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Effect Of Catfish Addition On Organoleptic Properties, Nutritional Value, And Acceptability Of Molele Noodles In Pregnant Women

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ABSTRACT

Background: *Noodles are one of the most popular food products in Asia. In Indonesia, noodles are a very popular food for children and adults. Noodles have been used as an alternative food to replace rice. This is possible because of the practical nature of noodles, their good taste, relatively cheap price, and easy manufacturing process.*

Research Methods: *This research uses an experimental design in the form of a one-factor Completely Randomized Design (CRD), namely the addition of catfish (t) consisting of 5 treatment levels. Organoleptic properties were assessed based on hedonic tests on 20 panelists of students majoring in nutrition. The best results will be given to consumer panelists, namely pregnant women in trimesters 2 and 3, a total of 30 people. Data analysis using One Way Anova at 95% confidence level or alpha 0.05.*

Research Result: *ANOVA analysis showed a significant value ($p<0.05$) on color and overall. The treatment most favored by panelists was molele noodles, with the addition of catfish as much as 20% (t1). The nutrient content in 100 grams of molecule noodles consists of 196 kcal energy, 10% protein, 1% fat, 36% carbohydrate, 51.95% water content, and 0.58% ash content. The acceptance of molele noodles showed the results of 90% of the targets having acceptance in the good category and 10% in the poor category.*

Conclusion: *The addition of catfish affects the organoleptic properties of color molele noodles. In 100 grams of molele noodles, there is energy of 196 kcal, 10% protein, 1% fat, 36% carbohydrates, 0.58% ash content, and 51.95% water content. Molele noodles have a percentage of good Acceptability≥ 90%, which means in the good category.*

BACKGROUND

Noodles are one of the most popular food products in Asia. In Indonesia, noodles are a very popular food for children and adults. Noodles have been used as an alternative food to replace rice, and this is possible because of the practical nature of noodles, good taste, relatively cheap price, and easy manufacturing process. The noodle products known by the public are wet, dry, and instant noodles. Wet noodles are made from wheat flour, salt, water, and other additives. Wet noodle products are currently experiencing development with a variety of mixtures between wheat flour as the primary raw material and other ingredients such as tubers and vegetables, which, of course, can increase the nutritional content of the noodles (Prasetya, 2018).

For Indonesia, which is not a wheat-producing country, substituting non-wheat flour for food manufacturing can save foreign exchange (Herlina, 2019). To reduce wheat dependence and the selling price

of noodle products, wheat flour can be reduced using various non-wheat flour, one of which is MOCAF flour (modified cassava flour).

Modified Cassava Flour (Mocaf) is cassava flour (Manihot esculenta Crantz) modified by fermentation techniques using microbes. It has characteristics good enough to substitute or replace 100% wheat flour. Mocaf flour is better quality, looks whiter, and loses the distinctive aroma of cassava (Yuanda, 2021).

The benefits of Mocaf flour are that it can be made into various processed products, one of which is wet noodles. According to research by Tuhumury et al. l (2020) with the title "Characteristics of Wet Noodles with Variations of Wheat Flour, Mocaf Flour, and Tuna Fish Flour" was found that the concentration of wheat flour (75%): mocaf flour (25%): tuna fish flour (20%) was liked by panelists in terms of color, aroma, and taste of wet noodles. In the above study, it can be seen that the wet noodles are high in protein because tuna flour is added. However, from an economic point of view, tuna fish has a more expensive price, and availability in the community is tough, so in this study, it was replaced with catfish.

In West Nusa Tenggara (NTB) Province, annual catfish production is around 125,631,755 (BPS 2018). Catfish live in public waters and are economically valuable fish favored by the community. They have various advantages, including fast growth, high environmental adaptability, good taste, and high nutritional content (Riswanto et al., 2019). In addition, catfish are easy to cultivate because they can live with low oxygen levels and very high densities.

Based on preliminary research conducted with the substitution of wheat flour (70%), mocaf flour (30%), and 50% catfish obtained wet noodle results favored by panelists. From the description above, research was conducted on making noodles and adding catfish, which was then named Molele Noodles. In this study, wet noodles were developed with mocaf and catfish in addition. This product is expected to contain high protein and be used as additional food for pregnant women.

