

COMPARISON OF HORSEMEAT QUALITY BETWEEN JEJU HORSE (KOREAN NATIVE HORSE) AND THOROUGHBRED

G. D. Kim, K. B. Ko , D. G. Kang, Y. W. Kim, I. D. Yang and Y. C. Ryu

Division of Biotechnology, College of Applied Life Sciences, Jeju National University, 66 Jejudaehakro, Jeju 690-701, South Korea

Abstract – Jeju horse, which is native to Korea, is used as meat resource. In the present study, carcass traits and meat quality characteristics of Jeju horse's *longissimus thoracic* (LT) muscle were investigated and compared with those of Thoroughbred horse. The LT of Jeju horse had lower carcass weight, loin-eye area, crude ash, and cooking loss than that of Thoroughbred ($p < 0.05$). However, the crude fat content and hardness were higher in Jeju horse than in Thoroughbred ($p < 0.05$). With the exception of hardness, there were no significant differences in moisture content, crude protein, pH, drip loss, meat color and textural properties ($p > 0.05$). In order to use Jeju horse as a meat resource, technologies must be developed to improve its carcass traits as well as the quality characteristics of its meat.

Key Words – Horse breed, *Longissimus thoracic*, Meat quality.

• INTRODUCTION

Historically, horsemeat was obtained from horses that were slaughtered at the end of their working life [1]. The main countries that imported and consumed horsemeat were Japan and some European countries, including Italy, France, Belgium, and Spain [2]. The consumption of horsemeat as well as other kinds of meat has varied extensively according to differences in the eating habits and cultures of human societies. In Korea, the main meat resources were pork, beef, and poultry. Recently, however, Korean people have become interested in horse meat because of its nutritional and organoleptic characteristics.

It has been reported that horsemeat is more digestible than mutton and beef are [3]. Furthermore, horse carcasses have a high percentage of dressing and meat yield [4, 5]. With regard to its fat and fatty acids profile, horse meat is considered a nutritious and healthy muscle food because of its low fat content and better proportion of unsaturated/saturated fatty acids [6, 7].

There are three breeds of horses in Korea: Thoroughbred, Jeju horse (Korean native horse), and their crossbreed. Despite the increasing consumption of horsemeat, there are very few reports [8, 9] concerning meat quality from horse which was produced in Korea. Therefore, the aim of this study is to investigate the quality of Jeju horsemeat compared with that of Thoroughbred.

• MATERIALS AND METHODS

Muscle (*longissimus thoracis*, LT) samples were obtained from Jeju horse ($n=6$) and Thoroughbred ($n = 3$) at a commercial slaughtering house. After the horse carcasses were chilled for 24 h, carcass traits, including carcass weight, loin-eye area, and backfat thickness were measured. In addition, the characteristics of meat quality, such as pH, proximate composition, drip loss, cooking loss, textural properties, and meat color were investigated. pH was assessed directly by inserting a probe into the muscle using a potable pH-meter (Model HM-17MX, TOADKK, Japan). Moisture content (%), crude protein (%) and crude ash (%) were analyzed by the AOAC method [10], and crude fat (%) was measured using the Folch method [11]. Drip loss (%) was determined using the method developed by Honikel [12]. Meat

color (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). Textural properties including hardness (kg), springiness (mm), cohesiveness and chewiness (kg×mm) were measured using a texture analyzer (EZ-test, Shimadzu, Tokyo, Japan) that was equipped with a cylindrical plunger (diameter 5 mm, depression speed 80 mm/min). The experimental data were analyzed by t-test of statistical analysis system [13]. The level of significance was set at p<0.05.

• RESULTS AND DISCUSSION

All carcass traits, such as carcass weight, backfat thickness and loin-eye area were significantly (p<0.05) different between Jeju horse and Thoroughbred (Table 1). Thoroughbred had higher carcass weight (330.50 kg) and loin-eye area (131.50 cm²) than Jeju horse, whereas backfat thickness was lower in Thoroughbred (2.02 mm) than in Jeju horse (4.29 mm). Compared to other breeds, such as Burguete (258.9 kg) and Hispano-Bretón (275.5 kg), Thoroughbred had higher carcass weight [14].

