Diversification of Surimi-Based Processed Products (Fish Meatballs) With AdditivesTuna Fish Bone Flour

ABSTRACT

Introduction: Natural resources in North Maluku, especially in the field of fisheries, are very abundant, therefore reliable human resource support is needed to manage them, besides that skills and technology are needed to manage these resources. Resource management requires the following strategies: (a) to intervene in the market so that fish prices remain stable in North Maluku Province; (b) to ensure continuous and sustainable availability of raw materials, a strong and resilient trading system (logistics) is needed by establishing a fisheries logistics system equipped with a fish stocking center (stocking area); (c) intervention is needed in the form of a local government policy commitment to stabilize fish prices in traditional markets; (d) expanding processed products.
Research purposes: This study was to produce surimi and then process it into fishball products and then carry out organoleptic tests including appearance, smell, taste and texture. The development of value-added processed products through the development of a modern processing industry that is competitive with the development of high value-added products that already have a market, for example breaded products, needs to be carried out to meet the ever-increasing consumer needs.
Methodology: Used in this study was to use an experimental method on a laboratory scale, by utilizing yellowfin yellowfin bone waste while the target to be achieved in this study was to produce yellowfin tuna bone flour surimi with concentrations (A1, A2, A3, A4 and A5) then The surimi is used for the manufacture of products (fish balls).
Results: Results: The results obtained in this study were to produce surimi from yellowfin meat of good quality, this was indicated when it was used for making fish balls which had very good gel strength. Another thing that resulted from this study was that the organoleptic tests including appearance, smell, taste and texture had very good values. Although the best treatment was A5 with a concentration of 3.2% yellowfin bone meal.
Conclusion: This study indicated that fish meatballs treated with fish bone meal A5 had the highest average value for all attributes including (appearance, smell, taste and texture) and the lowest score was in treatment A1.

Keywords: Fish meatballs, diversification, surimi, bone meal, yellowfin fish

1. INTRODUCTION

North Maluku Province has quite abundant fishery potential, namely in 2015 totaling 1,035,230 tons/year, while capture fisheries data continues to increase every year; in 2014 amounted to; 217,638 and 2015; 251,350 tons/year, this is because North Maluku waters have a strategic position and become an overflow of fish migration from the Pacific Ocean to Indonesian waters or vice versa, different from other waters in Indonesia which are only

found in certain months. It is estimated that the potential for capture fisheries reaches 1.1 million per year with a sustainable potential of 500 tons per year (Directorate General of Capture Fisheries) in (North Maluku Province Development Analysis Series, 2015 [1]. Capture fisheries production in North Maluku is still dominated by tuna, tuna and skipjack are the most abundant fishery commodities. Capture fishery products per city district as follows: Morotai district (9,585.7 tons/year); Halbar (12,576.3 tons/year); North Halmahera (14,662.9 tons/year); the city of Ternate (19,234 tonnes/year); Tidore City (16,265.2 tons/year; Sula Regency (10,265.4 tons/year); Halsel Regency (45,487.7 tons/year); Central Halmahera Regency (11,892.7 tons/year); and Haltim Regency (11,639.9 tons/year); (BPS, 2012 [2]; Dahuri 2015 [3] in Talib, 2018) [4]. In general, skipjack and tuna commodities are fishing-based commodities so that these commodities cannot fully guarantee stock availability. This is because capture fisheries are highly dependent on natural conditions and seasons. However, on the other hand, consumer demand for processed fish-based products continues to increase. This is because people's awareness to consume fish continues to increase.

