# HORSEMEAT QUALITY OF THREE MAJOR CUTS FROM KOREAN NATIVE BREED (JEJU HORSE)

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**Abstract – The aim of this study was to compare the quality of three major meat cuts from the Jeju horse (a Korean native breed): loin, chuck roll, and top round. The proximate composition, physicochemical properties, and fatty acid composition were investigated. The loin cut had higher crude protein and crude ash composition than the other cuts ($p<0.05$). It also had the highest water-holding capacity (WHC), lightness, yellowness, and redness ($p<0.05$). However, the moisture content and pH of the loin cut were lower than those of chuck roll and in top round cuts ($p<0.05$). There were no significant differences in all meat quality traits between chuck roll and top round ($p>0.05$). With respect to fatty acid composition, the Jeju horsemeat had 35.06-36.74% of saturated fatty acids (SFA) and 63.26-64.94% of unsaturated fatty acids (UFA), and there were no significant differences in the SFA and UFA between the cuts ($p>0.05$). Jeju horsemeat, regardless of the cuts, could be beneficial for human consumption from a nutritional point of view, especially its fatty acid composition.**

**Key Words – Fatty acid composition, Horse, Meat quality**

## • INTRODUCTION

Horsemeat is considered a healthy human diet because of its components, such as low intramuscular fat and cholesterol and high available iron content [1, 2]. Moreover, horsemeat is more digestible than other red meats, such as lamb or beef [3]. Horsemeat is mainly consumed in Italy, France, Belgium, the Netherlands, and Japan [4].

In Korea, the major meat resources are pork, beef, and chicken. However, horsemeat consumption has risen in recent years due to increased interest in a healthy diet. Given the growing interest in horsemeat, more detailed information is needed about its quality.
Meat from the Jeju horse, a Korean native horse breed, is mainly consumed in Korea. Although its nutritional characteristics have been studied, there are no reports on the quality of fresh meat from the Jeju horse [5] or on the effects of aging on the quality of the meat [6].

Therefore, in the present study, the quality of three major cuts from the Jeju horse was investigated and compared with each other.

## • MATERIALS AND METHODS

Three major cuts, including loin, chuck roll and top round, were obtained from the Jeju horse (Korean native horse breed, n=5) at slaughtering house after chilling for 24 h. The carcass weight, backfat thickness, and loin-eye area were 247.60±47.01 kg, 3.00±1.22 cm, and 105.20±16.57 $cm^2$, respectively.

The proximate composition, pH, meat color, shear force, water-holding capacity (WHC), and fatty acid composition were investigated. The moisture content (%), crude protein (%) and crude ash (%) were analyzed by the AOAC method [7], and the crude fat (%) was measured using the method of Folch et al. [8].

The pH was assessed directly by inserting the probe in the muscle using a potable pH-meter (Model HM-17MX, TOADKK, Japan). The color of meat (L*, lightness; a*, redness; b*, yellowness) was measured using a Minolta Chromameter CR-400 (Minolta Co., Tokyo, Japan) that was standardized with a white ceramic plate (Y=93.5, x=0.3132, y=0.3198). The shear force was analyzed using a texture analyzer (TMS-Touch, Food Technology Co., USA), and the samples were cooked to 70°C internal temperature for 30 min and cored to 1.0 cm diameter with a cylindrical stick. The WHC was analyzed by the method of Laakkonen et al. [9].

The fatty acid composition was analyzed by gas chromatography using a GC machine (Clarus 500, PerkinElmer Life and Analytical Sciences, USA) with a fused silica capillary column (SP-2560, Supelco Inc., Bellefonte, USA).

The experimental data were analyzed by the analysis of variance procedure using the statistical analysis system [10], and Duncan's multiple range test was used to determine the significant differences at a 95% confidence level ($p<0.05$).