Table 1 Comparison of carcass traits Jeju horse and Thoroughbred horsemeat

Measurements	Jeju horse		Thoroughbred		Level of significance ¹⁾
<i>Carcass traits</i>					
Carcass weight (kg)	183.14	± 23.27	330.50	± 36.06	*
Backfat thickness (cm)	4.29	± 1.03	2.02	± 0.21	*
Loin-eye area (cm ²)	71.57	± 12.45	131.50	± 0.71	*

¹⁾ NS, not significant; *, p<0.05.

Although, Jeju horse is remarkably lighter than other horses are, the LT muscle from Jeju horse showed no significant differences (p>0.05) in moisture and crude protein contents compared with Thoroughbred (Table 2). Crude fat was significantly higher (p<0.05) in Jeju horse than in Thoroughbred. However, crude ash was higher (p<0.05) in Thoroughbred than in Jeju horse. It was reported that the *longissimus* muscle from Italian Heavy Draft horse foals had 69.51 % of moisture and 21.67 % of crude protein [15]. Galician Mountain horses had 76.49% of moisture and 22.31% of crude protein [1]. Wood et al. [16] reported that backfat thickness and fat content of the porcine loin were positively correlated. In the present study, Jeju horses whose backfat was thicker showed higher fat content than Thoroughbred. The reason that Thoroughbred had lower crude fat content and backfat thickness than Jeju horse did is that Thoroughbred have been developed for speed [17].

Table 2 Comparison of proximate composition between Jeju horse and Thoroughbred horsemeat

Measurements	Jeju horse		Thoroughbred		Level of significance ¹⁾
<i>Proximate composition</i>					
Moisture content (%)	72.90	± 1.01	74.34	± 0.16	NS

Crude fat (%)	3.90	± 1.13	1.15	± 0.51	*
Crude protein (%)	23.15	± 0.67	23.86	± 0.72	NS
Crude ash (%)	0.96	± 0.11	1.06	± 0.09	*

¹⁾ NS, not significant; *, p<0.05.

As presented in Table 3, there were no significant difference in pH, drip loss, and meat color values, including lightness, redness and yellowness (p>0.05). However, cooking loss showed significant difference between Jeju horse and Thoroughbred (p<0.05). Jeju horse (12.13%) had lower cooking loss than Thoroughbred (17.91%). Both these two breeds had similar lightness to Burguete breed but lighter than Hispano-Bretón, whereas the redness values of them were lower than that of Burguete [14].

Table 3 Comparison of meat quality traits between Jeju horse and Thoroughbred horsemeat

Measurements	Jeju horse		Thoroughbred		Level of significance ¹⁾
pH	5.48	± 0.15	5.40	± 0.03	NS
Drip loss (%)	1.85	± 0.57	1.63	± 0.41	NS
Cooking loss (%)	12.13	± 2.88	17.91	± 1.35	*
Lightness (L*)	35.78	± 3.89	33.03	± 1.45	NS
Redness (a*)	19.57	± 2.22	18.30	± 1.71	NS
Yellowness (b*)	10.65	± 2.18	9.36	± 1.24	NS

¹⁾ NS, not significant; *, p<0.05.

The result of textural property analysis (TPA) is shown in Table 4. With the exception of hardness, there were no significant differences in TPA except for hardness between Jeju horse and Thoroughbred (p>0.05). Hardness was higher in Jeju horse than in Thoroughbred (p<0.05). However, the hardness values of these two breeds were lower compared with those of the foal meat from the Galician Mountain breed [15]. It seems that the difference in hardness varies from breed to breed.

Table 4 Comparison of textural properties between Jeju horse and Thoroughbred horsemeat

Measurements	Jeju horse		Thoroughbred		Level of significance ¹⁾
Hardness (kg)	3.33	± 0.32	2.85	± 0.46	*
Springiness (mm)	0.73	± 0.09	0.77	± 0.03	NS
Cohesiveness	0.47	± 0.05	0.54	± 0.04	NS
Chewiness (kg×mm)	1.15	± 0.18	1.19	± 0.34	NS

¹⁾ NS, not significant; *, p<0.05.

• CONCLUSION

Jeju horsemeat had higher crude fat and lower cooking loss than Thoroughbred, whereas Jeju horse had lower carcass weight, loin-eye area but higher hardness. Therefore, in order to use Jeju horsemeat for human consumption, technologies must be developed to improve its carcass

traits as well as the quality characteristics of its meat.

ACKNOWLEDGEMENTS

This work was supported by grants from the Korea Institute of Planning & Evaluation for Technology in Food, Agriculture Forestry & Fisheries (No. 111162-02), Republic of Korea.

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