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LEVEL OF ADDITION OF TILAPIA MEAL TO DRIED NOODLES

Tingkat Penambahan Tepung Daging Ikan Nila Pada Kesukaan Mi Kering

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ABSTRACT

Increasing the protein content of dry noodles can be done by adding tilapia fish meal. This research aims to determine the maximum percentage level of adding tilapia meat flour in the manufacture of dry noodle products that is still preferred by panelists. The research was conducted from February to April 2024 at the Fishery Product Processing Laboratory, Faculty of Fisheries and Marine Sciences, Padjadjaran University. This research method was experimental with 4 treatments with levels of tilapia fish meal addition of 0%, 7.5%, 10% and 12.5%. The parameters observed were the level of preference for color, aroma, texture and taste of dried noodle products using a hedonic test. The research results concluded that the addition of 10% tilapia fish meat flour was the maximum addition treatment that was still preferred based on the hedonic test with an average value of color 7.24, aroma 6.76, texture 6.92, and taste 6.6 with an overall average is 6.88 which is close to 7 which can be defined as liking. And has a protein content of 17.88%, water content of 12.78%, ash content of 2.01%, fat content of 0.49%, and carbohydrate content of 66.84%.

Keywords: Dry Noodles, Hedonic Test, Tilapia, Tilapia Meat Meal

ABSTRAK

Peningkatan kandungan protein pada mi kering dapat dilakukan dengan penambahan tepung daging ikan nila. Penelitian ini bertujuan untuk menentukan persentase tingkat penambahan tepung daging ikan nila maksimal pada pembuatan produk mi kering yang masih disukai oleh panelis. Riset dilakukan bulan Februari hingga April 2024 di Laboratorium Pengolahan Hasil Perikanan, Fakultas Perikanan dan Ilmu Kelautan, Universitas Padjadjaran. Metode riset ini adalah eksperimental dengan 4 perlakuan tingkat penambahan tepung daging ikan nila sebesar 0%, 7,5%, 10%, dan 12,5%. Parameter yang diamati adalah tingkat kesukaan warna, aroma, tekstur, dan rasa produk mi kering menggunakan uji hedonik. Hasil riset menyimpulkan bahwa penambahan tepung daging ikan nila sebesar 10% adalah perlakuan penambahan maksimal yang masih disukai berdasarkan uji hedonik dengan nilai rata-rata warna 7,24, aroma 6,76, tekstur 6,92, dan rasa 6,6 dengan rerata keseluruhan adalah 6,88 yang mendekati angka 7 dapat didefinisi sebagai suka. Serta memiliki kadar protein 17,88%, kadar air 12,78%, kadar abu 2,01%, kadar lemak 0,49%, dan kadar karbohidrat 66,84%.

Kata Kunci: Mi Kering, Ikan Nila, Tepung Daging Ikan Nila, Uji Hedonik

INTRODUCTION

According to KKP data, Indonesian tilapia fish production in 2022 will reach 1.41 million tonnes with a value of IDR 36.47 trillion. This amount increased 4.27% compared to the previous year which reached 1.35 million tons. Tilapia meat has a delicious taste, there are no fine spines that can make it difficult for consumers to eat it with its thick flesh (Cahyono, 2010). Tilapia fish contains protein and vitamin D, is low in fat, has a soft texture and taste that is suitable for processing into various dishes, both local and international recipes, and does not have an earthy smell (muddy flavor).

One of the innovations in processing tilapia meat is making it into flour and adding it to food products. Tilapia meat meal has advantages over using fish meat to add to food products. You can add meat flour to dry noodles.

Noodles are a food product that is popular in various countries, including Indonesia, even though the name, ingredients, shape and processing method for noodles are different from one another. Currently, noodles have become an alternative food product to replace rice which is popular with almost all groups, from children, teenagers, to adults in Indonesia. Indonesia is the world's second largest consumer of instant noodles after China. There are several types of noodles, such as wet noodles, dry noodles and instant noodles.

Fortification will affect the level of liking of a product, the higher it is, the more unpopular the addition will be. The addition of certain ingredients to a food product can cause physical and chemical changes to a product. If a product experiences changes or is different from its original characteristics, it will affect people's acceptance of the product, making it less popular (Nadimin & Abdullah, 2013).

The aim of this research was to obtain the organoleptic characteristics of dry noodles fortified with tilapia fish meal.

