SMART TUMBLING IMPROVED QUALITY AND PALATABILITY ATTRIBUTES OF FRESH BEEF *M. LONGISSIMUS LUMBORUM* AND *M. SEMITENDINOSUS*

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I.   OBJECTIVES

Beef round muscles often exhibit unacceptable tenderness and require extensive aging to reach targeted eating quality. Our recent study indicated a feasibility in improving tenderness of beef loins immediately following the tumbling process without the use of brine enhancement, as well as promoting enzymatic degradation of muscle fiber structure with aging (termed Smart Tumbling). However, it is currently unknown whether consumers would find a tumbled fresh beef product to be acceptable, as well as what role muscle type (i.e., tender vs. tough) may have. As such, the purpose of this study was to evaluate the impact of Smart Tumbling on the quality attributes and consumer acceptability of 2 beef muscles.

II.   MATERIALS AND METHODS

Beef loin (*M. Longissimus lumborum* [LL]) and eye of round (*M. Semitendinosus* [ST]) muscles ($n = 16$; USDA Low Choice) at 5 d postmortem were cut into 4 sections and allocated among 4 tumbling (T) treatments (in minutes: T0 [control], T40, T80, T120). The beef sections were individually vacuum packaged, tumbled in a Lance LT-30 at 8.5 rpm, and aged either 0 d or 10 d. Meat quality attributes, including pH, water-holding capacity, Warner-Bratzler shear force, and instrumental color, were analyzed. Consumer sensory evaluations ($n = 120$) per each muscle were conducted by assessing their liking of various attributes including tenderness, juiciness, flavor, and overall acceptability. A model per each muscle was created using the MIXED procedure of SAS (version 9.4; SAS Institute Inc., Cary, NC) with tumbling and aging durations serving as fixed effects and carcass included as a random effect.

III.   RESULTS

Both Smart Tumbling and aging main effects decreased Warner-Bratzler shear force in LL, but only aging improved instrumental tenderness in ST ($P < 0.05$). The consumer panel could clearly distinguish tenderness differences between Smart Tumbled and control (T0) beef samples from both LL and ST. Consumers found LL steaks tumbled for any duration to be more tender than the control ($P < 0.05$), whereas juiciness, flavor, and overall liking were unaffected ($P > 0.05$). In particular, Smart Tumbled steaks from LL (T120) without further aging had equivalent tenderness liking values to control steaks with additional 10-d aging ($P > 0.05$). Consumer panelists found improved tenderness values for Smart Tumbled (T120) steaks from ST ($P = 0.050$) after 10 d of aging, while no positive aging impact was found in the non-tumbled control (T0) counterpart ($P > 0.05$). This may be attributed to a similar interaction observed in liking of juiciness in ST ($P < 0.05$). Smart Tumbling increased cooking loss in LL ($P < 0.05$) regardless of aging duration, while 10-d aging appeared to mitigate tumbling-induced detriments to cooking loss in ST ($P < 0.05$). Smart Tumbling did not impact color attributes at either aging duration ($P > 0.05$).

IV. CONCLUSION

Overall, the results suggest that tumbling vacuum-packaged fresh beef (Smart Tumbling) can improve tenderness and possibly other eating quality attributes of beef LL and ST muscles. Smart Tumbling may allow fresh beef muscles to reach targeted eating quality outcomes with shorter aging. As the effects of combined tumbling and aging treatment appear to be muscle specific, further study on other muscles (i.e., round and sirloin) would be warranted.