

## CHANGES IN TASTE COMPONENTS OF JAPANESE NATIVE FOWL HYBRID DURING POSTMORTEM CONDITIONING

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### Background

Japanese native fowl hybrids have recently become very popular, because they are thought to be more delicious than conventional broiler meat. These new Japanese native fowl hybrids are being further developed to produce chicken possessing more palatable meat quality. Up to now, there have been many studies on changes in meat quality of broiler during postmortem conditioning, while little information relating to Japanese native fowl hybrids is available.

Since the growing speed of Japanese native fowl hybrids is slower than that of broiler, it takes a longer time to be bred. We assume that the difference in age has an influence on the speed of postmortem conditioning. Therefore, we thought that an investigation of the effect of aging on meat quality would be valuable and help contribute to the production of more palatable meat of Japanese native fowl hybrids.

### Objectives

In this study, Japanese native fowl hybrid F1 made from Shamo was used to investigate changes in meat quality, especially taste components, during postmortem conditioning. The changes in free amino acids, 5'-inosine monophosphate (5'-IMP) during postmortem conditioning of hybrids F1 with different ages were examined. Furthermore, peptides produced during postmortem conditioning were isolated and characterized.

### Methods

**Preparation of sample:** Japanese native fowl hybrids F1 from Shamo were bred for 8, 12, and 20 weeks. After slaughter, thigh muscle was immediately taken from carcass and stored at 4 degrees C for 0, 24, 48, or 72 hours. The conditioned meat was minced and homogenized with a three-fold volume of deionized water. The homogenate was centrifuged and the supernatant was obtained as an extract.

**Analysis of 5'-IMP:** After the extract was ultra-filtrated by membrane in order to remove proteins, the filtrate including 5'-IMP was analyzed. Analysis of 5'-IMP was done on a HPLC by YMC-Pack ODS-AM column (4.6 x 250mm). 5'-IMP was separated by a linear gradient from 5% to 100% acetonitrile in 0.2 M of triethylamine-acetic acid buffer (pH 2.0) during 35 min, and was monitored at 260 nm.

**Analyses of free amino acids and peptides:** Proteins were precipitated from the extract by the addition of trichloro-acetic acid (final conc.: 5%). After centrifugation, the supernatant was used for analysis of free amino acids and peptides. Free amino acids were determined with an amino acid analyzer (Hitachi, Japan). Total amino acids were also analyzed after hydrolysis of the supernatant in 6N HCl at 110 degrees C for 24 hours. The contents of peptides were calculated by subtracting the amount of free amino acids from that of total amino acids.

**Characterization of peptides:** The changes in peptides during postmortem conditioning were analyzed on a HPLC by a reversed-phase column. Peptides in extract of conditioned chicken were also isolated on a HPLC by an ODS-column (Senshupack PEGASIL-300, 4.6 x 250 mm) with a linear gradient from 0 to 40% acetonitrile in 0.1% trifluoro-acetic acid solution for 80 min. The N-terminal amino acid sequences of peptides were analyzed with Protein Sequencer (Hewlett Packard, USA).

### Results and discussion

As shown in Fig.1, the IMP content in the meat of 20 week-old fowl was higher than those in 8 and 12 week-old fowl immediately after slaughter. The 5'-IMP content decreased during postmortem conditioning of all fowl meat. The 5'-IMP content in the meat of 20 week-old fowl was still higher than that in 8 and 12 week-old fowl at 72 hours after postmortem conditioning.

Changes in total amino acids including free amino acids and peptides during postmortem conditioning are shown in Fig.2. The increase in total amino acids of 12 week-old fowl during postmortem conditioning for 72 hours was remarkably larger than that of 8 and 20 week-old fowl. The increase in total amino acids of 8 week-old fowl was slightly larger than that of 20 week-old fowl.

The amount of free amino acids in meat of 8 week-old fowl was highest among those of all fowl immediately after slaughter (Fig.3). The free amino acids content increased during postmortem conditioning of all fowl meat. The amount of free amino acids in the meat of 12 week-old fowl at 72 hours after postmortem conditioning was higher than those in 8 and 20 week-old fowl. The increment of free amino acids in 20 week-old fowl during postmortem conditioning for 72 hours was smallest among all fowl. These results indicate that the rate of increase of free amino acids in the meat of 12 week-old fowl during postmortem conditioning is highest among all fowl, and that of 20 week-old fowl is lowest.

The increase of peptides was not so large among all fowl (Fig.4). The amounts of peptides in 12 and 20 week-old fowl at 72 hours after postmortem conditioning were smaller than those at 48 hours after postmortem conditioning. Since free amino acids still continued to increase at 72 hours after postmortem conditioning, the decrease of peptides was caused by the decline of endopeptidase activity which was responsible for the increase in peptides.

