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PREFERENCE LEVEL OF WET NOODLES WITH ADDITION SNAKEHEAD FLOUR

Tingkat Kesukaan Mi Basah Dengan Penambahan Tepung Ikan Gabus

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ABSTRACT

Snakehead (*Channa striata*) is a high-protein fish that is less preferred for direct consumption. Through food diversification, snakehead fish meat can be processed into fish flour and incorporated into various food products, including wet noodles. This study aims to determine the optimal concentration of snakehead fish flour to produce wet noodles with the highest panelist preference. The method used was a laboratory experimental method, involving the preparation of wet noodles with snakehead flour at four different concentrations (0%, 5%, 10%, and 15%) and an evaluation by 25 semi-trained panelists to determine their preferences. The parameters observed included fishmeal yield, panelist preferences, and the chemical composition of wet noodles. The 10% snakehead flour treatment was the most preferred, with the highest alternative value of 8.05, and average scores for appearance (8.12), aroma (5.80), texture (6.68), and taste (7.72). The chemical composition of the 10% treatment included 10% protein content, 33.94% water content, 7.54% ash content, 3,85% fat content, and 44,67% carbohydrate content.

Keywords: Diversification, fish flour yield, hedonic, proximate analysis.

ABSTRAK

Ikan gabus (*Channa striata*) adalah salah satu jenis ikan tinggi protein yang kurang diminati masyarakat untuk dikonsumsi langsung. Melalui diversifikasi pangan, daging ikan gabus dapat diolah menjadi tepung untuk ditambahkan ke dalam berbagai produk makanan seperti mi basah. Tujuan penelitian ini yaitu menentukan konsentrasi penambahan tepung ikan gabus untuk menghasilkan mi basah yang paling disukai panelis. Metode yang digunakan adalah metode eksperimental laboratorium yaitu pembuatan mi basah dengan penambahan tepung ikan gabus dengan empat perlakuan (0%; 5%; 10%; dan 15%) dan 25 orang panelis semi terlatih sebagai ulangan untuk mengetahui tingkat kesukaan panelis terhadap mi basah. Parameter yang diamati adalah rendemen tepung ikan, tingkat kesukaan dan kadar kimia mi basah. Penambahan tepung ikan gabus yang paling disukai adalah perlakuan 10% karena memiliki nilai alternatif terbesar yaitu 8,05 dengan nilai rata-rata kenampakan yaitu 8,12; aroma 5,80; tekstur 6,68; dan rasa

7,72. Uji kimia yang dihasilkan yaitu kadar protein 10%, kadar air 33,94%; kadar abu 7,54%; kadar lemak 3,85%; dan kadar karbohidrat 44,67%.

Kata kunci : Diversifikasi, hedonik, proksimat, rendemen tepung ikan.

INTRODUCTION

Snakehead fish (Channa striata) is one of the freshwater fish that can be found in Indonesia with a production figure reaching 78,884.63 tons in 2021 (KKP 2021). This fish can live in dirty waters, low oxygen levels and lack of water. Snakehead fish has thick, white flesh, and has no bones between the flesh so that it can be easily processed into food products (Ayu et al., 2022). In Indonesia, snakehead fish has been used as a raw material for making regional specialties, such as in Papua and South Sumatra. However, there are still people who do not want to consume snakehead fish because its shape is like a snake with a fishy aroma (Arfan et al., 2021; Rahmaniar et al., 2023). Saputri et al., (2022) also stated that in some areas, snakehead fish is less popular with children because of its fishy smell and lack of processing variations. Thus, variations in snakehead fish processing are needed to increase the utilization of snakehead fish, as well as the interest in snakehead fish consumption (Fatmawati and Mardiana, 2014).

One variation in snakehead fish processing is to make flour to increase the surface area, extend the shelf life, facilitate handling and be more easily homogenized than still in the form of fish meat (Fatmawati and Mardiana, 2014; Prastari et al., 2017). Snakehead fish flour contains 13.61% water, 0.55% fat, 76.9% protein, 3.53% carbohydrates, 5.96% ash, 4.43 mg iron, 3.09 mg zinc, and 24.25% albumin. The manufacture of intermediate products such as snakehead fish flour can increase the consumption of snakehead fish by turning it into a more effective and efficient product (Rahmaniar et al., 2023). This snakehead fish flour can be used as the main ingredient or additional ingredient in products such as wet noodles.

