Short Paper

Gel Strength Enhancing Effect of Aqueous Extract of Fish Kidney Tissue

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Tropical sardine *Sardinella gibbosa* are usually not well handled after catch, and autolytic degradation is generally significant when the fish are landed. It is however known that tropical sardines can be made into surimi paste with good gel strength.¹⁾ In Experiment 1, we studied the effect of using only fish fillets in comparison with using fish meat with kidney tissue extracts on gel strength (G.S.) of sardine surimi. Contrary to our expectation, sardine surimi paste without the kidney tissue extract did not have a stronger G.S. than that containing kidney extract. The effects of substances present in the kidney tissue on the G.S. of sardine and commercial surimi in order to improve surimi quality were investigated in this study.

In Experiment 1, very fresh sardine (meat pH 6.2) were used to prepare two batches of surimi: one using beheaded and degutted fish (with kidney tissues encased by the backbone), and the other using fillets without the kidney tissue. The surimi was ground in a mortar with 3% NaCl for 20 min before freezing and weekly during frozen storage at -20°C . The surimi paste was set at $50^{\circ}\text{C} \times 20$ min, then at $90^{\circ}\text{C} \times 20$ min. The G.S. of the kamaboko made from the surimi was measured with Fudoh Rheometer. Figure 1 shows that the kamaboko from the beheaded, degutted fish had consistently higher G.S. than that from the fillet indicating that some fraction in that surimi has G.S. enhancing property.

Unfrozen sardine surimi was used in Experiment 2. During paste preparation (as in Experiment 1), a crude aqueous kidney extract (kidney tissue to water, 1:2) and water were added respectively to two batches of sardine surimi without the kidney tissue. The samples were set at $50^{\circ}\text{C} \times 20$ min, then at $90^{\circ}\text{C} \times 20$ min. The

average G.S. of the samples containing kidney extract was $349 \text{ g} \cdot \text{cm}$, while that of the sample without kidney extract was $263 \text{ g} \cdot \text{cm}$.

In Experiments 3 and 4, an aqueous extract was made from the coral fish *Caesio erythrogaster*, a white meat fish with natural good gel forming ability. Commercial threadfin bream surimi was used in these 2 experiments.

In Experiment 3, unheated kidney extract, kidney extract heated to $80^{\circ}\text{C} \times 10$ min, and water were added to 3 batches of threadfin bream surimi during paste preparation, and samples A, B, and C were prepared respectively. The pastes were set at $40^{\circ}\text{C} \times 20$ min, then $90^{\circ}\text{C} \times 20$ min. The average values of G.S. were $57.8 \text{ g} \cdot \text{cm}$, $71.2 \text{ g} \cdot \text{cm}$, and $49.8 \text{ g} \cdot \text{cm}$ for samples A, B, and C, respectively. The G.S. of sample B > sample A > sample C suggested that the G.S. enhancing property was also present in kidney of coral fish, and that this fraction was fairly heat stable.

In Experiment 4, the kidney extract was added to threadfin bream surimi and samples A and B were prepared; while water was used for sample C during paste preparation. Sample A was set at $60^{\circ}\text{C} \times 20$ min to induce *modori*, then set at $90^{\circ}\text{C} \times 20$ min. Samples B and C were set at $40^{\circ}\text{C} \times 20$ min, then at $90^{\circ}\text{C} \times 20$ min. The average values of G.S. were $70 \text{ g} \cdot \text{cm}$, $217 \text{ g} \cdot \text{cm}$, and $198 \text{ g} \cdot \text{cm}$ for samples A, B, and C, respectively. The G.S. of sample B > sample C, confirming the gel strength enhancing effect of the kidney extract. The kidney extract did not prevent *modori* as indicated by sample A.

The results indicated that there was a fraction in the kidney extract of sardine and coral fish which, when added to surimi, enhanced the gel strength enhancing effects even after exposure to $80^{\circ}\text{C} \times 10$ min.

Reference

- 1) T. Paiboon, H.-K. Lee, S. Loo, M.-C. Ng, and N. Tsukuda: Songkanakarin J. Sci. Technol., 3, 1988, pp. 339-347, (Thailand).

Fig. 1. Changes in gel strength during frozen storage of surimi made from beheaded, degutted sardine and sardine fillet.

Beheaded and degutted surimi (Treatment a); Fillet surimi (Treatment b); *AA, Folding test; **6, Teeth cutting test. Unfrozen surimi was used at week 0.

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