

# Implementation of Instrument Grading for Beef Carcasses

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In an effort to improve the consistency, accuracy, and precision of beef carcass grade and factor assessment, the Department of Agriculture (USDA), Agricultural Marketing Service (AMS), Livestock and Seed (LS) Program will utilize approved grading instruments to assist in determining the official quality and yield grades and evaluating factors for certified branded programs.

In the time it takes the heart to beat six to eight times, a USDA grader will scrutinize numerous beef carcass traits in order to make important quality and yield grade decisions. As every grader is different, every carcass is different, and in one shift, thousands of beef carcasses are assigned quality and yield grades. There is a daily continuous stream of carcasses that move at a demanding chain speed at multiple plants involving multiple graders; last year over 26 million quality and yield grade decisions were made. As graders fulfill their obligation to provide accurate grades, USDA also has the obligation to provide the information and tools that would enable graders to enhance their performance.

Twenty-nine years ago, the USDA, along with the National Aeronautics and Space Administration (NASA), Office of Technology, embarked on a mission to determine the feasibility of utilizing technology for beef grading. The mission has certainly evolved over the years but the needs have remained the same: accuracy, precision, repeatability, and speed. The mission has involved several phases and even several types of technologies. Importantly, multiple organizations, spanning the entire beef industry, have been involved in this process.

The LS Program established performance standards for instrument prediction of ribeye size, USDA Yield Grade, and ribeye marbling in 2003,

2005, and 2006, respectively. Instruments are approved after meeting three fundamental requirements: (1) demonstration that the instruments are repeatable; (2) demonstration that instruments are accurate and precise at line speeds; and (3) demonstration of a documented program of in-plant procedures and verifications that ensure accurate and precise determinations are made by properly calibrated and verified instruments. The approval process utilizes hundreds and even thousands of carcasses at multiple locations in assessing the predictive accuracy of an instrument and in ensuring the functionality of the technology relative to the U.S. beef carcass population.

## Transition to Instrument Grading

It is pertinent that the transition to instrument augmented grading be seamless and transparent to all parties. A smooth transition is extremely important to beef producers who look for livestock prices to be commensurate with quality and quantity through USDA grade metrics. A smooth transition is just as important to the expectations of retailers and restaurateurs and in particular, their customers. Presently, consumer acceptance is founded on quality expectations resulting from the current subjective grading and certification programs administered by USDA.

In the industry's efforts in transitioning toward instrument augmented grading, a study was undertaken to ascertain the variation between graders assigned to different plants, based on information obtained from the augmented instrument grading. Blind data collection was employed to reflect the normal day-to-day patterns of USDA field graders. Further, USDA field graders did not utilize the instruments to aid in grading decisions. The data obtained was independently analyzed by industry and USDA.

The study, which reviewed USDA quality grades and instrument assessed marbling scores of 1.22 million carcasses (two plants in Texas, three plants in Kansas, two plants in Colorado, and two plants in Nebraska), showed a significant divergence; however, the study showed that the significance of the divergence did have location limitations. The average marbling score of the data collected from the 1.22 million carcasses did not represent the national average; it was below the national average. Therefore, it was determined that a more balanced estimate of the divergence should be based on data obtained from multiple plants in Colorado, Kansas, and Nebraska. This would provide a more balanced approach to reflect the diversity in carcasses presented for USDA grade assessment.

### **Pilot Project**

A pilot project for assessing instrument augmented grading was conducted in selected locations in Kansas and Nebraska utilizing the approved systems. One plant each from four different companies participated in utilizing the USDA-approved systems. The limited scope ensured that necessary and appropriate controls and evaluations were performed in a meaningful manner.

Meat Grading and Certification (MGC) Branch personnel provided the day-to-day, carcass-to-carcass

oversight of proper instrument operation. Oversight included making certain that instrument operators are properly trained, instruments were operational in accordance with draft LS Program protocols, instruments were used only on carcasses that are presented properly for image capture and analysis, and the resulting factors or grades were determined with a high level of reliability. Instrument calibration was verified before any shift operation began and following periods of extended non-use.

### **Current Status**

The results of the pilot are currently being analyzed to provide beta test data to aid USDA as the industry migrates to fuller instrument augmented grading implementation. The resulting data will be evaluated by LS program staff to monitor instrument performance by shift, by day, and by plant relative to the officially assigned USDA grade. The decision logic between graders and instruments will provide an accurate appraisal of any bias or influence. This logic should support the premise that grading accuracy, precision, and consistency provides a benefit to all segments of the beef production and consumption supply chain.

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