PREFERENCE LEVEL OF PUFF PASTRY WITH THE ADDITION OF TILAPIA FLUOR

Tingkat Kesukaan Puff Pastry dengan Penambahan Tepung Daging Ikan Nila

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ABSTRACT

Increasing the protein content in Puff Pastry can be done by adding nila fish meat flour. This research aims to determine the percentage of nila fish meat flour addition level in making puff pastry products that are most preferred by the panelists. The study was conducted from February to March 2024 at the Fisheries Product Processing Laboratory, Faculty of Fisheries and Marine Sciences, Padjadjaran University. The method in this research is experimental with 4 treatments of nila fish meat flour addition at 0%, 2.5%, 5%, 7.5% of the weight of wheat flour. The parameters observed were hedonic test with levels of preference for appearance, aroma, texture, and taste conducted on 25 semi-trained panelists who are students of the Faculty of Fisheries and Marine Sciences. The next parameter is proximate testing for the control treatment and the most preferred one, determining the protein content, water content, ash content, fat content, and carbohydrate content. The research results conclude that the addition of 2.5% nila fish meat flour is the most preferred treatment based on hedonic test with median values of appearance 7, aroma 7, taste 9, texture 9, and alternative value 8.57 and has a protein content of 8.74%, water content of 1.48%, ash content of 1.80%, fat content of 38.64%, and carbohydrate content of 47.12%.

Keywords: Fish Protein, Hedonic, Preference Level, Proximate

ABSTRAK

Peningkatan kandungan protein pada *Puff Pastry* dapat dilakukan dengan penambahan tepung daging ikan nila. Penelitian ini bertujuan untuk menentukan persentase tingkat penambahan tepung daging ikan nila pada pembuatan produk *puff pastry* yang paling disukai oleh panelis. Riset dilakukan bulan Februari hingga Maret 2024 di Laboratorium Pengolahan Hasil Perikanan, Fakultas Perikanan dan Ilmu Kelautan, Universitas Padjadjaran. Metode pada riset ini adalah eksperimental dengan 4 perlakuan penambahan tepung daging ikan nila sebesar 0%, 2,5%, 5%, 7,5% dari bobot tepung terigu. Parameter yang diamati adalah uji hedonik dengan tingkat kesukaan terhadap kenampakan, aroma, tekstur, dan rasa yang dilakukan 25 panelis semi terlatih mahasiswa Fakultas Perikanan dan Ilmu Kelautan. Parameter selanjutnya adalah pengujian proksimat terhadap perlakuan kontrol dan yang paling disukai dengan penentuan

kadar protein, kadar air, kadar abu, kadar lemak, dan kadar karbohidrat. Hasil riset menyimpulkan bahwa penambahan tepung daging ikan nila sebesar 2,5% adalah perlakuan yang paling disukai berdasarkan uji hedonik dengan nilai median kenampakan 7, aroma 7, rasa 9, tekstur 9, dan nilai alternatif 8,57 serta memiliki kadar protein 8,74%, kadar air 1,48%, kadar abu 1,80%, kadar lemak 38,64%, kadar karbohidrat 47,12%.

Kata Kunci: Protein Ikan, Hedonik, Tingkat Kesukaan, Proksimat

INTRODUCTION

Indonesia is a country with high potential in the fisheries and maritime sector. The report of the Ministry of Marine Affairs and Fisheries (KKP) states that fisheries production in Indonesia is 4.85 million tons in 2022. Fish have a fairly high potential to become the main source of protein as a step to improve nutrition in the people of Indonesia, but this high potential is not balanced by a high level of consumption, this is evidenced by the level of fish consumption in Indonesia of 56.48 kg/capita/year in 2022 (KKP, 2023). One of the fish that is favored by the Indonesian people is tilapia. Tilapia production in Indonesia according to KKP data in 2018 reached 1.16 million tons. According to Harefa (2019), fresh tilapia contains 20.08 grams of protein per 100 grams, tilapia also contains vitamins B3, B12, potassium, phosphorus, and selenium. The high protein content in tilapia makes it a good source of protein. According to Yudaswara *et al*. (2018), tilapia is widely favored by the public because it has white, thick, and savory meat, and has a relatively cheap price so that it is easily accessible to the public, besides that it can be made into a processed product. Tilapia fish meat can be processed into an additional ingredient in food, one of which is flour by grinding and roasting it first. Tilapia fish meat flour can increase nutritional value and increase protein in processed fishery products.

