

Relationship of Pork Longissimus Muscle Fatty Acid Profile with Pork Loin Texture and Sensory Traits

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Summary and Implications

The objective this project was to determine the contribution of lipid composition and lipid profile to textural and sensory properties of fresh pork. Loins from pigs (n=2009; from 306 sires and 1030 dams) were used to determine the contribution of lipid composition and lipid profile to textural and sensory properties of fresh pork. Total lipid content was correlated with saturated fatty acids and negatively correlated with unsaturated fatty acids. Myristic acid was positively correlated with tenderness and negatively correlated with star probe. Negative correlations between stearic acid and the traits of tenderness and juiciness were detected. No other fatty acid component was determined to have a strong correlation with pork texture or sensory traits. The results suggest that when pigs are fed a similar diet, normal variations in pork loin fatty acid profile do not contribute to differences in pork texture and sensory traits.

Introduction

Improving the consistency and quality of fresh pork is of significant importance to the swine industry. Lipid content has often been reported to have a measure of influence over sensory traits of texture, tenderness, flavor and juiciness. Marbling has also often been used to classify fresh pork for specific markets. It has become apparent that the lipid profile of fresh lean pork is influenced by genetic background in addition to lipid profile of feedstuffs. The objective is to determine how normal variation in fresh pork lipid composition influences tenderness, juiciness and flavor of fresh pork.

Materials and Methods

Pigs (n=2009; from 306 sires and 1030 dams) were used in this study. The test included purebred Berkshire (269), Chester White (175), Duroc (360), Hampshire (228), Landrace (196), Poland China (130), Spotted (195), and Yorkshire (456) barrows (1178) and gilts (831). The halothane (Hal 1843TM) genotype was determined. Diets were uniform within test and across breeds. Pigs were slaughtered at 105 kg body weight, and samples of the LD were obtained from each carcass at the 10th rib. Total lipid content and fatty acid profile were determined on the lean portion of each loin chop. A trained sensory panel assigned juiciness, tenderness, chewiness and pork flavor scores to each loin chop. Two broiled chops were evaluated for instrumental texture using a circular, five-pointed star-probe.

Data were analyzed using a mixed linear model including test, gender, halothane genotype, breed, and breed-by-gender interaction as fixed effects, with sire and dam within breed included as random effects.

Results and Discussion

Table 1 documents correlation statistics of measured pork quality traits. Lipid percentage was negatively correlated with star probe, sensory chewiness and flavor, but was not correlated with sensory tenderness or juiciness. It is noteworthy that pH was more highly correlated with sensory traits than with total lipid content.

Total lipid content was correlated positively with saturated fatty acids and negatively with unsaturated fatty acids (Table 2). Myristic acid (C14) was positively correlated with tenderness and negatively correlated with star probe. Negative correlations between stearic acid (C18) and the traits of tenderness and juiciness were detected. No other fatty acid component was determined to have a strong correlation with pork texture or sensory traits. Results from this study do not support the hypothesis that normal variations in total lipid or specific fatty acids contribute to variation in sensory quality of fresh pork loin chops.

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Table 1. Correlation of pork loin quality and sensory traits.

	Cook loss	Lipid %	Star Probe	Juiciness	Tenderness	Chewiness	Flavor
pH	-0.31	0.01	-0.19	0.11	0.11	-0.16	0.19
Cook loss		0.04	0.29	-0.43	-0.30	0.23	0.05
Lipid %			-0.21	-0.02	0.01	-0.14	0.11
Star Probe				-0.39	-0.500	0.48	-0.03
Juiciness					0.83	-0.22	-0.15
Tenderness						-.46	-0.14
Chewiness							-0.14

Table 2. Relationship between fatty acid composition and fresh pork loin quality.

	C14	C16	C16:1	C18	C18:1	C18:2
pH	0.11	0.09	0.06	-0.02	-0.06	-0.06
Cook loss	-0.08	0.00	0.10	0.09	0.15	-0.10
Lipid %	0.40	0.44	0.30	0.19	0.44	-0.69
Star Probe	-0.22	-0.17	-0.04	0.025	-0.03	0.15
Juiciness	0.23	0.00	-0.16	-0.34	-0.12	0.11
Tenderness	0.27	0.03	-0.12	-0.33	-0.10	0.06
Chewiness	-0.11	-0.08	-0.14	-0.03	-0.06	0.13
Flavor	-0.03	0.03	0.18	0.17	0.11	-0.14