

A STUDY ON MEAT QUALITY CHARACTERISTICS OF CROSSBRED FATTENING PIGS DERIVED FROM PAKCHONG 5 BOARS

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Abstract - The current study was to evaluate the meat quality characteristics of crossbred fattening pigs sired by Pakchong 5 boars compare with commercial boars. A total of 48 weaning pigs were assigned into 3 x 2 factorial in completely randomized design (CRD). The experimental treatments consisted of crossbred fattening pigs sired by Pakchong 5 boar (CP5) and crossbred fattening pigs sired by 2 commercial boar (CB1 and CB2). Each group was contained with 8 gilts and 8 barrows. At 103.54 ± 6.89 kg bodyweight, all pigs were slaughtered. *Longissimus dorsi* (LD) muscle from each carcass was kept in vacuum plastic bag, then stored at -20°C until subsequent analysis. Chemical composition, collagen content, muscle fibre diameter (MFD), sarcomere length (SL) and Warner-Bratzler shear force (WBSF) of LD muscle were determined. The effects of breeds, sex and interaction were analyzed. The results showed that there was no difference (P>0.05) on chemical composition between breeds whereas CP5 had lower (P<0.05) amount of collagen content and shorter MFD than CB1 and CB2. In conclusion, meat characteristics of LD from crossbred fattening pigs sired by Pakchong 5 boars was not different from those sired by commercial boars. Moreover, CP5 fattening pigs could have more tenderness due to lower amount of collagen content and smaller muscle fiber size.

Key Words - Pakchong 5 boar, commercial boar, crossbred fattening pig, meat quality

1. INTRODUCTION

Increased selection pressure for leaner pork products in recent years has resulted in leaner and heavier muscled pigs [3]. Particularly, in the present, swine industry focus on the lean to fat ratio of pig carcasses [1]. A raise in body composition of fattening pigs is achieved by genetic selection [10, 11]. Furthermore, the heritage boars can strongly influence pork quality of fattening pigs, through it seems that crossbred pigs can be improved lean growth without decreasing pork eating quality [12, 15]. Consequently, it is necessary to study on new genetic lines to reach the market need and consumer requirement.

Pakchong 5 pigs, have been originated by Department of Livestock Development (DLD) Thailand, which it was established from genetic combination of Duroc and Pietrain pigs. There are utilized as terminal sire to produce high growth rate and lean gain crossbred fattening pigs. In addition, Pakchong 5 boars are proposed for commonly using on the small farm to replace the boars from commercial producers. The result of previous study showed the genetic efficiency of Pakchong 5 pigs, which it had high growth rate (> 850 g/d), FCR less than 2.5 and back fat thickness less than 1 cm [5]. But the meat quality of those have not been investigated. Therefore, the objective of this current study was to evaluate the meat quality characteristics of crossbred fattening pigs derived from Pakchong 5 terminal boars compared with crossbred fattening pigs derived from commercial boars.

2. MATERIALS AND METHODS

Animals and Samples Collection

A total of 48 weaning pigs (20 kg body weight) were assigned into 3 groups with 8 barrows and 8 gilts in each group. The experimental treatments consisted of crossbred fattening pigs sired by Pakchong 5 boar (CP5) and crossbred fattening pigs sired by 2 commercial boar (CB1 and CB2). All sires in this study were mated with crossbred sows (Large White x Landrace). The animals were fed with commercial diet and drinking water *ad libitum*. Routine medication, vaccination and husbandry practices were administered. All pigs were slaughtered at 103.54 ± 6.89 kg body weight. *Longissimus dorsi* (LD) muscle samples from each carcass were collected and kept in vacuum plastic bag, then stored at -20°C until subsequent analysis.

Meat quality determination

LD muscle samples were used to determine the chemical composition [2], collagen content [8], muscle fibre diameter (MFD) [14], sarcomere length (SL) [6] and Warner-Bratzler shear force (WBSF) [17].

Statistical Analysis

Data were analysed using the general linear model (GLM) procedure in SAS software (SAS Institute Inc., Cary, NC, USA). The model used included breeds, sex and interaction between breed and sex. Least square means were separated using PDIF option ($P < 0.05$).

