RESEARCH ABSTRACT
PORK QUALITY

Title: Post-harvest Prediction of Pork Tenderness – **NPB #09-243**

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Scientific Abstract:

The present experiments were conducted to provide a broad-scale test of the efficacy of a non-invasive system for pork loin tenderness prediction across multiple packing plants representing a diversity of carcass chilling methods. Exposed LM on the ventral side of boneless loins was evaluated, with visible and near-infrared spectroscopy (VISNIR), at line speed on the loin boning and trimming lines of large-scale commercial plants (Exp. 1, n = 1,208, 4 plants; Exp. 2, n = 599, 3 plants). Boneless loin sections were aged (2°C) and fresh (never frozen) chops were cooked (71°C) and LM slice shear force (SSF) was measured at 15 d postmortem. In Exp. 1, on-line classification of pork loins, based on spectroscopic evaluation and prediction of SSF with a previously developed model, resulted in VISNIR tenderness classes that differed in mean LM SSF values at 15 d postmortem ($P < 10^{-11}$). Relative to loins predicted to be tender, loins that were not predicted to be tender were more likely to have SSF > 25 kg ($P < 10^{-9}$). While these findings were favorable, further examination of the data showed that the prediction model only accounted for approximately one-half of the variation in plant means for SSF (r = 0.73). To develop a robust model that would properly reflect tenderness variation among and within packing plants, correlation analysis was conducted for each plant to identify the wavelength range at which reflectance was most highly related to SSF. For each plant, the strongest correlation was found at or near 822 nm. Also, variation in the plant means for reflectance at 822 nm accounted for virtually all of the variation in plant means for SSF (r = -0.99). That is reflectance at 822 nm was indicative of variation in tenderness both among and within plants. Predicted tenderness classes, based on reflectance at 822 nm, differed in mean LM SSF values at 15 d postmortem ($P < 10^{-26}$) and the percentage of loins with SSF > 25 kg ($P < 10^{-16}$). Exp. 2 confirmed that use of this VISNIR system with reflectance at 822 nm would provide a robust method to classify pork loins for tenderness, as VISNIR predicted tenderness classes differed greatly in mean LM SSF values at 15 d postmortem ($P < 10^{-9}$) and the percentage of loins with SSF > 25 kg ($P < 10^{-5}$). These results clearly indicate that the VISNIR technology could be used to non-invasively classify pork loins on-line for tenderness.