Maharani (2018) stated that one of the foods made from flour is Puff pastry is a food that has a crispy texture, fragile layers of tissue. The dough in puff pastry consists of many layers of fat in the form of puff pastry shortening or korsvet sandwiched between layers of puff pastry dough (Sufiah, 2017). Puff pastry is widely produced in Indonesia, even puff pastry is popular with the public because it can be made into various products such as croissants, crombloni, zuppa-zuppa. Wheat flour is the main ingredient in forming the composition used in pastry and bakery products. The function of wheat flour in puff pastry dough as a good network framework former, gas retainer during development facilitates the process of repeated grinding and folding (Rosidah, 2011). Puff pastry contains nutrients such as sodium, iron, and certain vitamins, but the content of these nutrients can vary depending on the brand and ingredients used in making puff pastry. The nutritional content of puff pastry per 100 grams contains 7.4 g of protein (Fatsecret, 2012).

Excessive consumption of foods containing high carbohydrates can cause obesity and diabetes because carbohydrates can increase blood sugar levels (Neacşu, 2014). Wheat flour has a fairly high carbohydrate content. According to the United States Department of Agriculture (2014), wheat flour has a high carbohydrate content of 74.5% and protein of 12%. One way to reduce the carbohydrate content in puff pastry is to reduce the composition of wheat flour and fish flour can be added because it has a low carbohydrate content and a high protein content.

A product with good nutritional content but is not liked by many people, the function of adding nutrition to the product is less effective (Wardani *et al*., 2012). The level of preference is measured using a hedonic test through the senses. Winarno (2004), stated that testing food ingredients from the chemical, taste and aroma aspects, a hedonic test needs to be carried out to find out how much tilapia fish flour is added as a source of protein in puff pastry that is most preferred by panelists.

Based on the background above, it is necessary to increase the protein content by adding tilapia fish meat flour to the basic ingredients of puff pastry which is most preferred by the panelists. There has been no further research on the addition of tilapia fish meat flour to this puff pastry, therefore further research is needed to determine the percentage of tilapia fish meat flour addition to the puff pastry that is most preferred by the panelists.

METHODS
Place and Time
The research was conducted from February to March 2024. The manufacture of tilapia fish meat flour, the manufacture of puff pastry and the hedonic test were conducted at the Fishery Product Processing Laboratory, Padjadjaran University. The proximate testing of puff pastry was conducted at the Food Technology Laboratory, Faculty of Engineering, Pasundan University.

Tools and Materials
There are tools for making tilapia fish meat flour, the first is a digital scale, oven knife, food processor, cutting board, spoon, 100 mesh sieve, zipplock plastic, plate, blender, with fresh tilapia fish ingredients of 1 kg containing 4 fish. There are tools for making puff pastry, namely label stickers, silicone mats, knives, basins, mixers, roll pins, spoons, digital scales, ovens, baking paper plates, brushes, measuring cups, cellphones. The ingredients used to make Puff pastry are blue triangle wheat flour, table salt, margarine, korsvet gold bullion, cold water.

Research Design
The method in this research is an experimental method, consisting of four treatments and a hedonic test with 25 semi-trained panelists who are students of the Faculty of Fisheries and Marine Sciences, Padjadjaran University. The treatment used is the level of addition of tilapia fish meat flour based on the weight of wheat flour in percentage with the following treatments:
Treatment A: addition of tilapia fish meat flour as much as 0% (control)
Treatment B: addition of tilapia fish meat flour as much as 2.5%
Treatment C: addition of tilapia fish meat flour as much as 5%
Treatment D: addition of tilapia fish meat flour as much as 7.5%.

Hypothesis
Based on the framework of thought and preliminary research above, the addition of tilapia fish meal previously, the percentage of tilapia fish meal addition level in the manufacture of puff pastry products of 5% produced the most preferred product.

RESULT
Preference Level
Appearance
Appearance assessment is the first assessment seen by panelists for the acceptance of food products before finally spreading to other factors such as aroma, texture, and taste. The average appearance of puff pastry with the addition of tilapia fish meat flour shown in Table 1.

