EVALUATION OF KOREA NATIVE PIG CROSSED PROGENY VS COMMERCIAL PIGS FOR MEAT QUALITY TRAITS AND FATTY ACID COMPOSITION

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Abstract— **This study was conducted to investigate that the genetic effect of Korea native pig(KNP) crossed Yorkshire on meat quality traits and fatty acid composition by comparing of KNP crossed progeny and commercial pigs. KNP crossed progeny (n=350) and commercial pigs (n=300) were conventionally slaughtered, and then chilled overnight. *Longissimus* muscles were removed to evaluate meat quality and fatty acid composition. In chemical composition, commercial pigs had slightly higher moisture and ash values than KNP crossed progeny($p>0.05$). KNP crossed progeny had higher fat than commercial pigs($p>0.05$). However, there were no significant differences in chemical composition of *longissimus* muscle between KPN crossed progeny and commercial pigs. In pH and water holding capacity, no significant differences were detected between KNP crossed progeny and commercial pigs. However, in drip loss and cooking loss, KNP crossed progeny had higher values than commercial pigs ($p<0.05$). In Hunter color, KNP crossed progeny had lower L^*, a^* and b^* values than commercial pigs ($p<0.05$). Otherwise, in shear force, KNP crossed progeny showed higher value than commercial pigs ($p<0.05$). In the subjective evaluation, commercial pigs showed higher marbling score than KNP crossed progeny ($p<0.05$). However, texture, color and total acceptability were not significantly different between KNP crossed progeny and commercial pigs. In the fatty acid composition, palmitic acid(C16:0) and stearic acid(C18:0) were main saturated fatty acids in KNP crossed progeny and commercial pigs. In palmitic acid(C16:0), commercial pigs had higher value than KNP crossed progeny ($p<0.05$), In stearic acid, KNP crossed progeny were similar to commercial pigs. Oleic acid(C18:1) and linoleic acid(C18:2) were main unsaturated fatty acids in KNP crossed progeny and commercial pigs. In oleic acid and linoleic acid, commercial pigs had higher values than KNP crossed progeny ($p<0.05$). In total unsaturated fatty acid / saturated fatty acid ratio, commercial pigs had higher value than KNP crossed progeny ($p<0.05$).**

key words: Korea native pig, Commercial pigs, Meat qualty, Fatty acid composition

I. INTRODUCTION

The Korea native pig(KNP) breed is a population that has been domesticated for a long time in Korea, but has not been known in other countries.There are clear differences in the meat qualities of KNP pork compared to western breeds such as Yorkshire. KNP showed significantly higher redness and yellowness values in meat color than those of Yorkshire (Kim et al., 2008). Meat color has been considered as one of important indicators for meat quality. Fat content in muscle and backfat thickness were significantly higher in KNP, comparing to the Yorkshire breed (Kim et al., 2008). It has been practiced KNP crossed with commercial pig breeds for improvement in growth performance and meat quality traits. Different breeds and lines of pigs predetermined propensity toward excellence in certain areas of meat quality characteristics and growth performance. However, compared with commercial pigs, KNP was remarkably slow in growth performance and meat production capacity (Moon, 2004; Choi et al., 2005; Kang et al., 2007). Yorkshire pigs had higher litter size, growth performance and meat production yield and they were used for a maternal line in the three-way crosses (Jin et al., 2006). Yorkshire was reported that loin eye area was the widest when compared with Landrace and Duroc(Choi and Lee, 2001).

Therefore, this study was conducted to understand how Korea native pig crossed Yorkshire would be performing for meat quality traits and fatty acid composition when compared with other commercial pig breed progeny.

II. MATERIALS AND METHODS

This study was accomplished with KNP crossed progeny (n=350) and commercial pigs(n=300), and commercial pigs were delivered from local pork corporation. Pigs were allowed ad libitum access to water and diet during entire experimental period. When the mean weight of pigs in a pen reached market weight, pigs were conventionally slaughtered and then chilled overnight. Then, the *longissimus* muscles from left side between the 5th and 13th rib were removed and meat qualities were evaluated. Fatty acid composition was analysised by GC using a fused silica capillary column (100m x 0.25 mm, i.d. x 0.20mm, thickness, Supelco, SPTM-2560,USA). The results were analyzed statistically using the SAS statistical package(2002).

III. RESULTS AND DISCUSSION

The chemical composition of KNP crossed progeny and commercial pigs is listed in Table 1. Commercial pigs had slightly higher moisture and ash values than KNP crossed progeny($p>0.05$). KNP crossed progeny had higher fat than commercial pigs($p>0.05$). However, there were no significant differences in chemical composition of *longissimus* muscle between KPN crossed progeny and commercial pigs.

The meat quality traits of KNP crossed progeny and commercial pigs are listed in Table 2. In pH and water holding capacity, no significant differences were detected between KNP crossed progeny and commercial pigs. However, in drip loss and cooking loss, KNP crossed progeny had higher values than commercial pigs ($p<0.05$).

Hunter color and shear force values of KNP crossed progeny and commercial pigs are listed in Table 3. KNP crossed progeny had lower L^*, a^* and b^* values than commercial pigs ($p<0.05$). Otherwise, in shear force, KNP crossed progeny showed higher value than commercial pigs ($p<0.05$). In the subjective evaluation (Table 4), commercial pigs showed higher marbling score than KNP crossed progeny ($p<0.05$). However, texture, color and total acceptability were not significantly different between KNP crossed progeny and commercial pigs.

