51st International Congress of Meat Science and Technology
August 7-12, 2005 – Baltimore, Maryland USA

THE EFFECT OF RACTOPAMINE AND INTRAMUSCULAR FAT CONTENT ON SENSORY ATTRIBUTES IN PORK FROM PIGS WITH SIMILAR GENETICS

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Key Words: Marbling, Pork, Ractopamine

Introduction

The impact of intramuscular fat level, or marbling, on flavor and tenderness of fresh pork has been of great interest recently in the pork industry. With increasing demand for pork with higher marbling by the export market as well as food service and branded retail products, it would be beneficial to better understand the effect of marbling on sensory characteristics. Additionally, the prevalence of ractopamine use in the industry warrants the investigation of any effects on sensory characteristics concerning ractopamine and intramuscular fat content.

Objectives

The objective of this study was to characterize the effects of ractopamine and amount of intramuscular fat on sensory characteristics using pigs from the same genetic line. Utilizing one genetic line should minimize any differences due to genotype or breed differences.

Methodology

Fresh boneless pork loins were collected from 233 barrows of the same genetic line over a two-day period from a commercial slaughter facility. Live treatments included a control diet and the control diet with the addition of ractopamine (RAC) fed at 5 ppm for 28 days. Loins were vacuum packaged, transported to the Meat Science Lab at the University of Illinois and held at 4 °C until they were opened over a two-day period at 7 days post mortem (loins collected on day one at the plant were opened on day one at the Meat Science Lab and likewise for day two). Ultimate pH (pH_u) was collected at 7 days post mortem using the pH star (SFK Technologies) calibrated with two buffers of pH 4.0 and 7.0. Objective color measurements (L*, a*, and b*) were collected using a Minolta Chromameter CR-300 (Minolta Camera Co.). Multiple 2.54 cm chops were cut for use in determination of proximate composition, cook loss, Warner-Bratzler shear force, and sensory analysis. Sensory analysis was performed by a trained 6-member panel using an anchored, unstructured 15 cm line scale and including tenderness, juiciness, and pork flavor as evaluation parameters. Initial statistical analysis of main effects was performed utilizing the Mixed Procedure of SAS including treatment and blocking by date of harvest in the random statement. Subsequent analysis for determining the relationship between intramuscular fat content and flavor was performed using the REG procedure of SAS (SAS Institute, Inc. version 8.2).

Results & Discussion

The effect of RAC on analyzed variables was minimal as displayed in Table 1. Numerically small, but statistically significant differences were identified for pH_u (5.62 vs. 5.70), Minolta a* (7.53 vs. 6.86), and Minolta b* (3.87 vs. 3.46) for control vs. RAC treatments, respectively. Due to the lack of significant differences concerning extractable lipid and sensory characteristics, all data were pooled for analysis by regression. Percent lipid and pH_u were regressed against sensory panel tenderness, juiciness, and pork flavor both independently and together.

Figure 1 displays the distribution of extractable lipid from the population of loins. Although it was not a uniform distribution, there was a wide range of extractable lipid, which should allow for regression against sensory characteristics. The pH distribution was relatively small with the average and standard deviation being 5.65 ± 0.15 units. One would not expect this to regress well due to the narrow range, however it could be used to regress in conjunction with extractable lipid to help explain some of the variation.

Results from regression of extractable lipid with tenderness, juiciness, and flavor as determined by the sensory panel can be seen in Figures 2, 3, and 4. Extractable lipid was unable to explain much variation in any of the sensory categories. Even when coupled with pH and regressed against the sensory characteristics, the R^2 achieved by extractable lipid did not exceed 0.10.

Conclusions

Results from this study indicate that RAC did not have any significant effects on quality or sensory characteristics. They also indicate that for this particular genetic line, extractable lipid was not a good indicator of sensory properties as determined by a trained sensory panel.

