EFFECT OF CROSSBREEDS AND SEXES ON PIG'S CARCASS TRAITS AND MEAT QUALITY

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Abstract –the effects of different crossbreeds and sexes on pig's carcass traits and the quality characteristics of the loins were studied. A total of 410 crossbred pigs were divided into four groups based on crossbred swine (Landrace × Yorkshire × Duroc, LYD; Landrace × Duroc, LD) and sexes (Barrows and Gilts). The results indicated that barrows were higher in hot carcass weight and backfat thickness (P<0.05) than gilts. The dressing yield showed that barrows were significant (P<0.05) higher than gilts. In loin eye area, LYD was significant (P<0.05) higher than LD. In meat quality, the color of loin in LYD was significant (P<0.05) lighter and yellower than LD, but were not significant differ in pH value. The marbling content of barrows were significant higher than gilts (P<0.05), and the LYD barrows were significant higher (P<0.05) than LD barrows. The firmness score showed that LYD was significant (P<0.05) higher than LD. No significantly differences were found in the water-holding capacity (WHC) and cooking loss. In summary, the results of this study were attempted to be used as a recommendation to the foundation of the Taiwan local hybrid pig carcasses, as well as the development of optimum feeding and slaughter policy reference.

Key Words – dressing yield, firmness, marbling

I. INTRODUCTION

Meat quality is an important factor affecting how swine can be utilised. When choosing the best animal breeding strategy, it is important to recognise that meat quality traits of pigmeat depend on the breed [14]. Today, meat quality has become a primary focus for pig production. Nowadays, a major objective of the swine industry has been to increase the carcass meat percentage. Therefore, when choosing the best animal crossbreeding plan, it's important to recognize that carcass and meat quality traits depend on the crossbreeds. The traditional swine breeds in Taiwan are Landrace, Yorkshire, Duroc and Taiwan black pig. Crossbreeding is extensively used in pig production to increase the total efficiency of swine production. In recent years, the majority of Taiwanese pig production is based on the crossbreds and generally are three-way crosses with Landrace × Yorkshire × Duroc and two-way crosses with Landrance × Duroc. These crossbred pigs retain the traits of an excellent growth rate, higher yields and bigger litter size than other crossbreds selected and tested [10]. Several economically important traits are not recorded systematically in routine genetic improvement programs, such as feed efficiency, carcass characteristics and meat quality. The important of meat quality traits for Taiwanese are tenderness, intramuscular fat, and water holding capacity of meat. The aim of this study was to compare carcass traits and meat quality of pigs produced by mating LYD and LD. The results in this report present of the main growth, carcass and meat quality characteristics.

II. MATERIALS AND METHODS

Animals and muscle samples

A total of 410 crossbred pigs were divided into four groups based on crossbred swine and sexes (Barrows and Gilts). It included 210 LYD (Landrace×Yorkshire×Duroc, LYD), 200 LD (Landrace×Duroc, LD) were used in this study. Animals were fed the same commercial feed, raised under similar conditions and also transported from the farm to the slaughterhouse. The pigs was slaughtered by Taiwan hog carcasses grading manual (1988). The carcass were cut after pre-cooling at 4℃. Carcass was separated into front, middle and rear part. The lean weight of the front part included shoulder weight and picnic weight. The lean weight of the middle part included loin weight, tenderloin weight and belly weight. The lean weight of the rear part included ham weight. The parts of loins (*M. longissimus dorsi*) on the left side of the cooled carcasses were

used to measure meat quality parameters. All samples were placed in vacuum bags and stored in 4℃.

Carcass traits and meat quality measurement

The carcass traits measurement modified by the literature [12]. It included live weight, carcass weight, dressing yield, carcass length, backfat thickness, loin eye area, lean percentage, color, marbling and firmness. The ultimate pH value of *M. longissimus dorsi* was measured between ribs 10 and 11. The meat quality were measured by color, marbling, firmness, shear value, hardness, cohesiveness, elasticity, chewiness, water-holding capability, cooking loss, *CIEL*a*b* and proximate analysis. External loin adipose tissue was removed. Marbling and color scores were evaluated using a published visual standards by National Pork Producers Council. Cooking loss was determined by measuring drippings as a percentage of original meat weight. Lean color values (*CIEL*a*b**; L^*=lightness, a^*=redness and b^*=yellowness) was measured by a Chroma meter (color and color difference meter, Model TC-1500SX, Tokyo Denshoku, Japan) calibrated with a white plate. The color was measured on a freshly cut surface of the loin by making three different measurements across the surface. Using an electric hotplate (Barbecue 1850, TEFAL, France) heated the samples to an internal temperature at 68℃. The cooked pieces per animal were cut to 2×1×1 cm^3. The shear value and the texture profile analysis were used as the samples which cut to 2×1×1 cm^3. It used texture analysiser (Texture analyser TA-XT-plus, Stable Micro System, England) to simulate biting and chewing which modified by study [8]. The water-holding capability was determined by percentage drip loss and purge loss [11]. The proximate analysis included the content of water, cure protein, cure fat and ash were determined by A.O.A.C [1].