RESEARCH METHODS

This experimental study uses a one-factor Completely Randomized Design (RAL), namely the addition of catfish. This research is included in the field of food technology and society, which was carried out on May 3 - May 13, 2023, at the Food Technology Science Laboratory (ITP), Department of Nutrition, Mataram Health Polytechnic to make Molele noodle products and also conduct organoleptic tests (to choose the best product), proximate tests were carried out at the Analytical Chemistry Laboratory, Faculty of Mathematics and Natural Sciences, Mataram University and for the acceptance test carried out in the Suranadi Health Center posyandu area.

Data collection was carried out through organoleptic tests with the hedonic method, which included testing the color, taste, aroma, and texture of Molele noodles by 20 moderately trained panelists from Mataram Health Polytechnic students majoring in nutrition who had studied organoleptic tests to determine the organoleptic properties of a product. Organoleptic properties data were collected using the hedonic method with five scales of favorability (hedonic test) consisting of 5 = very like 4 = like, 3 = somewhat like, 2 = dislike, and 1 = very dislike. Data from sensory test results (including color, aroma, taste, smell, and texture) were tabulated and analyzed using One Way Anova Statistical Analysis using a laptop. The data was then further analyzed using further tests such as Tukey. Chemical property tests were conducted to determine the proximate nutritional value of protein content using the kejedhal method, fat content using the soxhletation method, carbohydrate content using the by difference method, and moisture content and ash content using the gravimetric method and analyzing consumer acceptance of Molele noodles by calculating the remaining food that is not consumed. Then, analyze the remaining food based on the minimum service standards of the hospital, with the following percentages: Acceptability is less if < 80%, and Acceptability is good if ≥ 80%.

RESULTS

Data on organoleptic properties were collected through the hedonic test or openness test, which assesses the color, aroma, texture, and taste of Molele noodles. This research used 20 trained isellmpanellists, namely Mataram Kellsellhatan Polytechnic. Students, Department of Nutrition who have met requirements panelists.

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Table 1 shows the significance of the effect of catfish pellnamblahan on the organoleptic properties of Molele noodles

Parameters	P (Value)	Notation
Color	0,000	S
Aroma	0,936	NS
Taste	0,224	NS
Texture	0,246	NS
Overall	0,003	S

Based on Table 1, the aroma, flavor, and texture parameters (p> 0.05) can be seen. This shows that the addition of catfish has no significant effect on the aroma, taste, and texture of Molele noodles. At the same time, the color and overall parameters have a p-value <0.05. This shows that adding catfish influences the color and overall molele noodles. The average value of the molele noodle hedonic test based on data analysis can be seen in Table 2.

Table 2 Average value of Molele noodle organoleptic properties test

Treatment Wheat: Mocaf: Catfish	Average of Molele noodle organoleptic test results				
	Color	Aroma	Taste	Texture	Overall
t1 70%:30%:20%	4,05 b	3,20	3,70	3,60	3,75 b
t2 70%:30%:30%	3.35 a b	3,20	3,50	3,40	3.50 a b
t3 70%:30%:40%	3.25 a b	3,35	3,35	3,05	3.30 a b
t4 70%:30%:50%	3,05 a	3,10	3,35	3,05	3.35 a b
t4 70%:30%:60%	2,55 a	3,10	2,95	3,05	3 a

Source: Processed data 2023

Color

Table 2 shows that in the color of molele noodles, the increasing amount of catfish addition will make the color of molele noodles grayish and less preferred by panelists. The statistical test results found that the color of molele noodles with treatment level t1 was significantly different from t4 and t5. While the t1 treatment level is not significantly different from t2 and t3. However, t2, t3, t4, t5 are not significantly different. From the results of the organoleptic test, it was found that the treatment level with the highest level of liking was the treatment level t1 of 20% catfish addition in the like category (4.05).

Aroma

The aroma parameter has a value (p>0.005) of 0.936, which means it is non-significant, so it is not continued with further testing (Tukey).

Texture

The texture parameter has a value (p>0.005) of 0.246, which means it is non-significant, so it is not continued with further testing (Tukey).

Best Treatment

Table 2 shows the best product from 4 treatment levels and the average value of all organoleptic properties (color, aroma, taste, texture).

