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THE EFFECT OF TILAPIA MEAT FLOUR ADDITION ON THE LIKING LEVEL OF CORK EGG CAKE

Pengaruh Penambahan Tepung Daging Ikan Nila Terhadap Tingkat Kesukaan Kue Telur Gabus

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ABSTRACT

One way to increase the protein content in Gabus Egg Cookies is by adding Nile fish meat flour. This study aims to determine the optimal percentage of Nile fish meat flour addition in the production of Gabus Egg Cookies to produce the most preferred product, as well as to identify the proximate composition or nutritional profile of the most favored Gabus Egg Cookie product. The research was conducted using an experimental method by preparing Gabus Egg Cookies with four different treatments of Nile fish meat flour addition (0%, 7.5%, 10%, and 12.5%). A total of 20 semi-trained panelists were used as replicates to evaluate the preference level of the Gabus Egg Cookies through hedonic and chemical tests. The observed parameters included hedonic evaluation and chemical analysis. The results showed that the Gabus Egg Cookies with 10% Nile fish meat flour addition were the most preferred, with average scores of appearance 8.4; texture 7.8; aroma 7.8; and taste 8.1. Proximate analysis of the most favored product revealed moisture content of 3.90%; ash content 1.56%; protein content 8.52%; fat content 26.21%; and carbohydrate content 59.81%.

Key words: Fish Meat Flour, Cork Egg Cake, Favorability, Proximate Test

ABSTRAK

Salah satu upaya untuk meningkatkan kandungan protein pada Kue Telur Gabus adalah dengan menambahkan tepung daging ikan nila. Penelitian ini memiliki tujuan untuk mengetahui persentase dari penambahan tepung daging ikan nila secara optimal dalam pembuatan Kue Telur Gabus sehingga menghasilkan produk yang paling disukai, serta menentukan komposisi proksimat atau profil nutrisi dari produk Kue Telur Gabus yang paling disukai tersebut. Penelitian dilakukan dengan metode eksperimental dengan membuat Kue Telur Gabus menggunakan variasi penambahan tepung daging ikan nila sebanyak empat perlakuan (0%; 7,5%; 10%; dan 12,5%). Sebanyak 20 panelis semi terlatih digunakan sebagai ulangan untuk menilai tingkat kesukaan terhadap Kue Telur Gabus melalui uji hedonik dan uji kimia. Parameter yang diamati adalah uji hedonik dan uji kimia. Hasil penelitian dari penambahan

tepung daging ikan nila pada kue telur gabus membuahkan hasil bahwa kue telur gabus yang paling disukai adalah perlakuan 10% dengan nilai rata-rata kenampakan kenampakan 8,4; tekstur 7,8; aroma 7,8; rasa 8,1. Analisis proksimat pada produk yang paling disukai menunjukkan kadar air 3,90%; kadar abu 1,56%; kadar protein 8,52%; kadar lemak 26,21%; dan kadar karbohidrat 59,81%.

Kata Kunci: Tepung Daging Ikan, Kue Telur Gabus, Tingkat Kesukaan, Proksimat

INTRODUCTION

Fish has great potential as the main source of protein in efforts to improve the nutritional quality of the Indonesian people (Huniyah *et al.,* 2015). However, the level of fish consumption in Indonesia based on data obtained from the Ministry of Maritime Affairs and Fisheries (KKP) states that the level of fish consumption in 2023 has not reached the government's target, which at that time only reached 56.48 kg/capita/year, while the government's target in 2024 was 62.05 kg/capita/year (KKP 2023). This is due to the lack of public understanding of the benefits contained in fish nutrition and the limitations in fish processing and preservation technology to increase the variety and availability of fish for consumption by the Indonesian people (Djunaidah, 2017).

One effort that can be made to increase fish consumption in Indonesia is to create various variations of processed fish products, commonly known as product diversification (Ananda *et al.,* 2022). Diversification of processed fish products is a form of innovation to introduce different ways of serving fish to the public. If fish is usually served fried, grilled, or cooked whole, now it can be processed into a more attractive dish without reducing its nutritional content. This innovation makes processed fish products enjoyed by all groups, from children to adults and the elderly. One of the dry solid products that can extend the shelf life of fish is fish meal (Litaay *et al.,* 2023). Tilapia is a type of freshwater fish that is suitable as a raw material for fish meal. This fish is popular with the public because it has white meat, a soft, chewy, thick texture, and has a neutral taste, making it easy to process into various food products. In addition, the price is relatively affordable (Manteu *et al.,* 2017). In addition, fish meal can be used as a substitute for certain processed food products, especially traditional products that are low in protein.

One of the traditional products that is low in protein is Kue Telur Gabus. Kue Telur gabus is one of the traditional Betawi cakes that has been widely known in various regions in Indonesia. This cake is small, elongated and slightly bulging, golden yellow in color, has a fairly soft texture, is resistant to damage, and has a savory and crispy taste. (Ramadhani & Murtini, 2017). The protein content in Kue Telur Gabus is relatively low because the main ingredient is tapioca flour, which naturally has a low protein content. This is stated by the research of Rasulu *et al.* (2018), that tapioca flour has a low protein content because it comes from starch or cassava as the basic ingredient.