Table 1. Average Level of Preference for Appearance of Puff Pastry with Various Treatments

Addition of Tilapia Fish Meat Meal (%)	Median Value	Average Appearance
0	7.0	7.4 a
2.5	7.0	7.6 a
5	7.0	7.5 a
7.5	7.0	6.8 a

Description: Values followed by letters indicate no significant difference based on multiple comparison tests at the 5% level.
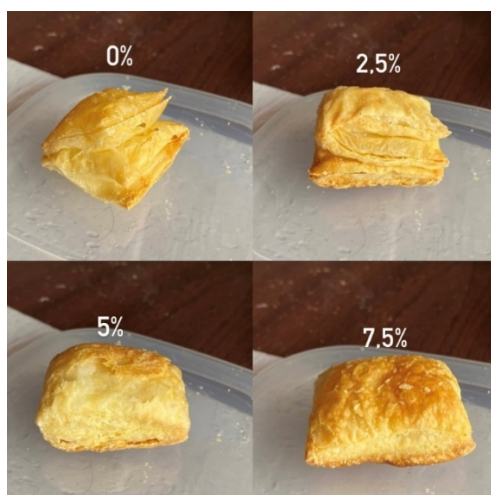
Figure 1. Puff Pastry

Aroma

The aroma spread by food is a very strong attraction that affects the sense of smell and arouses appetite. Aroma is one of the parameters in determining the delicious taste of a food product using the sense of smell because it can provide an assessment of whether the product is liked or not (Winarno, 2002). The average level of preference for the texture of puff pastry with the addition of tilapia fish meat flour is presented in Table 2.

Table 2. Average Level of Preference for Aroma of Puff Pastry with Various Treatments of Addition of Tilapia Meat Flour

Addition of Tilapia Fish Meat Meal (%)	Median Value	Average Aroma
0	7.0	7.2 a
2.5	7.0	7.6 a
5	7.0	6.4 ab
7.5	7.0	6.4 b

Description: Values followed by letters indicate significant differences in the multiple comparison test at the 5% level.

Texture

Texture is the main factor of the quality and characteristics of a food to determine the level of crispiness that can affect the acceptance of food products. Texture is a parameter that affects the image that is important in soft or crispy foods. The results of the Friedman Test analysis showed that the addition of tilapia fish flour to puff pastry had a significant effect on the level of texture preference, so a multiple comparison test was carried out. The average level of preference for the texture of puff pastry with the addition of tilapia fish flour is shown in Table 3.

Table 3. Average Level of Preference for Texture of Puff Pastry with Various Treatments of Addition of Tilapia Meat Flour

Addition of Tilapia Fish Meat Meal (%)	Median Value	Average Texture
0	7.0	7.6 a
2.5	9.0	8.2 a
5	7.0	6.4 ab
7.5	7.0	6.6 b

Description: Values followed by letters indicate significant differences in the multiple comparison test at the 5% level.

Flavor

A very important factor in determining the final consumer decision to accept or reject a food is the taste. Taste is one of the consumer's assessments of food and beverage products, there is a sensation of stimulation and stimulus that can come from external or internal and then felt by the mouth. Consistency of taste is one of the reasons consumers buy the products offered. The average level of preference for the taste of puff pastry with the addition of tilapia fish flour is presented in Table 4.

Table 4. Average Level of Preference for Flavor of Puff Pastry with Various Treatments of Addition of Tilapia Meat Flour

Addition of Tilapia Fish Meat Meal (%)	Median Value	Average Flavor
0	9.0	7.8 a
2.5	9.0	8.2 a
5	7.0	6.9 ab
7.5	7.0	6.0 b

Description: Values followed by letters indicate significant differences in the multiple comparison test at the 5% level.

Puff Pastry Proximate

Proximate analysis is a chemical test conducted to determine the nutrient content of a food raw material, namely protein, ash, water, fat, and carbohydrate content. Measurement of crude protein in food ingredients is used to determine whether the food ingredient can be used as a source of protein or not (Winarno, 2002). Total ash is determined to determine the parameter of nutritional value in food ingredients and to determine whether a processing process is good or not, as well as to determine the type of material used (Febrianto 2014). Fat analysis is intended to determine the effect between different treatments and the percentage of fat produced as a result of the treatment.

Proximate analysis was conducted at the Food Technology Laboratory, Faculty of Engineering, Pasundan University, Bandung City. Proximate tests include water content, protein content, fat content, ash content, and carbohydrate content on puff pastry in the control treatment (0%) and the most preferred treatment by panelists (2.5%). The results of the proximate test in the control treatment (0%) and the most preferred treatment by panelists (2.5%) can be seen in Table 5.