Proximate Analysis

Proximate analysis of Molele noodle products was conducted at the Analytical Chemistry Laboratory, Faculty of Mataram University. The results of the nutrient content test, which includes moisture content, ash content, fat content, protein content, and carbohydrate content of Molele noodles, were selected in treatment t1, where the addition of catfish was 20% (20 grams of catfish) of the total weight of wheat flour and mocap flour. Table 2 shows an analysis of the nutritional content of Molele noodles compared to the requirements set by SNI 01-2973-1992.

Table 3. Nutritional Content Test Results Molele noodles

Parameters	Unit	Average result
Water content	%	51,95
Ash content	%	0,58
Protein	%	10,03
Fat	%	1,32
Carbohydrates	%	36,11
Energy	Kcal/100 gram	196

Source: Processed Data 2023

Table 14 shows that Molele noodle products have a moisture content of 51.95%, ash content of 0.58%, protein of 10.03%, and fat of 1.32%. The data was then processed using the difference method to determine the carbohydrate content of Molele noodles, which was 36.11%. Furthermore, the macronutrient content in 100 grams of Molele noodle products is determined as energy of 196 kcal, converted from protein 40.12 kcal, fat 11.8 kcal, and carbohydrates 144.44 kcal.

Acceptability of Molele Noodles

The acceptance of Molele noodles is known because the rest is not consumed by pregnant women in the posyandu area of the Suranadi Health Center, West Lombok Regency, in one meal. The product given in this acceptability test is Molele noodles with a weight of 100 grams/portion, which has a nutritional value of 196.36 kcal of energy, 10.03 grams of protein, 1 gram of fat, and 36 grams of carbohydrates can meet 15% of the needs of pregnant women's snacks. To determine the amount spent or accepted by the target, the difference between the weight of the product served, and the weight of the product that was not spent was calculated. Acceptability is said to be good if the food spent by the target is ≥ 80% and is said to be lacking if the food spent is < 80%. The results of the chesitri acceptability test can be seen in Table 4.

Table 4 Acceptability test results of Molele noodles in pregnant women

Description	n	Percentage
Good	27	90%
Less	3	10%
Total	30	100%

Source: Processed Data 2023

The results of the acceptability test by 30 pregnant women in the second and third trimester of pregnancy showed that as many as 27 pregnant women could finish Molele noodles so that it fell into the good category with a percentage of 90% (≥ 80% eaten) and as many as three pregnant women who did not finish Molele noodles because they already felt full and did not like the taste so that it fell into the category of less with a percentage of 10% (< 80% eaten).

DISCUSSION

Color is the first sensory that can be seen directly by panelists. The determination of food quality generally depends on the color it has, a color that does not deviate from the color and should give the impression of its assessment by the panelist. The addition of catfish significantly affects the color of Molele noodles. The resulting Molele noodles are golden yellow to brownish yellow. This condition is suspected to occur in enzymatic browning reactions, namely the Maillard reaction, during the cooking process. Maillard reaction is between carbohydrates, especially reducing sugars, and NH2 from proteins that produce hydroxymifurfural compounds. The furfurans are formed and then polymerized to form brownish melanoidin compounds. Melanoidin gives catfish meat a brownish color (Mualim et al., 2013).

The aroma of a product is detected when volatile substances from the product are inhaled and received by the olfactory system. The fishy smell is a distinctive aroma in fish caused by nitrogen components, namely guanidine, trimethyl amine oxide (TMAO), and imidazole derivatives (Ramadhan et al. ., 2019)The fishy smell of fish in Molele noodles added with catfish is still felt even though during the process of making catfish steamed, the higher the concentration of catfish, the more pronounced the smell of fish in Molele noodles (Amanah et al., 2018). These results are the same as research conducted by Adelia et

al. (2021) on (The Effect of Fortification of Different Types of Fish on the Level of Pleasure and Physical Characteristics of Wet Noodles), the aroma of noodles with the addition of catfish, gourami, and catfish flour is not significantly different. Generally, the liking for aroma in wet noodles with fish flour is lower than without treatment (control).

