

## PORK QUALITY

**Title:** Predicting Pork Quality: Discovering protein biomarkers for fresh pork loin tenderness. #18-199  
IPPA

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### Scientific Abstract:

The objectives were to determine 1) the interaction between aging duration and post-aging freezing on pork loin quality attributes and 2) the relationship between pork loin star probe (SP) and Warner-Bratzler shear force (WBS). Loins from 20 carcasses were collected one d postmortem. Chops (n=9; 2.54 cm thick) were fabricated from each loin and vacuum packaged. Four chops from each loin were aged at 4°C for 1, 8, 14, and 21 d and immediately evaluated (Fresh). Four adjacent chops were aged (1, 8, 14, and 21 d), frozen for 14 d, and thawed for evaluation (Frozen). An additional chop was used for evaluation of sarcomere length, intact desmin and troponin-T degradation. Purge, objective color, pH, subjective color and marbling score, cook loss, SP, and WBS were evaluated at each aging period. Desmin and troponin-T degradation, and sarcomere length were measured on fresh samples at each day of aging. Post-aging freezing had no significant impact on SP, WBS, pH, and subjective color or marbling score at any aging period. Fresh chop purge increased at each day of aging ( $P<0.01$ ). Post-aging freezing resulted in greater purge at 1, 8, and 14 d aging ( $P<0.01$ ). Fresh chop cook loss was greater than post-aging freezing chop cook loss at 14 and 21 d aging ( $P<0.05$ ). Across all aging periods and treatments, SP was correlated ( $r=0.85$ ;  $P<0.01$ ) with WBS. Fresh chop SP and WBS decreased from 1 to 8 d aging but was not different after 8 d aging. The abundance of intact desmin decreased ( $P<0.01$ ) between 1, 8, and 14 d aging. Troponin-T degradation increased ( $P<0.01$ ) with each aging period. Sarcomere length was not different across aging periods ( $P>0.05$ ). Aging, without freezing, for 14 or 21 d did not improve SP or WBS observed at 8 d, corresponding with changes in desmin degradation.

A second experiment was conducted to determine the extent to which the sarcoplasmic proteome explains variations in aged pork loin star probe (SP) value. Pork loins (n=12) were categorized by differences in SP at 21 d postmortem from a larger set of loins. Loins were categorized into Low SP group (LSP; n=6; SP<5.80 kg) and High SP group (HSP; n=6; SP>7.00 kg) based on 21 d SP value with inclusion criteria of marbling score (1.0-3.0) and 24 h pH (5.69-5.98). Quality traits were measured at 1, 8, 14, and 21 d aging. Desmin and troponin-T degradation, peroxiredoxin-2 abundance, calpain-1 autolysis, and sarcomere length were determined. Two-dimensional difference in gel electrophoresis and mass spectrometry were used to identify proteins that differed in abundance due to category. Star probe values were lower ( $P<0.01$ ) in LSP at each d of aging compared with HSP. Greater pH values were observed ( $P<0.05$ ) in LSP compared with HSP at each d of aging. Marbling score was greater ( $P<0.05$ ) in LSP compared with HSP at each d of aging. Greater ( $P<0.05$ ) desmin and troponin-T degradation was detected in LSP chops at 14 and 21 d aging and 8, 14, and 21 d aging, respectively. Greater ( $P<0.05$ ) sarcomere length was determined in LSP compared with HSP at 1, 8, and 21 d aging. Sarcoplasmic proteins from HSP chops had greater abundance ( $P<0.10$ ) of metabolic and regulatory proteins whereas the LSP chops had greater abundance ( $P<0.10$ ) of stress response proteins. Star probe values were affected by pH, marbling score, protein degradation, sarcomere length, and sarcoplasmic proteome.

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