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Quality and Food Safety of Floss from Boneless Milkfish (*Chanos chanos*) *by Product* [Case Study of "Cahaya Bandeng" Msmes in Maros Regency]

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Abstract

Boneless milkfish is a fishery product in which the process is done by removing the bones. However, in the process of removing the bone, there is still flesh attached to the bone. The bones and meat of the fish will be wasted and become waste even though they can still be used as processed products with high economic value and high nutrition, such as floss. This study aims to determine the quality and safety of milkfish floss by-products with SNI for fish floss. The research was conducted from March to May 2022. The method used in this study is observation using the purposive sampling technique. Microbiological test results present ALT (6.8 x 102 colonies/g), *Escherichia coli* (< 3 APM/g), *Staphylococcus aureus* (< 10 colonies/g) and Salmonella (negative). Chemical test results show that protein content is 34.63% and moisture content is 9.17%, while the sensory results show a quality value of 7.1. The metal contamination test showed that the floss did not contain metal contamination in cadmium, element lead, mercury, arsenic or tin. Boneless milkfish floss by product at Cahaya Bandeng SMEs is good and meets the standards set by SNI 7690.1:2013.

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Keywords

Fish floss, by product, milkfish, quality, coastal and marine area.

Introduction

Maros Regency is an area directly adjacent to the capital city of South Sulawesi Province, 30 km from Makassar City. Maros Regency, as a coastal and marine area, has various potentials for the broad development of land and sea fisheries. One of the potentials that are expected to support the acceleration of its development is through the management and utilization of the potential of fishery and marine resources. The highest production cultivated in Maros Regency is pond cultivation, especially the potential for milkfish cultivation. Milkfish (Chanoschanos) is one of the fish favored by the community, so it has good prospects for development. Based on 2020 data, it was recorded that milkfish production reached 1,418.5 tons (Maros Marine and Fisheries Service, 2021).

Various types of processed milkfish are made to increase their economic value, and the food quite liked by the community is boneless milkfish. Boneless milkfish is a fishery product in which the process is done by removing the bones. However, in the process of removing the bone, there is still flesh attached to the bone.

The bones and meat of the fish will be wasted and become waste even though they can still be used as processed products with high economic value and high nutrition, such as floss. By product, floss is waste from boneless milkfish, which is softened using a pressure

cooker and then fried by adding certain spices. All age groups, from children to adults, like the delicacy of floss, so the utilization of fish bone waste in floss products is an appropriate alternative to provide a calcium-rich food source that is cheaper, easier to obtain and can reduce the negative impact on environmental pollution resulting from the disposal of fish processing industrial waste.

According to Sundari *et al.*, (2019), fish floss is preferred and consumed by many people compared to other traditional preparations because it has a soft shape, delicious taste and relatively long shelf life. Karim *et al.*, (2021) found that the nutritional content of milkfish floss is 38.71% protein, 23.63% carbohydrate, 1.59% crude fiber, and 1.70% calcium, so it can be a source of minerals to meet the needs of the community's nutrition.

Studies on floss from boneless milkfish waste have been carried out, but they only discuss the process and the benefits of the production process. For example, Djauhari and Hartati (2017) discuss innovation in making floss rich in calcium. In addition, Djauhari (2017) discusses the productive business floss' calcium made from fish bones.

In addition to paying attention to their economic value, processed products must also have good quality and be safe for consumption. Food safety cannot be achieved without implementing proper sanitation and hygiene. Thus, the researcher thinks it is necessary to study the suitability of the quality of the product to the requirements of SNI for fish floss.

Materials and Methods

Tools

The tools needed in processing by-product milkfish floss are tweezers, knife, blender, scales, basin, spinner machine, pressure cooker, plastic packaging, and a sealer machine. In testing the product quality, the tools used are an electric heater, condenser, Soxhlet extractor, Erlenmeyer flask, fat sleeve, desiccator, oven, analytical balance, Kjeldahl flask, steam distillation, flask glass, porcelain cup, desiccator and ashing furnace.

The main ingredient in floss is a by-product of processed boneless milkfish, which includes meat attached to fish bones. Other ingredients include palm sugar, salt, coriander, ginger, lemongrass, cooking oil, shallots and garlic, as well as some materials in the laboratory for chemical, heavy metal, and microbiological testing.

