

# Comparing meat quality traits and consumer perception of sensory qualities in different pig breeds

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## Abstract

The objective of this study was to compare postmortem meat quality traits and consumer acceptance of sensory qualities in Duroc, Landrace, Meishan, and Yorkshire pork, for both the fresh and cooked forms. A total of 134 pigs were evaluated. Meishan pork showed the lowest  $\text{pH}_{45 \text{ min}}$  and  $\text{pH}_{24 \text{ h}}$  values and the highest drip loss and lightness values. In the consumer evaluation of the fresh meat, the panelists rated the appearance and overall acceptability of the Duroc pork as significantly higher than the Landrace and Yorkshire pork. For the cooked meat, Meishan pork had the lowest abnormal flavor scores, and both Duroc and Meishan pork had significantly higher juiciness and tenderness scores than the Landrace and Yorkshire pork. Duroc and Meishan pork also had significantly higher overall acceptability than the Yorkshire pork. Based on these data, differences were observed in the postmortem meat quality and sensory quality characteristics among the breeds. Both Duroc and Meishan pork received high consumer sensory evaluation scores; however, the postmortem meat quality of the Meishan pork was low.

## Introduction

Meat quality is defined as a combination of the various properties of both fresh and processed meat, and includes sensory characteristics as well as technological aspects (van der Wal *et al.*, 1997). The sensory characteristics of pork can be affected by many factors such as carcass weight and sex, breed, diet, genetic variations, slaughtering, maturation, and cooking methods (Flore *et al.*, 1999; Risvik, 1994). However, the effects of pig breeds on sensory quality traits remain controversial. Therefore, the purpose of this study was to compare the postmortem meat quality traits as well as consumer acceptance of sensory qualities in Duroc, Landrace, Yorkshire, and Meishan pigs.

## Materials and methods

A total of 134 pigs were evaluated for this study (Duroc,  $n = 14$ ; Landrace,  $n = 29$ ; Meishan,  $n = 52$ ; and Yorkshire,  $n = 39$ ). Pigs from different pens of the same farm were fed the same commercial diet. At 45 min postmortem, samples were taken from the *longissimus dorsi* muscles at the 8th *thoracic vertebra* to analyze muscle pH at 45 min ( $\text{pH}_{45 \text{ min}}$ ) postmortem. After 24 h of chilling, the pork loins (9th-13th) were collected to analyze the meat quality characteristics, including  $\text{pH}_{24 \text{ h}}$ , lightness ( $L^*$ ), drip loss, cooking loss, Warner-Bratzler Shear force (WBS) values, and sensory traits for the fresh meat [moisture (1 = very dry; 9 = very moist), color, appearance, and overall acceptability (1 = very unacceptable; 9 = very acceptable)]. After cooking to an internal temperature of 71 °C, the sensory traits of the cooked meat were also evaluated [abnormal flavor (1 = very weak; 9 = very strong), juiciness (1 = very dry; 9 = very juicy), tenderness (1 = very tough; 9 = very tender), color, appearance, flavor, taste, and overall acceptability (1 = very unacceptable; 9 = very acceptable)]. A total of 48 panelists who regularly consume pork were employed, and consisted mainly of student and staff members from Korea University. A general liner model (SAS Institute, 2001) was used to evaluate the differences among the different pig breeds.

## Results and discussion

Table 1 shows the postmortem meat quality traits and sensory attributes of the fresh pork for the different pig breeds. The Meishan pork presented the lowest muscle  $\text{pH}_{45 \text{ min}}$  and  $\text{pH}_{24 \text{ h}}$  values, and accordingly, showed the highest drip loss and lightness values. The Duroc and Meishan pork had significantly lower WBS values than the Yorkshire pork. In terms of the fresh meat sensory quality (Table 2), the Duroc pork had significantly higher appearance and overall acceptability scores as compared to the Landrace and Yorkshire pork, but no significant differences were found in the color acceptability and moisture scores among the breeds.

**Table 1.** Postmortem meat quality traits of *longissimus dorsi* muscle in various pig breeds

	Duroc	Landrace	Meishan	Yorkshire	Levels of significance
Muscle pH <sub>45 min</sub>	6.45 <sup>a</sup> (0.08) <sup>1</sup>	6.26 <sup>b</sup> (0.05)	5.89 <sup>c</sup> (0.04)	6.24 <sup>b</sup> (0.05)	***
Muscle pH <sub>24 h</sub>	5.86 <sup>a</sup> (0.04)	5.79 <sup>a</sup> (0.03)	5.65 <sup>b</sup> (0.20)	5.83 <sup>a</sup> (0.02)	***
Lightness ( $L^*$ )	47.02 <sup>bc</sup> (0.79)	47.06 <sup>b</sup> (0.55)	49.73 <sup>a</sup> (0.41)	45.53 <sup>c</sup> (0.48)	***
Drip loss (%)	1.88 <sup>b</sup> (0.43)	2.71 <sup>b</sup> (0.30)	6.16 <sup>a</sup> (0.22)	2.24 <sup>b</sup> (0.26)	**
Cooking loss (%)	28.65 <sup>ab</sup> (1.14)	27.78 <sup>b</sup> (0.79)	30.22 <sup>a</sup> (0.59)	27.27 <sup>b</sup> (0.68)	***
WBS (N)	45.46 <sup>b</sup> (2.68)	50.02 <sup>ab</sup> (1.86)	45.85 <sup>b</sup> (1.45)	52.15 <sup>a</sup> (1.61)	*

<sup>1</sup>Standard error of least-square means

<sup>a-c</sup> Least-square means with different superscripts in the same row differ significantly ( $P < 0.05$ ).

