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Quality Characteristics of Korean Native Pigs Slaughtered at Commercial Market Weight

H. G. Ryou, K. H. Hah[1], K. H. Park, G. H. Ha,
S. M. Kang, S. K. Jin and I. S. Kim*

Department of Animal Resources Technology, Jinju National University
[1]National Livestock Research Institute, RDA

INTRODUCTION

In recent years, Korean Native Pigs(KNP) has become an increasingly important livestock industry in Korea, yet very little is known about their physico-chemical properties and fatty acid composition by different market(slaughter) weight. Over the past 10 year, the trend of crossbred pigs in Korean has been to increased slaughter weight to reduce costs and improve marbling and sensory characteristics of pork. However, the commercial market weights of KNP were very variety from below 60 kg to 90 kg. Few studies have been carried out to investigated the quality of KNP but some indicated that it is comparable in growth performance, carcass traits, fatty acid and amino acid composition to Landrace pigs[(1)]. The objectives of this study was to provide basic information on physico-chemical properties and fatty acid compositions of *Longissimus dorsi* from KNP by commercial different market weight for Korean native pigs industry.

MATERIALS AND METHODS

Ninety KNP(barrows) of the same age(220 days), reared under the uniform managemental conditionsand fed the same diet were used. Ninety KNP were divided into three group by differential market weight(20 of each group); Live weight of Group 1(G 1), Group 2(G 2) and Group 3(G 3) were 50-59 kg, 60-69 kg, 70-80 kg, respectively. The material used for this research was *Longissimus dorsi* sampled from each group after 24hr chilling. Moisture, protein, fat and ash were analyzed according to standard AOAC[2]. The pH values were determined with pH meter(Metrohm, Swiss) and L*, a* and b* color values with Minolta Chroma Meter CR-310(Japan). Samples were heated directly in a water bath for 40min at 70C. After chilling, water holding capacity was measured by centrifuging method(1000rpm for 10min). Cooking losses were evaluated after immersion of samples in a 80℃ for 1 hr. This cooked samples was used to determined shear force using a Rheometer(Eztest, Shimadze, Japan). Subcutaneous and intermuscular fat samples were taken from the loin region(5/6th rib) of carcass. Extraction of total fat were determined by Folch et al.[3]. Methylation to prepare fatty acid methyl esters(FAME) was done by using methanol-BF3. FAME were determined using GLC(Agilient 6890+, USA) with nitrogen as carrier gas. Results for each fatty acid were expressed as percentage of the sum of all identified fatty acid. Statistical analysis was conducted in triplicate. Data were analyzed using ANOVA with SAS[4] at 5% level of significance.

RESULTS AND DISCUSSION

The proximate analysis of KNP are shown in Table 1. Moisture, protein, fat and ash content did not differ with slaughter weight. Chemical composition of *Longissimus dorsi* from KNP was not affected by slaughter weight, which agrees with Beattie et al. [5].

Table 1. Proximate composition(%) of loins from Korean native pigs by commercial different market weight

Treatment[1]	Moisture	Crude protein	Crude fat	Crude ash
G1	70.61±2.19	21.78±0.54^{ab}	5.71±1.88	1.02±0.07
G2	70.35±1.83	21.41±1.10^{b}	6.07±2.65	1.05±0.10
G3	71.78±2.94	22.26±0.32^{a}	4.74±1.34	1.06±0.04

^{a,b} Means with different superscripts in the same column significantly differ at $p<0.05$.

[1] G1; 50~59kg, G2; 60~69kg , G3; 70~80kg.

The physico-chemical properties of KNP are shown in Table 2. The pH values of G 1 was significantly lower(P<0.05) than those of G 2 and G 3. The low weight(G 1) KNP displayed lower pH than their high weigh(G 2 and G 3). Cooking loss(%) was significantly lower(P<0.05) in G 3 than other 2 group. Water holding capacity(WHC, %) of G 2 was slightly higher than those of G 1 and G 3. However, no significant differences were observed among these 3 groups. Although pH is closely related to WHC and the speed of its fall in relation to slaughter have been observed, no significant influence of this value on WHC was found in the study. The result obtained in this work for KNP was similar to which one obtain in Diaz et al.[6] for lambs at different weight. Shear force value (g/cm^2) of KNP varied from 2918(G 1) to 3594(G 2) or 4357(G 3) in accordance with different market weight. Values of pH and shear force showed an increase with increased weight.

