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Effects of Exposure to a High-Concentrate or Pasture Based Diet for Varied Time Periods on Carcass Characteristics and Quantitative Analyses of Composition and Tenderness of Beef Strip Loin Steaks of Early Fed Steers

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Objectives

It is generally accepted that exposure to a high concentrate diet promotes improved carcass characteristics in cattle, but less has been done to explore carcass effects of early exposure to concentrate post-weaning across serial fed periods. The objective of this study was to assess carcass quality, composition, and tenderness of beef strip loin steaks from steers finished early post-weaning on either a pasture-based diet or various time periods on a high concentrate diet, followed by pasture finishing.

Materials and Methods

Following a live feeding trial at Clemson University (Clemson, SC), 47 steers were harvested on 2 dates at a commercial slaughterhouse (either 308 or 354 total d on trial), and carcass data were collected, including hot carcass weight (HCW), ribeye area (REA), 12th rib backfat thickness (FT), KPH, marbling score, and skeletal maturity. Steers were blocked by initial shrunk body weight (SBW) and assigned to diet treatment groups following weaning. Weight blocks were: light, middle, and heavy (214 ± 9 kg, 229 ± 9 kg, 250 ± 10 kg, respectively; n = 4/treatment/block). Animals were individually fed, and treatment groups included: all pasture (P; n = 12), 40 d high concentrate feed (40d; n = 12), 80 d high concentrate feed (80d; n = 11), 120 d high concentrate feed (120d; n = 12), followed by pasture finishing to a mean final SBW of 465 ± 29 kg. Loins were separated from the carcass 1 d post-harvest and stored at 0 to 4°C until 21 d postmortem. After aging, loins were frozen (–20°C) until further processing. Subprimals were fabricated into 2.5 cm steaks while still frozen and vacuum packaged for storage. The anterior-most steak was used for proximate analysis, conducted using a near infrared spectrophotometer; pH was measured subsequently using a slurry of ground product from the same steak. WBSF was conducted using the second most anterior steak. Data were analyzed using Proc GLIMMIX of SAS 9.4 (SAS Inst. Inc., Cary, NC) with treatment as the fixed effect. Carcass data were analyzed with block and harvest date as random effects. Cooking loss was included as a covariate ($P < 0.01$) in the analysis of WBSF.

Results

No differences were detected in full SBW or shrunk dressing percentage (P = 0.41, P = 0.07, respectively), though HCW did differ between treatments (P = 0.03). Marbling score was also influenced by diet ($P < 0.01$), as was FT (P = 0.04). In all 3 cases, 120d differed from other treatments, having a heavier HCW, greater marbling scores, and greater FT compared to the remaining diets. Skeletal maturity was not influenced by diet (P = 0.65), and no differences were detected for REA (P = 0.08), KPH (P = 0.17), or calculated yield grade (P = 0.57). Percent lipid content differed between treatments in proximate analysis (P = 0.01) with 120d having the greatest fat content. Consequently, moisture differed between treatments (P = 0.03), though percent protein and collagen did not (P = 0.34, P = 0.07, respectively). The pH was similar between treatments (P = 0.64), as was WBSF value (P = 0.98).

Conclusion

While varied lengths of exposure to high-concentrate diet early post-weaning had little effect on yield grade and dressing percentage, these data suggest that early exposure to a high-concentrate diet for 120 d increased fat deposition, and therefore backfat thickness, marbling, and percent fat in muscle composition.

