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Ability of Early Postmortem Traits to Predict Sensory Quality of Pork Loin Chops May Depend on Degree-Of-Doneness

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Objectives

The recommended degree-of-doneness (DOD) of whole muscle pork has been reduced from 71°C to 63°C. Previously, pork sensory research has focused on 71°C DOD. Therefore, it is necessary to reassess the prioritization of fresh traits used to predict eating experience. Fresh quality and sensory traits are weakly to moderately correlated among themselves. Therefore, a multivariate, rather than a univariate analysis approach may be more appropriate. Therefore, objectives were to use canonical correlation analysis (CCA) to 1.) Determine the relationship between canonical quality and sensory and constituent variables of pork loins cooked to 63°C or 71°C and 2.) Compare the relationships among loin quality traits and canonical sensory variates of pork loins cooked to 63°C or 71°C.

Materials and Methods

Pork loins were selected in batches of 36 over the course of 4 collection ($N_t = 288$) days at a commercial abattoir following a 22 h chilling period. Loins were selected using visual color and marbling to ensure variation in early postmortem quality traits. Instrumental color, visual color, marbling, pH (UpH), and firmness were evaluated on the ventral surface of the loin (used for canonical fresh quality; Q1, Q2, Q3) within 30 min of fabrication. Loins were vacuum-packaged and transported to the University of Illinois where they were stored at 4°C until 14 d postmortem. At this time, 2.54 cm chops were removed for determination of intramuscular fat (IMF), slice shear-force (SSF), and sensory tenderness, juiciness, and pork flavor (used for canonical sensory quality; S1, S2, S3). Data were analyzed using the CANCELL procedure of SAS. Canonical correlations were considered significant at $P < 0.05$. Individual factors

were considered to load significantly to a canonical variate if $|r| \geq 0.35$ and the standardized coefficient was $|C| \geq 0.25$.

Results

In CCA, the first canonical variate of each group is calculated such that it maximizes the explanatory power between the first set of canonical variates. Therefore, the first canonical variates are considered the most important. The first 3 canonical correlations were significant ($r_1 = 0.42$, $r_2 = 0.34$, $r_3 = 0.33$; $P < 0.04$); whereas, only the first canonical correlation was significant ($r_1 = 0.43$; $P = 0.01$) for chops cooked to 71°C. Tenderness ($C = 0.30$; $r = 0.60$), juiciness ($C = 0.40$; $r = 0.65$), and flavor ($C = 0.71$; $r = 0.79$) all loaded onto S1 for 63°C loins, and was therefore related to general eating quality. Q1 was loaded with subjective firmness ($C = 0.75$; $r = 0.54$) and IMF ($C = 1.15$; $r = 0.68$), and therefore was related to marbling. For loin chops cooked to 71°C; S1 was characterized by only juiciness ($C = 0.89$; $r = 0.78$) and flavor ($C = 0.51$; $r = 0.63$), and Q1 was characterized by UpH ($C = 0.51$; $r = 0.37$) and IMF ($C = 1.00$; $r = 0.40$). Only weak cross-loadings existed among quality variables and S1 for both DOD, but firmness ($r = 0.23$) and IMF ($r = 0.28$) were most correlated with S1 for 63°C; whereas, UpH ($r = 0.16$), firmness ($r = 0.15$), L* ($r = -0.13$), and IMF ($r = 0.17$) were most correlated with S1 for 71°C loins.

Conclusion

Overall, the extent to which sensory variables contribute to eating experience variability differs by DOD. Moreover, marbling appears to be more important factor in estimating eating quality of chops cooked to 63°C than pH, with both pH and marbling contributing equally when cooking to 71°C.