

The effect of free amino acids supplementation on the taste of beef extract

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Objectives: Free amino acids (FAAs), in particular glutamate which provides umami, have been generally considered to contribute to the taste of meat, and their concentrations increase during postmortem aging in meat (Kato et al. 1987). On the other hand, Nishimura et al. (1988) reported that aging did not improve the brothy-taste intensity of beef soup, even though the concentrations of FAAs in the soup stock prepared from the aged beef were greater than before the aging. Previous studies did not indicate whether the results could apply meat, not soup stock, because they were carried out by using meat broth just prepared by heating meat homogenate, which had different concentrations of taste-active substances from meat. Furthermore, meat aging also changes the levels of various taste-active and -inactive substances in meat other than FAAs. Thus, it has not been clarified whether the increase in FAAs during aging contributes on the taste characteristics of beef. To solve the above problems, it is necessary to investigate the relationship between taste traits of meat and the increase in the levels of FAAs separately from changes in other meat components. A meat extract is useful experimental model for sensory assessment of taste traits of meat. The model is easy to adjust its concentrations of components to meat and to assess the effect of FAAs on the taste traits of meat because it is easy to add FAAs to a meat sample. The aim of this study was to investigate whether the increase in FAAs, particularly glutamate, during aging is at levels that differentiate taste characteristics by sensory evaluation using beef extract as an experimental model. In this study, we conducted addition tests of FAAs with beef extracts prepared from before and after aging, which contained water-soluble components with equal concentrations of meat.

Materials and Methods: Longissimus muscles were obtained from three carcasses of Holstein steers and divided into 16×4×4 cm pieces on the day of slaughter. These samples were vacuum-packaged and subjected to aging for 7 or 28 days at 4 °C. After aging, water-soluble components were extracted into water at 75°C for 10 min. The supernatants of extracts were filtrated to remove water-insoluble substances and freeze-dried to obtain dry solids consisted of water-soluble substances. The dry solids of extracts were then dissolved in water to prepare model extracts containing water-soluble substances at the equal concentrations of meat (1 g water-soluble components of beef per 1 mL). These model extracts prepared from 7- and 28-days aged beef were called as 7D and 28D, respectively. Glutamate or 17 types of FAAs including glutamate were added to 7D to reach the 28D levels, and they were named 7D+Glu and 7D+FAAs, respectively. For assessment of sensory taste characteristics of these model extracts, paired-comparison tests were performed. Twelve trained panelists judged the relative intensities of umami and the brothy taste using the following combinations: (1) 7D and 28D to examine the effect of aging; (2) 7D and 7D+Glu to examine whether glutamate increased by aging affected the tastes; and (3) 7D and 7D+FAAs to examine whether the FAAs increased by aging affected the tastes. The results were compared by a binomial test.

Results: With the comparison between 7D and 7D+Glu, the umami intensity of 7D+Glu was significantly stronger than that of 7D. Furthermore, with the comparison between 7D and 7D+FAAs, the intensities of both umami and the brothy taste of 7D+FAAs were significantly stronger than those of 7D. These results indicated that FAAs improved the intensities of both umami and the brothy taste of the beef extract, whereas glutamate-alone supplementation enhanced only umami. However, there were no significant differences in umami or brothy taste intensities between 7D and 28D. Therefore, aging did not change umami or the brothy taste of beef extracts containing water-soluble components at the equal concentrations in meat.

Conclusions: The addition of FAAs to beef extracts as levels which was equivalent to those of aged meat elicited the increase in umami and the brothy taste, assessed by the trained panel test using beef extracts containing components at the equal concentrations of meat. These results indicated that increase in glutamate and FAAs during aging can contribute to the taste characteristics of meat. On the other hand, umami or the brothy taste of beef extract models were not changed during aging from 7 to 28 days, although the increase of FAAs reached the level which could be discriminated by the trained panels. Therefore, our results suggested that there are other factors that suppress the improvement of taste traits due to FAAs increased by aging.

References:

Kato H. (1987) Umami: A Basic Taste: 289-306 Nishimura T. (1988) Food Rev. Int. 4: 175-194

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