Wet noodles are a popular type of noodle and are used as an alternative food to replace rice which is widely consumed by Indonesian people (Rosalina et al., 2018). These wet noodles are made from wheat flour so they have a high energy content but are limited in protein, fiber, and minerals such as calcium (Rahmi et al., 2019). As stated by Nurfina et al., (2022), most noodles that are already on the market have low nutritional content, high in carbohydrates but low in protein, vitamins, and minerals. The content of wet noodles in 100 g consists of 80 g of water, 14 g of carbohydrates, 3.3 g of fat, 0.6 g of protein, 14 mg of calcium, 6.8 mg of iron, and does not contain vitamins (Ministry of Health, 2020). The protein content in snakehead fish flour can be used to increase the protein content in wet noodles. In line with the statement of Maharani et al., (2020), that the higher the concentration of fish flour added, the higher the protein content of wet noodles.

Wet noodles with snakehead fish flour can be used as a solution to add variety to the processing of snakehead fish so that it can be enjoyed by various groups. However, the addition of snakehead fish flour to wet noodles is a new product so it will affect the preferences of the noodles themselves, such as their appearance, taste, aroma and texture. As a product that has not yet been marketed, knowing the panelists' level of preference for wet noodles is important to obtain consumer opinions about the new product (Qamariah et al., 2022). Therefore, it is necessary to carry out a preference level test in order to determine the panelists' preference for wet noodles with snakehead fish flour added. Based on these problems, the aim of this research is to determine the concentration of adding snakehead fish flour to produce wet noodles that are most preferred by panelists.

RESEARCH METHODS

Place and Time

The research was conducted from August to October 2024. The manufacture of snakehead fish flour, the manufacture of wet noodle products, and hedonic testing were carried out at the Tropical Marine Fisheries Laboratory of the Off-Campus Study Program, Padjadjaran University, Pangandaran, and the chemical testing of noodles was carried out at the Center for Testing and Implementation of Fishery Product Quality (BP2MHP) Semarang.

Tools and Materials

The equipment used in this study included a gas stove, pan, digital scale, blend grinder, oven, 100 mesh flour sieve, Atlas PM098 Finito noodle maker, stopwatch, basin, baking pan, cutlery, thermometer, knife, measuring cup, noodle scoop, and ruler. The research materials consisted of snakehead fish, Cakra Kembar wheat flour, chicken eggs, water, salt, garlic, ash water, and cooking oil.

Research Design

This study used a laboratory experimental method with four treatments and replications of 25 semi-trained panelists. The panelists in this study were students of the Faculty of Fisheries and Marine Sciences, Padjadjaran University. The treatment given was the addition of snakehead fish flour calculated from the total weight of wheat flour used, namely 0%, 5%, 10% and 15%.

Procedure

Making Snakehead Fish Flour

The stages of making snakehead fish flour refer to Prastari et al., (2017), Rahmaniar et al., (2023), Safitri et al., (2022), and Alkhamdan and Husain (2022) with modifications. The manufacturing process begins with weighing the snakehead fish, then cleaning it and washing it with running water. The next process is steaming the fish at a temperature of 100 ℃ for 15 minutes. The steamed fish is separated from the bones, then chopped to reduce the size and dried in an oven at a temperature of 80 ℃ for 12 hours. After that, the dried meat is ground using a grinder and sieved with a 100 mesh sieve.

Making Wet Noodles

The making of wet noodles refers to the research of Rosalina et al., (2018) and Rahmi et al., (2019) with modifications. The stages begin by mixing sifted wheat flour with salt, garlic, eggs, ash water, and water according to the formulation. Snakehead fish flour is added to the dough according to the treatment (0%, 5%, 10%, 15%) and stirred until smooth. The dough is put into a roller to form sheets gradually at a thickness of number 1 (4 mm) five times, number 2 (3 mm) once, and number 3 (2 mm) once. This sheet is put into the noodle strand printer to form noodle ribbons with a width of 1-2 cm. The noodle strands are cut to a length of about 30 cm. Next, the noodles are boiled in boiling water mixed with cooking oil for 2 minutes. The cooked noodles are drained and cooled at room temperature.

