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The Impact of Selection Using Residual Average Daily Gain and Marbling Epds on Growth Performance and Carcass Traits in Angus Cattle

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Objectives

Angus steers (n = 191) over a 3-yr period were used to compare growth performance, feed efficiency, body composition, and carcass characteristics from bulls divergently selected for feed efficiency. Angus sires were selected with high and low residual average daily gain (RADG) EPDs and high and average marbling (MARB) EPDs.

Materials and Methods

Steer weight and body composition, via ultrasound, were measured at weaning and yearling ages. Steers entered the feedlot at 454 d of age and completed a 70-d GrowSafe Beef test to determine DMI, ADG, and RFI. Steers were then slaughtered under federal inspection as they reached a backfat thickness of 1.3 cm. Carcasses were chilled for 48 h at 2°C, ribbed, and USDA yield and quality grade data were collected. The right side of the carcass was fabricated and primal and subprimal weights were collected. A 2.5-cm longissimus steak was removed, vacuum-packaged, aged for 14 d, and frozen for slice shear force determination. Additionally, a 1.3 cm longissimus steak was removed from yr 3 steers for proximate analysis. The GLM procedure of SAS (SAS Inst. Inc., Cary, NC) was used and the main effects of RADG and MARB and their interaction were tested by SIRE(RADG*MARB). Year was evaluated as a replicate.

Results

Steer weaning and yearling weights and ultrasound body composition were not affected ($P \geq 0.30$) by RADG selection, except for the Lo RADG steers having higher ($P \leq 0.02$) IMF values than the Hi RADG steers at both measurement times. For MARB selection, weaning weight, backfat and REA were higher ($P \leq 0.05$) in the Hi vs. Lo MARB steers; however, no differences in weight or composition were noted at yearling. Feedlot gain, ADG, DMI and daily DMI were not affected ($P > 0.20$) by selection using RADG or MARB EPDs. However, feed efficiency measured by RFI ($P = 0.05$) and DM Gain:Feed ($P = 0.11$) was improved in the Hi RADG steers compared to their Lo RADG counterparts. Selection for increased marbling did not significantly affect feed efficiency measures. Slaughter and hot carcass weights were heavier ($P \leq 0.03$) in the Hi vs. Lo RADG groups; however, no other carcass traits were impacted ($P \geq 0.14$). Marbling score and adjusted 12th rib backfat tended to be higher ($P = 0.10$) in the Hi vs. Avg MARB groups. An interaction ($P = 0.05$) between RADG and MARB selection was found for marbling score, with the Lo RADG/Hi MARB steers having significantly higher marbling scores than all other groups which did not differ ($P > 0.05$) from each other. The distribution of quality grades across MARB groups revealed a higher percentage of low and average Prime carcasses in the Hi MARB group and a higher percentage of low Choice carcasses in the Avg MARB groups. No major differences were observed across the RADG and MARB groups in primal and subprimal yields or meat tenderness. Longissimus proximate composition from yr 3 steers showed that lipid content was higher in the Hi MARB and Lo RADG groups compared to the Lo MARB and Hi RADG groups, respectively.

Conclusion

These findings suggest that selection using RADG or MARB EPDs has minimal impact on carcass yield, and positive selection pressure placed on these genetic values can potentially improve efficiency and carcass quality, respectively. Furthermore, it appears that improvements in feed efficiency can be attained without negatively impacting beef carcass merit, especially USDA quality grade.