Table 51. Proximate Test Results of Puff Pastry Without Addition of Tilapia Fish Flour and the Most Preferred Treatment by Panelists

Chemical Content	Treatment	
	0%	**2.5%**
Protein	7.25	8.74
Ash	1.78	1.80
Water	1.39	1.48
Fat	38.16	38.64
Carbohydrate	49.04	47.12

DISCUSSION

The results of the Friedman Test analysis showed that the addition of tilapia fish meal to puff pastry did not affect the level of preference for appearance. The preferred appearance of puff pastry is brownish yellow which is not too dark, the higher the addition of tilapia fish meal will produce a darker puff pastry color, this is in accordance with the statement of Safitri (2023)

which states that the addition of tilapia fish meal with a higher concentration produces a darker puff pastry. The average level of preference for appearance in puff pastry with the addition of tilapia fish meal showed that in all treatments (0%, 2.5%, 5%, and 7.5%) there was no significant difference. The treatment of adding 2.5% tilapia fish meal was the most preferred treatment in terms of appearance parameters. The results of the panelists' assessment of the appearance of the puff pastry showed a median value of 7 and an average value ranging from 6.8-7.6, which means that the appearance of the puff pastry was preferred by the panelists. The highest average appearance value was found in the treatment of adding 2.5% tilapia meat flour, which was 7.6 and a median value of 7 (preferred) with a golden yellow appearance. The lowest average appearance value was found in the treatment of 7.5%, which was 6.8 and a median value of 7 (preferred) with a brownish yellow puff pastry appearance. The appearance of the puff pastry is presented in Figure 1.

The results of the Friedman Test analysis showed that the addition of tilapia fish meat flour to the puff pastry treatments (0%, 2.5%, 5%, and 7.5%) had a significant effect on the level of aroma preference so that a multiple comparison test was carried out. The results of the panelists' assessment of the appearance of the puff pastry showed a median value of 7 and an average value ranging from 6.4-7.6, which means that the aroma of the puff pastry was liked by the panelists. The highest average appearance value was found in the treatment of adding tilapia fish meat flour of 2.5%, namely 7.6 and a median value of 7 (preferred) with a distinctive aroma of puff pastry and tilapia. The aroma of puff pastry added with fish meat flour has different characteristics from conventional puff pastry. The addition of fish meat flour provides a stronger distinctive fish aroma. During the baking process, volatile compounds in fish meat flour, such as trimethylamine oxide, break down into trimethylamine, which gives a distinctive fishy smell, the higher the addition of tilapia fish meat flour will produce a fairly strong distinctive fish aroma.

The addition of 5-7.5% smells quite strong especially when the puff pastry is still hot while the addition of 2.5% produces a fragrant aroma of fat that combines well with the balance obtained from margarine and tilapia fish meat flour. The aroma of margarine mixes with the aroma of fish, this creates a complex aroma profile, the fishy smell dominates and the buttery aroma.

Based on the multiple comparison test, it shows that the 0% treatment is not significantly different from the 2.5% and 5% treatments, but the 7.5% treatment has a significant difference, because the texture of the puff pastry in the 7.5% treatment is harder and different from the 0%, 2.5% and 5% treatments. The results of the panelists' assessment of the texture of the puff pastry are known to have an average value ranging from 6.4-8.2, which means that the texture of the puff pastry is liked by the panelists. The highest average texture value is found in the treatment of adding tilapia fish meat flour of 2.5%, namely 8.2 and a median value of 9 (very much liked) with a crunchy, fragile, fluffy, and layered texture. The use of higher tilapia fish meat flour will make the texture less liked by the panelists, this can be proven in the 7.5% treatment can reduce the level of puff pastry preference because the resulting texture is less crispy and not fragile.

The results of statistical analysis showed that the addition of tilapia fish meat flour to puff pastry in all treatments (0%, 2.5%, 5%, and 7.5%) had a significant effect on the level of taste preference so that a multiple comparison test was carried out. The results of the panelists' assessment of the taste of puff pastry showed an average value ranging from 6.0 to 8.2, which means that the taste of puff pastry was liked by the panelists. The highest average taste value was found in the treatment of adding tilapia fish meat flour of 2.5%, namely 8.2 and a median value of 9 (very much liked) with a distinctive taste of puff pastry and tilapia.