Observed Parameters

Fishmeal Yield

Yield is the percentage of product obtained by comparing the product produced with the raw materials used (Farida et al., 2024). Yield can be used as a parameter to determine the economic value and effectiveness of a product or material process (Husna et al., 2020). The yield calculation formula is:

$$Yield\ (\%) = \frac{Fish\ meal\ weight}{Weight\ of\ raw\ materials} \times 100\%$$

Wet Noodles Like Level

The level of preference for wet noodle products was measured through a hedonic test using a test questionnaire by 25 semi-trained panelists. The parameters tested were appearance, aroma, texture, and taste. This test became the basis for assessing the level of preference for wet noodles that had been added with snakehead fish flour. The assessment of the level of preference used 5 hedonic scales consisting of 9 (very much like), 7 (like), 5 (quite like), 3 (dislike), and 1 (very much dislike) with a rejection limit for the product of 3. If the product being tested gets the same value or less than 3, then the product is declared not liked by the panelists (Soekarto, 1985).

Chemical Characteristics

Determination of chemical characteristics was carried out on control wet noodles (without the addition of snakehead fish flour) and on the best treatment. The chemical characteristics analyzed were protein content (SNI: 01-2354.4-2006), water content (SNI: 01-2354.2-2015), ash content (SNI 2354.1-2010), fat content (SNI 2354.3-2017), and carbohydrate content (by difference).

Data Analysis

The data obtained from the hedonic test results of wet noodle products added with snakehead fish were analyzed non-parametrically using the two-way analysis of variance technique of the Friedman test. To determine the best treatment of adding snakehead fish flour to wet noodles using the Bayes method with four parameters, namely appearance, aroma, texture, and taste. Data from the calculation of fish flour yield and chemical testing were analyzed using descriptive statistics. The results of these measurements will be compared with SNI Number 2987: 2015 concerning Wet Noodles to determine the suitability of the wet noodles produced with the SNI.

RESULT

Yield of Snakehead Fish Flour

The yield of snakehead fish meal is calculated from the weight of the meal obtained compared to the weight of the fresh snakehead fish used in percent (Dewita et al., 2023). The aim is to determine the percentage of the weight of the snakehead fish meal produced at the end of the process. The results of the calculation of the yield of snakehead fish meal can be seen in Table 1.

Table 1. Results of Calculation of Snakehead Fish Meal Yield

No	Calculation	Average Value
1.	Weight of snakehead fish used (grams)	838 ± 19,08
2.	Weight of snakehead fish flour produced (grams)	97 ± 3,06
	Yield (%)	**11,62 ± 0,5**

Level of Likeability

The panelists' preference level for wet noodles was determined based on a hedonic test of the appearance, aroma, taste and texture of the resulting wet noodle product. The appearance of wet noodles with the addition of snakehead fish flour is shown in Figure 1. The results of the analysis of the preference level for wet noodles with a hedonic test can be seen in Table 2**.**

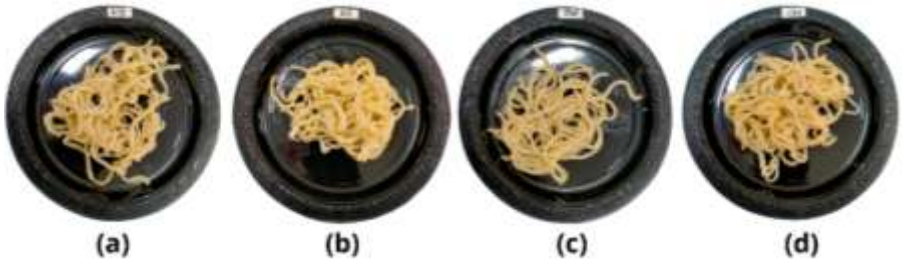

Figure 1. Appearance of Wet Noodles with the Addition of Snakehead Fish Flour: (a) Control; (b) Addition of 5% Snakehead Fish Flour; (c) Addition of 10% Snakehead Fish Flour; (d) Addition of 15% Snakehead Fish Flour%.

