Effect of deep seawater-salt on the formation of network structure involved in the texture properties of the kamaboko gel

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It has been considered that addition of deep seawater (DSW) to the processed food such as wheat noodles (udon) and soybeans curd (tofu) improve the textural properties. However, the effect of DSW on the structural changes observed with microscope has not been cleared. We have found that breaking strength and elongation of kamaboko gel increased by adding the DSW-salt (DSW-S). In this study, we tried to observe the internal structure of the kamaboko gel containing DSW-S to elucidate the contribution of DSW-S for the textures.

SS grade surimi was used as material. Water content of thawed surimi was adjusted to 80% and ground with 3% NaCl, DSW-S or heated DSW-S. Surface sea water (SSW) was used as control. These pastes were stuffed into stainless-steel ring, wrapped with polyvinilydene chloride film and boiled for 20 min at 80℃. The textural properties and SH group contents of the gels were determined. The protein compositions in the gels were analyzed by SDS-PAGE. The internal structures were observed with natural-scanning electron microscope (N-SEM).

The gel strength increased by adding the heated DSW-S, but not by unheated DSW-S. The polymerization of myosin heavy chain (MHC) through the S-S bonding was appeared by determination of SH content and SDS-PAGE analysis. Internal structure of the gel became smooth and flat with increasing of the gel strength. Similar phenomena were observed in the gel containing SSW-S and heated SSW-S. These results suggested that these textural and structural changes of the kamaboko gel with heated DSW-S or SSW-S were caused by heating some minerals in the deep seawater. Because $MgCl_2$ become MgO by heating at high temperature, we speculated and confirmed that contribution of MgO and heated $MgCl_2$ to those changes. Although unheated $MgCl_2$ was not affective to any changes of the kamaboko gel, both MgO and heated $MgCl_2$ caused the increases of gel strength, polymerization of MHC and formation of smooth and flat structure. These results were similar to that with heated DSW-S and SSW-S, indicating that MgO in heated DSW-S and SSW-S could improve the textural and structural properties of kamaboko gel.