Project Title: Prediction of Beef Carcass Cut-out Yields Using the
                             MARC Beef Image Analysis System

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Background

The beef industry has for several years investigated instrument grading as a means to more objectively determine carcass quality. Past research has shown that instrument grading through image analysis can accurately segregate carcasses based on certain quality attributes in a laboratory setting. Unfortunately, this system did not perform as well in a commercial setting. As a result, researchers proposed that an image analysis system be used to augment grading systems by having a preliminary yield grade calculated by a human grader and the instrument evaluate ribeye area and determine a final yield grade. This system proved more accurate than human grading alone, but the practical applications were still limited.

Previously conducted research has shown that the MARC beef carcass classification system (VBG2000) can accurately predict preliminary yield grade, ribeye area and yield grade, however its ability predict carcass cutout yields has not yet been determined. This project was conducted to determine the ability of the VBG2000 to predict beef carcass fabrication yields and carcass value in a commercial setting.

Methodology

During routine carcass grading procedures at a commercial processing facility that processes 4,600 head per day, image analyses were taken using the VBG2000 Grading System (Vision- For-You, Inc., Dakota Dunes, SD). The left sides of the 262 selected USDA Choice and Select carcasses were also evaluated by an individual with extensive grading experience for gender, yield and quality characteristics (preliminary yield grade, adjusted preliminary yield grade, kidney, pelvic and heart fat percentage, and marbling score).

Carcass sides were processed and cutting yields were determined three- or four-days postmortem. The sides were fabricated following routine procedures with some minor modifications to facilitate data collection.

Yield calculations were determined based on four different variables:
- Retail product weight (sum of the weights of all finished cuts plus lean trim weight adjusted to 81 percent to avoid biases for fatter carcasses)
- Retail product yield (expressed as a percentage of side weight)
- Subprimal cut yield (sum of the weights of the subprimal cuts from the round, loin, rib and chuck expressed as a percentage of side weight)
- Total Carcass Value (based on historical average price extension for each product— including fat, bone and kidneys—for the participating processing company)

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Findings

The VBG2000 was able to predict accurately in a commercial setting the variation in subprimal cut yields (74 percent) on a level similar to expert yield graders (77 percent) and official USDA on-line graders (67 percent). Additionally, the VBG2000 system is a single-component system unlike other instrument grading units that are currently being researched. Unlike other systems, the VBG2000 does not require use of a hot carcass assessment system.

Implications

This study demonstrated that an instrument grading system can accurately predict beef carcass fabrication yields and carcass value under commercial processing conditions. Advancements in instrument grading may in the long-term lead to the development of more objective methods of evaluating carcasses.

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