The effect of storage on the making of surimi and kamaboko tilapia (Oreochromis sp.)

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Abstract. The aims this research is to determine the effect of storage and raw materials on frozen storage on the quality of surimi and kamaboko tilapia (Oreochromis sp.). There are three types of raw materials used, namely fillet, minced fish, and minced fish + sorbitol, with three washing treatments and four weeks of freeze storage observed each week. The method used consisted of measuring pH, moisture content, bite test, and fold test. Then the results show that the best kamaboko for tilapia (Oreochromis sp.) is obtained from fillet raw materials compared to minced fish raw materials and minced fish + sorbitol raw materials, with a washing frequency of one time and a frozen storage period of 3 weeks.

1. Introduction
Fish is a source of high quality food, especially because fish contain a lot of protein which is needed by the human body. However, fish is a highly perishable food. Therefore, to overcome this, it is necessary to have a method of preservation and processing that can maintain durability and not significantly reduce its nutritional value. Apart from increasing the shelf life, fish processing also aims to increase its economic value. One of the efforts to increase the economic value of fish is by diversifying the processing of fishery products in order to obtain new fishery products so as to attract public interest in consuming these products.

Surimi is a common name for mashed meat that has undergone a process of separating bones, oil and flavor [1]. These intermediate products can be made of various kinds of fish gel products including fish sausage, dumplings, fish cakes, fish burgers and fish balls. These products require strong gelling specifications. As a raw material for making surimi, fish can be used, both freshwater and marine fish. In this practicum, tilapia (Oreochromis sp.) is used which is a freshwater fish. This fish has a delicious taste, thick flesh, not soft, affordable prices and few thorns. These fish are mostly kept in ponds and floating net cages [2].

2. Material and methods
2.1. Time and place
The present research is performed in the Laboratory of Aquaculture, Faculty of Fisheries and Marine, Universitas Airlangga.

2.2. Materials and equipment
The main ingredient used in this study is tilapia surimi. Other ingredients used are table salt, water, and ice cubes. The tools used in this study included knives, plastic basins, cutting boards, spoons, grinding tools, pressing tools, boilers, stoves, sleeves, and gauze. Meanwhile, the tools used for the analysis of materials and final products are a score sheet and a pH meter.
2.3. Research methods
The stages of making surimi are raw material selection, filing by removing the skin and bones, mashing the meat, washing with ± 5°C of cold water for 15 minutes, draining water, filtering, and squeezing. Raw material selection is intended to select fish that are fresh and uniform in nature. Then performed fish meat filing by removing the skin and bones. Furthermore, the meat is crushed by grinding. The meat that has been crushed is then washed with cold water (5-10°C) by soaking and stirring for 15 minutes, which is then followed by filtering. Washing is carried out 2-3 times. Washing is useful for separating blood, enzymes, urea, water soluble protein and improving the color of surimi. To remove water, it can be done by squeezing it using a filter cloth (gauze) or calico, then squeezing it either by hand or a mechanical wringer.

2.4. Observations and measurements
2.4.1. Potential hydrogen value
pH measurement is done using digital pH meter. Prior to use, the tool pH meter rinsed with distilled water and dried with a tissue. Furthermore calibrated using buffer solutions pH 4 and pH 7 buffer dipped in and allowed a moment to steady.

2.4.2. Water content
The cleansed porcelain cup is then dried in the oven for 1 hour at 105°C, then cooled in desiccator for 30 minutes and weighed (A gram). The 2 grams of smoothed sample were weighed in a cup (B gram) and then dried in an oven at 105°C for 6 hours. Then chill with the desiccator for 20 minutes then weigh several times until the weight is fixed (C gram).

3. Results and discussion
3.1. Potential hydrogen value (pH)
The surimi pH value of red tilapia (Oreochromis sp.) at various storage frequencies is presented in Table 1. Based on pH measurements, the average pH value of surimi is 5-6, the highest average pH value is 6.04 at storage 3 week, while the lowest pH average value is 5.35 for storage 1 week, and storage 2 weeks having an average pH value of 5.84. Based on the BNJ test, it was found that storage 1 week was significantly different from storage 3 weeks.

| Storage | pH value |
|---------|----------|
| 1       | 5.35     |
| 2       | 5.84     |
| 3       | 6.04     |

The pH value affects the strength of the gel (ashi). The strength of the gel will be high if the pH of the meat is between 6-7, because myosin protein has dissolved at that pH. Outside this pH range, either in a more alkaline state (pH > 7) or in a more acidic state (pH < 6) the gel strength will be low or decreased [4].

3.2. Water content
The water content of surimi complete storage effect is presented in Table 2. Based on the surimi test, water content ranges from 80.32% to 84.53%. The average value of water content surimi of tilapia can be seen in Table 2.
Table 2. The average value of water content surimi

| Storage | Water Content (%) |
|---------|-------------------|
| 1       | 78.80             |
| 2       | 82.27             |
| 3       | 82.75             |

According to Parris [5], this increase in water content is thought to be due to the denaturation of fish meat protein which can free water during frozen storage. In addition, the activity of bacteria in breaking down meat components can also free water. The increased water content in surimi and kamaboko can cause a decrease in elasticity.

4. Conclusion
Based on the results of the practicum that has been done, it can be concluded that the best kamaboko tilapia (*Oreochromis* sp.) is obtained from fillet raw materials compared to minced fish raw materials and minced fish + sorbitol raw materials, with a one-time washing frequency and a frozen storage period of 3 weeks.

5. References
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