Int. j. adv. multidisc. res. stud. 2023; 3(3):140-142

Received: 21-03-2023
Accepted: 01-05-2023

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Characteristics of Tilapia Meat Meat *(Oreochromis niloticus)*

[1] Junianto, [2] Rival Febriansyah, [3] M Delvin Tsar S, [4] Regita Alya Khoirunnis, [5] Mochamad Mirza Umam

[1] Lecturer, Department of Fisheries, Padjadjaran University, Indonesia

[2, 3, 4, 5] Student, Fisheries Study Program, Padjadjaran University, Indonesia

Corresponding Author: **Regita Alya Khoirunnis**

Abstract

This research aims to analyze the characteristics of tilapia meat meal which was given pre-treatment, namely steaming and boiling as well as control (without heating) prior to the drying process. The research method used is experimental. There are three types of treatment used before the drying process, namely boiling, steaming and control (without heating). The obtained tilapia meat meal was measured for its yield, water content, pH, and observed for its organoleptic properties. The data obtained were analyzed descriptively. Based on the results of research on the characteristics of tilapia meat flour obtained from the steaming process on fish meat before drying are as follows: yield of flour 11.0 4 % ±0.64; water content 6 ±0.5%; pH 6.4 0 ± 0.01; and organoleptic description of golden yellow color, savory aroma and smooth texture. The characteristics of tilapia meat flour obtained from the boiling process on fish meat before drying are as follows: yield of flour 11.99% ± 0.41; water content 8 ±0.5%; pH 6.23 ± 0.23; and organoleptic description of the white color of beach sand, savory aroma and fine texture. The characteristics of tilapia meat flour obtained from the process without heating the fish meat before drying are as follows: yield of flour 12.17% ± 0.53; water content 9 ±0.5%; pH 6.03 ± 0.20; and organoleptic description of light brown color, aromatic and coarse texture.

Keywords: Boiling, Steaming, Organoleptic, Moisture Content, PH

Introduction

Tilapia is a type of freshwater fish that is widely consumed throughout the world, including in Indonesia. Forms of consumption of tilapia apart from being in the fresh form which is fried are also processed into various processed forms both as fortification and substitute ingredients (Muhamad *et al*., 2017) [10].

According to Matondang (2022) [8], value fish meat has a protein content of 16.05%, higher than carp (16%), catfish (14.53%) and catfish (13.18%). Fish protein is composed of amino acids whose profile is the same as the amino acids that make up human protein, so it is essential (Natsir and Lativa, 2018) [11].

Tilapia as a potential source of protein food has many advantages. Some of the advantages of tilapia are 1) it is easy to cultivate in both tropical and sub-tropical climates and is able to survive in an oxygen-limited environment (Sibagariang, *et al*., 2020) [16]. 2) White flesh, thick and no thorns. 3). It has relatively fast growth and is resistant to disease (Oktapiandi, *et al*., 2019) [12].

Tilapia meat as a source of protein can be converted into flour. The advantages of being converted into flour form are that it lasts longer, does not require much storage space, and has a wider use than fresh meat. Tilapia meat meal has different characteristics from fish meal from other types of fish. Characteristics of fish meat meal can affect its application. Therefore, this research aims to analyze the characteristics of tilapia meat meal which was given pre-treatment, namely steaming and boiling as well as control (without heating) prior to the drying process.

Research Method

The research method used is experimental. There are three types of treatment used before the drying process, namely boiling, steaming and control. The process of making flour is carried out as follows: Tilapia fish is weeded (removed the entrails, gills, scales and fins). Then washed with running water then filleted. After that, the filet obtained was divided into three (according to the treatment). The tilapia fillet used for each treatment was 300 grams. The next step is the fillets are processed according to the treatment, namely steaming, boiling and dick (not boiled and not steamed). Steaming and boiling of fillets is carried out at a temperature of approximately 100oC for 15 minutes. After that it was cooled, then the fillets from each treatment were reduced in size using a knife. Then it was dried in a blower oven at 60oC for 5 hours. Then grind it using a grinder and filtered

using a 100-mesh flour sieve. The flour obtained was measured in yield, water content, pH, and observed for its organoleptic properties. The data obtained were analyzed descriptively.

Results and Discussion

Yield

Yield is a parameter used for the effectiveness of the applied process and also to determine its economic level (Kondolele *et al*., 2022) [7]. The yield value is obtained from the comparison between the fish meat meal obtained and the initial weight, namely tilapia filet as a basic ingredient multiplied by 100%. The greater the yield percentage, the higher the economic value of the product, as well as the effectiveness value of the product. Data on the results of measuring the yield of tilapia meat meal obtained from 3 different treatments before drying can be seen in Table 1.

