

Optimal aging times for beef destined for foodservice

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Objective: Historical data has shown 14-21 d as the optimal aging time for beef; therefore, this study assesses aging requirements for three subprimals and three USDA quality grades.

Materials and Methods: Upper two-thirds USDA Choice ($n = 26$), lower one-third USDA Choice ($n = 26$), and USDA Select ($n = 26$) carcasses were selected at a commercial beef processing facility. Carcass selection was divided evenly across two collection dates ($n = 13$ carcasses per grade per collection). From each carcass ($n = 78$ total), one each of the following subprimals were pro-cured during carcass fabrication: Beef ribeye rolls, strip loins, and top sirloin butts. Therefore, a total of $n = 74$ ribeyes, $n = 77$ strip loins, and $n = 78$ top sirloin butts were vacuum packaged and transported to the processing facility within 24 h (5 subprimals were not obtained). Within 48 h of collection, eight 2.54 cm steaks were portioned from the ribeye and strip subprimals, and five 2.54 cm steaks from the top sirloin butt. Both ribeye and strip steaks were trimmed to 0.32-cm visible fat and a 2.54-cm tail. Boneless top sirloin butts were trimmed to remove the *M. gluteobiceps*, the *M. gluteus profundus*, and *M. gluteus accessories*, leaving the *M. gluteus medius*. For the purpose of defining aging treatments, the day of subprimal identification and packaging (pack date) at the commercial processing facility was defined as “Day 0,” resulting in steaks being cut on Day 2. Therefore, steaks were assigned to one of eight aging times (2, 4, 6, 8, 10, 12, 14, 21 d post-pack date) with anatomical steak location, subprimal type, and quality grade balanced across treatments. All steaks were vacuum-packaged and stored under refrigerated conditions (approximately 4 °C; never frozen) before being cooked for Warner-Bratzler shear (WBS) force determination. Due to inclement weather that created unsafe road conditions for research personnel, steaks from the second product collection were not cooked on days 6 or 8 and are not included in the data analyses. The steaks were cooked on a flat-top griddle preheated to 177 °C ± 3 °C, flipped when internal steak temperatures reached 35 °C and removed at 70 °C. Final cooked weights were collected, and total cook times and yields were determined for each steak. Cooked steaks ($n = 1,606$) were stored (approximately 4 °C) for 12 h to 18 h before WBS testing. Data were analyzed using a mixed model function to perform an independent analysis of variance (ANOVA). Each subprimal type with aging time, quality grade, and their interaction as main effects; source, animal and anatomical steak position were included as random effects in the model. Models were reduced as appropriate, and where analysis of variance testing indicated significance ($P < 0.05$); least-squares means were separated using a Student *t* test with an alpha level of 0.05.

Results and Discussion: There were no differences in mean WBS force values across USDA quality grades for ribeye or top butt steaks. Select and Top Choice strip loin steaks had similar WBS values, while Select strip loin steaks had a higher value than Choice strip loin steaks. Differences in WBS values were identified across aging days for steaks from all three subprimal types. There was no improvement ($P > 0.05$) in objective tenderness of any steak type after d 10, irrespective of USDA quality grade/ brand category. Evaluation of the postmortem beef aging curve (Smith et al., 1978; Savell et al., 1981) has been analyzed in the past. Smith et al. (1978) determined aging time for optimal tenderness was 11 d, yet most distributors still age to 14 d minimum requirements. During the last Beef Tenderness Survey, data indicated the industry average for postmortem aging was 31.5 d (Martinez et al., 2017). This study indicates that optimal aging time for beef has decreased. However, due to recent supply chain disruptions, foodservice establishments must keep more products on hand, increasing their storage and subsequent aging time.

Conclusion: In conclusion, aging past 10 days with steaks destined for foodservice does not enhance overall tenderness. All steak types showed no inherent tenderness differences across subprimal. Quality grade for steak type was inconsequential after d 10 of the aging period in regards to tenderness.

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