



American Meat Science Association

May 19, 2016

Beef Carcass Revisions
Standardization Branch
LPS Program, AMS, USDA
1400 Independence Ave., SW., STOP 0258
Washington, DC 20250

Re: Request to Modernize the U.S. Standards for Grades of Carcass Beef

The American Meat Science Association is a broad-reaching organization of individuals that discovers, develops, and disseminates its collective meat science knowledge to provide leadership, education, and professional development. AMSA is the premier provider of learning and knowledge for the meat science discipline and has previously provided scientific input to both the U.S. beef industry and the USDA-AMS on issues relating to the production, processing and marketing of protein foods.

Recently, the American Farm Bureau Federation, National Association State Departments of Agriculture, National Cattlemen's Beef Association and U.S. Meat Export Federation requested that USDA-AMS add the following new language, in an effort to modernize the current standards, to section 54.104, paragraph k, of the U.S. Standards for Grades of Carcass Beef:

Carcasses of grain-fed steers and heifers determined to be less than 30 months old either by dentition (assessed at the time of slaughter under the supervision of USDA-FSIS) or by documentation of actual age (verified through a USDA Process Verified Program or USDA Quality System Assessment) are included in the youngest maturity group for carcasses recognized as "beef" (A maturity) regardless of skeletal evidences of maturity.

The review and input of the AMSA of this proposed language, in regards to the impact on the tenderness, juiciness and flavor of beef from specific grade categories, has been requested by both the industry stakeholders and USDA-AMS. Additionally, USDA-AMS has asked AMSA to identify those factors which have the greatest impact on the expected tenderness, juiciness and flavor of beef.

Research into factors that affect beef palatability is extensive and numerous reviews and publications investigating each of these factors and their comparative impacts on beef palatability, or a specific aspect of palatability, are available. Factors such as cattle breed, genetics, gender, diet, age, growth promotant strategy, pre-harvest stress, water holding capacity, marbling score, subcutaneous fat thickness, electrical stimulation, carcass suspension, postmortem aging, chemical enhancement, end-point degree of doneness along with other factors

not listed, have been shown to influence the ultimate beef eating experience. Tenderness of beef is often cited as the most important palatability characteristic for consumers (Miller et al., 2001ⁱ); however, when steaks become acceptable in tenderness, flavor becomes the primary driver of eating satisfaction (Killinger et al., 2004ⁱⁱ). Of the factors assessed during the process of applying official USDA Quality Grades to fed-cattle that are predominantly youthful, marbling score has been shown to segregate the population into appropriate and distinguishable palatability outcome groups (Smith et al., 1984ⁱⁱⁱ, Emerson et al., 2013^{iv}, Acheson et al., 2014)^v. Additional factors that could be identified at the time of grading that similarly impact beef tenderness are sex, pre-harvest stress (dark cutters), and breed (Tatum, 2006^{vi}; O'Connor et al., 1997^{vii}; Voisinet et al., 1997^{viii}). Of these factors, and among a narrow population of youthful, grain-fed cattle, marbling score is the factor that most consistently predicts the expected eating quality of beef. That being stated, it is also imperative to recognize that interactions among these factors are also prevalent.

Historically, the maturity of beef carcasses has been determined through the evaluation of skeletal ossification and lean color as primary indicators of physiological carcass age (USDA, 1997^{ix}). In 2001 after the discovery of the first case of Bovine Spongiform Encephalopathy in the U.S., the practice of estimating cattle age through the use of dental evaluation was additionally regulated to assist in the identification of cattle older than 30 months of age (MOA) and subsequent control of specified risk materials (SRMs). Both of these methods of age estimation have inherent error associated with their ability to accurately identify the chronological age and/or physiological maturity of cattle. Data published by Raines et al. (2008)^x reports simple correlation coefficients of 0.74 and 0.63 between dentition score and known days of age and USDA maturity score and known days of age, respectively. The approximate chronological ages of a carcass with USDA A-maturity characteristics would be 9 to 30 MOA and 30-42 MOA for carcasses with USDA B-maturity characteristics (Tatum, 2012^{xi}). According to USDA-FSIS^{xii}, eruption of a second permanent incisor occurs at 24-30 MOA. Lawrence (2001)^{xiii} similarly identified from a review of the literature, that across 16 studies, the mean chronological age at which the second pair of permanent incisors appeared was 30.4 ± 10 months. O'Connor et al. (2007)^{xiv} demonstrated that cattle with a known age of less than 24 months had a high probability (88%) of having USDA A-maturity carcass characteristics and that as age in months increased, the probability of a carcass being classified as youthful (A or B maturity) decreased.

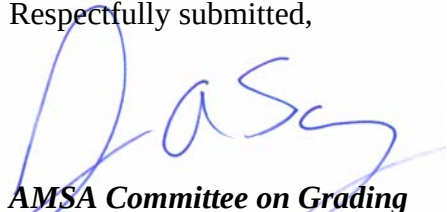
Lawrence et al. (2001)^{xv} and Berry et al. (1974)^{xvi} found no differences in mean tenderness values between carcasses with 0, 2, 4, 6 or 8 permanent incisors or from carcasses with USDA A, B, C or D maturity scores, respectively. Acheson et al. (2014)^{xvii} conducted a study designed to identify palatability differences across differing USDA maturity scores within cattle that have been identified, via dentition, as being less than 30 MOA. Within that sample population, tenderness, juiciness and flavor of cooked steaks did not differ between A, B and C USDA maturity groups and there were no interactions between maturity group and marbling score. Collectively, these data support that marbling, within a population of youthful, grain-fed carcasses, is the predominant palatability predicting factor assessed during the grading process.

Upon reviewing the request submitted by industry stakeholders, while it is accurate that several other countries utilize dentition to classify beef carcasses, drawing comparisons between a

carcass *classification* system and the USDA beef *grading* system is misleading and that modifications to USDA standards should be based solely on sound science, not protocols utilized in countries with vastly different beef production systems or marketing programs than the U.S. Similarly, while the committee recognizes the potential economic impacts of this situation, changes to the USDA beef grading system should not be predicated by economic impacts, but rather impacts on the system's ability to segregate carcasses and beef products based upon expected eating quality.

This committee concurs, and is in agreement with the available science, that while age at the time of slaughter does influence meat palatability, this becomes less influential within the U.S. grain-fed cattle population, as the vast majority of cattle presented for grading in U.S. beef processing facilities are < 30 MOA and USDA A or B maturity. Additionally, as the proportion of cattle being marketed on value-based pricing systems increases, the opportunity to create confusion exists when multiple age predicting systems are employed. This committee supports moving to a single mechanism of age/maturity identification as both methods currently in practice are equally accurate/inaccurate, and use of more than one method of predicting age or maturity, especially when pricing signals are being sent by both, creates unnecessary confusion in the cattle production sector. This committee, based upon a review of the science, does not feel that the proposed language modernizing the U.S. Standards for Grades of Carcass Beef would negatively or positively impact beef palatability or consumer acceptance of beef and would support the 'harmonization' of age determination among the systems used to identify SRM's and USDA Quality Grades, whether that is through the use of dentition, ossification and lean color or age verification.

Respectfully submitted,



AMSA Committee on Grading

John A. Scanga – Committee Chair

Michael E. Dikeman

Jessica L. Finck

Gretchen L. Mafi

James (Bo) R. Reagan

Clint E. Walenciak

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