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Effect of Pig Age at Slaughter on Fresh Pork Quality

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Summary and Implications

Differences in pork quality were observed between the three age groups defined by age at 275 pounds. Faster growing pigs had pork loins with higher marbling scores and greater lipid content than slower growing pigs. Loins from faster growing pigs had lower juiciness and tenderness scores than loins from slower growing pigs. Differences in pork quality could not be attributed to lower ultimate pH, but could be due to variations in postmortem proteolysis associated with growth.

Introduction

Postmortem pH decline and muscle protein degradation are important factors in determining fresh pork quality. Low pH early postmortem has been shown to predict poor water holding capacity of pork. Previous studies have demonstrated that selection for improved lean growth has the potential to alter early postmortem muscle metabolism in muscle, resulting in lower pH values early postmortem and a decrease in muscle protein proteolysis which ultimately leads to a negative influence on fresh pork quality. However, questions still arise as to the effect of other selection practices, such as selecting for improved growth rate, on pork quality.

Materials and Methods

A commercial line of Duroc sires was used for this experiment. Sires were chosen based on excellent growth rate (defined as age at 275 pounds) or to maintain average growth rate. Progeny (50% barrows and 50% gilts) were harvested at a commercial slaughter facility using conventional chilling. Loin pH was measured at 2, 6 and 24 h postmortem. Loin color (1-6, 1 being lightest), marbling (subjective score to predict % lipid), firmness (1-3, 1 being soft), lipid content and sensory traits were measured. In addition, intact desmin (a meat protein) was measured at 2 d postmortem as a measure of postmortem proteolysis (a higher value indicates less degradation).

Data from progeny were analyzed in a one-way ANOVA by age at 275 pounds. Progeny were divided into groups based on standard deviation from mean age at 275 pounds (calculated); mean age = 165 d.
Group A: 142-157 d; mean = 150 d (n=40)
Group B: 158-174 d; mean = 167 d (n=40)
Group C: 175-202 d; mean = 188 d (n=40)

Results and Discussion

Data are summarized in table 1. All data describe the pork loin. Loins from pigs that reached 275 pounds at a younger age had more marbling and corresponding greater lipid content than loins from slower growing pigs. Age group did not affect quality traits of color, firmness and drip loss. It is noteworthy that loins from faster growing pigs had poorer sensory tenderness and juiciness scores. This corresponds to less postmortem degradation that is documented with higher intact desmin values. Under the conditions of this experiment, marbling values were greater in the faster growing pigs, but sensory quality was poorer in that same group.

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Table 1. Effect of age group on pork loin quality traits.

| Trait | A, 150 d n=40 | B, 166 d n=40 | C, 188 d n=40 | P value |
|---------------------------------|------------------|------------------|------------------|-----------------|
| 2 h pH | 6.14 | 6.18 | 6.25 | Not significant |
| 6 h pH | 5.95 | 5.88 | 5.88 | Not significant |
| 48 h pH | 5.70 | 5.66 | 5.64 | <0.08 |
| Color ^d | 2.5 | 2.5 | 3.0 | Not significant |
| Firmness ^e | 2.0 | 2.0 | 2.0 | Not significant |
| Marbling ^f | 2.0a | 1.5b | 1.5b | <0.01 |
| Drip loss (%) | 2.45 | 2.56 | 2.18 | Not significant |
| Lipid % | 2.11a | 1.47b | 1.11b | <0.01 |
| Sensory Tenderness ^g | 5.9a | 6.2a | 6.5b | <0.05 |
| Sensory Juiciness ^g | 4.5a | 5.4b | 6.3c | <0.01 |
| Sensory Flavor ^g | 2.0 | 2.0 | 2.0 | Not significant |
| Intact Desmin ^h | 1.64a | 1.15a | 1.11b | <0.01 |

^{A,B,C} Age group A mean= 150 days of age, Age group B mean = 166 days of age, Age group C mean= 188 d of age.

^{a,b,c} Within a row, means without a common superscript letter are different

^d Color score assigned by a panel of experts according to the standards of the National Pork Board. (1= pale, 6 = dark)

^e Firmness score assigned by a panel of experts (1= soft, 3= firm)

^f Marbling score assigned by a panel of experts according to the standards of the National Pork Board. Values are set to represent a prediction of % lipid.

^g Sensory score assigned by a trained sensory panel. A value of 1 indicates not tender, not juicy, not flavorful, while a score of 10 indicates very tender, very juicy and very flavorful.

^h A ratio that indicates the proportion of intact desmin present in a sample compared to a reference. A high number indicates little proteolysis.