METHODS

Time and Place

Research will be carried out at the Fishery Products Processing Laboratory, Padjadjaran University for the manufacture of tilapia fish meat flour, dry noodles and hedonic testing from February to March 2024.

Tools and Materials

The tools used in making tilapia fish flour and dried noodles are a knife, basin, blender, 100 mesh sieve, digital scale, steaming pan, baking sheet, croton cloth, noodle maker, oven, cutting board, spoon and fork

The ingredients used in making tilapia fish flour and dried noodles are tilapia fish meat, tilapia fish flour, high protein wheat flour, tapioca flour, mineral water, salt and chicken eggs.

Research Design

The method used in this research was experimental using 4 treatments and 25 repetitions (panelists used). The treatment used was the addition of tilapia fish meat flour to making dry noodles based on the weight of wheat flour used in percentage with the following treatment:

- Treatment A : Addition of 0% tilapia fish meal (Control)
- Treatment B : Addition of 7.5% tilapia fish meal
- Treatment C : Addition of 10% tilapia fish meal
- Treatment D : Addition of 12.5% tilapia fish meal

The research procedure was carried out by first making tilapia fish meat flour, dry noodle formulation in Table 1 and characterization of product quality.

Making Tilapia Meat Meal

Making fish meat meal refers to a modified version of Amirullah (2008) which begins with weeding, removing the scales, entrails and gills of fresh tilapia, then washing with clean water and draining. Tilapia fish that have been cleaned are then steamed using a steamer (boiler) for 10 minutes after boiling water at a temperature of 100ºC. The flesh of the fish that has been steamed is removed using a spoon and fork. Fish meat is dried in the oven at 45℃ for 4 hours. The dried fish meat is then ground using a powder grinder until smooth and homogeneous. The finely ground fish meat is sifted using a 100 mesh sieve.

Making Dry Noodles

Making dry noodles refers to Canti *et al*. (2020) which has been modified which begins with mixing all the ingredients evenly in a predetermined ratio. The dough formed is made into small balls, then rolled into sheets using a noodle maker. This process is carried out until the surface of the dough is smooth. Leave the dough sheets for 15 minutes so that the gelatinization process is optimal. The sheets that have been left to rest are milled again to a thickness of 4 mm and formed into noodle shapes. The ground noodle dough is left to rest for 30 minutes, then steamed at 100°C for 15 minutes. Drying was carried out in the oven for 3 hours at 60°C. Cool the dried noodles at room temperature for 15 minutes.

Table 1. Formulation of Dry Noodle Ingredients with The Addition of Tilapia Fish Meal

Foodstuffs	Treatment			
	A (0%)	B (7.5%)	C (10%)	D (12.5%)
Fish meal (grams)	0	7.5	10	12.5
Wheat flour (grams)	100	100	100	100
Eggs (grams)	10	10	10	10
Salt (grams)	2	2	2	2
Water (ml)	35	35	35	35

Test Parameters

The parameters observed were organoleptic properties which included the level of preference for taste, aroma, color and texture of each dry noodle treatment using the hedonic test. The hedonic test was assessed by 25 people (slightly trained panelists) referring to SNI 2346:2015 regarding guidelines for sensory testing of fishery products. The panelists were asked to honestly express their choice of assessment or response to the sample, whether they liked or disliked it, even during the assessment process. This research proposes a research scale consisting of 5 responses, namely 9 = states they really like it, 7 = states they like it, 5 = states they are neutral, 3 = states they don't like it, and 1 = states they really don't like it. To serve, the noodles are first boiled for ±10 minutes, then each sample is placed on a small white plate.

Data Analysis

Test was analyzed statistically non-parametrically using a two-way analysis of variance Friedman test (Sudrajat, 1999). Friedman test to determine whether n samples (more than two samples) have a treatment effect on the observed parameters (Artaya, 2018). Friedman's formula is as follows:

$$X^2 = \frac{12}{bk\,(k+1)} \sum_{i=1}^{t} (Rj)^2 - 3b\,(k+1)$$

Information:
X^2 = *Friedman Test Statistics*
B = Repetition
K = Treatment

Rj = Total Rank of each treatment

If there are the same numbers, the correlation factor (FK) is calculated using the following formula:

$$X^2c = 1 - \frac{x^2}{FK} \quad FK = 1 - \frac{\sum T}{nk\,(k-1)}$$

Information:

T = $\sum ti^3 - \sum ti$

t_i = the number of same observation values for a rank in the ith block

If the treatment has a real effect and it is analyzed using a multiple comparison test to determine the differences between treatments. The multiple test formula is as follows:

$$|Ri - Rj| \geq Z\left[\frac{\propto}{k\,(k-1)}\right] - \frac{\sqrt{nk\,(k+1)}}{\epsilon}$$

Information:

| *Ri - Rj* | = Difference in average ranking. The normality value/criteria weight obtained is multiplied by the median value of the hedonic test results for each the treatment criteria are then added together to obtain a value alternative.

