

PORK MEAT QUALITY AS AFFECTED BY CARCASS QUALITY GRADE

Hoa Van Ba¹, Hyun-Woo Seo¹, Pil-Nam Seong¹, Soo-hyun Cho¹, Sun- Moon Kang¹, Yun-Seok Kim¹,
Sung-Sil Moon², Yong-Min Choi³ and Jin-Hyoung Kim^{1*}

¹National Institute of Animal Science, Rural Development Administration, Wanju 55365, Republic of Korea.

²Sunjin Meat Research Center, Ansong 17532, Korea, ³National Institute of Agricultural Sciences, RDA, Wanju 55365, Korea

*Corresponding author email: jhkim702@korea.kr

I. INTRODUCTION

In the meat industry, after being slaughtered the cattle carcasses are often evaluated for their quality grades. The application of carcass grading standard system has contributed to the facilitation of beef marketing by separating highly variable beef carcasses into groups which are more uniform in quality and composition. In Korea, beside the beef carcass grading system established in 1998 [1], the Pork Carcass Grading System has also been designed for evaluation of pork carcasses in order to categorize them into uniform quality groups by the KIAPQE [2], and modified by MIFAFF [3]. The pork carcass quality grade is evaluated based on some major criteria; marbling score, meat and fat color, and texture of exposed *longissimus dorsi muscle* at the last rib (13th) and the 1st lumbar vertebrae. Three quality carcass grades such as; "Grade 1+," "Grade 1" and "Grade 2" are usually formed. Among the criteria, marbling is considered as the most important criterion in which the marbling values of 4~5, 2~3 and 1 were the marbling degrees for the grade 1+, grade 1 and grade 2, respectively. For many meat markets such as Korea, consumers tend to prefer the highly marbled meats, while most attentions have been paid to the effects of carcass quality grade on the quality characteristics of beef [4]. To the best of our knowledge, however, limited scientific information regarding the quality characteristics of pork as affected by the carcass quality grade is available. Thus, the present study aimed at evaluating the effect of carcass quality grade on the technological quality traits of pork according to the Korean pork carcass quality grading system.

II. MATERIALS AND METHODS

Animals, meat samples and quality analysis

Crossbred [(Landrace ×Yorkshire)♀×Duroc♂] pigs with averaged weight of about 95-115 kg fed with the same diet, collected from pig farms in South Korea were used for the present investigation. The animals (n=120) were slaughtered under the commercial slaughter process at a processing plant of National Institute of Animal Science (Korea). After being chilled for 24 h in a chilling room (2 °C), the carcasses were graded according to the Korean pork carcass grading system [3] by official meat grader. Based on the grading criteria, three different grades: grade 1+, grade 1 and grade 2, were formed for the carcasses. Immediately after grading, the *Longissimus dorsi* muscles (n=12) from left sides of each the grade group were collected and used for the meat quality analyses. The technological quality traits such as; pH, color, water holding capacity (WHC), Warner-Bratzler shear force (WBSF) and cooking loss were analyzed following the procedures as described in our previous study [5]. The obtained data was statistically analyzed using Statistic Analysis System (SAS Institute, Cary, NC, USA, 2007). The raw data were analyzed using the General Linear Model (GLM) procedure considering grade as the main effect. The differences between means were compared by using Duncan's Multiple Range Test, and significance was defined at P < 0.05.

III. RESULTS AND DISCUSSION

Effect of carcass quality grade on the meat quality parameters

The effect of carcass quality grade on the technological quality (pH, WHC and cooking loss) and tenderness are presented in Table 1. No significant differences in pH occurred among the three grades (P>0.05). However, it was observed that the carcass grade showed a significant effect on the tenderness as the samples of the grade 1 presented the lowest WBSF values (2.46 kgf), followed by the grade 2 (2.79 kgf)

and the highest was found in the grade 3 (2.97 kgf). Additionally, the cooking loss level also were affected by the carcass quality grade in which the samples from the higher grade showed higher cooking loss as compared to those of the lower grade, this could be attributed to the differences in the water holding capacity of the samples among the grades (Table 1) since the lower graded meat samples tended to have higher WHC. This phenomenon also has been observed on beef samples from different quality grades [4].

Table 1. Meat quality traits of pork meat as affected by the carcass quality grade

Grade	pH	WHC	Cooking loss (%)	WBSF (kgf)
1+	5.68±0.09a	59.78±3.32a	30.58±1.65ab	2.46±0.22b
1	5.67±0.11a	61.94±1.85a	31.13±1.71a	2.79±0.37ab
2	5.71±1.18a	62.59±4.48a	27.4±2.33b	2.97±0.19a

Means in the same column with different letters (a,b) are significantly different (P < 0.05).

Effect of carcass quality grade on the color characteristics

The effect of the carcass quality grade on the instrumental color traits of LD muscle is presented Table 2. The grade significantly affected the lightness and redness of the meat whereas; no effects were observed for the other color traits such as; yellowness or Chroma and hue angle. Particularly, the meat samples of the higher quality grade (e.g., grade 1) were lighter and less red in colors in comparison with those from the lower quality grade (grade 2). These results could be attributed to the differences in chemical compositions such as; myoglobin and intramuscular fat contents among the grade groups.

Table 2. Color traits of pork meat as affected by the carcass quality grade

Grade	L* (lightness)	a* (redness)	b* (yellowness)	Chroma	Hue angle
1+	56.72±3.14a	5.20±0.81b	4.3±0.15a	7.25±0.61a	36.54±5.53a
1	56.94±1.35a	5.51±0.18b	3.84±0.28a	6.3±0.79a	37.09±4.82a
2	51.81±2.15b	6.55±0.24a	3.79±0.16a	6.92±0.28a	33.06±7.95a

Means in the same column with different letters (a,b) are significantly different (P < 0.05).

IV. CONCLUSION

Based on the results obtained in the present work, it is concluded that most technological quality traits (cooking loss, shear force and color) of pork meat were affected by the carcass quality grade. Increasing the carcass quality grade improves the tenderness but it may reduce the WHC and red color of pork meat.

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