The resulting taste of Molele noodles in all treatments is savory and tasteless because the composition used is the same in all treatments. The distinctive taste of catfish, which tends to be fishy, is different from noodles in general, which have a savory and salty taste that is common among the public. If added, catfish gives Molele noodles a distinctive taste of catfish and affects the Acceptability of Molele noodles. According to Asyik et al. (2018) and Ramadhan (2019), a food ingredient's taste is influenced by several factors, namely chemical compounds, temperature, and interactions with other flavor components. This is in line with the research of Adelia et al. (2021), namely the panelists' assessment of the taste of wet noodles with the addition of fishmeal, which has the lowest value in the treatment of 15% catfish flour addition. The addition of catfish flour tends to be fishy compared to catfish and gourami flour. The taste value decreased because, in this study, the wet noodle products were tested without using any seasoning to make the taste tasteless. The results of this study align with the research of Rumapar (2015), where there is a decrease in taste value in wet noodles fortified with fish flour. The taste of catfish meat tends to be fishy and smells earthy. According to Zuhri et al. (2014), aroma-forming components in fishery products are proteins, polysaccharides, pigments, and vitamins. Fishy odor flavor is the smell of fish caused by nitrogen components other than fish protein, namely aroma and guanidine. At the same time, proline is an important amino acid in fish that affects sweetness. In the organoleptic test results, wet noodles have different flavors due to differences in the addition of the types of Fishmeal used. The decrease in flavor value is due to catfish's high fatty acid and protein content. This is the opinion of Tarigan et al. (2016) that the high protein content of fish causes the fishy aroma in fish, reduced freshness of fish, especially those derived from ammonia, trimethyl amine, volatile fatty acids, and the results of fatty acid oxidation.

Texture is an assessment attribute that affects panelist acceptance or Acceptability. The texture is complex and has a material structure consisting of three elements, namely: mechanical (hardness, chewiness), geometric (sandy, crusty), and mouthfeel (oily, watery) (Setyaningsih, 2010 in Ramah et al., 2019). The addition of catfish did not significantly affect the texture of Molele noodles. The higher the catfish content in Molele noodles, the more the texture produced will decrease. This is in line with the research of Adelia et al. (2021) that the treatment of making wet noodles with the addition of 15% catfish flour is significantly different from the standard control treatment and the treatment of adding 15% gourami fish flour, but not significantly different from the treatment of adding 15% catfish flour. This is characterized by a chewy but less elastic wet noodle texture. This is because wet noodles with fishmeal have a low gluten content, while wet wheat noodles contain much gluten, making them more elastic and chewy. Catfish flour has a slightly coarse fiber texture compared to gourami and catfish flour. This is also because the older age of catfish can affect the quality of fish meat. This is because the age of catfish cultivation is longer, so feed consumption is greater. The fish feed contains a lot of fat, carbohydrates, and protein.

Moisture content is the total water in a food (free and bound water regardless of the degree of attachment). The water content will determine a food's acceptance, freshness, and shelf life. The moisture content in a food ingredient is determined by the oven method (thermogravimetry) (Yanuar et al., 2016 in Tuarita M, 2022). Based on SNI 2987-2015, the moisture content of wet noodles is a maximum of 65%, while the results of the analysis of the moisture content of Molele noodles are 51.95%, so the moisture content of Molele noodles can be said to meet the quality requirements of wet noodles. This is due to the protein blocking water absorption in the starch granules. The increase in protein causes water to be difficult to enter the starch granules of flour, so the gelatinization time becomes long. Catfish meat in wet noodles contains protein, which, when heated, denatures the protein, making it difficult for starch to bind with water for the gelatinization process. The hydrophobic nature of the protein prevents water from entering the center point of the material (Widiatmoko, 2015).

The ash content of a material is the residual content of the combustion of all organic components in the material (Pamungkas, 2008 in Rahman and Naiu, 2021). Most foodstuffs, about 96%, consist of organic matter and water. The rest consists of mineral elements. Measured ash content is inorganic materials that are not burned in the ignition process, while organic materials are burned. In the combustion process, organic materials burn, but inorganic substances do not, which is why it is called ash (Winarno, 2004). Determination

of total ash content can be used to determine whether or not a processing is sound, the type of ingredients used, and the nutritional value parameters of a food ingredient. Molele noodles have an ash content of 0.58%, which was obtained by proximate testing using the drying ash method. Based on SNI 2987-2015, the ash content of wet noodles is a maximum of 3%, so the ash content of Molele noodles can be by the quality requirements of wet noodles. The ash content and composition depend on the type of material and the method used. The ash content of a material shows the mineral content in the material. The greater the ash content obtained, the greater the mineral content in the material (Muchtadi, 1989; Yanti et al., 2019).

