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THE INFLUENCE OF STRIPED CATFISH MEAT FLOUR ADDITION ON THE SENSORY ATTRIBUTES AND HEDONIC PREFERENCE OF SPRITZ COOKIES

Pengaruh Penambahan Tepung Daging Ikan Patin Terhadap Karakteristik Sensoris dan Tingkat Kesukaan Kue Semprit

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ABSTRACT

Spritz cookies are one of the most popular types of dry cookies, favored by many due to their sweet taste and crispy texture. Innovation in the processing of spritz cookies can be carried out by incorporating other food ingredients, one of which is striped catfish meat flour. The addition of this ingredient is expected to provide flavor variation and different sensory characteristics. This study aimed to determine the effect of adding striped catfish meat flour on the consumer acceptability of spritz cookies and to identify the most preferred percentage of addition. The research used an experimental method with four levels of striped catfish meat flour addition: 0%, 2.5%, 5%, and 7.5%. The observed parameters included hedonic tests color, aroma, taste, and texture. The data were analyzed using non-parametric statistical methods, namely the Friedman test. The results showed that spritz cookies with 5% striped catfish meat flour received the highest preference scores, with color at 7, aroma at 9, texture at 9, taste at 9, and an alternative value of 8.68. Based on these findings, it is recommended to use 2.5–5% striped catfish meat flour in spritz cookie production to maintain consumer acceptance.

Keywords: Hedonic Test, Level of Preference, Spritz Cookies, Striped Catfish Meat Flour

ABSTRAK

Kue semprit adalah salah satu kue kering yang banyak disukai oleh masyarakat karena memiliki rasa yang manis dan tekstur yang renyah. Inovasi dalam pengolahan kue semprit dapat dilakukan dengan menambahkan bahan pangan lain, salah satunya tepung daging ikan patin. Penambahan bahan tersebut diharapkan memberikan variasi rasa dan karakteristik sensori yang berbeda. Penelitian ini dilakukan dengan tujuan untuk mengetahui pengaruh penambahan tepung daging ikan patin terhadap tingkat kesukaan kue semprit, serta untuk menentukan persentase penambahan yang paling disukai. Metode yang digunakan dalam penelitian ini adalah metode eksperimental, dengan empat variasi perlakuan penambahan tepung daging ikan patin, yaitu: 0%, 2,5%, 5%, dan 7,5%. Parameter yang diamati dalam penelitian ini meliputi uji hedonik yang mencakup aspek warna, aroma, rasa, dan tekstur. Data

hasil pengujian dianalisis menggunakan metode statistik non-parametrik, yaitu Uji Freidman. Berdasarkan hasil analisis, kue semprit dengan penambahan tepung daging ikan patin sebesar 5% memperoleh tingkat kesukaan tertinggi, dengan skor warna 7, aroma 9, tekstur 9, rasa 9, dan nilai alternatif 8,68. Berdasarkan hasil tersebut, disarankan penggunaan tepung daging ikan patin pada kisaran 2,5-5% dalam pembuatan kue semprit untuk mempertahankan daya terima konsumen.

Kata Kunci: Kue Semprit, Tepung Daging Ikan Patin, Tingkat Kesukaan, Uji Hedonik

INTRODUCTION

Indonesia is known as a country with a very high level of biodiversity, particularly in the fisheries sector, which includes freshwater, marine, and brackish water fish (Setiawan, 2016). Pangasius is a freshwater fish commodity with high economic value and is widely cultivated. According to data from the Ministry of Maritime Affairs and Fisheries (KKP), pangasius production has shown an increasing trend annually, reaching 332 tons in 2021, 342 tons in 2022, and 432 tons in 2023. This increase demonstrates the high potential of pangasius as a raw material for the development of various processed products.

Pangasius processing is generally limited to conventional methods such as frying, grilling, or making soup. This monotonous processing pattern can lead to consumer boredom, necessitating innovation in more diverse processed products (Oktavianawati & Palupi, 2017). One processing method that offers advantages in terms of shelf life and flexibility of use is flour. Fish meal has a low moisture content, making it more durable, easy to apply to various food products, and more efficient in storage and transportation (Hassan, 2014). Pangasius fish is known for its thick flesh, savory flavor, and lack of fine bones, making it suitable for processing into flour (Anggadiotama et al., 2023).

