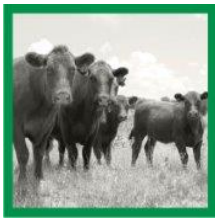

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Effectiveness of USDA Instrument-based Marbling Measurements for Categorizing Beef Carcasses According to Differences in *Longissimus* Muscle Sensory Attributes

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ABSTRACT

This study quantified relationships between USDA instrument marbling measurements and *Longissimus* muscle sensory attributes (tenderness, flavor, juiciness), and mechanical shear force tenderness measurements. Heifer (n = 390) and steer (n = 328) carcasses (all A-maturity) were selected at 4 beef processing plants in Colorado, Kansas, Nebraska, and Texas to represent 7 marbling degrees: traces (TR), slight (SL), small (SM), modest (MT), moderate (MD), slightly abundant (SA), and moderately abundant (MA). Classification into marbling groups was based on marbling scores determined using USDA-approved VBG 2000 instrument grading systems. One Strip Loin Steak was obtained from each side of every carcass and steaks were aged for 14 days. One steak from each carcass was used to obtain Warner-Bratzler shear force (WBSF) and slice shear force (SSF) tenderness measurements. The second steak from each carcass was evaluated by a trained sensory panel for the attributes of juiciness, tenderness, intensity of flavors characterized as meaty/brothy, buttery/beef fat, bloody/serumy, livery/organy and grassy; and overall sensory experience (negative or positive). Instrument marbling score explained 45%, 40%, 32%, 71%, and 61% of the observed variation in panel ratings for juiciness, tenderness, meaty/brothy flavor intensity, buttery/beef fat flavor intensity and overall sensory experience, respectively. Increased degree of marbling resulted in steaks having greater ($P < 0.001$) juiciness (MA > SA > MD > MT > SM > SL = TR), meaty/brothy flavor (MA = SA > MD = MT > SM > SL > TR) and buttery/beef fat flavor (MA > SA > MD > MT > SM > SL > TR). Steak tenderness also increased ($P < 0.001$) as marbling degree increased; however, tenderness differences among marbling degrees differed for steers (MA = SA > MD = MT > SM > SL = TR) and heifers (MA = SA > MD > MT > SM > SL > TR). Steaks produced by steers had significantly lower (more tender) WBSF and SSF values, and were rated as more tender by sensory panelists than steaks produced by heifers, but the effect of sex on panel tenderness was significant only among steaks within the TR marbling category. Results of this study showed that instrument-based classification of beef carcasses, according to differences in marbling, effectively identified subsequent differences in Strip Loin Steak sensory performance. Nearly all (98 to 99%) steaks with MA or SA marbling, and most (between 80% and 90%) steaks with MD and MT marbling, received positive ratings for overall sensory experience. In comparison, 62% of SM steaks, 29% of SL steaks, and 15% of TR steaks received positive sensory experience ratings.

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