Table 2. Hedonic Test Results

Parameter	Treatment							
	0%		5%		10%		15%	
	Median	Average	Median	Average	Median	Average	Median	Average
Appearance	7	6,60^{ab}	7	6,20^{a}	9	8,12^{b}	7	6,68^{ab}
Aroma	7	6,84^{a}	7	5,88^{a}	5	5,80^{a}	5	5,56^{a}
Texture	9	7,48^{a}	7	7,00^{a}	7	6,68^{a}	7	6,52^{a}
Taste	7	6,28^{a}	7	6,52^{ab}	9	7,72^{b}	5	6,04^{a}

Determining Best Treatment

The selection of the best wet noodle treatment was carried out using the Bayes method. The calculation results were based on the multiplication of the median value of the hedonic test of each criterion in each treatment with the criterion weight value. The results of the data are presented in the decision matrix in Table 3.

Table 3. Determination of the Best Treatment Using the Bayes Method

Treatment	Criteria				Alternative Values	Selected Product Order
	Appearance	Aroma	Flavor	Texture		
A (0%)	7	7	7	9	7,45	2
B (5%)	7	7	7	7	7,00	3
C (10%)	9	5	9	7	8,05	1
D (15%)	7	5	5	7	5,76	4
Criteria Weight	0,15	0,13	0,50	0,22	28,25	

Chemical Characteristics of Wet Noodles

The proximate test was conducted to determine the chemical characteristics of the control wet noodles (without the addition of snakehead fish flour) and the most preferred wet noodles (10% addition of snakehead fish flour). The results of the proximate test were compared with SNI 2987:2015 on Wet Noodles. The calculation results can be seen in Table 4.

Table 4. Proximate Test Results of Wet Noodles

No	Analysis Parameters	Catfish Flour 0%	Catfish Flour 10%	SNI 2987:2015 on Wet Noodles
1	Protein Content	7,23%	10%	Min. 9%
2	Water content	33,07%	33,94%	Maks. 35%
3	Ash Content	6,71%	7,54%	-
4	Fat Content	3,37%	3,85%	-
5	Carbohydrate Levels	49,62%	44,67%	-

DISCUSSION

Rendemen Tepung Ikan Gabus

Fresh snakehead fish used as raw material has an initial weight of 838 grams. After going through the steaming and drying process using an oven, snakehead fish flour was obtained with a final weight of 97 grams. Thus, this method produces a snakehead fish flour yield of 11.62%. This value is higher than the research of Sari et al., (2014) which only obtained a yield of 8%, but lower when compared to the research results of Fatmawati and Mardiana (2014) which ranged from 15.58% - 16.47%, and Asih and Arsil (2020) which ranged from 20.06%.

Differences in yield values can be influenced by several factors, such as the edible portion of the fish used and the processing method (Cahyani et al., 2020; Fatmawati and Mardiana 2014). According to Asikin and Kusumaningrum (2017), the edible portion of snakehead fish weighing 200–500 grams/fish is 36.2%. The heavier the weight of the fish, the higher the percentage of the edible portion of the fish and vice versa. The edible portion value will affect the yield value of snakehead fish flour because the main ingredient for making snakehead fish flour is only fish meat (Cahyani et al., 2020; Ghazali et al., 2014).

The yield of fish flour can be influenced by the processing method used. Fatmawati and Mardiana (2014) made snakehead fish flour by boiling which had a higher yield value than processing snakehead fish by steaming. This is because during boiling, the water content in the fish meat will be higher when compared to the steaming method which is carried out without direct contact with water and only uses hot steam. Asih and Arsil (2020) processed snakehead fish by pressure cooking which resulted in the fish bones becoming soft so that they can also be used as raw materials for making snakehead fish flour. In addition to the processing method, the high temperature used when drying using an oven can increase the evaporation of water in food ingredients, thereby reducing the yield value (Cahyani et al., 2020).

