Objectives

This study aimed to evaluate various packaging methods and retail display lighting conditions on the consumer preference of steaks from 5 different muscles.

Materials and Methods

Subprimals (n = 40 strip loins, 60 shoulder clods, 60 tenderloins, 60 top butts, 24 inside rounds) were collected from USDA choice beef carcasses and shipped to Texas Tech University. At 7d postmortem muscles (Longissimus lumborum, LL; Triceps brachii, TB; Psoas major, PM; Semimembranosus, SM; Gluteus medius, GM) were fabricated and sliced into 1 in steaks. Steaks (n = 120 per muscle) were randomly assigned to 4 packaging treatments: vacuum rollstock (ROLL); high-oxygen modified atmosphere (80% O₂/20% CO₂; HIOX); traditional overwrapped and stored in a motherbag with carbon monoxide (0.4% CO/30% CO₂/69.6% N₂; CO); and traditional overwrapped (OW), which was vacuum packaged until immediately prior to display. Steaks were displayed for an additional 13 d prior to retail display; they were displayed under fluorescent lights (FL) or light-emitting diodes (LED), with a third treatment remaining in dark storage (DARK). Steaks were displayed for 72h and then individually vacuum packaged. Steaks were cooked to a medium doneness and consumers (n = 300) rated flavor, juiciness, tenderness, and overall liking. Significant (P = 0.05) 3-way interactions were evaluated as slices of package×light interactions within each muscle types.

Results

A packaging×light interaction influenced flavor liking (P = 0.02). Dark storage improved flavor liking in OW and CO compared with FL for those treatments (P < 0.05). Rollstock had greater flavor liking scores than other packaging treatments among FL and LED display (P < 0.05). For packages placed under dark storage, HIOX had the lowest (P < 0.05) flavor liking. Muscle type influenced flavor liking (P < 0.0001), with PM being more liked (P < 0.05) than all other muscles. The SM had the lowest (P < 0.05) flavor liking compared to all other muscles. A muscle×packaging×light interaction was observed for juiciness liking (P = 0.0003). For GM steaks, each packaging type displayed under FL had the greatest (P < 0.05) juiciness liking. For the SM, HIOX had less (P < 0.05) juiciness than ROLL under FL display. Under LED display SM HIOX was lower (P < 0.05) in juiciness compared with SM CO. Tenderness liking also showed a muscle×packaging×lighting interaction (P = 0.002). In GM ROLL-DARK was less (P < 0.05) tender than ROLL-FL and ROLL-LED, which did not differ (P > 0.05). For LL, CO was more tender (P < 0.05) than HIOX steaks under FL display. Within SM, ROLL-DARK had similar (P < 0.05) tenderness as OW-DARK and each were more (P < 0.05) tender than all other packaging and lighting treatments. In TB, OW-FL had greater (P < 0.05) tenderness than all other TB steaks under FL display. The TB ROLL-LED and CO-LED were more (P < 0.05) tender than each other packaging type under LED display. A muscle×lighting interaction influenced overall liking (P = 0.05), where consumers liked PM most (P < 0.05) and SM least (P < 0.05), regardless of lighting treatment.

Conclusion

This study indicates that both lighting and packaging influence palatability of multiple beef muscles. Therefore, specific environments may be selected which lend to greater palatability.