INFLUENCE OF SLAUGHTER WEIGHT ON INTRAMUSCULAR FAT CONTENT AND TASTE CHARACTERISTICS OF PORK LOIN

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I. INTRODUCTION

Our previous study showed that increasing carcass weight increased intramuscular fat content in pork loin, resulted in improvement of meat quality and sensory palatability except tenderness [1]. The average slaughter weight (SW) in Korea has been increasing over the fast decades because consumers prefer meat with a strong pork taste from heavier carcass [2]. It could be possible that increasing SW affects pork quality and palatability of finishing pig production. However, while there are reports that pork quality and taste change as SW increases, there are reports that there is no effect due to the increase in SW. These discrepancy studies on SW increase effects may be due to differences in genetics, gender and age of pigs used in various experiments. In addition, the change in pork quality due to the increase in SW may be due to the difference muscle fiber composition and intramuscular fat content. Therefore, in this study, the change in meat quality and taste characteristics according to the increase in SW of gilts and barrows from commercial LYD breed was investigated.

II. MATERIALS AND METHODS

A total of 32 barrows and gilts from LYD crossbred were selected by live weight groups. All pigs used in this experiment were raised on the same farm with the same feed and specifications. Pork loin (*M. longissimus lumborum*) was collected after slaughter in three SW groups (CSW: 115±5kg, HSW: 130±5kg, VHSW: 140±5kg) for each gender. Loin cuts were excised at 24 hr post-mortem and transported to the laboratory to measure meat quality and sensory properties. While meat quality was measured with meat color (CIE $L^*a^*b^*$), water-holding capacity, tenderness, backfat thickness (BFT), and intramuscular fat (IMF) content, sensory property was evaluated by free amino acid content, sensory panel test and electronic tongue system (ETS). All data was analysed as a 2 X 3 factorial design using the General Linear Model procedure of SAS (ver. 9.3). The model included the gender and SW as main effects as well as their interaction. Significant differences were declared at $p < 0.05$.

III. RESULTS AND DISCUSSION

BFT and IMF content increased as SW increased in both gilts and barrows (Table 1). Both BFT and IMF of VHSW were significantly higher than those of CSW ($P < 0.05$). In addition, aspartic acid content of VHSW was also significantly higher than that of CSW ($P < 0.05$), although glutamic acid showed increasing tendency without significance as increasing SW. There were no significant differences in BFT, IMF, glutamic acid and aspartic acid concentration between gilts and barrows ($P > 0.05$). The increase of BFT and IMF with increasing SW is similar to our previous study and other researches. Since the meat flavor is closely related to the IMF content, the increase in SW is expected to improve the flavor of pork. In addition, although the increase in SW is negative for meat tenderness [1], it is expected to improve umami intensity by increasing the content of aspartic acid or glutamic acid. This

suggests that as pig SW increase, umami and flavor likely to increase due to increasing IMF and free amino acids.

Table 1. Differences in BFT, IMF, glutamic and aspartic acid concentration by slaughter weight increase

Measures	Gilts			Barrows			SEM
	CSW	HSW	VHSW	CSW	HSW	VHSW	
Backfat thickness (mm)	20.2 [b]	25.7 [ab]	28.4 [a]	21.2 [c]	26.0 [b]	29.6 [a]	3.24
Intramuscular fat (%)	2.04 [b]	2.52 [ab]	3.14 [a]	2.15 [b]	2.62 [ab]	3.12 [a]	0.58
Glutamic acid	28.3	34.2	38.5	25.3	36.3	39.2	11.7
Aspartic acid	8.8 [b]	9.2 [ab]	10.8[a]	8.5 [b]	9.4 [ab]	10.4 [a]	1.09

[a-d] Means with different superscripts in the same row are significantly different. Free amino acids (mg/1000g), CSW: Commercial slaughter weight, HSW: Heavy slaughter weight, VHSW: Very heavy slaughter weight

Table 2. Influence of increasing slaughter weight on taste-traits intensity assessed by the electronic tongue system

Taste traits	Gilts			Barrows			SEM
	CSW	HSW	VHSCW	CSW	HSW	VHSW	
Sourness	-1.48	-1.54	-1.46	-1.48	-1.99	-1.82	0.89
Bitterness	2.75 [b]	3.15 [ab]	3.58 [a]	3.56 [b]	3.94 [ab]	4.34 [a]	0.74
Umami	3.01 [b]	3.44 [ab]	3.82 [a]	2.99 [c]	3.76 [b]	4.31 [a]	0.46
Richness	2.77 [c]	3.20 [b]	3.98 [a]	2.81 [c]	3.66 [b]	4.45 [a]	0.61

[a-d] Means with different superscripts in the same row are significantly different. CSW: Commercial slaughter weight, HSW: Heavy slaughter weight, VHSW: Very heavy slaughter weight

As expected, umami, richness and bitterness intensity assessed by ETS was significantly increased with increasing SW ($P < 0.05$) (Table 2). All taste-traits except sourness of VHSW were significantly higher than those of CSW ($P < 0.05$). There was no sigificant difference in sourness among SW groups ($P > 0.05$). In addition, there were no significant differences taste-traits intensity between gilts and barrows ($P > 0.05$). Our previous study showed that increased IMF with increasing carcass weight had a positive effect onl sensory properties assessed by panel test. The present result assessed by ETS clearly confirmed our previous result. As SW increased, the porky taste became thicker (bitterness), the umami increased (umami), and the intensity lasted a long time (richness). These results imply that the increase in SW is positive for enhancing the taste characteristics of pork.

IV. CONCLUSION

As the SW of finishing gilts and barrows increases, the taste characteristics of pork loin was improved due to increasing of the IMF content and the concentration of free amino acids related to umami.

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REFERENCES

1. Hwang, Y. H., Lee, S. J., Lee, E. Y. & Joo, S. T. (2023). Effects of carcass weight increase on meat quality and sensory properties of pork loin. J. Animal Science & Technology 62(5): 753-760.
2. Jeong, T. Y., Park, G. B., Ha, D. M., Oarj, M. J., Joo, S. T. & Lee, C. Y. (2010). Effects of increasing slaughter weight on production efficiencey and carcass quality of finishing gilts and barrows. Korean J. Food Science Animal Resources 30: 206-215.