Several previous studies have been conducted to explore the use of pangasius fish meal in food products, such as onion sticks (Ayundra Putri et al., 2022), semprong cakes (Wildah et al., 2024), and cat's tongue cakes (Irpan et al., 2024). However, its application in semprit cakes remains very limited. Semprit cakes are a popular type of cookie due to their sweet taste and crunchy texture. Innovations in semprit cakes through the addition of alternative ingredients, such as pangasius fish meal, have the potential to vary the product's flavor and sensory characteristics and influence consumer preference for the final product.

Several studies have shown that adding additional ingredients to food products can influence consumer acceptance. In a study by Nilmalasari & Asih (2018), the addition of striped catfish meal to sago cookies affected panelists' preference ratings. Therefore, further research is needed to determine the extent to which the addition of striped catfish meal affects organoleptic characteristics, particularly the acceptability of semprit cookies.

This study aimed to determine the effect of striped catfish meal addition on preference ratings for semprit cookies through a hedonic test and to determine the most preferred addition level.

METHODS

Place and Time

This research was conducted in February 2025, at the Fisheries Product Processing Laboratory, Joint Building for Fisheries and Agriculture, Faculty of Agriculture, Padjadjaran University.

Tools and Materials for Making Striped Catfish Meat Flour

The tools used to make striped catfish meat flour include: a steamer, oven, chopper, and a 100-mesh sieve. The ingredients used were striped catfish, lemon, and water.

Tools and Materials for Making Semprit Cookies

The tools used to make semprit cookies include: an electric oven, mixer, spatula, and syringe. The ingredients used were wheat flour, cornstarch, margarine, powdered sugar, egg yolks, powdered milk, and vanilla powder.

Research Methodology

This research used an experimental method, which is a research method conducted through experiments and observations of the research object (Mako et al., 2018). In this study, semprit cakes were made with varying levels of striped catfish meal addition for each treatment. The treatment dosage was determined based on the results of a previously conducted preliminary test. The striped catfish meal addition treatments in this study were determined based on the weight of wheat flour, with the following details:

1. Treatment A = no striped catfish meal addition (0%);
2. Treatment B = 2.5% striped catfish meal addition;
3. Treatment C = 5% striped catfish meal addition;
4. Treatment D = 7.5% striped catfish meal addition.

Stages of Striped Catfish Meal Production

The stages of the striped catfish meal production process are based on a modified version of Syamsuri et al. (2023): Clean 2 kg of striped catfish, remove the head, guts, and fins, and drain. The fish is coated with lime juice and left to marinate for 30 minutes, then steamed at 85-90°C for 30 minutes. Once tender, separate the fish from the bones and skin. Squeeze the fish to remove excess fat. Dry the fish in an oven at 50-60°C for 12 hours. Grind the fish using a chopper, then sift it through a 100-mesh sieve.

Semprit Cookie Making Steps

The steps for making semprit cookies refer to Ishak et al. (2024), modified by adding catfish flour, as follows: Mix margarine and powdered sugar using a mixer. Add the egg yolks and mix again until evenly combined. Add the flour, cornstarch, powdered milk, vanilla powder, and catfish flour, and stir until a dough forms. The dough is then piped onto a baking sheet with a piping bag and baked in an oven at 130°C for 35 minutes. The formulation of semprit cake with the addition of fish meat flour is shown in Table 1.

Table 1. Formulation of Semprit Cake with Striped Catfish Meat Flour

Ingredients	Treatment			
	A (0%)	B (2.5%)	C (5%)	D (7.5%)
Wheat flour (g)	120	120	120	120
Striped catfish meal (g)	0	3	6	9
Cornstarch (g)	12	12	12	12
Refined sugar (g)	48	48	48	48
Margarine (g)	87	87	87	87
Egg yolk (pcs)	1	1	1	1
Milk powder (g)	12	12	12	12
Vanilla powder (teaspoon)	¼	¼	¼	¼

Data Analysis

The parameters analyzed were hedonic tests covering color, aroma, taste, and texture. The hedonic tests were conducted by 25 semi-trained panelists. The hedonic test data were analyzed using non-parametric statistics, including the Friedman Test, to determine the effect of adding catfish meal on the level of preference for semprit cookies. If a significant effect was

found, the analysis was continued with a Multiple Comparison test to determine the differences between treatments using catfish meal additions to semprit cookies. Furthermore, the Bayesian method was used to determine the most preferred treatment.

