

Effects of pelvic suspension and its duration on Hokkaido sika deer meat quality

Ayumi Yamaura, Natsumi Maruoka, Toru Hayakawa, Haruto Kumura, Jun-ichi Wakamatsu

Hokkaido University, Japan

Background and Objectives: In Hokkaido, the capture and hunting of Hokkaido sika deer, a subspecies of Japanese sika deer endemic to Hokkaido, is being performed to control its population because of serious crop damage. However, since many of them are not consumed effectively, improving meat quality may stimulate its use as a meat resource. In this regard, suspension of carcasses is a possibility to improve meat quality, especially tenderness. Pelvic suspension (PS) of carcasses can make meat tender, but this is not common in Japan. The Hokkaido sika deer is the largest among the seven Japanese sika deer subspecies and the meat from larger individuals tends to be tougher, therefore, PS may be an effective method to improve Hokkaido sika deer meat quality. Moreover, the outcome may also depend on muscles and suspension days. Therefore, the purpose of this study was to analyze the effect of PS on Hokkaido sika deer meat quality and to determine the optimal PS days for each muscle.

Materials and Methods: For the present study, we used 17 wild Hokkaido sika deer (eight males and nine females, 61.8-150.0 kg) hunted with guns in Hokkaido. The carcasses were split: one side was hung with the Achilles tendon, and the other side was hung with the pelvic obturator foramen. After 1, 3, 5, and 7 days of suspension, *longissimus thoracis et dorsi* (LTL), *psoas major* (PM), *semimembranosus* (SM), *semitendinosus* (ST), *biceps femoris* (BF), and *quadriceps femoris* (QF) muscles were collected for analysis. The muscle weight, length, pH, cooking loss, myoglobin and hemoglobin content, sarcomere length, and shear force were measured for each muscle along with assessment of the sensory tenderness. The samples were cooked at 76°C for 1 h and sliced to a thickness of 7 mm. Panelists were provided with two samples of different suspension groups of the same individual, and then evaluated to determine which was easier to bite off and which was chewier. Each pair of samples was evaluated by 26 panelists. Principal component analysis (PCA) was performed based on the analysis data.

Results and Discussion: On most days of suspension, the muscle length of LTL, SM, ST, BF, and QF extended in the muscle fiber direction by PS. In the case of PM, the muscle length was extended on days 3 and 7 of suspension by Achilles suspension (AS). However, the sarcomere length of the PM showed no difference between two suspensions on any days. In most muscles, except the PM, the sarcomere length extended from day 3 of suspension by PS. There were no noteworthy differences in muscle weight, pH, cooking loss, myoglobin and hemoglobin content, or shear force between two suspensions. In the sensory evaluation, LTL, SM, BF, and QF were easier to bite off by PS. The tenderization in LTL, SM, and QF was observed from day 1 of suspension, whereas for BF, it was evident from day 3 of suspension. With regard to the muscle that showed the most pronounced difference, approximately 80% of the panelists evaluated that PS made it easier to bite off. However, the PM was easier to bite off by AS on day 7 of suspension, while the ST showed no significant differences between two suspensions. From these results, it can be implied that LTL, SM, BF, and QF became easier to bite off because these muscles were stretched more by PS, and as a result, sarcomere length also got extended. In fact, the principal component plots of these muscles shifted by PS, and muscle length, sarcomere length, and chewability were the main factors involved in the shift from day 3 of suspension. In contrast, the principal component plots of PM on day 7 of suspension shifted conversely, indicating that the AS group tended to bite off easily. ST showed no noticeable shift, even in PCA. This study showed that the tenderization of PS was also observed in Hokkaido sika deer meat. Furthermore, the effect was observed in LTL, SM, BF, and QF, especially from day 3 of suspension, by extending the sarcomere length. On the other hand, the PM became more tender with AS on day 7 of suspension. In addition, this study shows the possibility that carcass weight affects PS tenderization. According to the sensory evaluation, differences between two suspensions were pronounced on day 3 of suspension; however, this group had the highest average weight. The meat of heavy carcasses may be influenced to a greater degree by PS as compared to light carcasses. Thus, it can also be suggested that PS can be an effective method for improving of Hokkaido sika deer meat.

Key words: Hokkaido sika deer, Tenderness, Pelvic suspension, Sarcomere length