



Effect of Intramuscular Fiber Type Variation on Beef Semitendinosus Steak Metmyoglobin Accumulation during Retail Display

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Objectives

The objective of this study was to examine effects of steak location (LOC) on muscle fiber type distribution and metmyoglobin accumulation of *Semitendinosus* (ST) steaks.

Materials and Methods

Twenty ST muscles (IMPS 171C) from a commercial abattoir were wet aged for 22 d. Progressing from the proximal to distal end, each ST was fabricated into twelve 2.54-cm thick steaks. Steaks 1 through 4 were designated proximal (PROX), 5 through 8 were designated middle (MID), and 9 through 12 were designated distal (DIST), with steaks 1, 6, and 12 utilized for fiber type analysis. Remaining steaks within each location were randomly assigned to 0, 4, or 9 d of simulated retail display under fluorescent light. Day-0 and -4 steaks were utilized for metmyoglobin reducing ability (MRA) analysis. Day-9 steaks were subjected to daily objective and subjective steak surface metmyoglobin analyses, and day-9 MRA analysis.

Results

There were Location \times Day interactions ($P < 0.01$) for surface metmyoglobin percentage and visual panel percent discoloration scores. On d 0 of display, PROX steaks had less surface metmyoglobin than the other locations ($P < 0.01$), which were not different ($P = 0.51$). On d 1, MID steaks had more metmyoglobin than the other locations ($P < 0.04$), and DIST steaks had more ($P < 0.01$) metmyoglobin than PROX steaks. From d 2 to 6, MID steaks had more metmyoglobin than steaks from other locations ($P < 0.01$), which did not differ ($P > 0.17$). On d 7 of display, MID steaks tended to have more metmyoglobin than steaks from other locations ($P < 0.09$), which did not differ

($P = 0.65$). On d 8 and 9, MID steaks had more metmyoglobin than PROX steaks ($P < 0.02$), and DIST steaks did not differ from the two locations ($P > 0.15$). No differences in panel percent discoloration scores were found between muscle locations on d 0 ($P = 1.00$); however from d 1 to 5, MID steaks had more discoloration than PROX and DIST steaks ($P < 0.04$), which did not differ ($P > 0.12$). From d 6 to 8, MID steaks had more discoloration than PROX steaks ($P < 0.05$), and steaks from both locations did not differ from DIST steaks ($P > 0.16$). On d 9, PROX steaks had less discoloration than MID and DIST steaks ($P < 0.03$), which did not differ ($P = 0.72$). At d 0 and 4 of display, PROX and DIST steaks had greater reducing ability than MID steaks ($P < 0.01$), but were not different ($P = 0.33$) from one another. At d 9 of display, all locations possessed the same MRA ($P > 0.51$).

Location affected percentage of all 3 fiber types ($P < 0.01$). There were less type I fibers in PROX steaks than the other 2 locations ($P < 0.01$), and MID steaks tended to have more ($P = 0.10$) than DIST steaks. Proximal steaks had more ($P < 0.01$) type IIA fibers than the MID location, and tended to have more ($P = 0.07$) than DIST steaks. The DIST steaks tended to have more ($P = 0.08$) type IIA fibers than MID steaks. Steaks from PROX and MID locations did not differ ($P = 0.72$) in type IIX fiber percentage, but did possess more type IIX fibers than the DIST steaks ($P < 0.01$).

Conclusion

Throughout most of display, ST MID steaks accumulated more surface metmyoglobin than PROX and DIST steaks, which was also detected by a visual panel. Steaks from the MID location possessed less MRA compared to the other 2 locations on d 0 and 4 of display. Differences in MRA and discoloration may be due to the MID location possessing less type IIA fibers.