Two peptides, which in particular increased during postmortem conditioning of Japanese native fowl hybrid, were isolated. The N-terminal amino acid sequence analyses of two peptides clarified that they possessed EPAPPPEEAE and APPPEEAEPEEE. Homology analyses also showed these peptides were derived from troponin T of chicken skeletal muscle.

References

- Nishimura T. (1998) Mechanism Involved in the Improvement of Meat Taste during Postmortem Aging. *Food Sci. Technol. Int. Tokyo*, 4(4), 241-249.
- Nakai Y., Nishimura T., Shimizu M., and Arai S. (1995) Effects of Freezing on the Proteolysis of Beef during Storage at 4 degrees C. *Biosci. Biotech. Biochem.* 59(12), 2255-2258.

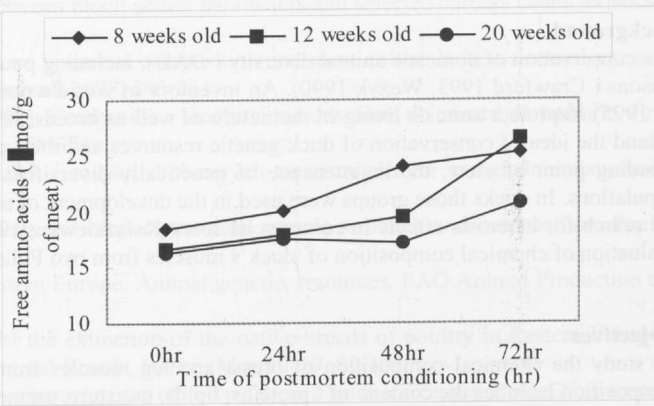
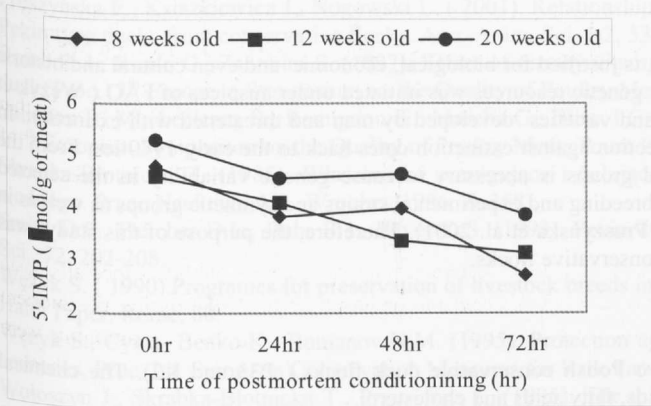


Fig.1 Changes of 5'-IMP in Japanese native fowl hybrids during postmortem conditioning.

Fig.3 Changes of free amino acids in Japanese native fowl during postmortem conditioning.

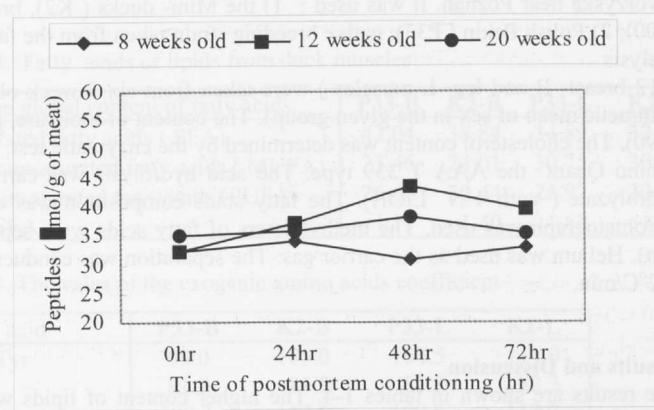
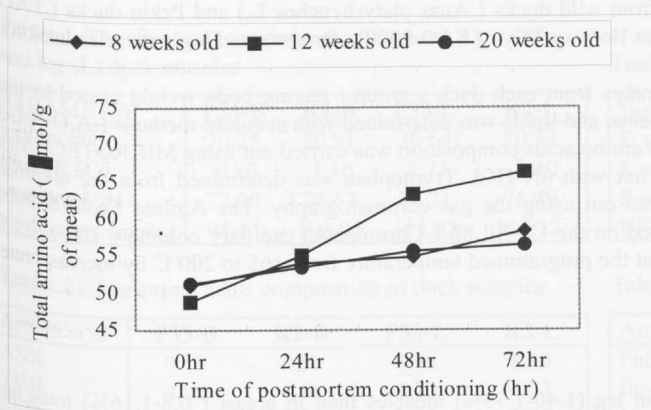


Fig.2 Changes of total amino acids in Japanese native fowl hybrids during postmortem conditioning.

Fig.4 Changes of peptides in Japanese native fowl hybrids during postmortem conditioning.