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: The method used in this study is to use experimental methods on a scale lab, by taking advantage of the waste of the madidihang fish bone while the goal to be achieved in this study is to produce the flour surimi of the madidihang bone with concentration (a1, a2, a3, a4 and a5) the surimi are then used for product production (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, 2016 [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 [5].in Talib 2018) [4].

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 material used for surimi is a 20 kilogram fillet of madidihang fish, Salt, Criyoprotectant, ice cubes.While the ingredients used for making meatballs are flour flour, Tapioca flour, monosodium glutamat, Pepper, Pepper, salt and eggs and materials that are used for the extraction of fish bones are using ch3cooh solution. The raw material used for surimi is a 20 kilogram fillet of madidihang fish, Salt, Criyoprotectant, ice cubes.While the ingredients used for making meatballs are flour flour, Tapioca flour, monosodium glutamat, Pepper, Pepper, salt and eggs and materials that are used for the extraction of fish bones

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2.2. Method

The method used in this research is to use experimental methods on a laboratory scale, by taking advantage of the waste of the madidihang fish bone while the goal to be achieved in this study is to produce the flour surimi of the madidihang bone with the concentration of (A0,) A1, A2, A3.. A4 and A5) the surimi are then used for the production of products (fish balls).

2.2.1. Research procedure

Flesh of fish madidihang prepared the ground water into a basin has been added ice and water and salt by comparison 1 3: washed about 3 times the flesh of strained uses a blacu dipres flesh of the next thing is to reduce the moisture content of the surimi added criyoprotektan packed and savings frozen before being used. One week after surimi storage in thawing and the next used for product production.For the extraction of fish bones into flour first reduced fish bones then washed with running water then boiled bone with water for the next 12 hours boiled with CH3COOH solution with concentration 1 and 3 % for 30 minutes.The next stage of the fish bone in the oven for 8 hours at 800c temperatures, Then the bone grinds and sifts the size of 100 mash.The next stage is the preparation of materials and tools for product production starting from meatballs and followed by other products.Every product manufacture is added flour fish bones to increase nutrients mainly calcium and phosphorus. The parameters that are tested on this research are dendement, organoleptic test that covers (color, It stinks, flavor 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.

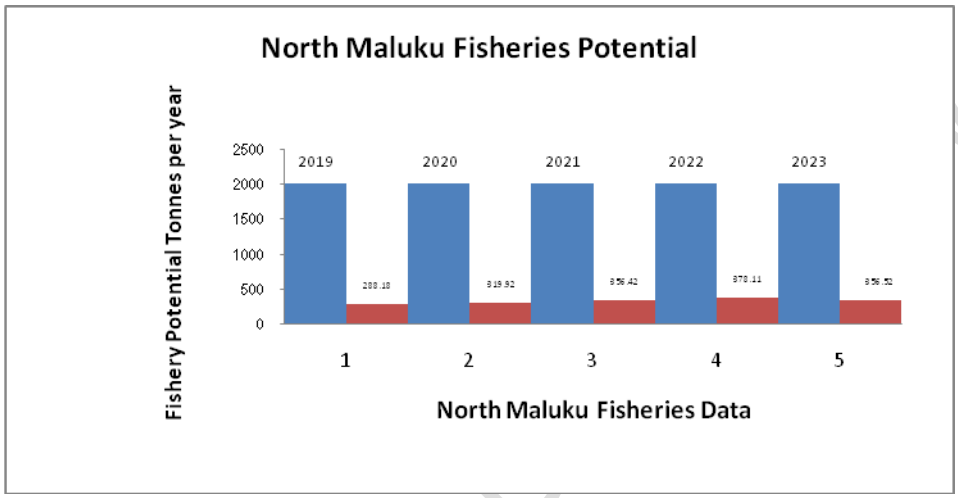

Figure 1. Fisheries Potential of North Maluku

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. When percentage of water-soluble proteins is morethan this rate, this situation is caused to be less surimi yield (Bakil, 2022) [7]. The other criteria to considerwhen choosing fish species for surimi are; ability to forma solid gel structure; having a good organoleptic qualityin terms of taste, odour, and appearance; having whitemeat; availability all year long and having an appropriateprice (Altun and Yıldız, 2018) [8].

