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Influence of Postmortem Aging of Fresh Pork Loin on Instrumental Tenderness and Abundance of a Soluble Desmin Degradation Product

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Objectives

It is well understood that aging fresh pork loins will improve tenderness. The explanation for this phenomenon is degradation of myofibrillar, cytoskeletal, and intermediate filament proteins by endogenous proteolytic enzymes. Recently, the abundance of a desmin fragment in the sarcoplasmic fraction of aged pork has been linked to differences in pork tenderness. The objective of this experiment was to document the abundance of this desmin degradation product in the sarcoplasmic fraction during aging of fresh pork loin and determine its relationship to fresh pork tenderness.

Materials and Methods

Loins (n = 20) were collected 1 d postmortem at a commercial processing facility. Criteria for inclusion in the study was an average pH between 5.70 and 5.85 and a visual color score (National Pork Board) between 3 and 4. Two loin chops containing only the longissimus muscle (2.54 cm and adjacent 1 cm chop) from each loin were aged 1, 3, 7, or 14 d. Upon completion of aging, 2.54 cm chops (never frozen) were used to determine Hunter L, a, b, pH, color scores, and marbling scores. These chops were then cooked to 68°C and evaluated for cook loss and star probe (kg). The 1 cm thick chops were frozen and homogenized in liquid nitrogen at the end of each aging period. Proteins were fractionated to isolate proteins soluble in a low ionic strength buffer (40 mM Tris, 1 mM EDTA, pH 8.0). Abundance of a desmin degradation product (34 kDa) in the sarcoplasmic fraction was determined by immunoblotting and normalized to the abundance of a reference sample on each gel. Data were analyzed with a fixed effect of days of aging, and a random effect of loin. Pearson correlations for the quality variables were calculated.

Results

Star probe values declined with aging (7.9 kg, 6.4 kg, 5.6 kg, and 5.1 kg after aging 1, 3, 7, and 14 d respectively). Each aging period showed a significant decline in star probe ($P < 0.05$). The abundance of the desmin degradation product in the sarcoplasmic fraction significantly increased between 1, 3, and 7 d aging ($P < 0.01$). No difference in desmin fragment abundance was observed in a comparison of samples aged 7 and 14 d. Across all days of aging, star probe was positively correlated with cook loss (r = 0.59), and weakly correlated with pH measured on the day of aging (r = 0.29). Across all aging periods, desmin degradation product abundance was significantly negatively correlated (r = –0.49) with star probe values. Abundance of the desmin degradation product in the sarcoplasmic fraction measured after aging 1 d postmortem was significantly negatively correlated with star probe measured 3,7, and 14 d postmortem (r = –0.46, –0.44, and –0.45 respectively). Presence of soluble desmin in early postmortem pork may aid in predicting pork loin tenderness after aging.

Conclusion

Therefore, results of this study demonstrate promise of using the abundance of a desmin degradation product in the sarcoplasmic fraction of early postmortem pork to predict fresh pork tenderness.

