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Comparison of Nutritional Value of Milkfish Shredded with Milkfish Bone Shredded *(Chanos Chanos)*

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ABSTRACT

The use of fishbone waste as shredded product is one of the right alternatives to provide a source of calcium-rich food that is cheaper, easier to obtain and of course easily absorbed and reduces the adverse effects of environmental pollution. The purpose of this research is to create a diversified product of milk fishbone shredded as an alternative use of fishery byproducts and to compare the chemical or nutritional characteristics of fishbone shredded and shredded milkfish (*Chanos chanos*). This study uses a comparative method. The results showed that the nutritional content of fish bone shredded was not much different from shredded milkfish products. The nutritional value of fishbone shredded are: 6.86% water content, 38.71% protein content, 17.16% fat content, 23.63% carbohydrate content and 1.59% crude fiber content, 12.04% ash content, 1.70% calcium content, and 1.51% phosphorus content. While the nutritional value of milkfish shredded is: 7.89% water content, 42.2% protein content, 31.48% fat content, 9.30% carbohydrate content, 1.64% crude fiber content, 7.49% ash content, 2.54% calcium content, and 1.34% phosphorus content. The nutritional value of fishbone shredded is higher in carbohydrate content, crude fiber content, and ash content compared to milkfish shredded products. The nutrient content of fishbone shredded is lower in water content, protein content, and fat content when compared to milkfish shredded products. High levels of ash in milkfish floss have the potential to be a source of calcium and phosphorus minerals. Thus fishbone shredded can be used as a mineral food source to meet the nutritional needs of the community.

Index Terms - Nutrition, by product, milkfish, fishbones shredded.

I. INTRODUCTION

The Indonesian government designated milkfish as a priority commodity for fisheries industrialization in 2010. The existence of a fishing industry that can process fish into semi-finished products and finished products that are preferred by consumers is becoming increasingly important [1]. According to [2], around 70% of fish are processed before the final sale. Fish processing involves stunning, leveling, removal of mucus, beheading, washing, scaling, cutting the intestines, cutting fins, separating the bones of meat and steak and fillets. Fish processing is not optimal, there are still many parts of the fish, both the contents of the stomach, head, bones, and tail have not been utilized and will be discarded [3]. A large amount of waste (20-80%) depending on the level of processing and type of fish) is generated. Generally, the edible portion of fish is around 45-50% of the body of the fish, the rest is by-product [4]. Whereas according to [5], the total yield of edible milkfish (77.2%) is the largest portion, the rest is the stomach contents accounted for 9.9%, bones with meat attached as much as 11.3%, fins are a component that is the smallest is as much as 1.6% of the total body weight of fish.

By product is a by-product obtained from the production process that is not the main product or often referred to as waste. Along with the development of the fishing industry, the waste generated from the company's production has also increased. Directly or indirectly, this will hurt the environment because it causes pollution [6]. Waste will also be a source of microbial growth that can interfere with the health of the human body [7]. To minimize this impact, efforts should be made to utilize this waste quickly and appropriately. The right way to deal with waste is by applying the concept of zero waste through optimizing the use of waste into raw materials in the development of new products [8].

Advances in science and awareness of the impact of waste on the environment, encourage research on the processing and utilization of waste as a byproduct for food and non-food needs [6]. Fish waste can be used for the production of various value-added products such as protein, oil, amino acids, minerals, enzymes, bioactive peptides, collagen and gelatin [9]. Research on the utilization of solid waste in the fishing industry has been widely developed, such as making chitosan from shrimp shells [10], making gelatin from milkfish bone waste [11], making fish feed using fish waste [12], and others. Waste utilization (by the development of products other than boneless milkfish, such as milkfish shredded, crackers, sticks, and meatballs) have supporting sustainability production of the SME's fish processing unit [13]. Waste management has reduced the impact on the SME's fish processing environment [14].

Solid waste from the fishing industry and household processing is quite large, one of which is fishbone. According to [15], milkfish bone waste produced by the milkfish industry every day reaches 15 kg or around 5.4 tons per year. Milkfish bones contain 4% calcium, 3% phosphorus, and 32% protein. Milk bones are usually consumed by humans for example when processed into fishery products. Nutrient content in milkfish bones is very beneficial for human bone health because the main elements of milkfish are calcium, phosphorus, protein, and carbonate [16] and [17]. Thus fish bone waste has great potential to be used as raw material for calcium-rich products. The milkfish bones (*Chanos chanos*) contain nutritional value so that it can prevent osteoporosis. Milkfish bones contain 4% calcium, 3% phosphorus, and 32% protein. [15]. The milkfish bones can be processed into shredded meat so that it will add value to the fishbone waste and boost the community's economy [18] and [19]. Fishbone shredded is a type of preserved food made from fish bones that are added with spices as a flavoring flavor, through the process of steaming, smelting, and frying [20].

