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The Effects of Ractopamine and Hormonal Growth Promotants on Growth and Meat Quality of Crossbred Angus Steers

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Objectives

Meat tenderness is an important quality parameter that influences consumer preference. The cattle industry has over the years seen the emergence of feed additives and hormonal growth promotants in the form of β-adrenergic agonists (β-AA) and steroids, respectively. The objective of this study was to analyze the effect of hormonal growth implants and ractopamine on slaughter weight and meat quality parameters of steers selected for high (inefficient) and low (efficient) residual feed intake (RFI) performance.

Materials and Methods

Forty-eight crossbred Angus steers identified from individual GrowSafe data as high (n = 21) or low (n = 27) RFI cattle were randomly assigned to pens according to treatment (n = 12). Treatments included control (no ractopamine hydrochloride (RAC)/no steroids), RAC and steroids, steroids only, and RAC only in a 2x2x2 factorial design. Steers on steroid treatment received a first implant (200mg progesterone, 20mg estradiol benzoate and 29mg tylosin tartrate) at about 350 d of age and 450kg live weight and a terminal implant (120 mg trenbolone acetate and 24mg estradiol) at about 100 d before slaughter. RAC was fed to the appropriate group 28 d before slaughter at a rate of 200mg $head^{-1}d^{-1}$. Cattle were slaughtered at about 16 mo of age over 6 consecutive weeks by weight and back fat, with 1 animal per treatment represented in each kill for a total of 8 animals slaughtered per week. Hot carcass weights (HCW) were recorded. *Gluteus medius* (GM) muscles were obtained from the carcasses 3 d post mortem and halved for ageing, with one half aged a further 12 d under vacuum. After ageing at 4°C, muscle halves were assessed for pH, color, drip loss and Warner-Bratzler shear force (WBSF). For all data the experimental unit was the steer as the effect of ageing was not considered. Data was analyzed using the General Linear Model procedure in SAS (SAS Inst. Inc., Cary, NC) with RFI, steroids, RAC and their interactions as fixed factors with slaughter day used as a covariate. Mean differences were determined using Least Square Means and Tukey's multiple comparisons.

Results

Results revealed no effect ($P > 0.05$) of RFI and RAC on slaughter weight (SW) but steroids increased ($P < 0.0001$) SW of steers. An interaction effect ($P = 0.0381$) was seen between RFI, steroids and RAC on HCW, where high RFI steers that were implanted with steroids and fed RAC had a higher HCW at 389.64 ± 8.70 kg than low RFI steers that were neither implanted nor fed RAC (325.68 ± 7.05kg). An interaction between RFI, steroids and RAC ($P = 0.045$) for drip loss was observed on muscles aged for 12 d, where high RFI steers that were implanted but not fed RAC had a higher drip loss (1.93 ± 0.23 g) than low RFI steers that were not implanted but feed RAC (0.63 ± 0.19g). Muscles from implanted steers had a higher mean WBSF value than muscles from non-implanted steers on d 12 post-mortem ($P = 0.039$), while high RFI steers that received RAC had the lowest mean WBSF ($P = 0.015$).

Conclusion

Results indicated that steroids compromised the development of tenderness during post mortem ageing in the GM. This suggests that the benefit of steroid use on slaughter and hot carcass weights will compromise tenderness of this muscle. Additional post mortem ageing beyond 12 d may be required. Conversely, the use of the β-AA RAC showed potential for decreasing cooked GM toughness in high RFI steers regardless of the ageing period.

