



The Impact of Selection using Residual Average Daily Gain and Marbling EPDs on Growth Performance and Carcass Traits in Angus Steers

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Objectives

Profitability in the beef industry has narrow margins regulated by revenue from output traits like growth and carcass merit, but profitability is also largely impacted by input expenses like feed costs. Selecting for improvements in feed efficiency during the finishing phase, one of the most feed intensive segments of the industry, can help to mitigate those input costs. This study compared growth performance, feed efficiency, body composition, and carcass characteristics in Angus steers ($n = 321$) from bulls divergently selected for feed efficiency and marbling.

Materials and Methods

Angus sires were selected based on high (10th percentile or better) and low (85th percentile or worse) residual average daily gain (RADG) EPD as well as high (fifth percentile or better) and average (near 50th percentile) marbling (MARB) EPD. These criteria resulted in a 2×2 factorial design with four breeding lines: high RADG/high MARB, high RADG/average MARB, low RADG/high MARB, low RADG/average MARB. Data were analyzed using MIXED procedures of SAS with RADG and MARB as main effects. Significance was set at $\alpha = 0.05$. Generation was also analyzed, where generation one (GEN1) steers were from a selected sire while generation two (GEN2) steers were from a selected sire and a selected dam.

Results

Ultrasound and carcass data revealed no differences ($P \geq 0.12$) in 12th rib backfat thickness from weaning through slaughter for the RADG EPD groups. Yield grade and dressing percent did not differ ($P \geq 0.56$) across RADG or MARB groups. At the beginning and end of the feeding trial, the high RADG ($P \leq 0.02$) group had larger

ultrasound ribeye area (REA) than the low RADG group. Carcass REA tended ($P = 0.08$) to be larger in the high versus low RADG steers. During the feedlot trial and through slaughter, body weight was heavier ($P \leq 0.006$) for the high versus low RADG steers but did not differ ($P \geq 0.44$) across MARB EPD. Feed efficiency measures did not differ ($P \geq 0.32$) across RADG or MARB groups apart from the tendency ($P = 0.08$) for residual feed intake to be lower in the high versus low RADG steers. Marbling scores differed ($P \leq 0.04$) across RADG and MARB groups with the low RADG steers and the high MARB steers having improved marbling. The quality grade distribution across MARB EPD revealed that the average MARB steers graded 73% Choice and 25% Prime while the high MARB steers graded 56% and 42%, respectively. Slice shear force did not differ ($P \geq 0.32$) across RADG or MARB EPD. Body weights tended ($P = 0.06$) to be heavier at the start of the feeding trial for GEN1 versus GEN2 steers. Total gain, average daily gain, and feed to gain (F:G) differed by generation ($P \leq 0.007$) with increased rates of gain and reduced F:G in the GEN2 versus GEN1 steers. Body weights did not differ ($P = 0.72$) across GEN at the end of the feeding trial. Backfat thickness at the start and end of the feedlot phase was less ($P \leq 0.03$) and marbling score was improved ($P = 0.02$) in the GEN2 versus GEN1 steers, respectively.

Conclusion

These results suggest that selection using RADG EPD has negligible impacts on meat quality; and that progress in selection for efficiency can be achieved while advancing carcass quality and value. Furthermore, continued divergent selection for feed efficiency and marbling has the potential to improve feed efficiency through advancements in the rate of gain, while enhancing carcass merit through marbling.