On the other hand, the government's campaign on eating fish continues to be encouraged considering that the consumption rate of fish among Indonesians is still quite low. Fishery product processing businesses in North Maluku are dominated by small and medium businesses with complex problems both in terms of technology, processing facilities and infrastructure, human resources and management. Processed fish-based products produced by small and medium enterprises are less diverse and only a few products, for example fish floss, fish crackers (kamplang), shrimp paste (balacang), fish sauce, smoked fish (fufu fish), salted fish (salted fish), and pindang and even then the number is limited and the packaging design is less attractive. Therefore, training and skills are needed regarding the diversification of fish-based processed products so that they can become local superior products as souvenirs (souvenirs) typical of North Maluku with high selling value. To realize this, the following things are needed: a) Local governments participate in improving standard processing equipment and facilities for food products through pilot projects in the form of export-standard SME fish processing centers through the form of soft assistance b) Increase the construction of house packaging including packaging design and labeling, to be able to extend the power store products, expand marketing reach and increase sales value c) The government and SMEs participate in promoting investment, developing working capital schemes and preparing processing business partnership patterns d) Developing value-added processed products through the development of modern processing industries that are competitive with product development (product development) high added value that already has a market for example breaded products e) Value Added Products or value

added products are a complimentary from a technique, diversification and equipment provided to the product so that the product has increased economics and quality assurance (Quality Assurance) which includes : food security (food security), food safety (food safety) and food utilization (Food utilization/consumption). The development of value-added products aims to increase the selling value of fish and optimize the utilization of fish resources. With an increase in the selling value of fish, fish damage can be suppressed, the income of fishermen, processors and community protein consumption increases and can increase the country's foreign exchange.

One form of value-added product development is by converting primary products into secondary products or ready-to-eat final products. Value added is all forms of processes, both manual and mechanical, that change to new forms, both in terms of appearance, texture, taste and flavour. One product that needs to be developed to meet consumer demand for diversified fish-based products is surimi. The term surimi comes from Japanese which means fish meat paste which is made in the traditional surimi factory process in Japan, as the basic ingredient for making kamaboko. However, now surimi is known as a wet protein concentrate in fish muscle, which has gone through a process of mechanical bone removal and has been washed with water (Poernomo, 2001 in Talib 2018) [5].

Diversification of fishery products needs to be done because consumers want more things to fulfill their appetite in consuming fishery products. One way to meet fish protein needs and mineral needs, especially calcium and phosphorus, is to substitute yellowfin tuna bone meal into surimi products. According to Marsaid and Atmaja (2011) the proportion of fish bones to the fish body reaches 12.4% [6]. Thus, solid waste in the form of bones from processing is estimated at ± 7,460 tons. If these wastes are not utilized properly, they can pollute the environment which can harm the health of the surrounding community. It is known that these wastes have only been processed into fish bone meal as animal feed or as an addition to surimi-based food products.

2. RESEARCH METHODS

2.1. Materials and tools

The raw materials used for the manufacture of surimi are 20 kg of yellowfin fillet, salt, criyoprotectant, ice cubes, jars, 1000 ml glass beakers, cool boxes, calico cloth filters, drying using a cabinet dryer. While the materials and tools for making meatballs, nuggets, dragon's feet and otak-otak products use wheat flour, tapioca flour, monosodium glutamate, pepper, salt and eggs. While the materials and tools used for the extraction of yellowfin

bones include: Bucket, basin, knife, cutting board, oven, 100 mash disc mill, autoclave and CH3COOH solution. Furthermore, for the organoleptic test, a scorsheat sheet was used.

2.2. Method

The method used in this study was to use an experimental method on a laboratory scale, by utilizing waste yellowfin bones while the target to be achieved in this study was to produce surimi yellowfin bone meal with concentrations (A0, A1, A2, A3, A4 and A5).) then the surimi is used to make products (meatballs, nuggets, sausages, dragon's feet and kamaboko).

2.2.1. Research procedure

The yellowfin fish meat is ground, then the water is prepared into a basin which has been added to ice and water and salt with a ratio of 3:1, washed 3 times, then the fish meat is filtered using a calico cloth. keep frozen before use. One week after storage the surimi is thawed and then used for making products (meatballs). To extract fish bones into flour, first the fish bones were reduced in size and then washed with running water, then the bones were boiled in water for 12 hours, then boiled with a CH3COOH solution with a concentration of 1 and 3% for 30 minutes. The next stage is the fish bones in the oven for 8 hours at 800C, then the bones are ground and sifted to 100 mash size. The next stage is the preparation of materials and tools for making products starting with meatball products and continuing with other products. In every product production, yellowfin fish bone meal is added to increase the nutritional content, especially calcium and phosphorus. The parameters tested in this study were yield, organoleptic tests which included (color, smell, taste and texture).

