EFFECT OF POSTMORTEM AGEING TIME ON QUALITY CHARACTERISTICS OF HORSE MEAT

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Abstract – This study was carried out to investigate the effect of postmortem ageing on technological quality (pH, drip loss, color, cooking loss and Warner-Bratzler shear force) and sensory characteristics of horse meat. Crossbred horses at 28 months old with live weigh of 320 kg were slaughtered and *longissimus dorsi* (LD) muscle taken from the carcasses was used in the present research. The LD muscle (each) was divided into 4 equal portions, vacuum packaged and aged for 2, 10, 20 and 30 d at 4°C. Our results revealed that pH and drip loss increased as time postmortem increased (p<0.05). The horse LD muscle decreased (p<0.05) in WBSF values from 2 to 10 d, and then shear force did not continually decrease (p>0.05) with increased postmortem ageing. No differences among the aged samples were found for the L*(lightness) and a*(redness) (p>0.05) but ageing increased the b* (yellowness) of horse meat (p<0.05). The sensory evaluation results show that only flavor was affected by ageing (p<0.05). These results suggest that a 10-day ageing period could be optimum for improving WBS force and has little impact on pH and drip loss of horse LD muscle.

Key Words – horse meat, ageing

I. INTRODUCTION

Horse was domesticated for thousands of years ago and has currently been exploited for transport, riding and meat production purposes. In recent decades, horse meat is not only regarded as a human food in most countries but also has a great potential as an alternative meat, due to its relatively high nutritional quality and cheap source of animal protein. Horse meat, therefore has become quite popular in some markets such as Italian, Mexico and France (1). However, the production and consumption of this meat type have varied widely with differences in the economies and cultures of human societies (2). Amounts of horse meat produced, exported and imported widely varied among the regions in which Asia apparently is one of the most largely horse meat produced regions in the world (3). Although the slaughter of horse for human consumption and trade in this meat type appear commonly in many countries worldwide however very little information on the quality and sensory characteristics of horse meat is available. More to the point, ageing is a widely used technique in meat industry to improve meat tenderization however it is still unknown whether ageing affects the quality and eating quality of horse meat. Thus, the aim of this study was to investigate the effect of postmortem ageing on the technological quality and sensory characteristics of crossbred horse meat.

II. MATERIALS AND METHODS

Animals and sample preparation

Female crossbred horses at 28 months of age with live weigh of 320 kg obtained from a local farm in Jeju province, Korea were used in the present research. The animals were reared on pasture and fed *ad libitum* with 1.6% concentrate-supplemented dried *tallfescue* grass diet. Horses were transported to an abattoir of National Institute of Animal Science, Suwon, Korea and were stunned with a captive bolt, slaughtered and dressed. Carcasses were chilled for 24 h at 4°C and *longissimus dorsi* (LD) muscle samples were taken from left carcass sides. Each LD muscle was divided into 4 equal portions, vacuum packaged and randomly assigned to 2 (sampling day), 10, 20 and 30 d ageing groups. Ageing was carried out at 4°C in a chilling room. After ageing, the samples were reweighed to determine drip loss and were then cut into sub-sample sizes depending on type of analysis in the following order: pH, color-cooking loss-shear force, and sensory evaluation.

Analysis of meat quality and sensory

Color, cooking and Warner-Bratzler shear force (WBSF) were measured on same steaks (3-cm thick) of about 200 g according to the method of Hwang et al. (4). Sensory evaluation was performed by an un-trained panel. Panelists rated for the flavor, tenderness, juiciness and acceptability using 7-point scales; Flavor (1=undesirable flavor, 7=desirable flavor); Tenderness (1=very tough, 7 = very tender); juiciness (1= very dry, 7 = very juicy); Acceptability (1= dislike extremely, 7 = like extremely).

III. RESULTS AND DISCUSSION

Table 1 shows the technological quality traits of horse LD muscle at different chiller ageing at 4°C. Postmortem ageing significantly ($p< 0.05$) affected the pH of horse meat; the pH values tended to increase with increased ageing time up to d 20. The pH values of LD muscle in the present study ranged from 5.63 to 5.77 which were almost equal to the values reported by Lorenzo et al. (6) for foal meat. Similarly, the LD muscle samples increased in drip loss between 2 and 30 d ($p< 0.05$). No differences in cooking loss due to ageing were found ($p>0.05$). The LD muscle samples decreased ($p<0.05$) in WBSF values from 2 to 10 d, and then shear force did not continually decrease with increased postmortem ageing indicating that postmortem ageing beyond 10 d may not be effective in improvement of WBS force of LD muscle. Ageing did not affect the L*(lightness) and a*(redness) ($p>0.05$) but the b*(yellowness) values increased ($p< 0.05$) with increased ageing time.

Table 1 Quality characteristics of horse meat at different chiller ageing periods

Item	Ageing period			
	2d	10d	20d	30d
pH	5.63±0.05B	5.62±0.01B	5.77±0.05A	5.73±0.04AB
Drip loss (%)	0.50±0.09B	1.29±0.19AB	1.27±0.21AB	2.09±0.43A
Cooking loss (%)	25.70±0.80	26.18±1.30	25.35±0.58	24.60±3.86
WBSF (kgf)	4.13±0.7A	2.43±0.5B	2.36±0.19B	2.34±0.42B
CIE L*	35.99±1.26	37.24±1.43	36.11±0.50	35.72±0.73
CIE a*	17.11±0.56	17.61±1.33	17.87±0.55	18.71±0.56
CIE b*	5.41±0.22B	7.83±0.56A	7.67±0.23A	8.03±0.49A

A-B Means with different letters within the same row differ at $p<0.05$; WBSF: Warner-Bratzler shear force.

The sensory characteristics of horse LD muscle at different ageing periods are shown in Table 2.

Ageing significantly ($p<0.05$) affected the flavor; particularly higher flavor score was given by the panelists for the 20 d aged samples. However, no differences among the ageing periods were found for the tenderness, juiciness and acceptability ($p>0.05$).

Table 2 Sensory characteristics of horse meat at different chiller ageing periods

Item	Ageing period			
	2d	10d	20d	30d
Flavor	4.33±0.18B	4.59±0.25AB	5.08±0.14A	4.50±0.18AB
Tenderness	5.00±0.24	4.13±0.96	5.54±0.18	5.04±0.58
Juiciness	4.79±0.22	5.05±0.24	5.21±0.34	4.25±0.41
Acceptability	5.13±0.32	5.25±0.14	4.96±0.21	4.37±0.43

A-B Means with different letters within the same row differ at $p<0.05$.

Rating scale: Flavor (1=undesirable flavor, 7=desirable flavor); Tenderness (1=very tough, 7 = very tender); juiciness (1= very dry, 7 = very juicy); Acceptability (1= dislike extremely, 7 = like extremely).

IV. CONCLUSION

Postmortem ageing significantly affected the pH, drip loss, WBSF and yellowness of horse LD muscle. However, postmortem ageing only affected flavor. Taken together, these findings suggest that a 10-d ageing period for could be optimum for improving WBS force of horse LD muscle whereas a longer ageing period may result in an increase of pH and drip loss.

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VI. REFERENCES

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