Research Method

This study was conducted from March to May 2022. A sampling of fish floss was done using the purposive sampling method. The quality and safety parameters of fish floss were analyzed at the Laboratory of Feed Chemistry, Faculty of Animal Husbandry of Hasanuddin University and the Laboratory of Application of Quality of Fishery Products in South Sulawesi. Food quality and safety parameters analyzed were water, fat, ash, protein, metal contamination of lead, cadmium, arsenic, mercury, lead, ALT, *Escherichia coli*, *Staphylococcus aureus*, Salmonella, and calcium test. The test was carried out 3 (three) times (repetitions).

Sensory testing was carried out by semi-trained panelists totaling 30 people. Panelists judge directly by appearance, smell, taste, and texture criteria. The results obtained refer to SNI 7690.1:2013 regarding quality and safety requirements for fish floss (National Standardization Agency, 2013).

Data analysis was carried out descriptively through measurement data using tables.

Results and Discussion

A product is of good quality if it meets the established standards (Hermanto, 2020). The quality of the resulting product is also very dependent on the freshness of the raw materials and the treatment of the materials and tools during the processing until the product is finished. The tests carried out in this study were sensory tests, microbial contamination tests, metal contamination, and chemical tests.

Sensory Test

Sensory testing is a test method using the human senses as the main tool to assess the quality of fishery products that have undergone processing. Sensory testing in this study includes appearance (color), smell, taste, and texture tests.

In sensory testing, what is seen first is the product's appearance. Thus, appearance determines consumer perceptions of a food ingredient. Based on SNI 7690.1:2013, the sensory quality requirement for fish floss is at least 7. Based on the appearance parameters of 30 panelists, sensory test results found that the average value of by-product milkfish floss was 7.1, with specifications of brilliant brown color and homogeneous

fiber. The smell of fish floss is less strong, the taste is unsatisfying, and it has a slightly lumpy dry texture. This value indicates that the sensory quality of by-product milkfish floss produced by Cahaya Bandeng SMEs is above the required value.

Microbial contamination test

To a certain extent, microbes' presence in food can pose a risk to health. Microbial testing in this study included ALT, *Escherichia coli*, Salmonella and *Staphylococcus aureus* tests. These bacteria are often found in fishery products where handling raw materials for products is not hygienic or does not comply with standards. The results of the microbial contamination test on floss can be seen in Table 1

The results showed that the microbial contamination in this study still met the quality standards set by SNI 7690.1:2013. The results of the microbial contamination test with three repetitions obtained an average ALT value of 6.8 x 102, while the specified requirements were not more than 5 x 104 colonies/g or 50,000 colonies/g. The results of the ALT test are lower than the study of Uyunun *et al.,* (2020), which shows that the ALT value of fish floss on CV Aroma Food is 2.0 x 104 colonies/gram. Fresh raw materials can cause a low ALT value. Therefore, contamination does not occur during the processing. Furthermore, Hermanto (2020) obtained the ALT value of tuna fish floss of 1.5 x 102. Rosyadi (2019) also obtained the same result, showing that the ALT value of fish floss was 1.7 x 102 Colonies/g. The ALT test results are below the maximum standard of food quality and safety requirements for fish floss that are allowed in a product, so it is safe for consumption.

The test results obtained the value of Escherichia coli of <3 APM/g. This result is under the SNI 7690.1:2013 quality standard of fish floss, where the value of Escherichia coli is not more than 3 APM/g. The results of the E.coli test are in line with Hermanto (2020), who shows that in the E. coli test on fish floss, a value of <3 APM/g was obtained. These results indicate that the processors apply good sanitation and hygiene in processing fish floss. According to Rahayu *et al.,* (2020), *E.coli* is a bacterium whose presence indicates a low level of sanitation applied to a product. Further, Uyunun (2020) argues that sanitation standards for fresh and processed food ingredients derived from fish, such as fish floss, must be free from contamination of E. coli and Coliform bacteria.

Salmonella in milkfish floss was negative or did not contain Salmonella bacteria. These results align with Harianti *et al.,* (2018) that the results of the microbiological analysis show that the catfish floss product is negative for Salmonella microbial contamination, so it is safe for consumption. It is because the processing carried out by the processors applies sanitation which makes it susceptible to contamination. According to Sopandi and Wardah (2014), microbiological contamination in food products can come from equipment used in the processing or food presentation.