The taste of puff pastry is produced by various compounds that emerge from the main raw materials such as flour, margarine, salt, and from the baking process. Puff pastry with the

addition of fish meat flour contains various compounds that provide a unique and complex taste, in addition to the basic compounds of puff pastry such as diacetyl and lactones which provide a margarine and cream flavor, fish meat flour introduces new compounds that affect taste, one of the main compounds that appears is trimethylamine which comes from the breakdown of trimethylamine oxide in fish meat giving a savory taste with a slight fishy aroma. Amino acids and peptides from fish protein contribute to the umami flavor that enhances the deliciousness of puff pastry. Fish fat contains omega-3 fatty acids such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which add a distinctive fishy flavor. The Maillard reaction between amino acids from fish meal and sugar in the dough produces compounds such as furfural and maltol. The combination of all these compounds creates a puff pastry with a rich, complex, and unique flavor, with a touch of savory fish flavor.

The protein content of puff pastry without the addition of tilapia fish meal has a protein content of 7.25%, while puff pastry with the addition of tilapia fish meal, which is the most preferred, has a protein content of 8.74%. The increased protein in puff pastry obtained through the addition of tilapia fish meal can affect various aspects of the final product such as texture, appearance, aroma, and taste. Increasing the protein content can make the texture of the puff pastry denser and less crispy, because the additional protein contributes to a stronger and more elastic structure, reducing the fragile tissue typical of puff pastry. The appearance of puff pastry looks darker or more colorful due to the more intense Maillard reaction, which occurs between protein and sugar during baking, producing a more concentrated brown color. The aroma of puff pastry will change, the addition of protein from fish meal will make the distinctive fishy or savory aroma more pronounced when baked.

A high ash content value indicates a high level of minerals that are very important in terms of nutrition (Khan *et al*., 2012). Ash content is an inorganic substance in wheat flour that is not completely burned and does not evaporate during the baking process. The ash content value of the proximate test results of puff pastry without the addition and the most preferred treatment can be seen in Table 5. The ash content of puff pastry without the addition of tilapia fish flour is 1.78%, while puff pastry with the addition of tilapia fish flour is the most preferred at 1.80%. Based on the results of the ash content measurement in puff pastry, it shows that with the addition of tilapia fish flour, the ash content increases. Puff pastry produced from the most preferred tilapia fish flour addition treatment has a higher ash content than without the addition of tilapia fish flour. The increase in ash content in puff pastry is due to an increase in mineral content which can affect several aspects of the product, namely texture, appearance, aroma, and taste. Higher ash content is caused by additional ingredients that are rich in minerals, such as flour that is not processed enough. The texture of puff pastry that has an increased ash content can make puff pastry feel rougher and less smooth due to the mineral particles contained in the dough. The appearance of the puff pastry can become darker and less visually appealing due to the gray or brownish color of the minerals. High ash content affects the aroma slightly, although not as much as the texture or appearance, there is a possibility of a heavier or stronger aroma that smells of minerals. The taste of the puff pastry is affected by the appearance of a slightly saltier or bitter taste depending on the type and amount of minerals contained. Increasing the ash content can give new variations to the puff pastry, but can reduce some characteristics such as smooth texture and attractive color.

Water content is the amount of water contained in a food ingredient or food product. Water content is one of the important parameters for determining the quality of a food ingredient. Water content itself also determines the quality of the shelf life of food ingredients, including flour. Puff pastry can be said to have good shelf life because it has a low water content. The quality standard for puff pastry for water content refers to SNI for snacks SNI 01-2886-2000, which is a maximum of 4%.

The water content value of the proximate test results of puff pastry without the addition

and the most preferred treatment can be seen in Table 5. The water content of puff pastry without the addition of tilapia fish flour is 1.39% while puff pastry with the addition of tilapia fish flour is the most preferred at 1.48%, this value has increased, in contrast to Afiah (2016), stating that puff pastry has a water content of 6.84%, the higher the protein or gluten in the flour, the higher the water absorption capacity (Sutriyono *et al*., 2016), this states that puff pastry with the addition of fish flour has a low water content because it has a high protein content and causes the water absorption capacity of the dough to be higher which causes the water content results in the most preferred puff pastry to be only 1.48%.