Table 1: Yield of tilapia meat meal from different treatments before drying

S. No	Treatment	Average Yield
1	steaming	11.0 4 % ±0.64
2	boiling	11.99% ± 0.41
3	Cock (No Warm Up)	12.17% ± 0.53

Based on Table 1, the highest yield of fish meal was obtained from the control treatment, namely tilapia fillets which did not receive heat treatment before the drying process was carried out (12.17%). The high yield of tilapia meat meal from this control treatment was because the fish meat did not undergo a heating process. The heating process by steaming or boiling causes the protein to dissolve in the boiling or steaming water. According to Anwar *et al* (2018) [1], boiling will cause some of the protein present in fish to be partially lost due to dissolving with water during the boiling process. While the loss of protein in shredded fish in steaming, the loss of protein is not as great as in the boiling process because the fish meat is not in direct contact with the heated water. The use of water directly, will dissolve some of the protein into the boiling water. Proteins can be degraded at high temperatures.

Water Content

According to Daud *et al* (2019) [3], water content is very important in the food industry to determine the quality and food resistance to damage that may occur. Reducing the water content of food ingredients will result in reduced availability of water to support the life of microorganisms and also for physicochemical reactions to take place. Thus, both the growth of microorganisms and the physicochemical reactions of both will be hampered, the food will last longer from damage. Regulation of water content is one of the most important bases and keys in food technology. The moisture content of tilapia meat meal obtained from 3 different treatments before drying can be seen in Table 2.

Table 2: Value of water content (%) of tilapia meat meal from different treatments before drying

S. No	Treatment	Water content (%)
1	steaming	6 ±0.5
2	boiling	8 ±0.5
3	Cock (No Warm Up)	9 ±0.5

Based on Table 2, the water content of tilapia meat meal obtained from all treatments was below 10%. Based on this water content value, it shows that tilapia meat meal can be categorized into Standard I with a water content of 6 – 10% (Indonesian National Standard Agency). The smallest flour content of tilapia meat was obtained from the steaming treatment, namely 6% (Table 2). The steaming treatment causes denatured protein (Salmatia *et al*., 2020). Denatured protein causes a decrease in water holding capacity, so that water is easily evaporated during the drying process (Rompis, 2015) [14].

According to Prasetyoa *et al* (2019) [13], water content is the amount of water content in a material expressed in percent. Water content is also a very important characteristic of a material, because water can affect the texture, appearance and taste of a material (Maulani *et al*, 2019) [9]. The water content can also determine the durability and freshness of the material.

Degree of Acidity (pH)

PH is the degree of acidity used to express the degree of acidity or alkalinity of a solution and is an important indicator in the principle of food preservation (Astria *et al*., 2014) [2]. According to Hartanto *et al* (2012) [6], acidity in flour products is a fairly important parameter, because it can be used to detect the age of flour. Measurement of the pH of tilapia meat meal obtained from 3 different treatments before drying can be seen in Table 3.

Table 3: The pH value of tilapia meat meal from different treatments before drying

S.No	Treatment	Degree of Acidity (pH)
1	steaming	6.4 0 ± 0.01
2	boiling	6.23 ± 0.23
3	Cock (No Warm Up)	6.03 ± 0.20

Based on Table 3, it shows that the pH value of tilapia meat meal obtained from the treatment without heating (control) is lower than the heating treatment, both steaming and boiling. This means that tilapia meat flour obtained without heating is more acidic. Heating treatment can cause acidic compounds in tilapia meat to dissolve in the water used as the heating medium. Heating also causes protein denaturation. According to Wastuti (2011) [17], protein denaturation causes damage to the acidic groups, so the pH of the meat becomes higher.

Organoleptic

According to Anwar *et al* (2018) [1], sensory assessment, which is also called organoleptic assessment or sensory assessment, is a simple method of assessment. Sensory assessment is widely used to assess the quality of agricultural and food commodities, including fish meat meal. The organoleptic assessment of tilapia meat meal obtained from 3 different treatments before drying can be seen in Table 4.

Table 4: Organoleptic description of tilapia meat meal from different treatments before drying

Treatment	Color	Aroma	Texture
steaming	Golden Yellow	Tasty	Fine
Boiling	White Sand Beach	Tasty	Fine
Cock (No Warm Up)	Light brown	Fishy	Rough

From the results of organoleptic tests on the color of tilapia meal showed a difference. The color difference in the resulting tilapia fish meal is due to the heating treatment during the drying process. Treatment without heating can cause an enzymatic browning reaction to produce a light brown color. In the heating treatment, the enzymes found in tilapia meat are inactive, so that the enzymatic browning process can be inhibited, so that the fish meal produced is slightly white in color.

The aroma of tilapia fish meal made by heating treatment, either by steaming or boiling, was liked by the panelists. The aroma that is released is savory like the aroma of cooked fish meat. During the heating process, protein hydrolysis runs faster than without heating. Protein hydrolysis is the breakdown of proteins into peptide compounds and amino acids. One amino acid that gives a savory aroma is glutamic acid.

Organoleptic tests on the texture of fish meal processed in several ways showed different results. Tilapia flour which is processed by steaming and boiling produces tilapia meat flour which is liked by the panelists. According to Harimurti *et al* (2021) [5], the purpose of cooking, both boiling and steaming, is to reduce the water content and maintain the quality of fish meat, namely a dense and compact texture. According to Fatmawati and Mardiana (2021), the boiling stage is the most critical step in processing fish meal. If the boiling is not cooked enough, the liquid is not or is still very difficult to separate. Conversely, if it is too cooked, the fish will be too soft. On the other hand, the boiling process is carried out for +15 minutes so that the fish meat is not raw or overcooked so as to produce fish meal that has a good texture (uniform particle size, rather smooth and dry).