Table 2. Physico-chemical properties of loins from Korean native pigs by commercial different market weight

Treatment[1)]	pH	Cooking loss(%)	WHC[1)]%)	Shear force(g/cm^2)
G1	5.06±0.05^b	36.10±2.56^a	71.15±5.97	2,918±882^b
G2	5.14±0.09^a	35.65±3.84^a	72.76±7.35	3,594±1306^{ab}
G3	5.13±0.02^a	32.41±2.79^b	70.04±1.93	4,357±1808^a

^{a,b} Means with different superscripts in the same column significantly differ at p<0.05.
[1)] G1; 50~59kg, G2; 60~69kg , G3; 70~80kg.

Color parameter L*, a* and b* values of KNP are shown in Table 3. G 2 and G 3 resulted in darker(P<0.05) and redder(P<0.05) color compared to G 1. Slaughter weight did not affect b* values. The color was measured as the CIE a* value (Andersen et al., 1988), where a high value(redness) is judged more attractive by the consumers and also indicates the freshness of meat. The backfat color was affected by slaughter weight. The L*value showed decrease, while a* and b* values showed an increase with increased weight. The L* values of meat and backfat from *Longissimus dorsi* muscle were lower at 70-80 kg(G 3) than at 50-59 kg(G 1) or 60-70 kg(G 2) slaughter weight. The a* values were higher in the heavier KNP. Higher a* values were reported by Virgili et al. [7] in older pigs.

Table 3. CIE L*, a*, b* of loins from Korean native pigs by commercial different market weight

Treatment[1)]	Meat color			Backfat color		
	L^*	a^*	b^*	L^*	a^*	b^*
T1	42.41 ± 2.88^b	10.92 ± 1.56^a	4.02 ± 0.62	70.85 ± 2.44^a	2.52 ± 0.32^b	2.27 ± 0.29^b
T2	44.90 ± 3.02^a	8.14 ± 2.05^b	3.34 ± 1.43	71.40 ± 2.18^a	1.94 ± 0.21^b	2.74 ± 0.55^a
T3	41.93 ± 2.84^b	9.83 ± 1.23^a	3.32 ± 0.81	63.67 ± 13.58^b	4.62 ± 4.54^a	3.01 ± 0.90^a

[a,b] Means with different superscripts in the same column significantly differ at p<0.05.
[1)] G1; 50~59 kg, G2; 60~69 kg , G3; 70~80 kg.

The fatty acid composition of intermuscular fat from *Longissimus dorsi* of KNP is shown in Fig 1. Slaughter weight did not significantly affect the fatty acid composition of subcutaneous fat of KNP(Data are not shown). Only the oleic acid(C18:1) of G 2 in intermuscular fat were significantly($P<0.05$) higher than that of G 1 and G 2. In general, oleic acid(C18:1) was the most common fatty acid in the two studied locations, subcutaneous fat and intermuscular fat, representing 52.89-55.64% of the total analysed fatty acids, followed by palmitic acid(C16) (20.56-22.09%) and linoleic acid(C18:2)(8.54-10.99%). The 3 group had similar contents of total saturated and unsaturated fatty acid. Unsaturated fatty acids were the most abundant(67.91-70.49%), followed by saturated fatty acids(29.51-32.09%).

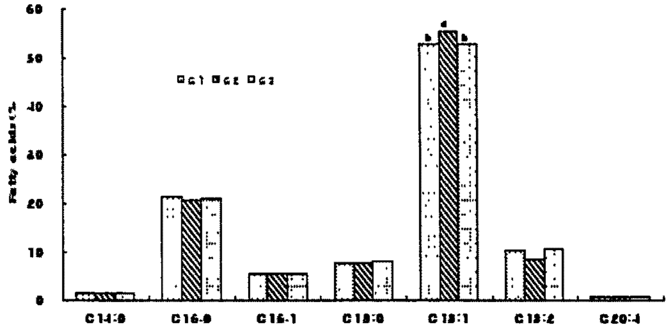

Figure 1. Fatty acid composition of intermuscular fat from Korean native pigs by commercial different market weight

SUMMARY

Ninety KNP were divided into three group by differential market weight(20 of each group); Live weight of Group 1(G 1), Group 2(G 2) and Group 3(G 3) were 50-59kg, 60-69kg, 70-80kg, respectively. Values of pH and shear force showed an increase, while cooking loss showed decreased with increased weight. In color analysis, a* value in meat and b* value in backfat of KNP showed higher as slaughter weight increased. Slaughter weight did not significantly affect the fatty acid composition of subcutaneous fat of KNP. With the exception of oleic acid in intermuscular fat, there were no significant weight-dependent differences in the fatty acid profiles.

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