Based on the description above, this study aims to create a diversified product of milk fishbone shredded

as an alternative use of by-products of fisheries that are rich in calcium, as well as to compare chemical or nutritional characteristics of bone shredded meat and milkfish (*Chanos chanos*). The parameters tested in this study were protein content, fat content, water content, crude fiber, and carbohydrate content, ash content, calcium, and phosphorus content.

II. METHODOLOGY

2.1. Sample Making and Testing

This research was conducted in July-August 2019. Making samples of shredded meat and shredded milkfish bones (Chanos Chanos) was carried out at UKM 88 Marijo Kab. Pinrang, South Sulawesi Province. The stages of research include the preparation of tools and materials in research. The shredded formula used is seen in Table 1.

TABLE 1. Formulation Of Fishbone Shredded and Fishmeat Shredded

Material	Fishbone Shredded (A)	Fishmeat Shredded (B)
Milkfish Bone	1000 g	-
Milkfish Meat	-	1000 g
Coconut milk	400 ml	400 ml
Garlic	150 g	150 g
Union	150 g	150 g
Salt	20 g	20 g
Brown Sugar	150 g	150 g
Galangal	50 g	50 g
Pepper	5 g	5 g
Cumin	5 g	5 g
Cilantro	5 g	5 g
Lemongrass	50 g	50 g

Sample testing was carried out at the Laboratory of Productivity and Water Quality, Faculty of Marine and Fisheries Sciences, Hasanuddin University, Makassar. The unit of analysis used in this study was shredded bone and shredded milkfish. The parameters tested included water content, protein content, fat content, carbohydrate content, ash content, calcium content, and phosphorus content. The analysis technique to determine nutrient levels in food is the proximate analysis or the Weende method.

2.2. Data analysis

This study uses a comparative research method [21]. Data analysis used T-test to determine the comparison of nutrient levels of shredded milkfish and shredded milkfish (C*hanos chanos*). Furthermore, compared with the 1995 Indonesian National Standard (SNI) that has been set [22].

III. RESULTS AND DISCUSSION

The quality of processed milkfish bone waste products can be seen from the nutritional content. The results of the proximate analysis of the nutritional content of shredded bone and shredded milkfish can be seen in Figure 1.

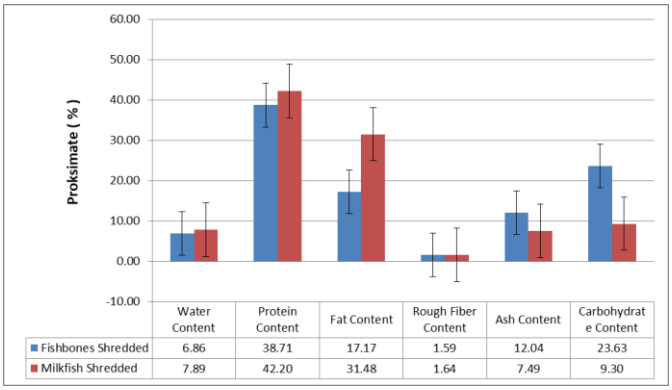

Figure 1. Proximate Test Results of milk fish bone shredded meat and milk fish shredded meat (*Chanos chanos*).

The biggest chemical component contained in food is water, therefore water is the most important component of food. The water content in food affects the resistance of microbial attack. Water content contained in shredded milkfish products ranges from 6.70% to 6.99%. The water content of milkfish shredded fish products ranges from 7.8% to 8.00%. The average water content of milk fishbone shredded products is 6.85% lower than shredded milkfish meat that is equal to 7.89% (Table 2).

TABLE 2. Quality of Fishbone Shredded according to SNI 01-3707-1995.