3. RESULTS AND DISCUSSIONS

The data of this study were summarized in Table 1 and 2. The results showed that there was no significantly different ($P > 0.05$) on chemical composition of pork loin between breeds, while LD from barrows had a higher ($P < 0.05$) crude fat than gilts but did not different ($P > 0.05$) on crude protein. Similar results was reported by [11] that showed no effect of breeds ($P < 0.05$) on chemical composition of pork loin and also no effect of sex (barrow vs gilt) on protein content. The findings of [7, 9] also reported that protein content was not different between barrows and gilts while LD from barrow had higher ($P < 0.05$) fat content than those from gilts.

LD from crossbred pigs sired by Pakchong 5 boar had a lower ($P < 0.05$) collagen content and shorter muscle fibre diameter than crossbred pigs sired by commercial boar (CB1 and CB2). Tenderness is one of the important factors in order to satisfy the consumer's requirement. There was a study that reported a negative correlation between collagen content meat tenderness [16]. Pork muscle fibre area has influence meat quality, especially on drip loss, shear force and cooking loss [4]. According to the results of the present study, LD from CP5 fattening pigs could be more tender than LD from CB1 and CB2 fattening pigs. Moreover, the interaction of breed and sex affected muscle fibre diameter (Table 1). LD from gilts of CP5 pigs showed the shortest ($P < 0.05$) muscle fibre diameter (Table 2). Butsex did not affect ($P > 0.05$) collagen content and muscle fibre diameter.

Breed and sex did not influence ($P > 0.05$) on sarcomere length and WBSF. Similar results indicated that breeds of boar did not affect ($P > 0.05$) pork loin shear force value of crossbred pigs [1, 13].

4. CONCLUSIONS

In conclusion, meat characteristics of LD from crossbred fattening pigs sired by Pakchong 5 boars was not different from those sired by commercial

boars. Moreover, CP5 fattening pigs could have more tenderness due to lower amount of collagen content and smaller muscle fiber size.

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Table 1. Effect of breed and sex on physical characteristics of LD muscle of fattening pigs

Items ²	Group ¹			Sex		P-value		
	CP5	CB1	CB2	Gilt	Barrow	Breed	Sex	Breed x Sex
Chemical composition (%)								
Dry matter	74.35	74.36	73.77	74.54 ^a	73.78 ^b	0.28	0.03	0.74
Crude fat	1.97	2.54	2.43	1.99 ^b	2.64 ^a	0.22	0.03	0.51
Crude protein	21.88	22.78	22.13	22.57	21.89	0.19	0.07	0.13
Collagen content (mg/g)								
Soluble	0.19 ^b	0.35 ^a	0.40 ^a	0.29	0.34	<0.01	0.14	0.23
Insoluble	2.10 ^b	2.77 ^a	2.56 ^a	2.51	2.44	<0.01	0.65	0.49
Total	2.30 ^b	2.96 ^a	3.12 ^a	2.81	2.78	<0.01	0.83	0.29
Solubility, %	8.67 ^b	11.70 ^{ab}	13.71 ^a	10.50	12.22	0.02	0.21	0.83
MFD (µm)	71.41 ^b	83.34 ^a	77.44 ^a	78.79	76.01	<0.01	0.26	0.04
SL (µm)	1.60	1.63	1.61	1.61	1.62	0.44	0.57	0.65
WBSF, kg	5.45	5.95	5.77	5.92	5.53	0.45	0.24	0.52

¹CP5 = crossbred pigs sired by Pakchong 5 boar, CB1 = crossbred pigs sired by commercial boar 1 and CB2 = crossbred pigs sired by commercial boar 2.

²DM = dry matter, CF = crude fat, CP = crude protein, MFD = muscle fibre diameter, SL = sarcomere length, SC = soluble collagen, IC = insoluble collagen, TC = total collagen, WBSF = Warner-Bratzler shear force.

^{a,b}Means in the same row with different superscripts are significantly different (P≤0.05).

Table 2. Effect of breed and sex on muscle fibre diameter of LD muscle of fattening pigs

Items ²	CP5		CB1		CB2		P-value
	Gilt	Barrow	Gilt	Barrow	Gilt	Barrow	
MFD (µm)	68.50 ^c	74.33 ^{bc}	87.80 ^a	78.88 ^{ab}	80.06 ^{ab}	74.81 ^{bc}	0.04

²MFD = muscle fibre diameter

^{a,b,c}Means in the same row with different superscripts are significantly different (P≤0.05).