Unlike other macronutrients (carbohydrates and fats), protein is more involved in forming biomolecules than as an energy source. However, if the organism experiences a lack of energy, this protein is used as an energy source. According to Almatsier (2009), the energy value of food can be determined by calculating using the Atwater factor based on the protein and energy composition of the food produced. The Atwater factor is a conversion rate where 1 gram of protein produces 4 kcal of energy. Molele noodles have a protein content of 10.03%, as obtained by a proximate test using the Kjeldhal method. Based on SNI 2987-2015, the protein content of wet noodles is at least 6%, so Molele noodle protein can be said to meet the quality requirements of wet noodles. The higher the addition of catfish, the higher the protein content of Molele noodles. The protein content influences this in catfish, which is 14.8 g (Ramadhan et al., 2019). In addition, the protein content of Molele noodles comes from additional ingredients, namely eggs. According to Koswara (2009), egg protein is high quality because it has a complete arrangement of essential amino acids.

Fat is a macronutrient that is the most significant energy contributor, protects the body's internal organs, dissolves vitamins, and regulates body temperature. Fat provides texture and shortening functions so that pastries become softer. In addition, fat also functions as a flavor provider (Ihsan, 2020). If the fat intake from food is lacking, it will impact the lack of calorie or energy intake for the body's activity and metabolic processes. Low fat intake, followed by reduced energy in the body, will cause changes in body mass and tissue and disorders (Ramadhan et al. 2019). Molele noodles have a fat content of 1.32%, obtained by

Proximate testing using the Soxhletation method. Based on SNI 2987-2015, the fat content of wet noodles is at least 7%, so the fat content of Molele noodles can be said not to meet the quality requirements of wet noodles. This is because the ingredients used in making Molele noodles contain low-fat nutritional values in every 100 grams, including catfish, which contains 2.3 grams of fat, 1 gram of wheat flour, 0.60 grams of mocap flour, and 10.8 grams of eggs.

Carbohydrates are a source and reserve of energy carried out through metabolic processes. Other functions of carbohydrates are as food reserves, helping the release of feces by regulating intestinal peristalsis, giving sweetness to food, and being a regulator of fat metabolism because carbohydrates can prevent it (Habibana, 2014). Different methods determine the carbohydrate content in Molele noodles. This method determines the carbohydrate content by 100% minus the percent protein, percent fat, percent moisture content, and percent ash content so that it is obtained that the carbohydrate of Molele noodles is 36.11%, where this value is by the quality requirements of wet noodles in Indonesian National Standard SNI 2987-2015.

The acceptability test was conducted to determine the level of consumption or consumer acceptance of Molele noodle products as a distraction that will be given using the food waste method adopted from the Hospital Nutrition Service Guidelines (PGRS) (Ministry of Health, 2013). Panelists in this acceptability test were pregnant women in trimesters 2 and 3 in the Suranadi village area, West Lombok Regency, as many as 30 people. Of the 30 pregnant women, there were 27 pregnant women (90%) who could accept well (≥ 80% eaten), and the remaining three pregnant women (10%) with less acceptance (≤ 80% eaten). The results showed that 27 pregnant women with good acceptance responded that Molele noodle products have a good taste and chewy texture, like noodles that they buy in general. In contrast, catfish ingredients highlight the distinctive taste of catfish. Three pregnant women with poor acceptance responded that although it tasted good because they had lunch so, they felt full and could not finish Molele noodles. Seeing the good response from 30 pregnant women towards accepting Molele noodle products above can positively impact a business opportunity as a distraction product for pregnant women.

CONCLUSIONS

The addition of catfish has a significant effect on the color parameters of Molele noodles ($p<0.05$), while for the aroma, taste, and texture parameters, it has no significant effect ($p>0.05$). The nutritional value of Molele noodles contains 196 kcal energy, 10% protein, 1% fat, and 36% carbohydrate.

RECOMMENDATION

Based on the study's results, further research is suggested to increase the fat content of Molele noodles by adding food ingredients with a higher fat nutrient content, such as eel.

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