



RESEARCH BRIEF PRODUCT QUALITY

BEEF RESEARCH

The effects of degree of dark cutting on tenderness and sensory attributes of beef

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Abstract

The objective of this study was to determine the effect of degree of dark cutting (DC) on the tenderness, juiciness, and flavor attributes of beef. During carcass grading at a large U.S. commercial beef harvesting facility, DC carcasses ($n = 160$) and matching normal control (NC) carcasses ($n = 160$) were selected. *Longissimus lumborum* (LL) pH was determined and DC carcasses were classified as severe (severe dark cutter [SEDC]; mean pH = 6.9; $n = 40$), moderate (moderate dark cutter [MODC]; mean pH = 6.6; $n = 40$), mild (mild dark cutter [MIDC]; mean pH = 6.4; $n = 40$), or shady (shady dark cutter [SHDC]; mean pH = 6.1; $n = 40$). Strip loins were obtained from the left carcass sides, vacuum-packaged, and aged at 1°C. Slice shear force (SSF) was measured (14 d postmortem) fresh (never frozen), and trained descriptive sensory analysis of tenderness, juiciness, and flavor was measured (13 d postmortem) on frozen/thawed LL steaks. Cooked SSF pieces were frozen and used for western blotting of desmin to determine extent of postmortem proteolysis. Thaw and cook loss decreased as intensity of DC increased, with SEDC having the lowest loss (1.83 and 10.1%, respectively) compared with NC (3.37 and 14.9%, respectively). Slice shear force was higher ($P < 0.05$) for SHDC (25.6 kg) and MIDC (22.9 kg) compared with SEDC (16.8 kg), MODC (19.4 kg), and NC (17.8 kg). Sarcomere length was shorter ($P < 0.05$) between DC class (1.66, 1.67, 1.71, and 1.73 μm for SEDC, MODC, MIDC, and SHDC, respectively) and NC (1.86 μm). Postmortem proteolysis of desmin was greater ($P < 0.05$) for NC compared with all DC classes (59.83% vs. 49.20, 40.31, 42.07, and 43.30% for SEDC, MODC, MIDC, and SHDC, respectively). Trained sensory panel ratings for tenderness differed ($P < 0.05$) among DC class with SEDC (6.51) the most tender followed by MODC (6.04) and then MIDC (5.19), whereas SHDC (4.66) and NC (4.93) were the toughest. Juiciness ratings differed ($P < 0.05$) among each DC class (5.9, 5.7, 5.4, and 5.2 for SEDC, MODC, MIDC, and SHDC, respectively), with no difference between MIDC or SHDC compared with NC (5.23). Fat-like, rancid, heated oil, chemical, and musty/earthy/hummus flavors increased ($P < 0.05$) whereas metallic, sour, and salty flavors decreased as severity of DC increased. This study showed DC and NC differed in LL tenderness, juiciness, and flavor. The direction and/or magnitude of those differences were greatly dependent on severity of DC. Steaks with intermediate pH (SHDC and MIDC) are most likely to be tough and are regularly included in U.S. Select and U.S. Choice product lines.

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