R*i* = Average ranking of the 1st sample

R*j* = Average ranking of the jth sample

α = Experimental wise error.

n = Number of data or repetitions

k = Number of treatments

Z = Value in the Z table for *Multiple Comparison* (α/k (k-1))

Determining the best decision making is done using the Bayes method. The Bayes method is a technique used to carry out analysis in making the best decision from a number of alternatives or treatments with the aim of producing optimal results based on the highest total value of each treatment (Marimin, 2004). The criteria in question are the parameters of appearance, aroma, texture and taste. The Bayes equation is as follows:

$$Total\ nilai_i = \sum_{i-1}^{m} Nilai_{ij}\,(krit_j)$$

Information:

Total value $_i$: The total final value of the i-th alternative

Value $_{ij}$: Value of the i-th alternative in the j-th criterion

Criterion $_j$: The level of importance (weight) of the jth criterion

i : 1,2,3, ……n;n = number of alternatives

j : 1,2,3, ……n;n = number of criteria

Combining data for each criterion using the geometric average formula, namely:

$$XG = \sqrt[n]{\pi}.xi$$

Information:

xG = Geometric Mean

π = Permutation

N = Number of Panelists

xi = Assessment by panelist i

RESULT

Hedonic Quality of Dried Noodles Fortified with Tilapia Meat Meal

The organoleptic test results of dry noodles fortified with tilapia fish meal can be seen in Table 2.

Table 2. Hedonic Test Results

Treatment	Hedonic Test							
	0%		7.5%		10%		12.5%	
	Median	Average	Median	Average	Median	Average	Median	Average
Color	7	6.44[a]	7	7.16[a]	7	7.24[a]	7	6.44[a]
Aroma	9	7.8[b]	7	6.76[a]	7	6.76[ab]	5	5.8[a]
Texture	7	7.24[a]	7	7.08[a]	7	6.92[a]	7	6.44[a]
Flavor	7	7.56[c]	7	7.08[bc]	7	6.6[a]	5	5.48[a]

Decision Making Using the Bayes Method

The calculation results of the weighting criteria for color, aroma, taste and texture of dry noodles and alternative values in determining the best treatment can be seen in Table 3.

Table 3. Criteria Weights

Criteria	Criteria Weight
Color	0.10
Aroma	0.19
Flavor	0.50
Texture	0.21

The calculation results to determine the best treatment using the Bayes method by considering the criteria of color, aroma, taste and texture of dry noodles with the addition of tilapia fish meal are presented in Table 4.

Table 4. Bayes Criteria

Treatment	Criteria				Alternative Value	Priority Value
	Color	Aroma	Flavor	Texture		
0%	7	9	7	7	7.38	0.2733
7.5%	7	7	7	7	7.00	0.2592
10%	7	7	7	7	7.00	0.2592
12.5%	7	5	5	7	5.62	0.2083
Criterion Value	0.10	0.19	0.50	0.21	27.00	1.0000

The color of dried noodles with the addition of tilapia fish flour from various treatments can be seen in Figure 1.

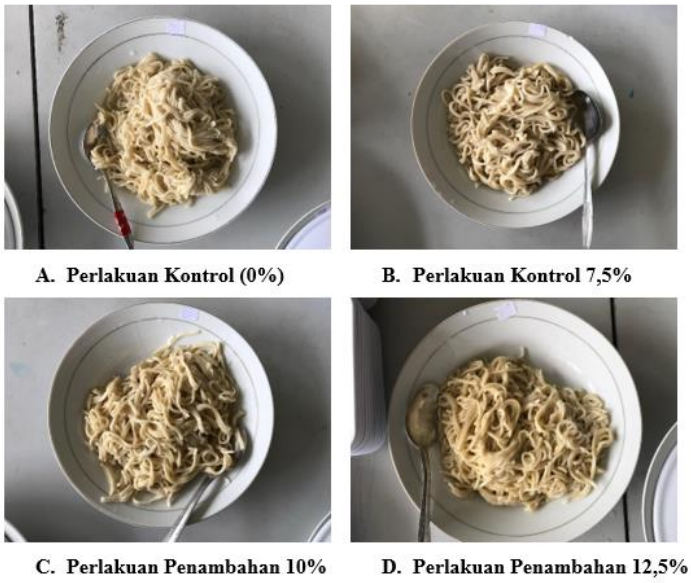

Figure 1. Color of Dried Noodles with the Addition of Tilapia Meat Meal from Various Treatments

