

COMPARISON OF MEAT QUALITY CHARACTERISTICS OF *LONGISSIMUS* MUSCLE FROM PUREBRED AND THREE-WAY CROSSBRED PIGS

J. T. Jeong¹, Y. S. Choi¹, J. K. Lee¹, J. S. Choi², Y. C. Jung³, J. H. Jung³ and Y. I. Choi^{1*}

¹Department of Animal Science, Chungbuk National University, Cheongju Korea, 361-763

²Department of Swine Science & Technology Center, Gyeongsang National University of Science and Technology, Jinju Korea, 660-758

³Jung P&C Institute, Yongin, Korea 446-982

*Corresponding author email: yangilchoi@chungbuk.ac.kr

Abstract – This study was conducted to compare the meat quality characteristics of *longissimus* muscle from each purebred and three-way crossbred pig. A total 15 Landrace, 20 Yorkshire, 15 Duroc and 29 three-way crossbred pigs were used in experiment. In meat quality characteristics, Duroc and Yorkshire pigs were higher in the redness (a^*) and yellowness (b^*) values than Landrace ($p<0.05$). The pure bred pigs had a low drip loss than LYD pigs during 48 hours. In proximate composition, the fat content of Duroc was significantly higher compared with the other pigs ($p<0.05$). In sensory characteristics, the overall acceptability of Duroc and LYD pigs were higher compared with the other pigs. As results, it is considered that this information about purebred and LYD pigs would be used as a basic data for improvement of pork quality.

Kew Words- *longissimus* muscle, purebred, three-way crossbred pigs

I. INTRODUCTION

There are pig breeds such as Landrace, Yorkshire, Duroc and Berkshire worldwide for commercial pig production. In Korea, three-way crossbreds (Landrace×Yorkshire, F1 ♀ ×Duroc ♂) utilized in mostly commercial pigs. Yorkshire breed has a thin backfat thickness, excellent reproductive ability, lactation ability and growth performance. Landrace breed has a good reproductive ability, lactation ability and high daily gain. Duroc breed shows muscularity constitution and high Marbling formation (Jin *et al.*, 2006; Kang *et al.*, 2011). Recently, interest of breeder has been increasing for improving meat quality due to Free Trade Agreement and consumer's needs (Li, 2013). Eating quality traits such as flavor, color, tenderness and smell are the most important factor that influences the preference of consumers. Therefore, this study was conducted to compare the meat quality characteristics of *longissimus*

muscle from each purebred and three-way crossbred pig.

II. MATERIALS AND METHODS

In total, 15 Landrace, 20 Yorkshire, 15 Duroc and 29 three-way crossbred pigs were used. Landrace, Yorkshire and Duroc were raised by Korean Feeding Standard for Swine (KFSS) at Great Grand Parent (GGP) farm in Yeonggwang Jeollanam-do. LYD was raised by KFSS at commercial farm. The *longissimus* muscle from Landrace, Yorkshire, Duroc and LYD pigs were swiftly transferred to Chungbuk National University's meat science lab after conventional slaughtering at slaughter house in Jeollanam-do. Meat quality characteristics (pH, meat color, shear force, WHC, drip loss, moisture, fat, protein, ash, and sensory characteristics) were analyzed. The result data was analyzed using the SAS package Release 9.4 (SAS Institute, Cary, NC, USA) and the significance was defined at $p<0.05$.

III. RESULTS AND DISCUSSION

The comparison of meat quality characteristics of *longissimus* muscle from purebred and three-way crossbred pigs are presented in Table 1. The water holding capacity and shear force had no significant difference among the pigs. The redness (a^*) values of Duroc and Yorkshire were significantly higher compared with the other pigs ($p<0.05$). The b^* values of Landrace was the lowest among the pigs ($p<0.05$). Drip loss at 24h and 48h, the LYD pig was significantly higher than those of other pigs. The comparison of proximate composition of *longissimus* muscle from purebred and three-way crossbred pigs is presented in Table 2. The moisture content of Duroc was significantly lower compared with the other pigs ($p<0.05$), but, the fat content of

Duroc was significantly higher compared with the other pigs ($p < 0.05$). There were no significant differences in the protein and Ash contents. The pH values at 24h and 14day, the Landrace was higher than LYD pig ($p < 0.05$).

Table 1. The meat quality characteristics of *longissimus* muscle from purebred and three-way crossbred pigs

Traits	Duroc (n=15)	Landrace (n=15)	Yorkshire (n=20)	LYD (n=29)	
L [*]	57.18±5.29 ^a	53.18±5.05 ^b	56.20±4.67 ^{ab}	57.93±4.79 ^a	
a [*]	7.32±1.92 ^a	5.63±1.00 ^b	6.91±2.05 ^a	5.17±1.35 ^b	
b [*]	10.17±1.28 ^a	8.60±1.40 ^b	9.67±1.66 ^a	9.83±1.62 ^a	
Shear force(g)	2004.57 ±461.38	2096.41 ±534.83	1814.98 ±429.59	1833.8 ±458.77	
WHC(%)	56.91±9.06	61.99±6.93	62.46±10.34	56.74±8.37	
24hr	3.14±1.55 ^b	3.65±1.59 ^b	3.83±1.18 ^b	5.42±2.02 ^a	
Drip loss(%)	48hr	3.57±1.22 ^b	2.89±1.65 ^b	3.56±1.82 ^b	5.47±1.82 ^a
14day	6.73±2.89 ^b	8.46±3.20 ^{ab}	8.72±2.81 ^a	8.39±1.85 ^{ab}	

L*: lightness, a*: redness, b*: yellowness.

