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Relationship of Fat Quality and Meat Quality Traits of Fresh Pork

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Cover Page Footnote
We gratefully acknowledge the work of the farm staff at the Iowa Swine Testing Station, the staff at Hormel Foods (Austin, MN) for their assistance in carcass data collection, and the National Pork Board for their support of this research.

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Summary and Implications

Barrows and gilts (n=347) of 5 purebred lines and one commercial crossbred line were fed commercial swine diets with dried distillers grains with solubles (DDGS) inclusion at 30% of dry matter. For the final 30 days of feeding, DDGS were removed from the diet. Pigs were harvested at a minimal weight of 111.4 kg. At harvest, fat was collected from the back, belly, and jowl, and meat samples were taken from the longissimus muscle for evaluation of fat and meat quality characteristics. Jowl fat iodine values were significant predictors of back and belly fat iodine values, and increases in iodine value of the fat of the pork chop were moderately and negatively correlated with several measures of meat quality. This study demonstrates that iodine value of fat from one anatomical location (i.e., back and belly) can be predicted from iodine value of a less valuable anatomical location (i.e., jowl), and, additionally, increases in iodine value correlate negatively with predictors of meat quality.

Introduction

Profitability of the pork industry is dependent on the production of high quality, affordable pork being provided to consumers. With the increased production of ethanol, DDGS have become readily available and are often an economical feed source for inclusion in the diet of market pigs. Feeding DDGS, however, may negatively affect pork production by increasing the incidence of soft pork fat. Because DDGS often are incorporated into commercial diets for pigs, it is important to understand and evaluate fat quality from pigs fed diets containing DDGS. One measure of quality of pork fat used by industry is iodine value, where a greater value indicates a greater concentration of unsaturated fatty acids in the fat (i.e., softer fat). The goal of this study was to identify a predictive relationship between the iodine value of jowl fat and back and belly fat and to determine the relationship between iodine value and pork chop meat quality.

Materials and Methods

A total of 347 barrows and gilts from five pure breeds and one commercial crossbred line were delivered to the Iowa Swine Testing Station (Ames, IA) and housed in a slatted finishing barn with eight pigs per pen. Pigs began the performance test at 31.8 kg and were slaughtered at a minimal weight of 111.4 kg. All pigs were fed a commercial corn/soy-based diet with DDGS inclusion at 30% of dietary dry matter. For the final 30 days of finishing, DDGS were removed from the diet. Immediately following harvest and upon arrival of the split carcasses to the chillbox, pork fat tissue samples were collected from the jowl, the back over the 10^{th} rib, and the midsection of the belly. Fatty acids were extracted from the pork fat samples and used to determine the iodine value. Additionally, several measures of pork quality were made from a section of bone in loin from the 10^{th} – 12^{th} rib (ultimate pH, Minolta Y, Hunter L, visual color, visual marbling, and visual firmness) at the Iowa State Meat Laboratory (Ames, IA) 24 hours post-mortem.

All statistical analyses were performed by using the CORR procedure of SAS version 9.3 and simple linear regressions.

Results and Discussion

Jowl fat iodine values were significant predictors of back and belly fat iodine values (r = 0.5406 and 0.6001, respectively; $P < 0.0001$), indicating that one can predict the iodine value of the back and the belly fat from jowl fat (Figure 1). Additionally, jowl fat iodine values were significantly, but inversely correlated with visual color ($P < 0.0001$), visual marbling ($P < 0.0001$), and ultimate pH of the pork chop ($P = 0.0014$). Jowl fat iodine values also tended to be correlated with visual firmness ($P = 0.0520$; Table 1). These correlations indicate that an increased iodine value is related to a decrease in pork quality as perceived by the consumer.

Acknowledgments

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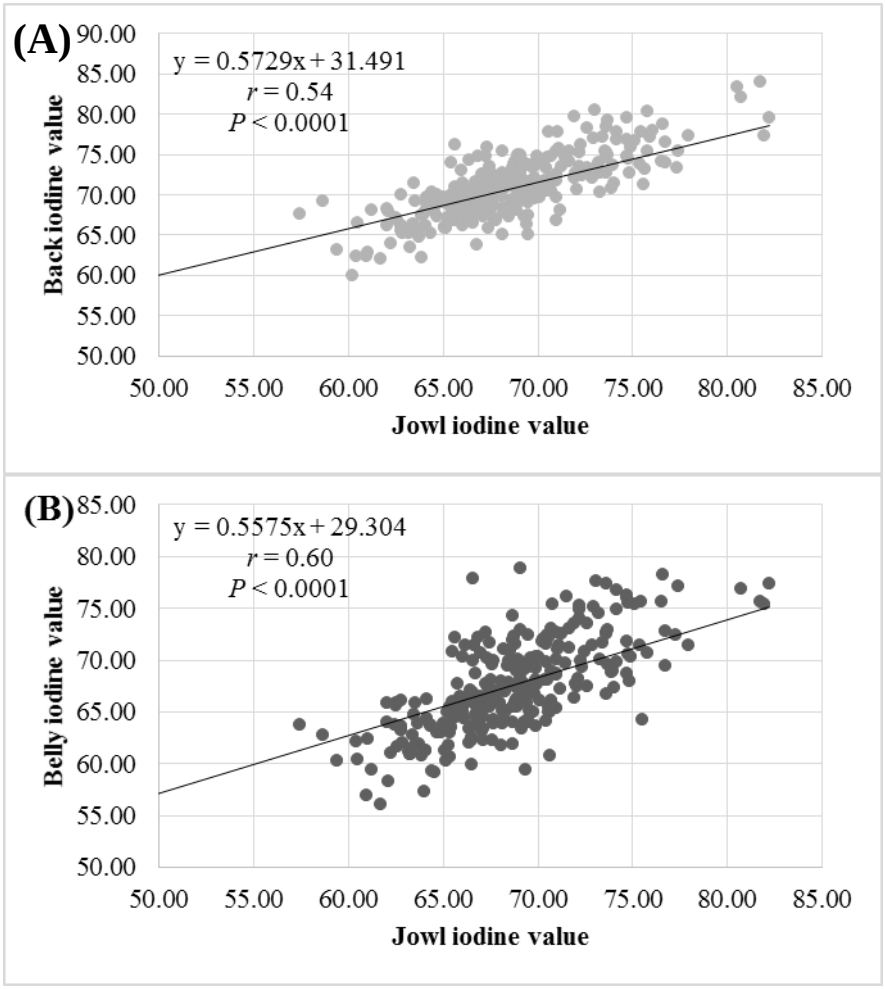

Figure 1. Iodine values of jowl adipose tissue of six breeds of pig as a predictor of iodine values of back and belly adipose tissue. Numbers are expressed in grams iodine consumed per 100 grams of lipid. P-value is for difference from zero. (a) Prediction of iodine value of back adipose tissue from iodine value of jowl adipose tissue. (b) Prediction of iodine value of belly adipose tissue from iodine value of jowl adipose tissue.

Table 1. Correlation between iodine values of jowl fat and of meat quality metrics.

Item	Value[1]	Std. Dev.	r	*P* - Value[2]
pH	5.65	0.18	-0.18	0.0014
Minolta Y	23.05	3.00	0.24	< 0.0001
Hunter L	47.86	3.28	0.22	< 0.0001
Visual color	2.89	0.86	-0.27	< 0.0001
Visual marbling	1.90	0.89	-0.24	< 0.0001
Visual firmness	2.27	0.85	-0.11	0.0520

[1] Mean value n = 315 pigs.
[2] P-values for difference from zero