DISCUSSION

Color

Color is used as an indicator in determining the quality, freshness or maturity of a product. Apart from that, color is also an indicator in the mixing or processing method of a product which indicates whether the product is evenly distributed or not (Sidi *et al.*, 2014). The addition of tilapia fish meal to making dry noodles can be seen in Figure 1. It does not have a real effect. The median value of the panelists' assessment of the color of dried noodles was 7, which means that the color of dried noodles with the addition of tilapia fish meat flour was still liked by the panelists. The highest average value was found in the dry noodle treatment with the addition of 10% tilapia fish meal, while the lowest average color was found in the dry noodle treatment with the addition of 0% (control) and 12.5%, namely 6.44. This is in line with research from Apriansyah *et al.* (2021) who stated that the addition of 10% African catfish meat flour was the treatment with the highest score, namely 4 because the panelists preferred the yellowish color. Research from Canti *et al*. (2020) Adding up to 20% tuna fish meal to cooked dry noodles does not affect panelists' preferences for color attributes. The hedonic value of color shows that the higher the concentration of fish, the more the preference value for the color will decrease. This is because the addition of fish meal makes the noodle dough have a darker color (Andira *et al.*, 2022). The color of the flesh of the fish affects the color of the product produced. Tilapia fish meat has almost the same color as catfish meat, namely reddish white, and apart from the color of the fish meat, there is a factor that influences the color, namely the calcium found in tilapia fish, which is 96 mg.

Aroma

Aroma is one of the main attractions for panelists in determining the preference value for noodle products (Amalia *et al.*, 2023). The aroma of food largely determines the deliciousness of a food, because the aroma received by the nose and brain is a mixture of four main odors, namely fragrant, sour, rancid and burnt (Sidi *et al*., 2014). Dried noodles have a dominant wheat flour aroma. The addition of tilapia fish flour to dried noodles affects the aroma of dried noodles in general. The 0% control treatment had an average value of 7.8 which produced dry noodles with a dominant wheat flour dough aroma. The control treatment was the treatment most preferred by the panelists because it had an aroma. According to Farhana *et al*. (2017) the

aroma smells more typical of fish because the greater the concentration of fish added, the product is dominated by the fish smell which tends to be high. like dry noodles in general and does not produce a distinctive fish smell. The 7.5% treatment had an average of 6.76, producing dry noodles with a fish aroma that was quite noticeable, although slightly. The 10% treatment had an average of 6.76 producing dry noodles with an aroma that was not much different from the 7.5% treatment. The 12.5% treatment with an average of 5.8 produced a fishier aroma of tilapia meat meal that was more pronounced than the 10% treatment. Research from Canti *et al*. (2022) stated that the highest aroma value was obtained in the treatment without the addition of skipjack tuna flour or control, namely 4.68 with a non-fishy aroma. Research from Canti *et al*. (2020) stated that the highest aroma value was obtained in the treatment without the addition of tuna fish meal or control, namely 5.32 with a non-fishy aroma. The fishy smell and taste of fish can be caused by free amino acids from the protein content in the meat as well as various free fatty acids from the fat content in the fish meat (Hasanah *et al.,* 2017). The addition of tilapia fish flour to dried noodles has a significant effect on the aroma. The more tilapia meat flour you add, the aroma of tilapia meat flour increases.