3. RESULTS AND DISCUSSION

3.1. Fish Raw Materials

The development of the fishing industry depends on the availability of raw materials that will become processed products. Along with this, the North Maluku Provincial Government rolled out a fishery beacon program, namely the National Fish Barn (LIN) by carrying out the concept of sustainable fisheries. This is supported by the Ministry of Maritime Affairs and Fisheries which is committed to funding the LIN program. The KKP's official release stated that the DPR approved the proposed additional 2021 budget allocation ceiling of Rp. 3.4 trillion. This fund is Rp. 3.2 trillion for LIN, the rest is for infrastructure for the maritime tourism village program (Dewi Bahari) and lifting cargo. This is very appropriate

because North Maluku has quite abundant fishery potential, this is in accordance with production data for the last five years presented in Figure 1.

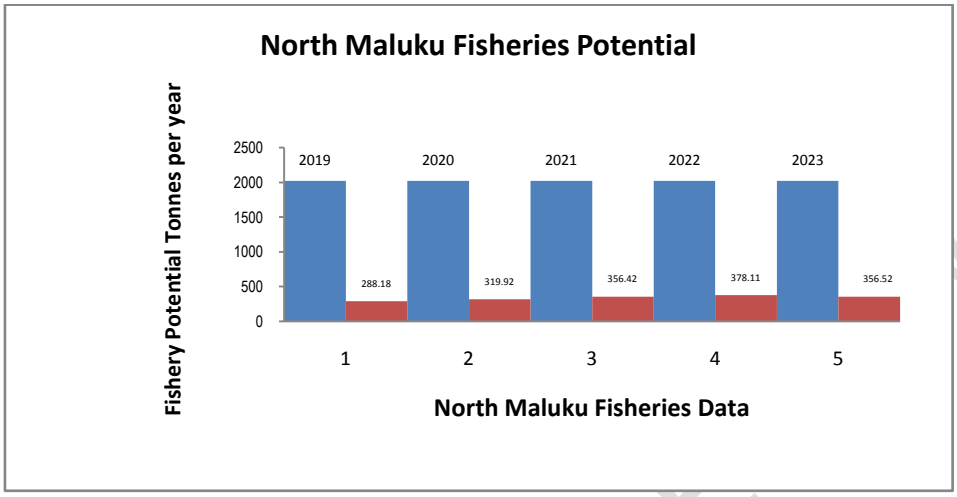

Figure 1. Fisheries Potential of North Maluku

Furthermore, the Directorate General of Marine Spatial Management (PRL) provides information that the government's commitment is to realize the Maluku and North Maluku Provinces as national fish storages. One form of this commitment includes increasing human resources in Maluku and North Maluku with plans to establish a Marine and Fisheries Polytechnic to support the National Fish Barn (LIN). The raw material commodity for fishery products in North Maluku has been known by the world for a long time because of the abundance of tuna and skipjack. The raw materials for tuna are presented in Figure 2.

Figure 2. Raw materials for tun

3.2. Surimi

The selection of raw materials for tuna as raw materials for surimi is very suitable because tuna has a lot of meat so that the yield obtained from surimi processing is very good according to the expectations of researchers. In addition, tuna contains more white meat than red meat. Basically surimi processing requires white meat compared to red meat because white meat has better gel strength for surimi-based processed products. Surimi is crushed fish meat that has been cleaned of unwanted materials such as bones, scales, skin, etc., then washed and pressed to remove excess water. Surirni can be stored frozen with the addition of cryoprotectant (sodium tripolyphosphate) to maintain water holding capacity. Surimi is usually an intermediate product for further product processing (Anonymous 1978) [7].

