

Residual feed intake does not interact with growth promotants on growth and meat quality of crossbred angus steers (#536)

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Introduction

Anabolic hormonal implants and β -adrenergic agonists are the two most common growth promotants (GP) used in North American beef cattle production. Residual feed intake (RFI), a measure of feed efficiency in cattle production that has recently become a tool for animal selection, has the potential to be synergistic with GP. GP can affect beef tenderness negatively (1) and the effects of RFI on meat quality are not yet fully understood (2). The objective of this study was to ascertain if interactions existed between GP and RFI status on steer growth performance and carcass and meat quality.

Methods

Forty-seven crossbred Angus steers from herds selected for low (efficient, $n=26$) (-0.33 ± 0.08) or control (inefficient, $n=21$) (0.63 ± 0.09) RFI status were randomly assigned to one of four treatments within RFI status: control (no implant), no ractopamine hydrochloride (RH) ($n=12$), implant and RH ($n=11$), RH only ($n=12$) and implant only ($n=12$). Steers receiving steroid implants received an implant containing 200 mg progesterone and 20 mg estradiol benzoate at 10 months of age and another implant containing 120 mg trenbolone acetate and 24 mg estradiol 80 days later. RH was fed at 200 mg/head/day for the last 28 days of finishing. *Semimembranosus* (SM) muscles were removed from right carcass sides 48 hours post mortem and cut in half. Halves were randomly assigned to 3 and 12 days of ageing at $0 \pm 4^\circ\text{C}$ and were balanced within treatment for position within the muscle. Warner-Bratzler Shear Force (WBSF) and proximate content were measured according to Girard et al., (2012a) (3). Meat colour was measured according to Girard et al., (2012b) (1). Data were analyzed using RStudio (R version 3.5.1 (2018-07-02)). Live weight data were analyzed using ANCOVA with initial live weight as a covariate. Carcass quality data were analyzed as a split plot blocked by slaughter group. RFI, RH, steroid treatment and their interactions were the fixed effects within the whole plot, with ageing period and its interactions as the fixed effect at sub-plot level. Animal within slaughter group served as the random effect.

Results

Results confirmed that low RFI steers were more feed efficient than control RFI steers ($P < 0.05$). Implanted steers consumed more feed ($P = 0.0464$) possibly due to increased maintenance energy requirement from increased body weight (4) and had greater feed efficiency ($P < 0.0001$) than non-implanted steers. Final live and carcass weights were increased in implant-

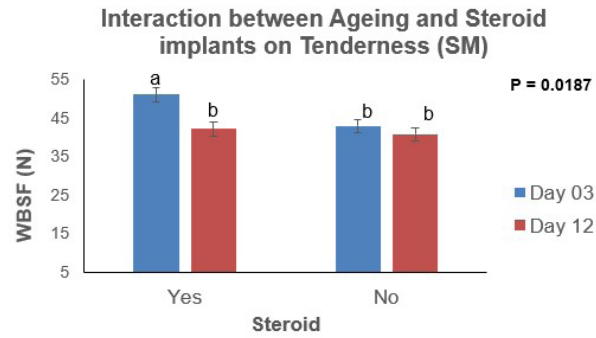
ed steers ($P < 0.0001$). Mean luminosity (L^*), yellowness (b^*), chroma, hue ($P < 0.0001$) and redness (a^*) values were greater ($P = 0.0014$) in steaks aged for 12 days than steaks aged for 3 days. Increased myofibril degradation and the presence of drip in the extramyofibrillar space can increase reflection of light. Steaks cooked to 71°C from control RFI steers had lower mean WBSF ($41.97 \pm 1.14\text{N}$) than those from low RFI steers ($47.11 \pm 1.02\text{N}$) ($P < 0.0012$). This could be due to increased feed intake associated with control RFI status translating into excess fat (5), but RFI had no effect on fat content ($P = 0.5952$). Steaks regardless of implant treatment had lower mean WBSF values at 12 days postmortem than steaks at 3 days postmortem ($P = 0.0187$) (Figure 1) most likely due to additional postmortem proteolytic activity with prolonged ageing (6). There was no effect of RH on production efficiency and meat quality characteristics.

Conclusion

Results confirmed that steroids enhanced production efficiency of beef steers but increased beef toughness. Selection for low RFI did not interact with growth promotants to affect growth or meat quality characteristics but may increase the toughness of high connective tissue muscles.

References

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Interaction between ageing period and steroid implants on tenderness of the SM muscle Figure 1. WBSF values(N) of SM muscles from steers implanted or not and aged for 3 or 12 days (n=23,23,24 and 24 respectively). Treatment interaction with different superscripts differ according to Tukey's method for least square mean comparisons between interaction means ($P < 0.05$).

Notes