Texture

Texture greatly influences the image of food and is sometimes more important than smell, taste and color (Sidi *et al.,* 2014). The addition of tilapia fish flour to dry noodles on texture based on statistical test results was not significantly different in all treatments. The control treatment produces dry noodles that are springy, soft and smooth. The 7.5% treatment with an average value of 7.08 produces dry noodles with a chewy, quite soft and smooth texture. The 10% treatment with an average value of 6.92 produces dry noodles with a chewy texture, quite soft and quite smooth. Likewise, the 12.5% treatment with an average value of 6.44 produces dry noodles with a chewy texture, quite soft and quite smooth. The 0% treatment is the treatment preferred by the panelists based on the highest average and produces dry noodles with a chewy, soft and smooth texture which indicates that the higher the addition of fish meal, the preference value in terms of texture will decrease, this is in line with Amalia *et al*. (2023) who stated that the more flying fish meal that is substituted, the more the elasticity of the noodles will decrease. According to Silaban *et al*. (2017) Protein plays a role in increasing the hard texture because the proteins found in fish are myosin and actomyosin. Proteins consisting of myosin and actomyosin in fish meat play an important role in coagulation and gel formation, so that if the fish is processed it will produce a solid structure. This is in line with research by Apriansyah *et al*. (2021) which shows that the treatment of adding Dumbo catfish meat with a different composition has no real influence on the resulting texture value. This shows that there is a level of preference that also tends to be the same for the texture of the instant noodles produced. Research from Canti *et al*. (2020) showed that the highest texture value resulted from treatment without the addition of tuna meat flour or control with a value of 5.20.

Flavor

Taste is one of the most important parameters in organoleptic testing because it has a significant influence on consumer acceptance of food products (Amalia *et al.,* 2023). The savory taste comes from fish which contain high protein, protein contains glutamic acid which gives a savory taste to food (Sulistiyati *et al.,* 2017). The addition of tilapia fish meal to making dry noodles has a real effect. The 0% and 7.5% treatments were not significantly different. The 10% and 12.5% treatments were not significantly different, while the 0% and 10% treatments were significantly different and the 7.5% and 10% treatments were significantly different. Based on the assessment of the taste of dried noodles, the median value for all ingredients was obtained, which ranged from 5 to 7. The taste of dried noodles in the 12.5% treatment had the lowest median value, namely 5. The other median values had a value of 7. Addition of tilapia

fish meat flour to the noodles. dryness has a significant effect on taste. The more tilapia fish flour you add, the fishier taste of the noodles will increase. Table 10 shows that the more fish concentration added, the lower the panelists' acceptance of taste parameters. This is in line with research by Canti *et al*. (2022) which showed that the taste assessment of dry noodles without the addition of skipjack tuna flour or control had the highest value, namely 4.88. According to research by Canti *et al*. (2020), the taste attribute of cooked dry noodles with the addition of 25% tuna fish flour showed low results, namely the taste of tuna fish, the panelists preferred dry noodles without the addition of tuna fish flour. Changes in the taste of food ingredients are caused by the decomposition of proteins, fats and carbohydrates through chemical processes that occur as a result of enzymatic reactions (Hadiwiyoto, 1993). According to Yulianti (2018), panelist acceptance decreased when skipjack tuna meal was used in dry noodle production when skipjack tuna meal was added, this was because too much skipjack tuna made the dry noodles taste like fish. Panelists prefer dry noodles with a little tilapia flour in them.

Decision-making

Decision making can be done using various methods, such as the exponential comparison method (MPE), composite performance index (CPI), analytical hierarchy process (AHP), and Bayes (Rangkuti, 2011). Decision making using the Bayes method is a technique for analyzing appropriate decision making from a number of alternatives, with the aim of producing optimal decisions by considering various criteria (Rangkuti, 2011). The results of calculating the parameters of color, aroma, texture and taste of dry noodles showed that the highest number of criteria weights was found in the taste parameter of 0.50, which means that the taste parameter is the most important parameter or the main consideration according to the panelists in choosing dry noodle products. The second most important parameter is texture, followed by aroma and color with the respective criteria weight values being 0.21; 0.19; and 0.10. Overall, the 0% treatment is the most preferred treatment by the panelists and the 10% treatment is the treatment limit that is still preferred by the panelists based on the alternative values obtained, and taste is the most important parameter based on the criteria weight values.

CONCLUSION

Based on the results of research that has been carried out, it can be concluded that the addition of tilapia fish meal to dry noodles with the treatment of 0%, 7.5%, 10% and 12.5% with the 0% treatment is the best treatment with a value of hedonic which includes color 6.44, aroma 7.8, taste 7.56, and texture 7.24 with an overall mean value of 7.26 which can be defined as liking, while the final limit of treatment still received by panelists is 10% treatment with hedonic values including color 7.24, aroma 6.76, taste 6.6, and texture 6.92 with an overall average of 6.88 which is close to 7 which can be defined as liking.

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