The development of surimi-based products is intended to assist the government in increasing the level of fish consumption in Indonesia. Reduced diversification of fishery products causes the level of fish consumption for children to decrease, which has implications for a lack of protein consumption and this can lead to high stunting rates in North Maluku. North Maluku Province is one of the provinces that contributes the highest stunting rate. This can be seen in Figure 3. The prevalence of stunting rates in North Maluku.

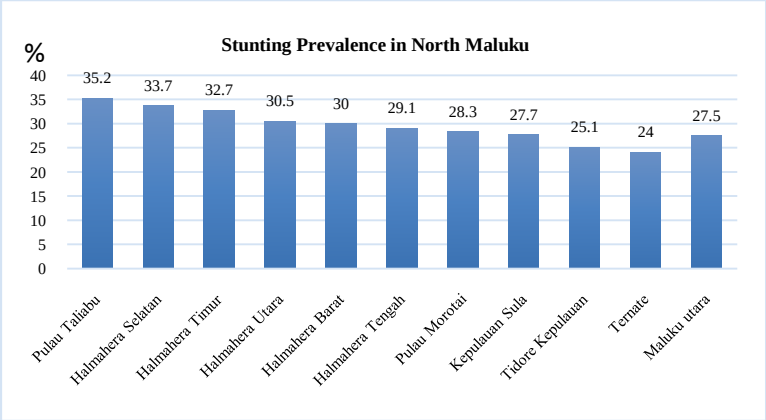

Figure 3. The prevalence of stunting in North Maluku

The results of the 2019 Indonesian Toddler Nutrition Status Survey (SSGBI) show that the prevalence of stunting in Indonesia is 27.67%, much higher than the maximum tolerance according to WHO, which is 14%. Based on SSGI data for 2021, the prevalence of stunting in North Maluku Province is almost the same as the national data of 27.5%. The highest prevalence was in Pulau Taliabu Regency at 35.2% and the lowest was in Ternate at 24%. The data will continue to grow if no intervention efforts are made, one of which is

diversification of the types of processed fishery products from raw surimi to fish meatballs and nuggets.

3.2. Fish meatball

Meatballs are a homogeneous mixture of fish meat, flour and seasonings that have undergone an extraction and marketing process. Good quality meatballs can be made without adding any chemicals. Tuna is a type of white-flesh fish that is suitable for making meatballs, has a high enough actin and myosin content so that the texture of the meatballs produced is quite good. The following is the form of meatball production results presented in Figure 4.

Figure 4. Fish Meatballs

3.1. Organoleptic Test

The results of the analysis of organoleptic tests (appearance, smell, taste and texture) on fish meatball products can be seen in Figure 5.

