RESEARCH ABSTRACT
PORK QUALITY

Title: Prediction of pork loin quality and tenderness with the VQG pork loin grading camera - **NPB #15-103**

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Scientific Abstract:

To develop an accurate method to predict/evaluate meat quality traits of pork loins under industrial conditions, boneless pork loins (n = 1,400; 7 days × 200/day) were evaluated with the VQG pork loin grading camera during routine loin boning and trimming. Testing occurred at 6 large-scale commercial packing plants. Using the exposed longissimus on the ventral side of the boneless loin, loins were imaged by the VQG, objective color was assessed, and subjective color, firmness, and marbling were evaluated. Longissimus pH was determined. Vacuum-packaged loins were aged until 14 d postmortem and purge loss was determined. Loins were sliced into chops and objective and subjective assessments were made on chops that had been bloomed 3 h. Longissimus pH was determined for the chops. The following d, chops were cooked and cooking loss and slice shear force were determined. One-half of the loins were assigned to a calibration (n = 700) data set, which was used to develop regression equations, and one-half of the loins were assigned to a prediction (n = 700) data set, which was used to validate the regression equations. When appropriate, data from a separate experiment (n = 7,106 loins with routine quality measurements and n = 788 loins with slice shear force data) was used to independently validate equations. Noninvasive assessment of loin muscle lean color made with the VQG immediately following loin boning and trimming was strongly correlated to objective and subjective color measurements taken on the ventral side of the boneless pork loin at the time of cutting (1 d postmortem) and measurements taken on bloomed chops at 14 d postmortem. The equation, which was developed to predict Hunter colorimeter L* with the calibration data set was effective for the prediction data set suggesting that this equation is robust. For the prediction data set, the VQG camera predictions of loin L* were negatively correlated with subjective color scores of the loin at 1 d postmortem (r = -0.55) and bloomed chops at 14 d postmortem (r = -0.50). A positive correlation occurred between the VQG camera predictions of loin color and chop L* (r = 0.78) for the prediction data set. VQG predicted intramuscular fat percentage (IMF) was correlated with observed IMF (r = 0.71 to 0.78), observed marbling score taken on the ventral side of the boneless pork loin at the time of cutting (1 day postmortem; r = 0.63 to 0.68) and observed marbling score taken on bloomed chops at 14 d postmortem (r = 0.55 to 0.69) for the calibration and prediction data sets and when validated independently. For water-holding capacity, a regression model was developed to predict cooking loss at 15 d postmortem. For the calibration and prediction data sets, predicted cooking loss was positively correlated with cooking loss (r = 0.50 to 0.62) and purge loss (r = 0.38 to 0.44) and negatively correlated with pH at 1 (r = -0.47 to -0.51) and 14 (r = -0.36 to -0.37) d

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stmortem. For tenderness, a regression model was developed to predict slice shear force (SSF) at 15 d postmortem. For the calibration and prediction data sets, mean SSF ($P < 10^{-17}$) and the percentage of loins with SSF > 25 kg ($P < 10^{-6}$) were lower for loins predicted tender than loins not predicted tender. Moreover, when this regression equation was validated independently, loins classified as predicted tender had a lower ($P < 10^{-13}$) SSF mean and a lower ($P < 0.001$) percentage of loins with SSF > 25 kg than loins classified as not predicted tender. This technology could facilitate more effective marketing of pork loins and likely will provide pork industry professionals with data on the source of product quality differences.