The Effects of Minerals Contained in Salt on the Taste and Elasticity of Kamaboko

Fujio Nishioka (Former Professor, Faculty of Bio-Industry of Tokyo University of Agriculture)
Yukinori Ishiuchi (Chief Researcher, Laboratory of All-Japan Kamaboko Makers Assosiation)
Kazufumi Matsuoka (Researcher, Laboratory of All-Japan Kamaboko Makers Assosiation)

The characteristic elasticity of kamaboko is produced by adding 2% to 3% salt to fish flesh to elicit a high water-holding function and elasticity-forming ability from myosin. The main ingredient of kamaboko is frozen surimi, of which consumption in Japan reaches as great as 0.4 million tons per year. The worldwide production of frozen surimi is estimated to be approximately 0.65 million tons. With increasing number of producing countries, the types of raw fishes vary increasingly and have included fishes that are strong or weak on setting(suwari) ability of kamaboko.

On the other hand, the consumption of so-called mineral salt derived from ocean water and halite has been greater with the abolition of salt monopolies and a public trend toward natural foods, and the amount of mineral salt used for kamaboko has also been increasing. The main ingredients of mineral salt include calcium (Ca) and magnesium (Mg), which are well known to play an important role not only in the taste but also in the water-holding ability and setting of kamaboko.

In the present research, we assessed the effects of Ca and Mg on the taste and elasticity of fish sausages made from frozen surimi.

<1> In the first place, we conducted tests of bitter taste with water solution. The salt level was stabilized at 2.5%, and 10% potassium (K) was added to the salt in view of the effectiveness for human body and effects on the sense of taste. Furthermore, solutions in which Ca and Mg were added from 5% to 15% at intervals of 2% were prepared, and the bitter taste tests were performed with solutions at 15 °C in 3 panelists. The results showed that all of 3 panelists answered as "bitter" for 11% solution; after the addition of 5% sugar to solutions, the bitterest solution was 9% solution. Regardless of the presence/absence of sugar, all the panelists answered as "not bitter" for 5% solution, and they judged that the degree of bitterness was greater for Mg than for Ca. <2> Frozen surimi of fishes that are strong suwari ability (Alaska Pollock and Threadfin-bream) and weak suwari ability (White croaker) was diluted with 7-fold greater cold water, to which Ca and Mg at the concentrations corresponding to the above levels were added. Following homogenization, the solutions were centrifuged, and the sediments were measured to investigate the effects on the water-holding ability of the flesh. The results showed that the water-holding ability of the frozen minced flesh was markedly reduced with increasing concentrations of Ca and Mg, suggesting the acceleration of suwari ability. The decreasing rate in water-holding ability was higher for Mg than for Ca. <3> Using the above frozen surimi, 10% K as well as Ca and Mg of

different quantities were added to salt. The frozen surimi maintained at 10 °C or lower was crushed to prepare kamaboko. With the kamabokos, we assessed bitter and astringent tastes in taste tests and the effects on settingability in indentation tests. The results revealed that Ca and Mg at 5% caused neither bitter nor astringent tastes but produced a somewhat smooth taste. For Ca and Mg at higher concentrations, however, bitter and astringent tastes became stronger with increasing concentrations. The effects on settingability appeared significantly even in the frozen surimi of White croaker that is weak settingability; with Ca and Mg added at as low as 5%, the breaking strength (g) and the breaking strain (mm) of indentation tests increased.