Statistical analysis

The data was analysed using SAS v9.3 (SAS Institute Inc. Cary, NC). General linear model was used to analysed the data. The mean separation was performed with Duncan's multiple range test

III. RESULTS AND DISCUSSION

Carcass traits

Compares with LYD crossdreed pigs and LD crossbreeds pigs in carcass traits which displayed in Table 1. The results of this study in Table 1. which indicated that barrows were higher in hot carcass weight and significant (P<0.05) high in backfat thickness than gilts. This results are shown live weight was positively correlated with hot carcass weight. The carcass length shown that gilts were significant (P<0.05) longer than barrows in the same breed, the results were the same as Wu [5]. The dressing yield in Table 1. showed that barrows were significant (P<0.05) higher than gilts in LYD, but there were not significant differ in LD breeds. The results in Table1. indicated that LYD breeds had significant (P<0.05) higher lean percentage than LD breeds, but there were no significantly different in the same breeds. Lean percentage was positively correlated with live weight, which were the same as Correa *et al* [7]. Compare with breed and sexes in backfat thickness shown that LYD were higher than LD crossbreeds pigs. The reason for this was that Yorkshire has the thicker backfat thickness than Duroc and Landrace (P<0.05) [5]. Compare LYD with LD in loin eye area showed that LYD was significant (P<0.05) higher than LD. The reference showed that pig's backfat thickness and lean eye area were increase with live carcass in the same breed [7] and the backfat thickness in barrows were thicker than gilts [3].

Meat quality

The results of meat quality were shown in Table 2. In meat quality, the lean color score showed that LYD gilts were significant (P<0.05) higher than others breeds. The marbling score indicated that barrows were significant (P<0.05) higher than gilts, that results were the same as Cisneros *et al*. [6]. The firmness score showed that LYD was significant (P<0.05) higher than LD. The lean color and marbling content will affect consumer's purchase desire. Marbling also affects tastiness by unctuousness, firmness, and press in eat. The color values of loin in LYD was significant (P<0.05)

lighter and yellower, but there was no significantly differ in redness. The variety of L value is related to the amount of water seepage on the surface of the

Items	Live weight (kg)	Carcass weight (kg)	Dressing yield (%)	Carcass length (cm)	Lean percentage (%)	P1BF (cm)	P2BF (cm)	P3BF (cm)
LYD Barrows	112.42±12.34^{a}	97.70±11.61^{a}	87.08±0.01^{a}	84.47±3.85^{a}	51.34±7.45^{a}	3.43±0.62^{a}	2.33±0.51^{a}	1.63±0.40^{a}
LYD Gilts	109.37±11.42^{a}	94.34±10.53^{b}	86.75±0.01^{a}	85.48±3.35^{b}	51.99±7.76^{a}	3.22±0.68^{b}	2.11±0.55^{b}	1.49±0.49^{b}
LD Barrows	108.51±10.78^{b}	94.16±9.74^{b}	86.82±0.01^{a}	84.07±3.18^{a}	56.87±12.86^{b}	3.20±0.62^{b}	2.24±0.51^{ab}	1.53±0.41^{ab}
LD Gilts	106.85±11.67^{b}	93.05±10.29^{b}	86.21±0.01^{b}	85.13±3.82^{b}	58.16±14.87^{b}	2.83±0.52^{c}	1.95±0.53^{b}	1.15±0.44^{c}
Significant (B*S)^{1}	NS	NS	**	NS	NS	NS	NS	NS

Items	Lean eye area (cm^{2})	Lean color	Marbling	Firmness	L	a*	b*	pH	WHC
LYD Barrows	51.4±7.45^{a}	2.56±0.67^{a}	2.02±0.79^{a}	2.50±0.84^{b}	56.27±3.96^{a}	9.14±1.42	10.51±1.02^{a}	5.49±0.20	0.80±0.06
LYD Gilts	50.93±7.76^{a}	2.69±0.69^{b}	1.77±0.73^{c}	2.50±0.66^{b}	55.95±3.13^{a}	8.89±1.56	10.44±1.30^{a}	5.53±0.12	0.81±0.06
LD Barrows	42.83±12.86^{b}	2.58±0.62^{a}	1.92±0.63^{b}	2.78±0.65^{a}	53.04±4.33^{b}	8.72±2.12	9.67±2.75^{b}	5.54±0.13	0.80±0.03
LD Gilts	46.10±14.87^{b}	2.47±0.64^{c}	1.71±0.65^{c}	2.76±0.67^{a}	50.86±4.52^{c}	8.67±2.05	8.44±2.92^{c}	5.53±0.09	0.80±0.03
Significant (B*S)^{1}	NS	**	NS	NS	*	NS	**	NS	NS

Table 2. Effects o

[a-c] Means in the same column v
[1]B, Breads; LD, LYD. S, Sex;
P1BF, Backfat thickness (1st ri

[a-c] Means in the sam
[1]B, Breads; LD, LY
L*, lightness; a*, re
Lean color, marblin
Lean color, six-poi

muscle which will cause reflection. There is also no significant difference in pH value and water-holding capacity.

IV. CONCLUSION

The results indicated that barrows were higher in hot carcass weight and backfat thickness ($P<0.05$) than gilts. The dressing yield showed that barrows were significant ($P<0.05$) higher than gilts. In loin eye area, LYD was significant ($P<0.05$) higher than LD. It can sell much more lean loin meat than LD breeds. In fresh meat, the color of lean and marbling content affected consumer's purchase desire. The marbling content of barrows were significant higher than gilts ($P<0.05$), and the LYD barrows were significantly higher ($P<0.05$) than LD barrows. The firmness score showed that LYD was significantly ($P<0.05$) higher than LD. Marbling also affects tastiness by unctuousness, firmness, and press in eat. In the recent years, the economic condition and standard of living has increased. Consumers are paying more attention on selecting meat and meat products. According to appearance and freshness, high quality pork flavour is the trend of development in Taiwan. The main species now are LD crossbreeds pigs in Taiwan. The Yorkshire breed decreased in Taiwan. Consequently, the LYD crossbreeds pigs were also decrease in Taiwan. The three-way crossbreeds pig LYD had better breeding traits and carcass traits than two-way crossbreeds pig LD. As a result, keep this breed can make Taiwan pork industry into positive development.

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