RESULTS

Hedonic Test Results for Semprit Cookies with Striped Catfish Flour

Color

The average preference for the color of semprit cookies with added striped catfish flour is shown in Table 2.

Table 2. Average Preference for Semprit Cookie Color for Each Treatment

Treatment with Addition of Striped Catfish Meat Meal (%)	Average Value of Color Preference Level
0	8.44[b]
2.5	7.72[b]
5	7.24[ab]
7.5	6.20[a]

Description: The average color values followed by the same letter vertically show no significant difference in the Multiple Comparison Test at the 95% confidence level.

Analysis using the Friedman Test indicates that the addition of fish meal significantly affects the level of preference for the color of semprit cookies. Therefore, a Multiple Comparison Test was conducted to determine significant differences between the tested treatments. The results of the Multiple Comparison Test indicate that the level of preference for the color of semprit cookies in the 0% treatment is significantly different from the 5% and 7.5% treatments. Meanwhile, the 2.5% treatment shows no significant difference from either the 0% or 5% treatments. The 7.5% treatment has a significant difference compared to the 0% and 2.5% treatments, but not significantly different from the 5% treatment. The highest average preference score for color was 8.44 in the 0% treatment, while the lowest score was 6.20 in the 7.5% treatment.

Aroma

The average preference score for the aroma of semprit cookies supplemented with catfish flour is shown in Table 3.

Table 3. Average Preference Score for Semprit Cookie Aroma in Each Treatment

Treatment with Addition of Striped Catfish Meat Meal (%)	Average Value of Aroma Preference Level
0	7.72[b]
2.5	7.56[b]
5	7.96[b]
7.5	6.12[a]

Note: The average aroma values followed by the same letter vertically indicate no significant difference in the Multiple Comparison Test at the 95% confidence level.

Analysis using the Friedman Test indicated that the addition of fish meal significantly affected the level of preference for the aroma of semprit cookies. Therefore, a Multiple Comparison Test was conducted to determine significant differences between the treatments tested. The results of the Multiple Comparison Test showed that the 7.5% treatment was significantly different from the 0%, 5%, and 2.5% treatments. However, the 0%, 5%, and 2.5%

treatments were not significantly different from each other. The highest average aroma value and panelist preference was found in the 5% treatment, with an average aroma value of 7.96. Meanwhile, the lowest average aroma value was found in the 7.5% treatment, with an average aroma value of 6.12.

Texture

The average preference values for the texture of semprit cookies supplemented with catfish meal are shown in Table 4.

Table 4. Average Values of Semprit Cookie Texture for Each Treatment

Treatment with Addition of Striped Catfish Meat Meal (%)	Average Value of Texture Preference Level
0	7.96[b]
2.5	8.04[b]
5	8.20[b]
7.5	6.68[a]

Note: The average texture values followed by the same letter vertically indicate no significant difference in the Multiple Comparison Test at the 95% confidence level.

Analysis using the Friedman Test showed that the addition of fish meal significantly affected the level of preference for the texture of semprit cookies. Therefore, a Multiple Comparison Test was conducted to determine significant differences between the tested treatments. Based on the results of the Multiple Comparison Test, the level of preference for the texture of semprit cookies in the 7.5% treatment showed a significant difference compared to the 0%, 2.5%, and 5% treatments. Meanwhile, there was no significant difference between the 0%, 2.5%, and 5% treatments. The 5% treatment had the highest average texture value, preferred by panelists, at 8.20. Conversely, the 7.5% treatment had the lowest average texture value, at 6.68.

Taste

The average preference rating for the taste of semprit cookies with added catfish flour is shown in Table 5.

