

Project Title: **Objective Assessment of Beef Quality by Color
Computer Vision**

Principle Investigators: **J. Tan,
University of Missouri-Columbia**

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Layman's Summary:

This project was designed to develop color computer vision technology for objective beef quality yield evaluations. Digital imagery was captured on approximately 260 carcasses in the participating packing plant at traditional line speeds following the grading process. Computer algorithms were developed to compute image features relating to muscle color, marbling, muscle image texture, and fat thickness. The image features were used to predict USDA quality and yield grades, actual lean meat rate (yield), and shear force (a measure of tenderness) of cooked meat. The rates of correct predictions for quality and yield grade classification were approximately 85% and 50% respectively, with the overall correct classification at 64%. Showing that this computer vision technology may be used effectively to implement an official grading system, with a reasonably accurate outcome. However, predictions of actual lean meat rate and shear force measurement of tenderness were poor (both about 30% accuracy). In turn, additional indicators of beef quality and yield are needed.

About 140 vertebra images were taken in two commercial plants. The images were analyzed to characterize the degree of bone ossification. The ossification characteristics were used to predict maturity scores given by an official USDA grader. An accuracy of approximately 75% was obtained. This establishes the efficacy of using computer vision for maturity assessment.

