, except that these cattle also were supplemented daily with RAC (200 mg/animal) during the final 28 d of finishing.

Approximately one month later, an on-test body weight was recorded for each animal and calves in treatment groups 2, 3 and 4 each received an initial implant. Steers received Revalor-IS initial implants (80 mg TBA and 16 mg E<sub>2</sub>) and heifers received Revalor-H initial implants (80 mg TBA and 8 mg E<sub>2</sub>). All cattle were reweighed two months later and animals in treatment groups 1, 3 and 4 received terminal implants.

At the beginning of the test period, cattle were receiving a 66% concentrate diet. A series of 5 step-up diets were used to gradually increase the concentrate level of the diet to approximately 90% over a 46-day period. Twenty eight days before each projected harvest date, individual body weight was recorded and the 28-day RAC supplementation period was initiated.

Carcass data was collected after harvest and measurements of *longissimus* muscle areas were obtained for each carcass using a video image analysis system (Computer Vision System; Research Management Systems, Inc., Fort Collins, CO). Additionally, objective color measurements were taken on the exposed *longissimus* (striploin) muscle at the 12<sup>th</sup>/13<sup>th</sup> rib interface.

Carcasses were fabricated and the striploin (IMPS #180) was collected from the right sides of each. On day three postmortem, each striploin was assigned to a sampling scheme that randomly specified anatomical locations of *longissimus* muscle sections that would be assigned to each of the five postmortem aging periods (3, 7, 14, 21 and 28 days). Sections were removed, vacuum-sealed, frozen and cut into steaks using band saw. Sections aged for 3 days were fabricated into 2 steaks randomly designated for either Warner-Bratzler shear force (WBSF) or Slice Shear Force (SSF). The other 4 sections were fabricated into one steak for WBSF tenderness determination.

## Findings

The 2X-CONV strategy improved ADG 5% and increased carcass weight 26 pounds compared with the 1X-DEL strategy. However, the 1X-DEL strategy improved quality grade performance and resulted in fewer heavyweight carcasses. 2X-RAC cattle showed a 21 pound advantage in final live weight and a 9 pound advantage in carcass weight compared with 2X-CONV cattle.

Cattle that were implanted twice (2X-CONV and 2X-RAC) produced heavier carcasses than did cattle implanted once during finishing. A higher percentage of cattle that received 2 implants produced heavyweight carcasses. Also, 2X-RAC cattle produced carcasses with larger *longissimus* muscle areas, whereas *longissimus* muscle areas of 1X-RAC cattle were smaller. Cattle in the 1X-DEL group had *longissimus* muscle areas that were similar to those of 1X-RAC cattle, but smaller than *longissimus* areas of cattle in the 2X-RAC group. Carcass weight was the only carcass trait that differed between the two sex classes in the current study; steers produced heavier carcasses than did heifers.

Growth-management strategy influenced both 3-day *longissimus* muscle area SSF and WBSF. Neither single-implant treatment (1X-DEL, 1X-RAC) differed from the 2X-CONV treatment with respect to SSF or WBSF. However, combining RAC supplementation with the use of 2 finishing implants significantly reduced *longissimus* muscle tenderness. Cattle in the 2X-RAC group produced *longissimus* steaks that had higher values (less tender) for SSF and WBSF than steaks from cattle in all other treatment groups.

After 3 days of postmortem aging, *longissimus* steaks from heifers had higher WBSF values than did *longissimus* steaks produced by steers. However, *longissimus* WBSF did not differ between the sex classes when samples were aged 7, 14, 21 or 28 days postmortem.

Additional analysis were conducted to compare effects of the 4 growth-management strategies on beef carcass value characteristics and predicted consumer acceptance of *longissimus* steaks. None of the growth management strategies adversely affected predicted consumer acceptability of *longissimus* steaks. When steaks were aged for 14 days or more, the probability that a majority of consumers would experience a satisfactory eating experience was 0.68 or greater.

## Implications

The 2X-CONV strategy improved ADG 5% and increased carcass weight 26 pounds compared with the 1X-DEL strategy. However, the 1X-DEL strategy improved quality grade performance and resulted in fewer heavyweight carcasses. 2X-RAC cattle showed a 21 pound advantage in final live weight and a 9 pound advantage in carcass weight, compared with 2X-CONV cattle.

Feeding Optaflexx to twice-implanted cattle did not affect quality grade performance; however, strip steak tenderness was reduced slightly. None of the growth-management strategies evaluated in the current study adversely affected predicted consumer acceptability of strip steaks.

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