Table 5. Average Preference Rating for Semprit Cookie Texture for Each Treatment

Treatment with Addition of Striped Catfish Meat Meal (%)	Average Value of Taste Preference Level
0	7.64[b]
2.5	7.80[b]
5	8.20[b]
7.5	6.04[a]

Note: Average taste scores followed by the same letter vertically indicate no significant difference in the Multiple Comparison Test at the 95% confidence level.

Analysis using the Friedman Test indicated that the addition of fish meal significantly affected the level of preference for the taste of semprit cookies. Therefore, a Multiple Comparison Test was conducted to determine significant differences between the tested treatments. The Multiple Comparison Test showed that the level of preference for the taste of semprit cookies in the 7.5% treatment was significantly different from the 0%, 2.5%, and 5% treatments. However, the three treatments were not significantly different from each other. The highest average taste score and the most preferred by panelists was in the 5% treatment, with

an average aroma score of 8.20. Meanwhile, the lowest average aroma score was in the 7.5% treatment, with an average aroma score of 6.04.

Determining the Best Treatment Using the Bayes Method

The determination of the best treatment in this study was conducted using the Bayes method. The evaluation results for each treatment are presented in full in Table 6.

Table 6. Evaluation Results of Striped Catfish Flour Semprit Cakes Based on the Bayes Method

Treatment	Criteria				Alternative Values	Priority Values
	Color	Aroma	Texture	Taste		
0%	9	7	7	7	7.32	0.23
2.5%	7	7	9	9	8.41	0.27
5%	**7**	**9**	**9**	**9**	**8.68**	**0.28**
7.5%	7	7	7	7	7.00	0.22
Weight	0.16	0.13	0.16	0.54	31.41	1.00

DISCUSSION

Color is one of the first organoleptic aspects observed and plays a crucial role, because if a product's appearance is unattractive or unpopular, panelists tend to give lower ratings to other organoleptic parameters such as aroma, taste, and texture (Husen, 2022). The higher the addition of striped catfish meal, the darker the color of the semprit cake, thus decreasing the panelists' preference for color. The brownish-yellow color of semprit cake with striped catfish meal was considered less attractive compared to semprit cake without the addition of fish meal, which has the typical golden yellow color of semprit cake. This color change is thought to be due to the protein content in striped catfish meal reacting with sugar during the baking process through the Maillard reaction. The Maillard reaction is a non-enzymatic process that occurs between amino groups and reducing sugars, which produces brown compounds known as melanoidins (Safitri et al., 2023). The higher the concentration of striped catfish meal added to the dough, the higher the protein content, which has an impact on increasing the intensity of the Maillard reaction and resulting in a darker product color. This finding aligns with the research of Wahyuningsih et al. (2024), which showed that the addition of striped catfish meal to the production of mocaf semprit cakes caused a browner color change due to the Maillard reaction, thus reducing panelists' preference for the color aspect. The color variation of semprit cakes for each treatment is shown in Figure 1.