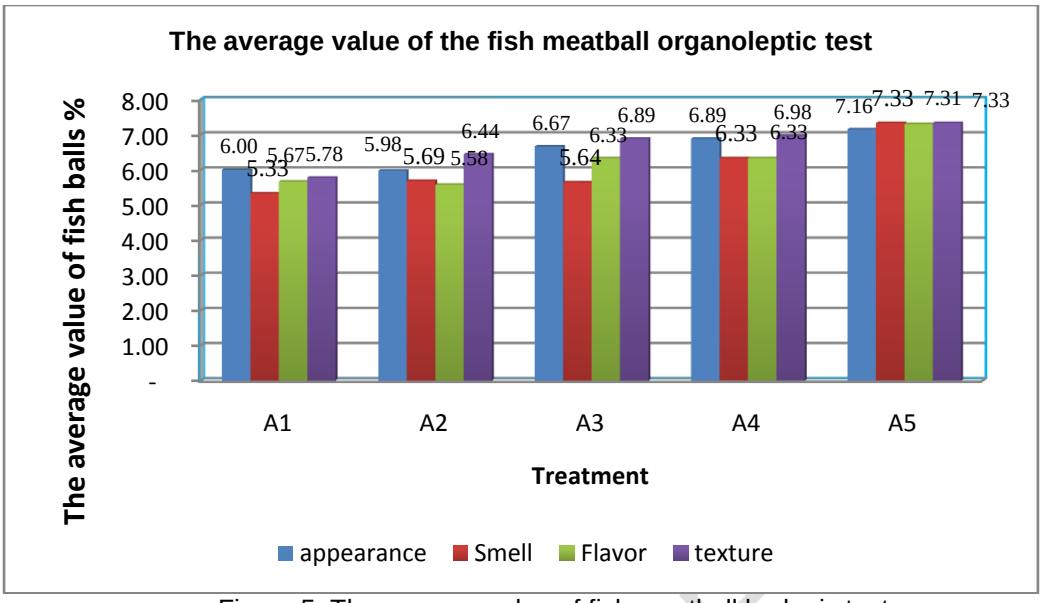

Figure 5. The average value of fish meatball hedonic tests

A1 = Control (without adding yellowfin bone meal)
A2 =Addition of 0.8% yellowfin bone meal
A4 =Addition of 1.6% yellowfin bone meal
A6 =Addition of 2.4% yellowfin bone meal
A8 =Addition of 3.2% yellowfin bone meal

3.1.1. Appearance

The results of the analysis of organoleptic tests (appearance) of yellowfin fish meatballs with a value range of 5-7. The lowest average organoleptic score is A1 and the highest is A5 namely; 7 (smooth surface and not hollow), and the lowest is A1 (ie rough surface), so the organoleptic value (Color) is 5.33 to 7.33 (Figure 1). It is suspected that the addition of fish bone meal with a concentration of 3.2% can close the pores of the meatballs during the boiling process so that they have a better appearance compared to other treatments.

3.1.2. Smell

The organoleptic test results for the aroma parameters of yellowfin fish meatballs, obtained the highest value in sample A5 7.33 with characteristics (product specific) and the lowest A1 5.33 with characteristics (specific neutral). So that the average value of the organoleptic test for aroma is 5.33 – 7.33 (Figure 2). This is still in accordance with SNI 01-2713-2009 (BSN, 2009) [8]. The more fish bone meal added, the more the aroma or smell of the meatballs will increase. This is in accordance with Talib's research, 2009 that the distinctive aroma of yellowfin bones in walnut macron products is less desirable even though it has gone through the boiling process using acid but the characteristic odor still appears

[9].. However, this is different for wet fish meatball products, the stronger the smell of bone meal, the more consumers like it. This is the same as stated by Setiawan et al. (2013) [10]; Rizki et al., (2017) [11], that the increasing amount of fish meat which contains protein and fat as the aroma of fish in the dough makes the aroma of meatball products sharper.

3.1.3. Flavor

The results of the organoleptic (taste) test of yellowfin fish meatballs had fluctuating results. The average value of the organoleptic test for taste parameters is the lowest A1 5.58 (with bland characteristics) and the highest A5 7.31 (product specific). Most panelists liked the resulting fish bone flour meatball products as shown in (Figure 5). These results indicate that with the addition of fish bone meal at a concentration of 3.2% the taste of the meatballs is getting stronger. , It is suspected that the combination of yellowfin fish meat with fish bone meal can give a stronger taste sensation to fish balls.

3.1.4. Texture

The organoleptic value (texture) of yellowfin meatballs obtained a significant average value for each treatment, with the lowest score being A3 6.33 and the highest value A5 7.31 for the texture of yellowfin meatballs which the panelists liked (Figure 3). This is in line with Talib's research, 2009 that the addition of yellowfin bone meal to walnut macron products affects the texture because the more fish bone meal is added, the harder the walnut macron, this is related to the calcium and phosphorus content found in yellowfin fish bone meal so that the texture of the walnut macron will also change according to the amount of addition of fish bone meal concentration. However, in this study, the difference was that the greater the addition of fish bone meal, the better the texture. This is presumably because fish bone meal also influences the texture improvement of fish balls.

4. CONCLUSION

The potential of fisheries resources in North Maluku is still very abundant but unfortunately it has not been utilized optimally for the diversification process of surimi-based processed products. The results of this study indicated that fish balls treated with yellowfin bone meal A5 had the highest average value for almost all treatment attributes (appearance, smell, taste and texture) and the lowest was for treatment A1.

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