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 × 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.