Conclusion

Based on the results of research on the characteristics of tilapia meat flour obtained from the steaming process on fish meat before drying are as follows: yield of flour 11.0 4 % ±0.64; water content 6 ±0.5%; pH 6.4 0 ± 0.01; and organoleptic description of golden yellow color, savory aroma and smooth texture. The characteristics of tilapia meat flour obtained from the boiling process on fish meat before drying are as follows: yield of flour 11.99% ± 0.41; water content 8 ±0.5%; pH 6.23 ± 0.23; and organoleptic description of the white color of beach sand, savory aroma and fine texture. The characteristics of tilapia meat flour obtained from the process without heating the fish meat before drying are as follows: yield of flour 12.17% ± 0.53; water content 9 ±0.5%; pH 6.03 ± 0.20; and organoleptic description of light brown color, aromatic and coarse texture.

Acknowledgement

On this occasion we would like to thank Mr. Basri, MSi and Mr. Kenny, S.Pi for their assistance and cooperation in this research.

References

1. Anwar C, Irhami, Kemalawaty M. The Influence of Fish Types and Cooking Method on Shredded Fish Quality. FishtechH–Journal of Fisheries Product Technology. 2018; 7(2):138-147.
2. Astria FM, Subito, Nugaha DW. Design of Short Message Service (SMS) Gateway-Based pH and Temperature Measuring Instruments. Journal of Metrics. 2014; 1(1):47-55.
3. Daud A, Suriati, Nuzulyanti. Study of the Application of Factors Affecting the Accuracy of Determining Moisture Content of the Thermogravimetric Method. LUTJANUS. 2019; 24(2):11-16.
4. Fatmawati, Mardiana. Analysis of Snakehead Fish Meal as a Source of Protein. OCTOPUS. 2014; 3(1):235-243.
5. Harimurti EK, Sudjatinah M, Fitriana I. The Effect of Differences in Steaming Time on the Process of Pemindangan Mackerel on Physical, Chemical and Organoleptic Properties. Journal of Food Technology and Agricultural Products. 2021; 15(1):1-7.
6. Hartanto ES. The Study of Indonesia National Standard (SNI) Implementation on Wheat Flour for Foodstuff. Journal of Standardization. 2012; 14(2):164-172.
7. Kondolele SL, Asikin AN, Kusumaningrum I, Diachanty S, Zuraida I. Effect of Boiling Temperature on Physicochemical Characteristics of Spanish Mackerel (Scomberomorus commerson) Bone Flour. Fisheries Product Technology Media. 2022; 10(3):177–184.
8. Matondang SE. Comparison of Protein Levels of Freshwater Fish and Seawater Fish. LAVOISIER: Chemistry Education Journal. 2022; 1(2):9-16.
9. Maulani TR, Utami RK, Mulyana A. Development of Macaroni Product Made from Taro Beneng Flour with Moringa Leaves (Moringa oleifera L). Gorontalo Agriculture Technology Journal. 2019; 2(2):69-78.
10. Muhamad SB, Afrianto E, Kurniawati N. Fortification of Tilapia Meat on Organoleptic and Chemical Characteristics of Kecimpring. Journal of Fisheries and Marine. 2017; 8(1):174-178.
11. Natsir NE, Latifa S. Analysis of Total Protein Content of Red Snapper and Duck Cracker Fish. Journal of Biology Science & Education. 2018; 7(1):49-55.
12. Oktapiandi, Sutrisno J, Sunarto. Growth Analysis of Tilapia Cultivated in Musta'mal Water. Journal of Bioexperiments. 2019; 5(1):16-20.
13. Prasetyoa TF, Isdianab AF, Sujadic H. Implementation of a Moisture Detection Tool in Food Ingredients Based on the Internet of Things. SMARTICS Journal. 2019; 5(2):81-96.
14. Rompis JEG. Water Binding Power and Cooking Shrinkage of Vacuum-Packed, Oven-Dried Blanched Beef. Zootech Journal. 2015; 35(1):131-137.
15. Salmatia S, Isamu KT, Sartinah A. The Influence of Boiling and Steaming Processes on Albumin and Proximate Content of Goat Fish (Channa striata). Journal of Fish Protech. 2020; 3(1):67-73.
16. Sibagariang DIS, Pratiwi IE, Saidah, Hafriliza A. Growth Pattern of Tilapia (Oreochromis niloticus) Cultivated by the Community in Bangunsari Baru Village, Tanjung Morawa District. Jeumpa Journal. 2020; 7(2):443-449.
17. Wastuti S. Effect of Cooking and Soaking in Lime Solution (*Citrus auratifolia swingle*) on Lamb Meat Quality. Thesis, Eleven March University, Surakarta, 2011.