No.	Nutrition Content	Fishbone Shredded (% b/b)	Standard SNI 1995 (% b/b)	Kateranga n
1.	Water	6.86	Max 7	Qualify
2.	Protein	38.71	Min 15	Qualify
3.	Fat	17.17	Max 30	Qualify
4.	Fiber	1.59	Max 1	Not Qualify
5.	Carbohydrat e	23.63	Max 30	Qualify
6.	Ash	12.04	Max 7	Not Qualify
7.	Calcium	1.70	-	-
8.	Phosfor	1.51	-	-

T-Test results show that the water content of milkfish bone shredded products is significantly different from milkfish shredded meat products. The water content of shredded milkfish produced is also higher than [20], which uses different fish bones, namely between 3.16% to 4.93%. The moisture content of bone shred products produced is following the quality requirements set in SNI 1995 where the maximum moisture content is 7%.

Protein is a food that is very important for the body. The function of protein for the body other than as fuel also functions as a builder and regulator [23]. The protein content of shredded milkfish products ranges from 38.10% to 39.11%. The protein content of milkfish shredded meat products ranged from 42.00% to 42.47%. The average value of milk protein shredded protein content of milkfish is 38.71% lower than the average value of protein content of shredded milkfish which is 42.2%. T-Test results show that the protein content of milkfish bone shredded products is significantly different from the protein content of milkfish milk shredded meat. Even so, the protein content in milkfish shredded and milkfish shredded products is following the quality requirements set in SNI 1995 where the value of protein shredded fish is at least 15%. The level of protein from shredded milkfish produced is far higher than [20], ie 5.66% to 8.04%.

Fat is one of the chemical elements found in food and as a source of energy other than protein and carbohydrates. Fat is a mixture of triglycerides in solid form and consists of a solid phase and a liquid phase [24]. Fat in the composition of food ingredients and food raw materials can be useful for adding flavor, but if there are enough of them can trigger rancidity [26]. The level of fat of shredded milkfish products is between 16.34% to 17.61%. The fat content of shredded milkfish products ranged from 31.20% to 31.65%. The average fat content of milk fishbone shredded is 17.16% lower than the fat content of milkfish milk meat that is equal to 31.38%. Fat content in bone shredded products is following the quality requirements that have been set according to SNI 1995 where the maximum fat content is 30%. Based on the results of the analysis of the T-test showed that the value of the fat content of bone shredded products was significantly different from shredded milkfish. The level of fat of shredded milkfish produced is not different from the results of the study [20], namely 15.13% to 24.54%

Crude fiber is a part of food that cannot be hydrolyzed by chemicals that are used to determine crude fiber content, namely sulfuric acid (H2SO4; 1.25%) and sodium hydroxide (NaOH; 1.25%). While dietary fiber is part of food that cannot be hydrolyzed by digestive enzymes. The levels of crude fiber from shredded milkfish products range from 1.45% to 1.80%. The levels of crude fiber from shredded milkfish products range from 1.33% to 1.93%. The average level of the crude fiber of shredded milkfish is 1.59%, lower than the level of the crude fiber of shredded milkfish products, which is 1.64%. T-Test results show that the crude fiber content of milk

fishbone shredded products is not significantly different from milk shredded fish floss. The levels of crude fiber in shredded bone and milkfish products produced are not following the quality requirements that have been set according to SNI 1995 where the maximum crude fiber value is 1.0%.

Carbohydrates are the main source of energy calories for the human body, are useful to prevent the occurrence of excessive body protein breakdown, loss of minerals and are useful to help metabolize fats and proteins. Carbohydrates also have an important role in determining the characteristics of food ingredients such as taste, color, texture, and others [25]. The carbohydrate content of shredded milkfish products ranges from 22.60% to 24.45%. The carbohydrate content of shredded milkfish products ranges from 8.68% to 10.06%. The average value of the Cadena carbohydrate of shredded milkfish is 23.63% higher than the carbohydrate content of milkfish shredded meat that is equal to 9.30%. Based on the results of the T-test showed that the carbohydrate content of milk fishbone shredded products was significantly different from milkfish meat floss. Carbohydrate content in milkfish shredded and milk fishbone shredded products are following SNI 1995 quality requirements where the maximum carbohydrate content is 30%. The level of carbohydrate shredded milkfish produced is far lower than the results of Iskandar, 2016, with a carbohydrate content of 44.92% to 51.44%.

Ash is an inorganic substance produced from the combustion of organic material. Ash content and composition depends on the type of material. According to [26], ash content is related to minerals of an ingredient. The higher the ash content means the higher the content of inorganic material [23]. Ash and mineral content contained in fishbone shredded and fishmeat shredded can be seen in Figure 2.