^{a-b}Means±SD with different superscripts in the same row differ significantly($p < 0.05$).

Table 2. The proximate composition of *longissimus* muscle from purebred and three-way crossbred pigs

Traits	Duroc (n=15)	Landrace (n=15)	Yorkshire (n=20)	LYD (n=29)
Moisture (%)	72.85±1.73 ^b	75.18±0.97 ^a	74.50±0.97 ^a	74.24±1.58 ^a
Fat (%)	2.83±0.97 ^a	1.46±0.40 ^b	1.86±0.66 ^b	1.85±1.03 ^b
Protein (%)	22.56±1.18	22.28±0.92	22.51±0.90	22.80±2.10
Ash (%)	1.14±0.11	1.06±0.12	1.11±0.12	1.09±0.16
pH (24hr)	5.63±0.22 ^{ab}	5.76±0.31 ^a	5.65±0.30 ^{ab}	5.56±0.10 ^b
pH (14day)	5.67±0.21 ^{ab}	5.72±0.24 ^a	5.64±0.23 ^{ab}	5.57±0.10 ^b

^{a-b}Means±SD with different superscripts in the same row differ significantly($p < 0.05$).

The comparison of subjective evaluation of *longissimus* muscle from purebred and three-way crossbred pigs is presented in Table 3. There were no significant differences in the color and hardness values. But, the marbling score of Duroc was the highest among the pigs ($p < 0.05$). The comparison of sensory characteristics of *longissimus* muscle from purebred and three-way crossbred pigs is presented in Table 4. There were no significant differences in

the juiciness, tenderness, flavor and overall acceptability. Although there were no significant differences, the juiciness value was the highest in Yorkshire (2.68). The tenderness, flavor and overall acceptability values were the highest in Duroc and LYD pigs.

Table 4. The sensory characteristics of *longissimus* muscle from purebred and three-way crossbred pigs

Traits ¹⁾	Duroc (n=5)	Landrace (n=5)	Yorkshire (n=5)	LYD (n=5)
Juiciness	2.25±0.62	2.45±0.63	2.68±0.55	2.58±0.72
Tenderness	3.06±0.21	2.37±0.59	2.38±0.65	2.30±0.48
Flavor	2.53±0.66	2.14±0.49	2.33±0.51	2.58±0.48
Overall acceptability	2.62±0.65	2.00±0.41	2.48±0.40	2.63±0.50

¹⁾ 1: very dry, very tough, very mild, very unacceptable

5: very juicy, very tender, very intense, very acceptable

V. CONCLUSION

As a result, the meat quality of *longissimus* muscle from the Duroc breed was excellent in color and marbling. The Landrace and Yorkshire breeds were high pH and excellent water holding properties. The *longissimus* muscle of LYD pig showed an intermediate meat quality between purebred pigs.

Table 3. The subjective evaluation of *longissimus* muscle from purebred and three-way crossbred pigs

Traits ¹⁾	Duroc (n=15)	Landrace (n=15)	Yorkshire (n=20)	LYD (n=29)
Color	2.65±0.58	3.00±0.61	2.87±0.53	2.75±0.69
Marbling	2.68±0.65 ^a	2.01±0.40 ^b	2.15±0.47 ^b	1.76±0.63 ^b
Hardness	2.83±0.71	2.76±0.57	2.68±0.73	2.88±0.76

¹⁾ Color (1=extremely undesirable, 5=extremely desirable), Marbling (1=extremely low, 5=extremely abundant), Hardness (1=extremely soft, 5=extremely hard)

^{a-b}Means±SD with different superscripts in the same row differ significantly($p < 0.05$).

ACKNOWLEDGEMENTS

This research was supported by Korea Institute of Planning and Evaluation for Technology in Food, Agriculture, Forestry and Fisheries(IPET) through Agri-Bioindustry Technology Development Program funded by Ministry of Agriculture, Food and Rural

Affairs(114073-3) and Priority Research Centers Program through National Research Foundation of Korea(NRF) funded by Ministry of Education(2009-0093813).

REFERENCES

1. Jin, S. K., Kim, I. S., Hur, S. J., Kim, S. J., & Jeong, K. J. (2006). The influence of pig breeds on qualities of loin. *Journal of Animal Science and Technology* 56: 801-813
2. Kang, H. S., Seo, K. S., Kim, K. T., and Nam, K. C. (2011). Comparison of pork quality characteristics of different parts from domesticated pig species. *Korean Journal for Food Science of Animal Resources* 31(6): 921-927.
3. Li, Y, X., Cabling, M, M., Kang, H, S., Kim, T, S., Yeom, S, C., Sohn, Y, G., Kim, S, H., Nam, K, C., and Seo, K, S. (2013) . Comparison and correlation analysis of different Swine breeds meat quality. *Asian-Australas Journal Animal Science* 26(7): 905-910