Wet Noodles Like Level

Appearance

The addition of snakehead fish meal significantly affected the level of appearance preference. The highest average appearance value was treatment C (10%) which produced a homogeneous yellowish white color and a neat noodle shape with uniform thickness. The lowest average value was in treatment B (5%) with bright yellow noodle color but had inconsistent thickness so that the shape of the resulting noodle strands was not neat.

Overall, it can be seen in Figure 1 that the color of the noodles looks duller with the addition of more snakehead fish meal. This is in line with the research of Safitri et al., (2022) which states that the higher the concentration of catfish meal added, the darker the color of the wet noodles will tend to be. The increasingly dull color comes from the boiling process which causes coagulation of sarcoplasmic and stromal proteins (Rumapar, 2015). In addition, it is also because the added snakehead fish meal has a color that tends to be brownish and contrasts with the other noodle making ingredients.

The thickness and shape of the noodle strands are influenced by the water content in the dough, where the addition of snakehead fish meal reduces the percentage of water. Dough with high water content becomes softer with low viscosity, making it difficult to maintain its shape when molded and producing non-uniform noodle strands. Conversely, dough with low water content is harder and stiffer, making it difficult to mold, at risk of breaking when rolled, and easily broken when cut (Billina et al., 2015) In this study, treatment C (10%) had a water content that was balanced with other ingredients, producing noodle strands that were uniform in size and shape.

Aroma

The addition of snakehead fish flour did not have a significant effect or did not provide a significant difference in the level of panelists' preference for the aroma attributes of the resulting wet noodles. The highest average aroma value was in wet noodles without the addition of snakehead fish flour and the lowest average value was in the treatment of adding snakehead fish flour by 15%. The distinctive aroma of fish was not detected in wet noodles without the addition of snakehead fish flour, while wet noodles with the addition of snakehead fish flour had a distinctive aroma of fish that became stronger as the concentration of the addition of snakehead fish flour increased. This is in line with the research of Maharani et al., (2020) and Valentina et al., (2021) that the more anchovy flour, catfish flour, gourami fish flour and patin fish flour were added to wet noodles, the panelists' preference value decreased from 7.13 to 5.8-6.2 because the wet noodles smelled increasingly fishy and rancid.

The aroma of wet noodles is influenced by volatile compounds in fish flour that come from the oxidation of fat or fatty acids due to drying. These compounds are from alcohol, ketone, ester and aldehyde groups (Zhang et al., 2020). These compounds provide a strong, specific fish aroma. In addition, the aroma that appears in wet noodles is also caused by the spices or other ingredients used (Kaudin et al., 2019). Garlic contains spicy and fragrant methyl allyl disulfide, so it will produce a fragrant aroma (Sulsia et al., 2020).

Texture

The addition of snakehead fish flour did not have a significant effect or did not provide a significant difference in the level of panelists' preference for the texture attributes of the resulting wet noodles. The level of preference for the texture of wet noodles decreased with the addition of snakehead fish flour up to 15%. The highest average value was treatment A (0%) and the lowest was treatment D (15%) with a texture that was no different from other treatments, namely rather chewy, less elastic and not easily broken. This is in line with research (Ilham et al., 2022), that the more mackerel fish flour was added, the texture of wet noodles decreased from 6 to 5.96-5.72 because the noodle texture was less elastic.

The chewy texture of noodles comes from the gluten contained in wheat flour. Gluten functions to provide shape or form the structure of noodles (Susanti et al., 2011). The addition of ash water to the dough will accelerate the binding of gluten, increase elasticity, flexibility, and increase the smoothness of the noodle texture (Yulizar et al., 2014). Reducing gluten makes noodles less elastic and less fluffy (Sihmawati and Wardah 2021). Fish proteins such as myosin and actomyosin also produce a denser noodle structure (Fitriani and Roziana 2023). However, wet noodles in this study had a texture preference value that was not significantly different between treatments. The addition of snakehead fish flour which has high protein and fat content, namely reaching 76.9% protein content and 0.55% fat content, makes the texture of wet noodles not harden.