- RESULTS AND DISCUSSION

The results of the proximate composition are presented in Table 1. There were significant differences between the horsemeat cuts in the moisture, crude protein, and crude ash compositions ($p<0.05$). The moisture content was lowest in the loin cut, but the crude protein and crude ash compositions were highest ($p<0.05$). However, crude fat content did not show the significant differences among the cuts ($p>0.05$). Moisture content is negatively correlated with intramuscular fat content in meat [11, 12]. Although loin, which had the lowest moisture content, had the highest mean value of crude fat content, there was no significant difference in crude fat content ($p>0.05$).

Table 1 Comparison of the proximate composition among the major cuts from the Jeju horse

| Measurements | Loin | Chuck roll | Top round |
|---|---|---|---|
| Moisture (%) | 71.64 [b] (0.82) | 74.33 [a] (0.65) | 73.51 [a] (1.00) |
| Crude fat (%) | 2.31 (0.84) | 1.86 (0.71) | 1.51 (0.40) |
| Crude protein (%) | 23.57 [a] (0.68) | 21.67 [b] (0.66) | 22.28[b] (0.98) |
| Crude ash (%) | 1.04 [a] (0.13) | 0.89[b] (0.03) | 1.00[ab] (0.03) |

[a,b] Means (SE) within a row with different superscript differ significantly ($p<0.05$).

The results of physicochemical properties, such as pH, shear force, WHC, and meat color, are shown in Table 3. The loin had the lowest pH value (5.19) among the cuts ($p<0.05$), whereas other measurements, except for shear force, were significantly highest in the loin cut ($p<0.05$). The shear force did not show the significant difference among the cuts ($p>0.05$). In pigs, muscles that have lower pH values have higher lightness (L*) and lower WHC than those with higher pH values [13, 14]. The horsemeat in the present study partly followed the trend observed in pork. Loin, which had a lower pH than chuck roll and top round, had the highest lightness, but its WHC value was not significantly lower compared with the other cuts. The shear force was not significantly different among the cuts ($p>0.05$).

Table 2 Comparison of the physicochemical properties among the major cuts from the Jeju horse

| Measurements | Loin | Chuck roll | Top round |
|---|---|---|---|

| | | | |
|---|---|---|---|
| pH | 5.19[b] (0.15) | 5.80[a] (0.23) | 5.64[a] (0.17) |
| Shear force ($kg/cm^2$) | 10.86 (3.46) | 14.82 (4.77) | 12.44 (8.06) |
| Water-holding capacity (%) | 56.75[a] (8.87) | 46.58[b] (5.79) | 51.60[ab] (3.41) |
| Lightness (L*) | 36.08[a] (3.17) | 30.78[b] (2.31) | 29.13[b] (1.38) |
| Redness (a*) | 19.12[a] (1.22) | 16.48[b] (2.45) | 16.59[b] (1.08) |
| Yellowness (b*) | 10.18[a] (1.49) | 7.69[b] (1.46) | 8.03[b] (0.53) |

[a,b] Means (SE) within a row with different superscript differ significantly ($p<0.05$).

The sum of the saturated fatty acids (SFA) and the unsaturated fatty acids (UFA) are presented in Table 4. The means for the SFA and the UFA were 35.06-36.74% and 63.26-64.94%, respectively. There were no significant differences among the cuts in terms of SFA and in UFA ($p>0.05$). Previous reports found that horsemeat contains about 38.01-45.22% of SFA, regardless the breed or muscle type [15, 16]. The Jeju horse had a relatively lower composition of SFA and a relatively higher composition of UFA than the other breed, regardless of the cuts.

Table 3 Comparison of the fatty acid composition among the major cuts from the Jeju horse

| Measurements | Loin | Chuck roll | Top round |
|---|---|---|---|
| Saturated fatty acids (%) | 36.74 (3.32) | 35.33 (3.67) | 35.06 (2.87) |
| Unsaturated fatty acids (%) | 63.26 (3.32) | 64.67 (3.67) | 64.94 (2.87) |

Data are means (SE).

- CONCLUSION

There are no differences in the meat quality of chuck roll and top round from the Jeju horse. However, loin cuts have a higher protein and ash content and exhibit better WHC than the other cuts. Jeju horsemeat, regardless cut, could be a good food for human consumption from a nutritional point of view, especially fatty acid composition.

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