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. Surimi is an excellentsource of myofibrillar proteins, which are preserved by cryoprotectants during long-term frozen storage. Surimi is a product obtained by mixing mechanically deboned fishmeat, after washing with water and chopping, mixing thickeners such as sugar, sorbitoland polyphosphate (cryoprotectant) and preservatives from freezing denaturation,and is defined as the moist frozen concentrate of myofibrillar protein in fish meat.Surimi goods with unusual gelling capabilities and high nutritional value include fishballs, kamaboko, chikuwa, and crabstick etc (Bakil, 2020) [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.

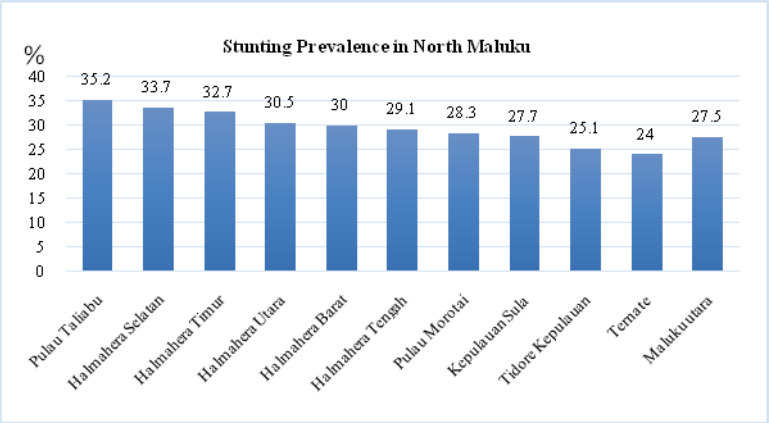

Figure 3. The prevalence of stunting in North Maluku

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 extraction and marketing processes. Good quality meatballs can be made without adding any chemicals. Tuna is a type of white-fleshed fish that is suitable for making meatballs. Meatballs made from tuna have a high content of actin and myosin and have a pretty good texture. 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 organoleptic test analysis which includes attributes (appearance, smell, taste and texture) of the fish meatball product can be seen in Figure 5.

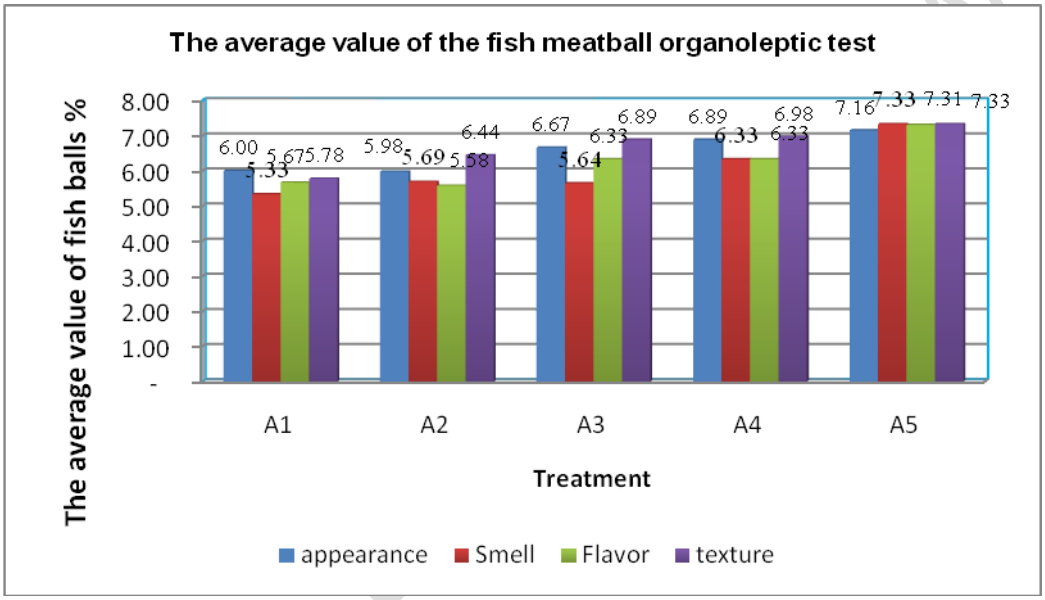

Figure 5. The average value of fish meatball hedonic tests

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) [9]. 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 (Buket, 2022) [10]. 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) [11]; Rizki et al., (2017) [12], 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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