Flavor

The addition of snakehead fish flour has a significant effect or provides a significant difference in the level of panelists' preference for the taste attributes of the resulting wet noodles. The highest average taste value is in wet noodles with the treatment of adding 10% snakehead fish flour with a savory taste. The lowest average value is in the treatment of adding 15% snakehead fish flour with a savory taste tending to be bitter. This is in line with the research of Mulyana and Farida, (2024) where the addition of snakehead fish flour to kwetiau produces a savory taste, but the more concentration it is added, the more bitter the kwetiau taste becomes. The taste of a product is caused by the presence of nonvolatile compounds such as free amino acids, peptides, and nucleotides (Pratama et al., 2018; Sopa et al., 2023).

The savory taste of wet noodles with the addition of snakehead fish flour comes from the glutamic acid content (Prastari et al., 2024). The more fish flour in the treatment of adding 15% fish flour will result in more protein compounds being degraded, causing a bitter taste in wet noodles. In line with research by Lova et al., (2024) which showed that the more snakehead fish flour added, the more bitter the taste of cookies.

Best Treatment

Based on the Bayes method calculation in Table 3, the results show that the treatment of adding 10% snakehead fish flour to wet noodles is the treatment most preferred by panelists with an alternative value of 8.05. This shows that this treatment has the most optimal sensory characteristics and is most preferred by panelists based on consideration of all its attributes with the main consideration being taste, then followed by texture, appearance and aroma. Wet noodles with the addition of 10% snakehead fish flour are most preferred by panelists with a savory taste supported by a slightly chewy, elastic and not easily broken texture, a homogeneous yellowish white color and a neat noodle shape with a uniform thickness. The resulting aroma is also fragrant with a distinctive fish aroma but not too rancid.

Chemical Characteristics of Wet Noodles

Protein Content

The addition of snakehead fish flour can increase the protein content of wet noodles. The protein content in the control wet noodles is 7.23%, while the most preferred wet noodles are 10%. The addition of snakehead fish flour to wet noodles by 10% can increase the protein content by 2.77%. When compared to SNI 2987:2015 concerning Wet Noodles, the control wet noodles (without the addition of snakehead fish flour) do not meet the minimum protein content requirements for wet noodles, which is 9%. Thus, wet noodles with the addition of 10% snakehead fish flour, in addition to being liked by panelists, can also make the protein content of wet noodles meet the quality requirements based on the SNI.

The protein content of wet noodles comes from the wheat flour and eggs used. The increase in the protein content of wet noodles comes from the addition of snakehead fish flour which contains high protein, namely 76.9%. The results of this study are in line with the research of Mulyana and Farida (2024) which showed that the higher the percentage of snakehead fish flour addition, the protein content in rice noodles will increase. Protein in snakehead fish meal includes essential amino acids such as alanine, histidine, threonine, arginine, methionine, valine, phenylalanine, isoleucine, leucine, and lysine (Prastari et al., 2017). According to Fitriyani et al., (2020), snakehead fish also contains glutamic acid. Glutamic acid can provide a savory taste to fishery products (Pratama et al., 2018).

Water content

The addition of snakehead fish meal can increase the water content of wet noodles. The water content of the control wet noodles was 33.07%, while the wet noodles that were most preferred by the panelists were 33.94%. The addition of snakehead fish meal to these wet noodles can increase the water content by 0.87%. When compared with SNI 2987:2015 concerning Wet Noodles, both treatments have met the maximum water content requirements for wet noodles, which is 35%.

The addition of snakehead fish meal to wet noodles increases the water content. In line with the research of Dewantara et al., (2019) where the addition of snakehead fish meal can make the water content of macaroni pasta have a higher value than without the addition of snakehead fish meal. The stage of kneading the wet noodle dough is done by adding water. Snakehead fish meal which is rich in amino acids with hydroxyl groups will bind water so that the added fish meal will increase the water content of wet noodles (Utomo et al., 2011). This water content can affect the texture and shelf life of the product. The elastic texture of the noodles is produced due to the presence of protein that binds water. The increasing water content makes the shelf life of raw noodles relatively short (Billina et al., 2015).