The increase in water content in puff pastry has a significant impact on the texture, appearance, aroma, and taste of the final product. The texture of the increase in water content can interfere with the formation of a perfect layer because too much water vapor produced during baking can make the dough softer and less crispy. The water content of the dough should be sufficient to produce steam to help separate the layers of dough, but too much water can make the dough dense and heavy. The appearance of puff pastry can change with increasing water content, becoming paler and less golden because excess moisture prevents caramelization and the formation of the desired color. The aroma of puff pastry becomes less appealing, because higher moisture levels can inhibit the development of the characteristic aromas that come from fat and baking reactions. The taste of puff pastry with a higher water content is less savory because water does not have the ability to absorb and distribute flavors like fat. Puff pastry that is more moist can feel heavier in the mouth, reducing the taste pleasure provided by the light texture and crisp layers. Increasing the water content in puff pastry decreases the quality of the final product by reducing the delicious texture, appearance, aroma, and distinctive taste.

Fat is one of the most important sources of energy needed, especially by humans, which is useful for carrying out daily activities (Santika, 2016). The fat content of the proximate test results of puff pastry without the addition and the most preferred treatment can be seen in Table 14. The fat content of puff pastry without the addition of tilapia fish flour is 38.16%, while puff pastry with the addition of tilapia fish flour is the most preferred at 38.64%, this value has increased, the amount of fat content is greater than the study (Afiah *et al*., 2023) only produced puff pastry with a content of 25.76% this is because there is no fish flour content which causes the fat content to not be too high compared to puff pastry with added fish flour.

Fish have different amounts of fat, some have high fat content and some have low fat content. Fat is one of the major elements in fish (Batubara, 2009). The fat in fish contains polyunsaturated fatty acids that undergo oxidation or hydrolysis processes that produce a rancid odor quickly (Batubara, 2009). Increasing the fat content in puff pastry has a significant impact on texture, appearance, aroma, and taste.

The texture that experiences increased fat content produces puff pastry that is crispier and airier because fat plays an important role in forming layers of dough when baked. Fat melts during baking, creating steam that helps expand and separate the layers of dough, giving a distinctive and layered texture. The appearance of puff pastry with more fat looks glossier and golden in color because the fat caramelizes on the surface. The aroma is more fragrant with increasing fat content which gives a distinctive buttery aroma of fat that is appetizing. The taste of puff pastry becomes more delicious, because fat absorbs and distributes flavors more efficiently, giving a more savory taste. Increasing the fat content in puff pastry produces a product that is more visually appealing, more fragrant, crispier, and more delicious, which significantly improves the consumption experience.

Carbohydrates play an important role in determining the characteristics of food ingredients such as taste, appearance and texture, different in the body, carbohydrates are useful for preventing ketosis, protein breakdown, mineral loss and are useful for helping the fat and protein metabolism system (Winarno, 2002). The carbohydrate content of the proximate test

results of puff pastry without the addition and the most preferred treatment can be seen in Table 14. The carbohydrate content of puff pastry without the addition of tilapia fish meal is 49.04%, while puff pastry with the addition of tilapia fish meal is the most preferred at 47.12%, according to Afiah (2016), stating that the large content of butterfly pea flower puff pastry produces a carbohydrate content of 56.92%, where this carbohydrate content is quite high compared to puff pastry with the addition of tilapia fish meal.

The increase in carbohydrate content in puff pastry through the addition of fish meal can affect the texture, appearance, aroma, and taste. The texture that experiences increased carbohydrates can make puff pastry denser and less crispy. The appearance of puff pastry is more golden and attractive due to caramelization during baking. This brownish color is considered a sign that the puff pastry has been baked perfectly. Puff pastry with high carbohydrate content creates a sweet aroma created by the Maillard reaction. The taste of puff pastry with higher carbohydrate content will be sweeter, which can increase the deliciousness of the sweet taste. The increase in carbohydrate content in puff pastry provides an increase in visual appeal and sweet aroma, but it needs to be controlled so that there is no damage to the texture and balance of taste in puff pastry products.

CONCLUSION

Based on the research results, it can be obtained that the percentage of the addition of tilapia fish meat flour to puff pastry products that is most preferred in the hedonic test is the treatment of adding tilapia fish meat flour of 2.5% which has a preference level value for appearance, texture and aroma of 7.0 (preferred), taste 9.0 (very preferred) and has an alternative value of 8.27, as well as a proximate content test which has a protein content of 8.74%, ash content of 1.80%, fat content of 38.64%, water content of 1.48%, and carbohydrate content of 47.12%.

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