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A study on the relationship between perceived saltiness and texture of surimi- based products

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博士学位論文内容要旨
Abstract

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論文題目 Title	A study on the relationship between perceived saltiness and texture of surimi-based products (すり身加工品で感知される塩味強度とテクスチャーの関係に関する研究)		

Salt intake is an important concern for health reasons and the strength of taste is thought to be affected not only by content in food, but also by the texture. Surimi-based products, such as kamaboko, are elastic gels with approximately 2% NaCl; despite recent concerns among Japanese consumers regarding high-salt foods, little is known about the relationship between saltiness and texture in these products. Therefore, this study was aimed to clarify the relationship between perceived saltiness and texture of surimi-based products.

Chapter 2 was aimed to clarify the relationship between saltiness and texture using heat-induced surimi gels as a model of surimi-based product. Various types of heat-induced gels with different physical properties were prepared from surimi and washed surimi by two-step heating with different setting (preheating) times at 30°C. Washed surimi was prepared to remove the additives, because the additives such as sucrose and sorbitol were thought to affect the taste of surimi gel. The physical properties of heat-induced gels were characterized by puncture breaking strength and expressible water. The perceived saltiness of the heat-induced surimi gels was evaluated by time-intensity method, and the maximum saltiness intensity during chewing were evaluated by comparisons with salt solutions of known concentrations. The physical properties of heat-induced gels differed considerably depending on the salt content and heating conditions. A longer setting time was associated with a higher breaking force and lower expressible water, regardless of salt content. On the other hand, perceived saltiness depended on the NaCl concentration, but not greatly influenced by the physical properties of the gels prepared from both surimi and washed surimi. The perceived saltiness of all gels tested was less than 1/3 of solution with the same NaCl concentration. The maximum saltiness intensity did not correlate with breaking force, breaking strain and expressible water of heat-induced gels. From these results, it was suggested that the difference in physical properties derived by setting did not affect the relative saltiness intensity of gels to NaCl solution during consumption of surimi gels.

Next, chapter 3 was aimed to clarify the relationship between the intensity of saltiness and texture of heat-induced surimi-based products prepared by 2-steps heating with different level of pre-heating at 60°C (modori). The physical properties of surimi gels were evaluated by puncture test, two-bite texture profile analysis and measurement of expressible water. The physical properties of heat-induced

surimi gels became softer and the saltiness intensity by the time-intensity method became stronger according to the pre-heating time at 60°C. On the other hand, it is known that the disintegration of surimi gels is considered to be induced by the proteases that are active at temperatures of around 60°C which degrade myofibrillar proteins, and that various components, such as peptides and free amino acids, which are considered to affect the taste of foods, are generated accompanying with the protein degradation. Accordingly, it was investigated to confirm whether these components also affected the saltiness of the surimi gels or not using the extract solution from the surimi gels. As a result of sensory evaluation by duo-trio test, it was shown that there were no significant differences in saltiness between the extract solutions from the gels preheated at 60°C with different heating time. The result revealed that the difference of physical properties derived by the modori time affected the temporal change in saltiness during consumption of modori gels. It was seemed that the saltiness was different depending on both the salt content and the physical properties derived from the modori time.

From the above mentioned results, it was shown that there were no significant relationship between the physical properties and saltiness in the case of suwari gels with different heating time, although there observed a clear relationship between the physical properties and saltiness in the case of modori gels with different heating time, and it was seemed to contradict to the findings obtained with other food material so far. To clarify the phenomenon, the assessment of fragmentation and the perceived saltiness of surimi gels after mastication were conducted in Chapter 4. In the case of modori gels, it was confirmed that the fragmentation progressed depending on the heating time accompanying the increase of the number and the surface area of the fragments of the gels after mastication. On the other hand, there observed no differences in suwari gels depending on the heating time. These results suggested that the difference in physical properties derived by heat induced degradation during pre-heating at 60°C affected the perceived saltiness during consumption of surimi gels, and that the fragmentation of the gel rather than elasticity will strongly correlate to the perceived saltiness of surimi gels.

The results obtained in this research are expected to provide an useful knowledge to food manufacturing industry sites such as surimi-based products aiming for salt reduction.