Ash Content

The addition of snakehead fish meal can increase the ash content of wet noodles. The ash content in the control wet noodles (without the addition of snakehead fish meal) was 6.71%, while the wet noodles that were most preferred by panelists (10% addition of snakehead fish meal) were 7.54%. The addition of snakehead fish meal to wet noodles by 10% can increase the ash content by 0.83%.

The increase in the ash content of wet noodles comes from the addition of snakehead fish meal. This is in line with the research of Dewantara et al., (2019) that the addition of snakehead fish meal resulted in an increase in the ash content of macaroni pasta. This is due to the high mineral content contained in the snakehead fish meal used. Snakehead fish meal contains 170 mg of calcium, 0.1 mg of iron, and 139 mg of phosphorus (Ministry of Health, 2020). According to Afrinis et al., (2018), the presence of these minerals can affect the texture of products such as rice noodles and dry noodles so that the texture feels chalky or slightly sandy. Wittriansyah and Kristiningsih (2023) also added that this ash content can reduce the effect of gluten from wheat flour. Therefore, this increased ash content can reduce the formation of a chewy and elastic texture in wet noodles.

Fat Content

The addition of snakehead fish meal can increase the fat content of wet noodles. The fat content in the wet noodles was 3.37%, while the wet noodles which were most preferred by the panelists was 3.85%. The addition of snakehead fish meal to wet noodles by 10% can increase the fat content by 0.48%. This is in line with research by Dewantara et al., (2019) where the more snakehead fish flour added, the higher the fat content contained in macaroni pasta. Macaroni pasta without fish meal tends to have a lower fat content than with the addition of snakehead fish meal.

Snakehead fish meal contains 0.55% fat (Briliannita and Marlisa 2020). This fat content consists of unsaturated fatty acids such as omega-3 (EPA and DHA), oleic acid, palmitoleic acid and linoleic acid as well as saturated fatty acids such as arachidonic acid, palmitic acid, and stearic acid (Fitriyani et al., 2020; Salmatia et al., 2020). The main fatty acid in snakehead fish is omega-3 fatty acid which is beneficial for human brain health and development (Fitriyani et al., 2020; Umage et al., 2020). Wulandari et al., (2022) also added that omega-3 fatty acids (EPA and DHA) can provide a distinctive fish aroma. According to Valentina et al., (2021),

fatty acids, especially unsaturated fatty acids, will easily oxidize, causing a rancid aroma. The fat content can also make the texture of the noodles softer. However, high fat content can cause food products to go rancid quickly and damage product quality so that they have a short shelf life (Husna et al., 2020).

Carbohydrate Content

The addition of snakehead fish flour can reduce the carbohydrate content of wet noodles. The carbohydrate content in the control wet noodles was 49.62%, while in the most preferred wet noodles it was 44.67%. The addition of snakehead fish flour to wet noodles by 10% can reduce the carbohydrate content by 4.95%. This is in line with the research of Mulyana and Farida (2024) that the addition of snakehead fish flour to kwetiau can cause the carbohydrate content to decrease. This is because the composition of wheat flour as the basic ingredient for making wet noodles decreases along with the addition of snakehead fish flour.

The addition of snakehead fish flour causes the carbohydrate content to decrease along with the increase in protein in wet noodles. According to Ainiyah et al., (2022), consuming wet noodles like this can help maintain body weight. Carbohydrates also provide a sweet taste to food (Aliwasa et al., 2024). In addition, carbohydrates also have the ability to absorb water to produce a chewy and elastic texture.

CONCLUSION

Based on the research results, it can be concluded that the concentration of snakehead fish flour addition that can produce wet noodles that are most preferred by panelists is 10%. This treatment has an average value of the level of preference for appearance of 8.12; aroma 5.8; texture 6.68; and taste 7.72 which produces homogeneous yellowish white wet noodles and neat noodle shapes with uniform thickness, a distinctive fish aroma, a slightly chewy, elastic and not easily broken texture and a savory taste. This most preferred treatment has a protein content of 10%, water content of 33.94%, ash content of 7.54%, fat content of 3.85% and carbohydrate content of 44.67%.

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