In the fatty acid composition (Table 5), palmitic acid(C16:0) and stearic acid(C18:0) were main saturated fatty acids in KNP crossed progeny and commercial pigs. In palmitic acid(C16:0), commercial pigs had higher value than KNP crossed progeny ($p<0.05$), In stearic acid, KNP crossed progeny were similar to commercial pigs. Oleic acid(C18:1) and linoleic acid(C18:2) were main unsaturated fatty acids in KNP crossed progeny and commercial pigs. In oleic acid and linoleic acid, commercial pigs had higher values than KNP crossed progeny ($p<0.05$). In total unsaturated fatty acid / saturated fatty acid ratio, commercial pigs had higher value than KNP crossed progeny ($p<0.05$).

IV. CONCLUSION

The result from this study indicated that KNP crossed progeny was similar to commercial pigs in meat quality characteristics and fatty acid composition. Although meat quality characteristics are important, other traits, such as growth performance and feed efficiency must also be considered. KNP is necessary to study more growth performance and feed efficiency. Therefore, KNP crossed progeny may not be useful for efficient pork production using cross-breeding system.

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Table 1. Chemical composition of *longissimus* muscle from Korea native pig crossed progeny and commercial pigs

Items	Moisture(%)	Protein(%)	Fat(%)	Ash(%)
T1	74.00±1.60	22.27±1.58	2.33±1.00	1.05±0.13
T2	74.37±1.07	22.32±0.76	2.13±0.72	1.19±0.78

T1 = Korea native pig crossed progeny, T2 = commercial pigs

Table 2. Meat quality traits of *longissimus* muscle from Korea native pig crossed progeny and commercial pigs

Items	pH	WHC(%)*	Drip loss(%)	Cooking loss(%)
T1	5.57±0.12	58.03±6.34	5.11±1.81[a]	32.26±3.53[a]
T2	5.57±0.13	57.81±4.52	4.97±1.90[b]	31.59±3.43[b]

[a, b] Means±SE with different superscription within the same column differ($p<0.05$).
T1 = Korea native pig crossed progeny, T2 = commercial pigs
*WHC: water holding capacity

Table 3. Hunter color and shear force values of *longissimus* muscle from Korea native pig crossed progeny and commercial pigs

Items	Hunter color[A]			Shear force(kg)
	L^*	a^*	b^*	
T1	52.69±5.50[b]	5.72±2.03[b]	7.43±1.80[b]	1.73±0.43[a]
T2	60.40±5.04[a]	6.92±2.25[a]	9.55±1.42[a]	1.20±0.40[b]

[a, b] Means±SE with different superscription within the same column differ($p<0.05$).
T1 = Korea native pig crossed progeny, T2 = commercial pigs
[A]L: lightness, a: redness, b: yellowness.

Table 4. Subjective evaluation[1)] of *longissimus* muscle from Korea native pig crossed progeny and commercial pigs

Items	Marbling	Texture	Color	Total acceptability
T1	2.39±1.01[b]	2.86±0.42	3.06±0.49	2.91±0.30
T2	2.59±0.79[a]	2.86±0.44	3.03±0.46	2.94±0.72

[a, b] Means±SE with different superscription within the same column differ($p<0.05$).
T1 = Korea native pig crossed progeny, T2 = commercial pigs
[1)] Marbring ,1: extremely low in intramuscular fat, 5: very abundant in intramuscular fat
Texture, 1: extremely coarse in texture, 5: very fine in texture
Meat color, 1: very pale in meat color, 5: very dark in meat color
Total acceptability, 1: extremely unacceptable, 5: extremely acceptable

Table 5. Fatty acid composition of *longissimus* muscle from Korea native pig crossed progeny and commercial pigs

Items	T1	T2
C14:0	1.39±1.12[a]	1.00±0.39[b]
C16:0	21.71±2.31[b]	22.29±2.00[a]
C16:1	3.36±1.73[a]	2.58±1.23[b]
C18:0	10.65±2.50	10.40±1.73
C18:1	31.14±5.73[b]	33.76±6.52[a]
C18:2	17.51±5.57[b]	20.12±4.86[a]
C18:3	0.89±0.69[a]	0.24±0.27[b]
C20:1	0.25±0.26	0.06±0.12
C20:4	0.14±0.21[b]	2.89±2.78[a]
C20:5	0.12±0.20[a]	0.01±0.01[b]
C22:6	0.35±0.81	0.34±0.31
SFA*	39.51±3.67[a]	35.24±2.45[b]
Mono-USFA	38.33±6.73[b]	40.29±5.67[a]
Poly-USFA	22.20±6.25[b]	24.45±5.80[a]
USFA**	60.53±3.74[b]	64.75±2.45[a]
USFA/SFA	1.56±0.38[b]	1.85±0.19[a]

[a, b] Means±SE with different superscription within the same row differ($p<0.05$).

T1 = Korea native pig crossed progeny, T2 = commercial pigs

*Saturated fatty acid

**Unsaturated fatty acid