Tables and Figures

Table 1. Effects of RAC on Loin Characteristics

	Control	RAC	SEM	P-Value
Moisture (%)	73.84	73.71	0.09	0.21
Extractable Lipid (%)	2.89	2.75	0.09	0.27
Cook Loss (%)	21.34	21.04	0.45	0.64
Shear Force (kg)	2.86	2.79	0.10	0.23
Juiciness	7.52	7.44	0.17	0.59
Tenderness	7.71	7.68	0.22	0.86
Pork Flavor	6.38	6.37	0.43	0.95
NPPC Color	3.16	3.25	0.42	0.16
NPPC Firmness	2.32	2.40	0.05	0.23
NPPC Marbling	1.71	1.70	0.08	0.94
Ultimate pH	5.62	5.70	0.04	< 0.01
Minolta L*	47.52	46.86	0.26	0.07
Minolta a*	7.53	6.86	0.13	< 0.01
Minolta b*	3.87	3.46	0.28	< 0.01

Figure 1. Distribution of Extractable Lipid

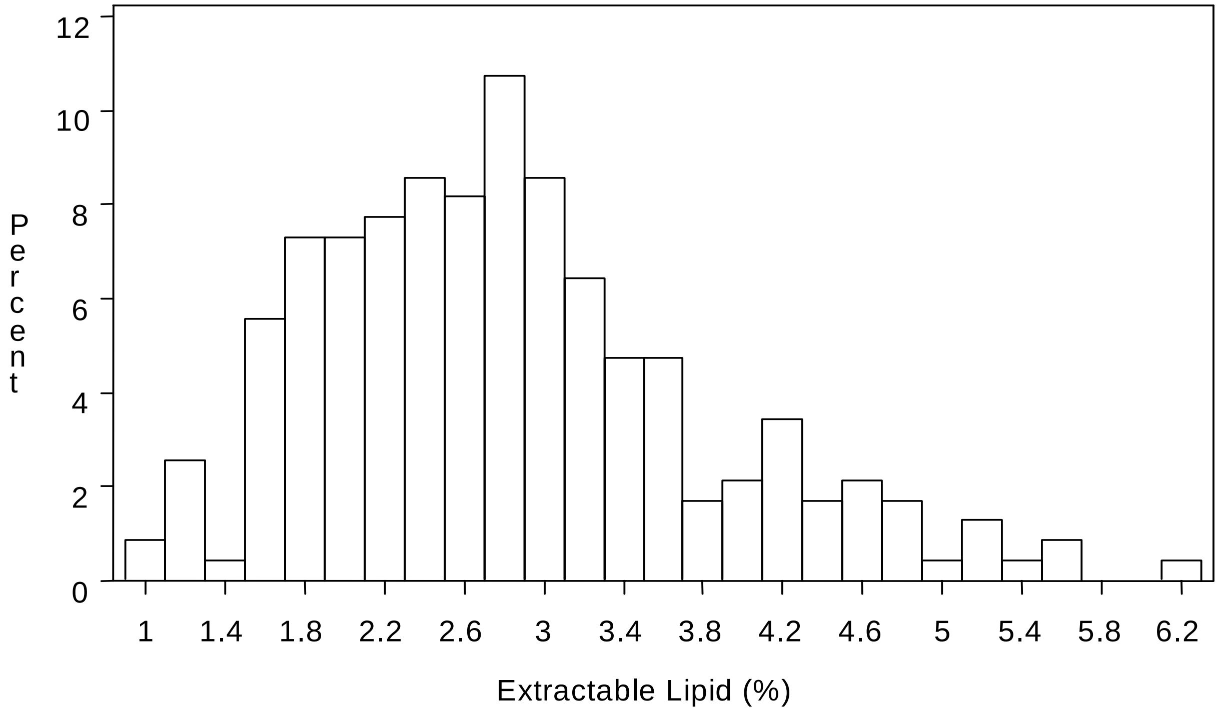

Figure 2. Regression of Extractable Lipid * Sensory Panel Tenderness

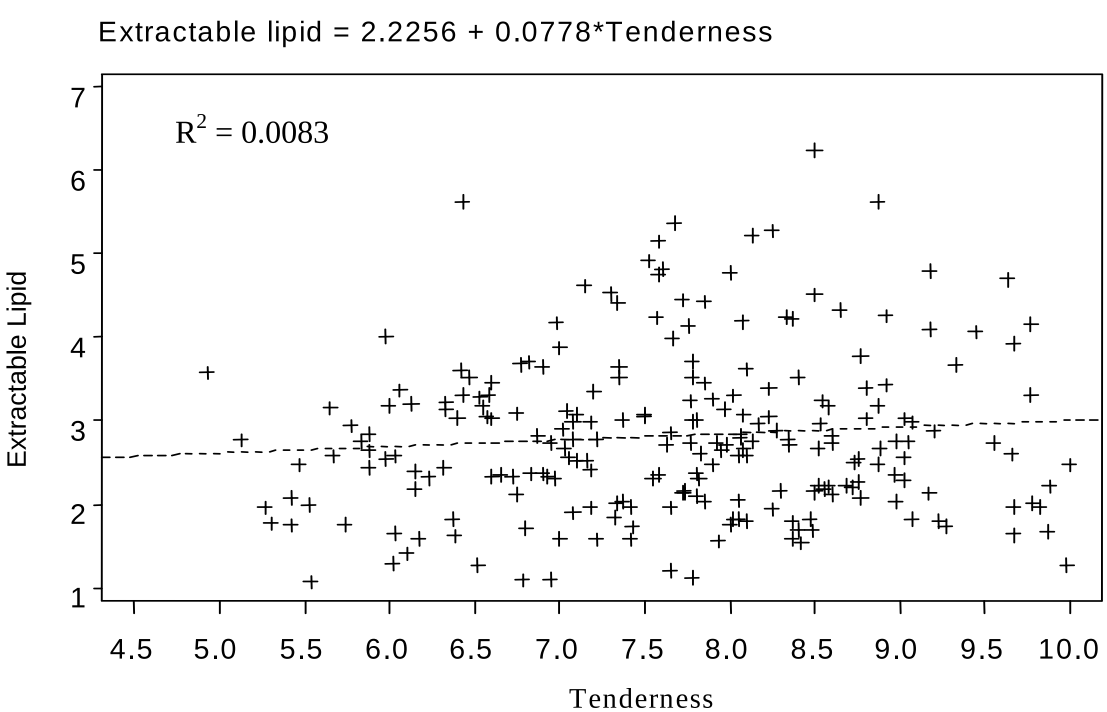

Figure 3. Regression of Extractable Lipid * Sensory Panel Juiciness

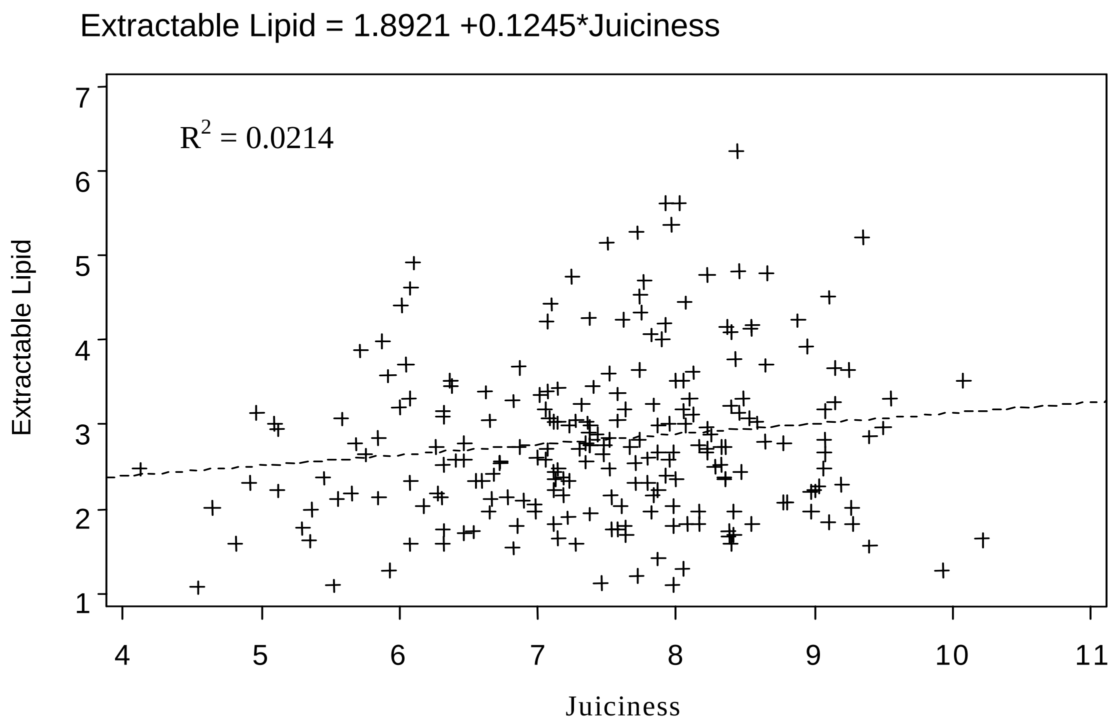

Figure 4. Regression of Extractable Lipid * Sensory Panel Pork Flavor