2016 Reciprocal Meat Conference – Meat and Poultry Quality

Meat and Muscle Biology™

Effects of Total Mixed Ration pH on Carcass Characteristics, Subprimal Yields and Fatty Acid Composition when Fed to Brahman or Holstein Cross Steers

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Keywords: beef, feedlot, marbling, slaughter, TMR
Meat and Muscle Biology 1(2):81 **doi:10.221751/rmc2016.078**

Objectives

The objective of this study was to determine the effects of total mixed ration (TMR) pH on carcass characteristics and fatty acid profiles when fed to Brahman cross (BC) or Holstein cross (HC) steers.

Materials and Methods

Eighteen steers (6 Brahman × Thai native and 12 Holstein × Zebu) were blocked by breed and stratified by weight before being randomly assigned 1 of 3 treatment diets, fed individually ad libitum including: fresh grass mixed-TMR (GTMR; pH 4.70 to 4.99), grass silage mixed-TMR (STMR; pH 4.00 to 4.40), and fermented-TMR (FTMR; pH 3.5 to 3.87). After 460 d all steers were slaughtered after a 24 h fast. During slaughter offal items were weighed to determine if breed or diet impacted visceral weight. After 7-d postmortem (1 ± 1°C) carcasses were separated at the 12th to 13th rib for collection of ribeye area (REA), fat thickness, marbling score, and objective color. After carcass data collection, carcasses were fabricated according to French standards and subprimal yields were calculated as a percentage of chilled carcass weight. The longissimus thoracis (LT) was removed and steaks (2.54-cm) were cut for Warner-Bratzler shear force (WBSF), proximate analysis, and fatty acid analysis. Data were analyzed using the MIXED procedure of SAS (V9.4; SAS Inst. Inc., Cary, NC). Steer was considered the experimental unit and steer within block by treatment was considered the random term. Mean differences were considered significant at $\alpha \leq 0.05$.

Results

There was not a breed by diet interaction ($P > 0.09$) for hot carcass weight (HCW), dressing percent (DP), REA, fat thickness, chill loss, marbling score, objective color, or cook loss and WBSF. However, BC had greater HCW, DP, REA, and WBSF than HC ($P < 0.05$). Marbling scores were greater ($P < 0.05$) for steers fed STMR and FTMR than GTMR, otherwise diet did not impact carcass traits ($P > 0.05$). Non-carcass components were a greater percentage of live weight for HC than BC. There was a breed by diet interaction ($P < 0.05$) for subprimal cuts of the macreuse (clod), knuckle, and bottom round ($P < 0.05$). Brahman cross steers had a greater percentage of weight in the chuck, sirloin, strip loin, and bottom round ($P < 0.05$); however, HC had a greater percentage of weight in the macreuse, knuckle, nerveux (heel), and bone ($P < 0.05$). There was no breed by diet interaction or main effects for chemical composition except percent fat where FTMR > STMR > GTMR ($P < 0.01$). For fatty acids there was no difference in total SFA or n6:n3 ($P > 0.10$), however, there were breed by diet interactions ($P < 0.01$) for total PUFA, n-6, n-3 and PUFA:SFA where LT from BC fed GTMR had greater percentages than all other treatment combinations.

Conclusion

Rations consisting of STMR and FTMR may be utilized to increase marbling and maximize tenderness for finishing Holstein cross steers, while feeding GTMR to Brahman cross steers could be an appropriate method for producing lean beef with a greater percentage of polyunsaturated fatty acids.