Levels of significance: \*  $P < 0.05$ , \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ .

Abbreviation: WBS, Warner-Bratzler Shear Force.

For the cooked meat, the panelists gave significantly higher appearance and flavor acceptability scores to the Landrace and Meishan pork as compared to the Yorkshire pork, and the Meishan pork had the lowest abnormal flavor scores. The Duroc and Meishan pork received significantly higher juiciness and tenderness scores than the Landrace and Yorkshire pork. And both Duroc and Meishan pork received significantly higher overall acceptability scores than the Yorkshire pork.

**Table 2.** Consumer sensory evaluation of fresh and cooked pork from the *longissimus dorsi* muscle in various pig breeds

	Duroc	Landrace	Meishan	Yorkshire	Levels of significance
Consumer sensory evaluation for fresh pork					
Color <sup>2</sup>	5.99 (0.25) <sup>1</sup>	5.42 (0.17)	5.77 (0.13)	5.62 (0.15)	NS
Appearance <sup>2</sup>	6.16 <sup>a</sup> (0.21)	5.39 <sup>b</sup> (0.14)	5.72 <sup>ab</sup> (0.11)	5.68 <sup>b</sup> (0.12)	*
Moisture <sup>3</sup>	5.31 (0.23)	5.49 (0.16)	5.75 (0.12)	5.60 (0.14)	NS
Overall <sup>2</sup>	6.14 <sup>a</sup> (0.25)	5.23 <sup>b</sup> (0.17)	5.63 <sup>ab</sup> (0.13)	5.35 <sup>b</sup> (0.15)	*
Consumer sensory evaluation for cooked pork					
Color <sup>2</sup>	5.61 <sup>a</sup> (0.13)	5.55 <sup>a</sup> (0.09)	5.75 <sup>a</sup> (0.07)	5.27 <sup>b</sup> (0.08)	***
Appearance <sup>2</sup>	5.32 <sup>ab</sup> (0.15)	5.52 <sup>a</sup> (0.11)	5.65 <sup>a</sup> (0.08)	5.21 <sup>b</sup> (0.09)	**
Flavor <sup>2</sup>	5.10 <sup>ab</sup> (0.13)	5.19 <sup>a</sup> (0.09)	5.37 <sup>a</sup> (0.07)	5.62 <sup>b</sup> (0.08)	***
Abnormal flavor <sup>4</sup>	4.17 <sup>a</sup> (0.14)	4.13 <sup>a</sup> (0.10)	3.64 <sup>b</sup> (0.07)	4.16 <sup>a</sup> (0.08)	***
Juiciness <sup>5</sup>	5.39 <sup>a</sup> (0.22)	4.71 <sup>b</sup> (0.16)	5.61 <sup>a</sup> (0.12)	4.45 <sup>b</sup> (0.13)	***
Tenderness <sup>6</sup>	5.80 <sup>a</sup> (0.24)	4.85 <sup>b</sup> (0.17)	5.37 <sup>a</sup> (0.13)	4.44 <sup>b</sup> (0.15)	***
Taste <sup>2</sup>	4.92 (0.14)	5.01 (0.10)	4.95 (0.07)	4.75 (0.08)	NS
Overall <sup>2</sup>	5.20 <sup>ab</sup> (0.16)	4.93 <sup>bc</sup> (0.11)	5.22 <sup>a</sup> (0.08)	4.64 <sup>c</sup> (0.10)	***

<sup>1</sup>Standard error of least-square means; <sup>2</sup>Scale: 1 = very unacceptable; 9 = very acceptable; <sup>3</sup>Scale: 1 = very dry; 9 = very moist;

<sup>4</sup>Scale: 1 = very weak; 9 = very strong; <sup>5</sup>Scale: 1 = very dry; 9 = very juicy; <sup>6</sup>Scale: 1 = very tough; 9 = very tender.

<sup>a-c</sup> Least-square means with different superscripts in the same row differ significantly ( $P < 0.05$ ).

Levels of significance: NS = not significant, \*  $P < 0.05$ , \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ .

## **Conclusions**

Based on these data, differences were observed in the postmortem meat quality and sensory quality characteristics of Duroc, Landrace, Meishan, and Yorkshire pork. Moreover, the Duroc and Meishan breeds received higher consumer sensory evaluation scores; however, the postmortem meat quality traits of the Meishan pork were low.

## **References**

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