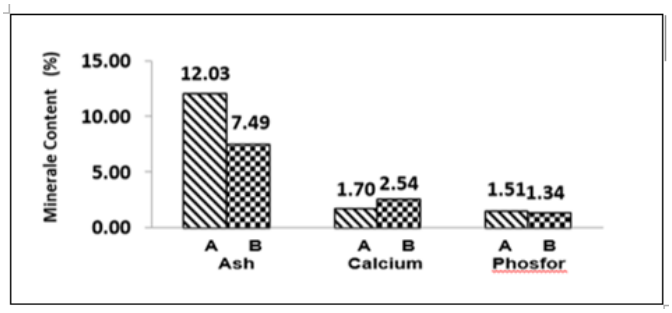

Figure 2. Comparison of Ash, Calcium and Phosphorus Content of Fishbone Shredded and Fishmeat Shredded.

Ash content of milkfish bone shredded products ranged from 11.68% to 12.39%. Ash content of milkfish shredded meat products ranged from 7.10% to 8.01%. The average value of ash content of milkfish bone shredded products is 12.04% greater than the ash content of milkfish shredded meat products that is equal to 7.49%. Based on the results of the T-test analysis showed that the ash content of bone shredded products was not significantly different from shredded milkfish. According to the provisions of SNI 1995, the maximum ash content for shredded is 7%. Thus the level of milkfish bone shredded and milkfish shredded meat produced exceeds the maximum limit set by SNI 1995. However, the level of milkfish bone shredded meat produced is much lower than [20], which is between 20.47 % to 23.75%. The high ash content is due to the main bone constituent components are minerals. This is in line with the statement [27], ash content obtained from materials related to minerals contained in it. According to [28], living bones and intracellular matrix are contained in the form of mineral salts. Mineral salt is a component consisting of 80% calcium phosphate and the rest consists of calcium carbonate and magnesium phosphate.

The calcium content of milk fishbone shredded ranges from 1.46% to 1.84% while the calcium content of milkfish meat shredded products ranges from 2.49% to 2.58%. The average value of calcium milk shredded bone of milkfish is 1.70% lower than

the calcium content of milk shredded milkfish product that is equal to 2.54%. T-Test results show that the calcium content of bone shredded products is significantly different from milk shredded milkfish. Shredded calcium levels are not listed in SNI-01-3707-1995. Adequate calcium recommended for adults is 500-800 mg per day [29]. Calcium is useful to help the process of formation of bones and teeth and is needed in blood clotting, muscle contraction, signal transmission in nerve cells. Calcium can help prevent osteoporosis. Most of the calcium is concentrated in cartilage and teeth, the rest is in body fluids and soft tissues [30].

Phosphorus levels of milkfish bone shredded products range from 1.35% to 1.76%, while the phosphorus content of shredded milkfish products ranges from 1.33% to 1.35%. The levels of phosphorus contained in milkfish shredded products are on average 1.51%, higher than the phosphorus content contained in milkfish shredded products with an average value of 1.34%. Based on the results of the T-test showed that the level of phosphorus of shredded milkfish products was not significantly different from shredded milkfish. Abon phosphorus levels are not listed in SNI-01-3707-1995. Phosphorus is one of the minerals needed with an amount of approximately 22% of all minerals found in the body. Phosphorus is a macromineral that has an important role in the body, not only plays a role in various biological processes but also includes energy metabolism and bone mineralization [31]. Phosphorus is the second most mineral in the human body after calcium, which is 1% of body weight. Approximately 80% of phosphorus in the body is stored as calcium phosphate salts, which are part of hydroxyapatite crystals in bones and teeth [32].

IV. CONCLUSION

Based on the results of the study it can be concluded that the milkfish shredded product has a quality that is not much different from the shredded milkfish product. The nutritional value of milkfish shredded milkfish is: 6.86% water content, 38.71% protein content, 17.16% fat content, 23.63% carbohydrate content and 1.59% crude fiber content, 12.04% ash content while the meat abon nutrition value is: water content 7.89 %, 42.2% protein content, 31.48% fat content, 9.30% carbohydrate content, 1.64% crude fiber content, 7.49% ash content. The nutritional value of milkfish bone abon is higher in carbohydrate content, crude fiber content, and ash content compared to milkfish shredded meat products. The nutrient content of milk fishbone shredded is lower in water content, protein content, and fat content when compared to milkfish shredded meat products. High levels of ash in milkfish floss have the potential to be a source of calcium and phosphorus minerals. Shredded milkfish can be used as a mineral food source to meet the nutritional needs of the community.

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