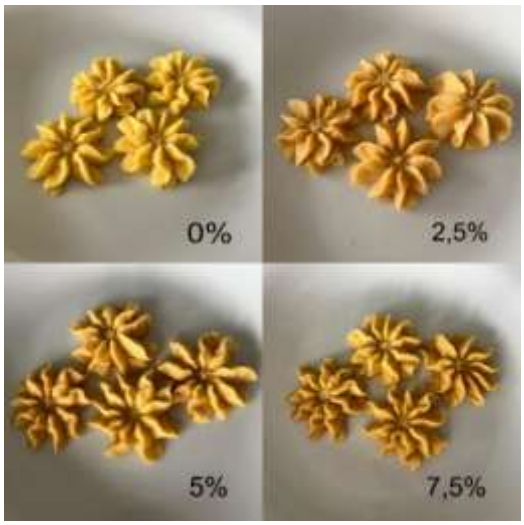

Figure 1. Color of Striped Catfish Meal Semprit Cakes with Various Treatments

Aroma is a characteristic odor emanating from a food product and is detected when volatile compounds reach the nasal cavity and are recognized by the sense of smell (Nafsiyah et al., 2022). Based on the research results, increasing the amount of striped catfish meal added was directly proportional to the stronger fishy aroma, thus decreasing panelists' preference for the aroma aspect. This occurs because panelists are still unfamiliar with the distinctive, dominant aroma of striped catfish meal. Striped catfish meal contains volatile compounds resulting from protein degradation during the heating process, which contribute to the fishy aroma. Tarigan et al. (2017) explained that the fishy odor of fish is closely related to its high protein content. According to Nurfajrina & Hastuti (2021), protein in fish can break down into dipeptides, amino acids, trimethylamine (TMA), and other volatile nitrogen compounds. This finding is supported by Rosmini & Astria (2022), who reported that the addition of eel flour to crackers produces a strong fishy odor that is unpopular with panelists, thus reducing the level of acceptance of the product's aroma. Similar results were also found in a study by (Aina, 2021) which stated that the higher the concentration of Medan anchovy flour used in making cookies, the lower the level of panelists' acceptance of the aroma.

Texture is the perception of pressure felt through the mouth when food is bitten, chewed, swallowed, or touched with the fingers. Each type of food has different textural characteristics depending on its physical condition (Wardani et al., 2024). The ideal texture of semprit cookies is crispy but still firm. The use of higher levels of striped catfish flour causes a decrease in the panelists' preference for the texture of semprit cookies, because the resulting texture becomes less crispy. This is due to the increased protein content in semprit cookies derived from the use of striped catfish flour in the dough. According to Sumartini et al. (2024), protein plays an important role in the biscuit-making process because it can affect their texture. Furthermore, according to Rahardjo et al. (2021), the higher the protein content, the higher the product's hardness level will also increase. These results are supported by the opinion of Irpan et al. (2024), who stated that the higher the addition of striped catfish flour to cat's tongue cookies, the lower the panelists' preference level because the resulting cat's tongue cookies have a less crispy texture. Similar results were obtained by Nurfajrina & Hastuti (2021), who reported that increasing the concentration of striped catfish meal in mocaf cookies decreased the level of texture preference due to the cookie's harder texture. This is because the striped catfish meal used does not contain gluten, which causes the dough to rise poorly, resulting in a hard product.

Taste is the most crucial aspect influencing consumers' decision to accept or reject a food product. Even if other elements are of good quality, the product still risks being rejected if the taste is unpleasant or unpopular (Abdullah et al., 2021). The addition of high amounts of striped catfish meal can reduce panelists' acceptance of the taste of semprit cookies, as the savory flavor of the striped catfish meal becomes more dominant, thus reducing the desired balance of sweet and savory flavors in semprit cookies. This is in accordance with research Ishak et al. (2024), which states that increasing the amount of mackerel meal added to the semprit cookie formulation reduces panelists' acceptance of the taste. The higher the concentration of mackerel meal added, the more intense the fish flavor in the resulting semprit cookies. A similar opinion was expressed in a study Cindrawati et al. (2019), which showed that the addition of high concentrations of nike fish meal to sago cookies can reduce panelists' taste acceptance. This is because the resulting sago cookies have a distinctive fishy and salty taste, making them less popular among panelists.

Based on the Bayes method, semprit cookies with 5% added catfish meal were the most preferred treatment by panelists in the hedonic test, as indicated by the highest alternative and priority values of 8.68 and 0.28, respectively.

CONCLUSION

This study shows that the addition of striped catfish meat flour has a significant effect on the level of panelists' preference for semprit cakes based on the hedonic test. The higher the addition of striped catfish meat flour, the level of preference for color, aroma, taste, and texture tends to decrease. This is caused by changes in the color of semprit cakes to become darker due to the Maillard reaction, the emergence of a strong fishy aroma, a dominant savory taste that reduces the balance of taste, and a texture that becomes less crispy due to the high protein content in semprit cakes. Based on the results of the calculation of the level of preference using the Bayes method, semprit cakes with the addition of 5% striped catfish meat flour is the best treatment, marked by the highest alternative value of 8.68 and a priority value of 0.28, which reflects the highest level of preference compared to other treatments.

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