Effects of backfat thickness and intramuscular fat % on color and drip loss of pork loin

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Introduction

Animal breeders and pork producers have concentrated on reducing subcutaneous fat in pigs until recent years. W genetic and environmental components and their interaction in the immediate preslaughter period are considered to be main factors which determine the incidence of PSE pork (Murray et al., 1989), the pork processing industry has considered PSE pork to increase as carcass fatness is reduced (Jones et al., 1994). According to Kempster (1987) Wood et al. (1988), very lean pig carcasses are showing soft fat, subcutaneous fat separation, high drip loss, and lacking in juiciness and flavor. Kempster et al. (1986) found that meat color and drip loss were not affected by carcass weight, whereas meat from leaner carcasses had higher drip loss but had no effect on meat color.

For those countries aiming at the Japanese market, it is important to keep producing high quality pork, and it is important to know that Japanese prefer highly marbled pork loin. Recently, marbling of pork loin is also emphasized Korea, but few studies have reported about the relationship between intramuscular fat or backfat thickness and quality characteristics. Hence, the present study aimed to examin the associations among carcass weight, backfat thickness, intramuscular fat content, drip loss, and meat color of pork.

Materials and Methods

Two trials were conducted using pigs from a same farm. A total of 321 pork carcasses were used in Trial 1. Carcass weight, sex, backfat thickness at three different point, muscle pH of loin at last rib, and subjective scores including color, firmness and marbling were assessed using established standards (NPPC, 1994). All samples were classed into one of four pork quality classes (PSE (pale, soft and exudative), RSE (reddish-pink, soft and exudative), RFN (reddish-pink, firm and non-exudative) and DFD (dark, firm and dry)) as visual assessment.

In Trial 2, a total of 100 pork loins were evaulated. Pork loins were assessed for drip loss %, intramuscular fat and objective meat color. Surface meat color was assessed on a cut surface at the last rib using a Minolta Chromameter 200b. Results were expressed as C.I.E. L*, a*, b*, and metric chroma C* and hue were calculated. Drip loss % was determined as the weight loss during suspension of meat samples (about 30g) in an inflated plastic bag (4℃) for 48 hrs (Honikel, 1987). These measurements were used to assign samples to one of four quality classes. Intramuscular fat was determined by ether extraction over 48 hrs (A.O.A.C., 1990). Prior to the quality assessment, carcass weight and backfat thickness were measured.

To evaluate the differences among backfat thickness classes, intramuscular fat classes and quality classes, data were analyzed by ANOVA using the General Linear Model (GLM) of SAS (1990).

Results and Discussion

In trial 1, with increasing backfat thickness, carcass weight, subjective color and marbling score, ultimate pH, and quality score were increased (Table 1). As increasing of carcass weight and backfat thickness, both ultimate pH and subjective color score were increased due to high subjective marbling score. When samples were classified as PSE, RSE, RFN and DFD, backfat of RFN sample was thicker than that of others ($p<0.05$). This result implied that carcass weight

and backfat thickness maybe effected on subjective marbling score, and pork quality also could be affected by them.

To more carefully investigate this hypothesis, objective meat color, drip loss % and intramuscular fat % were measured in Trial 2. Although the simple correlation between backfat thickness and intramuscular fat % was 0.33 ($p<0.001$), significant correlation between pork quality and backfat thickness was not showed. With increasing of carcass weight and backfat thickness, L* value and drip loss % were not changed. Furthemore, even intramuscular fat % was increased, meat color and drip loss % were not changed (Table 2). There was not significantly different between intramuscular fat % and pork quality ($p>0.05$). These results showed that marbling did not effect on pork quality characteristics, although carcass weight and backfat thickness were correlated with marbling of pork loin.

References

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Table 1. Characteristics of four backfat thickness classes of pork carcasses

Characteristics	Backfat thickness classes (mean, SE)			
	A<=20mm	20mm<B<=25mm	25mm<C<=30mm	D>30mm
Carcass weight (kg)	68.83^{a}(2.16)	77.52^{b}(1.02)	81.40^{c}(0.67)	84.69^{d}(0.65)
Subjective scores				
Color	1.75^{a}(0.24)	2.14^{ab}(0.11)	2.35^{b}(0.07)	2.39^{b}(0.07)
Firmness	1.67^{a}(0.22)	2.06^{ab}(0.10)	2.25^{b}(0.07)	2.24^{b}(0.07)
Marbling	1.33^{a}(0.22)	1.68^{ab}(0.10)	1.81^{b}(0.07)	1.86^{b}(0.07)
Ultimate pH	5.47^{a}(0.09)	5.57^{a}(0.04)	5.63^{b}(0.03)	5.66^{b}(0.03)
Quality score	1.92^{a}(0.24)	2.44^{ab}(0.11)	2.56^{b}(0,08)	2.63^{b}(0.07)

Means for any row having unlike superscripts are different ($p<0.05$).

Table 2. Characteristics of intramuscular fat % classes of pork loin

Traits	Intramuscular fat % classes (mean, SE)		
	A<=2.0	2.0<B<=5.0	C>5.0
Carcass weight (kg)	87.00(4.50)	79.57(0.89)	81.15(1.71)
Backfat thickness (cm)	2.60^{ab}(0.23)	2.75^{a}(0.05)	3.00^{b}(0.09)
Ultimate pH	5.71(0.14)	5.66 (0.03)	5.66(0.05)
Lightness (L*)	50.44(2.50)	50.96(0.49)	51.09(0.97)
Drip loss (%)	4.11(1.31)	4.11(0.26)	4.73(0.50)
Intramuscular fat (%)	1.75^{a}(0.39)	3.50^{b}(0.08)	5.66^{c}(0.15)
Quality score	2.33(0.47)	2.55 (0.09)	2.45(0.18)

Means for any row having unlike superscripts are different ($p<0.05$).