

Estimation of sensory difference threshold for emulsified fat in chicken broth

Genya Watanabe¹, Shota Ishida¹, Michiyo Motoyama¹, Keigo Takita², Ikuyo Nakajima¹, Atsushi Tajima², Keisuke Sasaki¹

¹ Institute of Livestock and Grassland Science, National Agriculture and Food Research Organization (NARO), Tsukuba, Japan

² Faculty of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Japan

Introduction: “*Koku*” is a Japanese sensory expression term that is thought to be similar to “richness” or “body” in English. We reported that “fat taste” may be related to the perception of *oku* in meat dishes by general consumers through a questionnaire survey. However, no study has directly revealed whether differences in fat content of meat affect the perception of *oku* in humans. Nishimura & Kuroda (2019) suggested that *oku* is perceived when a particular substance is present in very small amounts or at concentrations below the threshold of that substance alone, by enhancing the overall flavor of the food. On the other hand, the sensory difference threshold of fat in meat products have never been demonstrated. To investigate the contribution of fat on *oku* perception in meat, it is necessary to clarify the sensory difference threshold for fat in meat. In this study, we used chicken broth as a model, and the sensory difference threshold for fat in chicken broth was demonstrated.

Materials and methods: Thigh meat was prepared from 3 broiler chicken carcasses and were minced. Ground meat was weighed 600 g and 2.6 L ultra-pure water was added. The mixture rapidly brought to the boil in the stainless pot and then simmered at 90°C for 2 h. The broth was filtered, and the volume of broth was adjusted to 2 L by ultra-pure water. An emulsifier and sodium chloride were added to a final concentration of 0.1 and 0.3% (w/v) of chicken broth, respectively and were homogenized. This broth was used as a control. After that, chicken fat was added to a final concentration of 1, 0.2, 0.04, and 0.008% (w/v) of the control broth and mixture was homogenized. Each broth was dispensed 9 ml in an aluminum cup and covered with a polyethylene terephthalate lid. These samples were kept warm at 70°C until immediately before the test.

The triangle test was demonstrated between control broth and each fat added chicken broth. Eleven trained panelists were instructed to choose one different sample from the three samples. A Latin square design was used to avoid the effects of assessment order and serial-position. In each combination, the test was repeated twice, and a total of 22 runs were conducted.

For the triangle test, the null hypothesis is H_0 : observed $n_c/n = 1/3$; n_c =number of correct responses, n =total number of responses. The alternative hypothesis is H_1 : $n_c/n > 1/3$. The critical number of correct responses to reject H_0 at $P < 0.05$ in favor of H_1 was calculated by the chi-square test. The chi-square test was performed using the FREQ procedure in SAS.

Results: In this study, 1, 0.2, and 0.04% fat added chicken broth led to conclude at a significant difference between control broth, whereas 0.008% fat added chicken broth failed to reach significance.

Conclusion: The sensory difference threshold for fat in chicken broth was estimated between 0.04 and 0.008% which is same order of the difference threshold of the basic taste-active component such as monosodium glutamate. In further study, it is necessary to conduct an additional triangle test in the range of addition of the fats between 0.04 and 0.008% to clarify the sensory difference threshold for fat in chicken broth in more detail.

Acknowledgements and Financial support statement: This research was financially supported by a JSPS KAKENHI Grant Number 18K13029.

Literature:

Nishimura, T. (2019). Definition of “*Koku*” Involved in food palatability. In T. Nishimura, M. Kuroda (Eds.), *Koku in Food Science and Physiology*, (pp. 1-16). Berlin: Springer.

Watanabe, G., Motoyama, M., Nakajima, I., & Sasaki, K. (2021). Estimation of “*oku*”-related taste sensory words for meat using questionnaire to consumers and cooking workers. *Nihon Chikusan Gakkaiho*, in press (in Japanese).