Staphylococcus aureus is a bacterium that produces enterotoxins that cause poisoning (Lowder *et al.,* 2009). Furthermore, Thomer *et al.,* (2016) explained that contamination caused *by Staphylococcus aureus* bacteria can result in various clinical infections such as skin infections, bacteremia, and digestive tract infections. Based on the test results, *Staphylococcus aureus* content was less than 10 colonies/g. Based on the quality standard of fish floss, the results of the *Staphylococcus aureus* test in this study already met the established standard, which was not more than 1.0 x 103 col/g or 1000 colonies. These results align with Rosyadi *et al.,* (2019), showing that in the test of catfish floss, the value of *Staphylococcus aureus* bacteria was <10 colonies. Therefore, it can be said that this milkfish floss product is safe for consumption.

Metal Contamination Test

Heavy metal contamination in marine biota can damage the biochemical systems in the animal's body, and if consumed by humans, it will be dangerous for their health. Heavy metals become dangerous due to the bioaccumulation process, namely an increase in the concentration of chemical elements in the body of living things according to the food pyramid (Haryanti and Martuti, 2020). The results of the metal contamination test on floss can be seen in Table 2

The results of heavy metal testing with three repetitions showed that the milkfish floss in this study was not detected or did not show any metal contamination in the form of cadmium, iron, mercury, arsenic, and lead. It indicates that the raw materials or milkfish used in processing fish floss have good quality. Besides, the processor applies a fish handling system quickly, directly processing the fish when the fish arrives at the location. Therefore, it can produce a good quality product.

Table.1 Microbiological test results

Parameters	Unit	Result
ALT	Colony/g	6,8 x 10^2
Escherichia coli	APM/g	< 3
Salmonella	Per 25 g	Negative
Staphylococcus aureus	Colony/g	<10 colony

Table.2 Metal contamination test result

Parameters	Unit	Result
Cadmium (Cd)	mg/kg	*tt*
Element Lead (Pb)	mg/kg	*tt*
Mercury (Hg)	mg/kg	*tt*
Arsenic (As)	mg/kg	*tt*
Tin (Sn)	mg/kg	tt

Note: *tt* = undetected

Table.3 Chemical Test Results

Parameters	Unit	Result
Water level	%	9.17
Protein level	%	34.63

Chemical Test

The chemical analysis aims to identify the nutritional content of floss products. In this study, the chemical analysis tested was the content of protein, water, ash, and fat. The results of chemical testing on floss can be seen in Table 3

The chemical testing results of by-product milkfish floss with three repetitions obtained an average water content value of 9.17%. The water content of milkfish floss is slightly higher than Harianti (2018), which shows that the water content of catfish floss is 7.71% and Karim *et al.*, (2021), which show that the water content of milkfish floss is 7.89%. It is lower than Restu (2016), showing that the water content of coral fish floss is 10.3%. The quality requirements for fish floss are based on SNI 7690.1:2013, determining a maximum water content is 15%.

The water content in milkfish floss has met the quality standards set. The low water content in floss is due to the drying process using a spinner after the cooking process. It causes the flossing product to become drier than it was. In addition, using salt and sugar in the processing can reduce the water content of fish floss. It is based on Anwar *et al.*, (2018), which argue that humectant compounds in the form of sugar and salt can bind water so it is believed to have a role in reducing the fish floss water. The dehydration process can also cause another thing that causes low water content in shredded fish during the cooking process. Therefore, the heat created evaporates the water from the fish floss.

Protein content in this study obtained a value of 34.63%. Based on the quality standard set by SNI for protein content, which is at least 30%, it can be seen that the value of protein content has passed the minimum set standard. It may be because the floss processing process uses high temperatures, using the pressure cooking process of milkfish meat and bones. The results of this analysis are in line with Pratiwi *et al.*, (2015), stating that the protein content of fish in pressure cooking has increased due to high temperatures and the release of water from fish meat which causes the protein to be concentrated. In addition, Sulthoniyah (2013) argues that the processing causes the increase in protein content in fish floss.

The quality and food safety of floss products from boneless milkfish by product at MSME Cahaya Bandeng has met the standards set by SNI 7690.1:2013, namely sensory (7.1), ALT (6.8 x 102), Escherichia coli bacteria that are not more than 3 APM/g. Salmonella in milkfish

floss was negative, and Staphylococcus aureus content was less than 10 colonies/g. The metal contamination test showed that the floss did not contain metal contamination in cadmium, element lead, mercury, arsenic or tin. Some tests show that the water content is 9.17% and protein content is 34.63%.

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