

Physicochemical and sensory properties of Hokkaido sika deer (*Cervus nippon yesoensis*) and brown bear (*Ursus arctos*) meat

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Objectives: Since crop damage and human injuries caused by wild animals have been increasing in Japan, such wild animals have been captured to regulate their population. Thus, effective utilization of meat obtained from wild animals, such as Hokkaido sika deer and brown bear, is being tried. Hokkaido sika deer (*Cervus nippon yesoensis*) is known as a subspecies of the sika deer, which distributes throughout Hokkaido, Japan and causes the most crop damage there. Brown bear (*Ursus arctos*) also lives in Hokkaido and occasionally causes human injuries. A small part of these animals captured by trapping and hunting are utilized for their meat. Such meat, often called 'gibier', is gradually becoming popular in Japan. To make effective use of captured wild animals, it is important to accumulate the exact value of their meat. In particular, odor, taste and processed meat characteristics contribute to meat palatability. In this study, physicochemical and sensory properties of Hokkaido sika deer and brown bear meat were examined.

Materials and Methods: Skeletal muscles of Hokkaido sika deer and brown bear were prepared from individual animals captured in Hokkaido, Japan. Preparation of muscle samples were performed according to Guidelines on the Hygienic Management of Wild Meat established in 2014 in Japan. All muscles used in this study were cut from thighs of each animal. Other information, such as sex, age and capture date, are unknown. In each experiment, beef was used as a control. Water retention and crunchiness were examined as follows. Drip loss generated by refrigeration at 4°C for 5 days and cooking loss generated during the cooking process at 70°C and 95°C were measured. A compression strength test of 1 cm square cooked steaks (63°C of center temperature, 30min) was performed and the maximum load was measured by a Rheo meter. Tastes of cooked (95°C, 2h) meats were analyzed with the electric taste sensor (Intelligent Sensor Technology, Inc. Taste Sensing System SA402B). Sausages prepared from Hokkaido sika deer meat and pork (blending ration of pork; 0, 25, 50, 75, and 100%) were used for sensory evaluation. Odor intensity of raw and cooked (95°C, 2h) meat was measured with the odor monitor with beef. Odor compounds found in each meat sample were detected by GC/MS in 1 cm square steak samples heated at 230°C for 30 seconds on each side.

Results and Discussion: Since Hokkaido sika deer meat showed significantly more drip loss at 4°C and cooking loss at 95°C compared with brown bear meat and beef, Hokkaido sika deer seems to have the lower water retention property. The results of taste analysis showed that Hokkaido sika deer meat had lower umami value and higher umami richness value compared with beef. No significant differences were found in brown bear meat. Sensory evaluation of sausages prepared from Hokkaido sika deer meat and pork indicated that sausages containing 25% of deer meat (75% pork) were highly preferred in flavor, taste, appearance, and comprehensive evaluation. In addition, measurements of odor intensity of the raw meat showed that brown bear meat had strong odor. Presumably, this odor might be generated due to inadequate postcapture processing and residual blood in muscle. GC/MS analysis revealed that acetoin and acetaldehyde are detected as characteristic volatile components in the cooked deer meat. They are known as important odor components in some fermented foods [1].

Conclusion: Hokkaido sika deer meat particularly showed outstanding characteristics compared with other meats. It was particularly interesting result that characteristic volatile components (acetoin and acetaldehyde) were detected in the Hokkaido sika deer meat, and sensory evaluation of sausages differed depending on the blending ration of Hokkaido sika deer meat. Therefore, since we measure that some odor component of Hokkaido sika deer meat is responsible for its palatability, sensory evaluation using quantitative descriptive analysis should be conducted to determine how the odor components affect palatability.

References:

1. Emoto E. (2013): Flavors produced by lactic acid bacteria and those utilization. Japanese Journal of Lactic Acid Bacteria, 4, 71-78.

Key words: Hokkaido sika deer (*Cervus nippon yesoensis*), Brown bear (*Ursus arctos*), Palatability, Odor, Sausage