The addition of tilapia fish flour to Kue Telur Gabus will affect the level of preference and increase the protein content. Hedonic tests also need to be carried out to determine how far Kue Telur Gabus with the addition of tilapia fish flour can be liked by consumers and to determine the nutritional content of the product. Several studies state that Putri *et al.* (2020) that the addition of tilapia fish flour to crackers produces a percentage of 15% which is the most preferred. Another study, namely Safitri *et al.* (2023), added tilapia fish meat flour to fish flakes resulting in a percentage of 10% which was the most preferred. Therefore, research is needed on the addition of fish meat flour in making Kue Telur Gabus to determine the effect of the level of preference for Kue Telur Gabus so as to obtain the most preferred product.

RESEARCH METHODS

Place and Time of Research

This research was conducted from November 2024 to March 2025. This research was conducted at the Fisheries Product Processing Laboratory, Faculty of Fisheries and Marine Sciences, Padjadjaran University for the manufacture of tilapia fish meat flour and the manufacture of gabus eggs with the addition of tilapia fish meat flour, as well as hedonic tests on Gabus Egg Cakes. The proximate test was conducted at the Saraswati Indo Genetech (SIG) Laboratory, Bogor.

Tools and Materials

The equipment used in this study included a 100 mesh sieve, blender, gas stove, basin, digital scale, electric oven, steamer, knife, spoon, mixer, cutting board, frying pan, spatula, plate, thermometer, plastic solet, and gloves. While the materials used consisted of tilapia, water, tapioca flour, margarine, eggs, salt, and cooking oil.

Research Design

The method applied in this study is using an experimental method, namely an experiment in making Kue Telur Gabus with different levels of tilapia fish meat flour addition consisting of 4 treatments. Hedonic test with 20 semi-trained panelists who are students of the Faculty of Fisheries and Marine Sciences, Padjadjaran University. The treatment used is the level of tilapia fish meat flour addition based on the weight of tapioca flour with the following treatments:

Treatment A: 0% tilapia meat meal
Treatment B: 7.5% tilapia meat meal
Treatment C: 10% tilapia meat meal
Treatment D: 12.5% tilapia meat meal

Research Procedures

Making Tilapia Fish Meat Flour

According to (Safitri *et al.,* 2023) the process of making tilapia fish meat flour begins with cleaning and gutting the fish using running water. Next, the tilapia is soaked in lime juice for 30 minutes. After that, the fish is steamed at a temperature of around 35-50°C for 30 minutes. After steaming is complete, the fish meat is separated from the skin and bones. The fish meat is then crushed into smaller sizes and then dried in a tool, namely an oven with a temperature of 60°C for 6 hours. After drying, the dried fish meat is mashed using a blender. Finally, the results of the refining process are sieved properly using a tool, namely a 100 mesh sieve to produce fish meat flour with a smooth and uniform texture.

Making Egg Cakes

The formulation used to make Kue Telur Gabus comes from Mustofa (2013) which has been modified. The process begins by beating the eggs and salt using a mixer until well mixed. After that, tapioca flour, tilapia fish meat flour, and margarine are added to the dough. The dough is then stirred until smooth and not sticky. After reaching the desired texture, the dough is formed by twisting it so that it is elongated and puffed. The finished dough is then fried in a frying pan filled with hot oil at a temperature of 100°C over low heat for 10 minutes until golden yellow. The following is the formulation used to make Kue Telur Gabus with the addition of tilapia fish meat flour, which can be seen in Table 1.

Table 1. Gabus Egg Cake Formulation with the Addition of Tilapia Fish Meat Flour

Materials	Treatment			
	A (0%)	B (7,5%)	C (10%)	D (12,5%)
Tapioca flour (g)	200	200	200	200
Tilapia fish meal (g)	0	15	20	25
Egg (g)	100	100	100	100
Margarine (g)	50	50	50	50
Salt (g)	2,5	2,5	2,5	2,5

Data Analysis

The data obtained in the organoleptic test are quantitative data, namely data that is analyzed statistically (Sugiyono, 2009). Data obtained from the hedonic test (preference level) will be analyzed statistically non-parametrically using a two-way analysis of the Friedman test with the Chi-square test. The Friedman test is to determine the effect of the addition of tilapia fish meal on the level of preference for the Kue Telur Gabus produced. Furthermore, the multiple comparison test is intended to determine the difference in the treatment of adding tilapia fish meal to Kue Telur Gabus. Furthermore, to determine the best treatment for adding tilapia fish meal to Kue Telur Gabus using the Bayes method. Proximate observation data for the control and preferred Kue Telur Gabus will be analyzed descriptively comparatively with SNI 2973:1992.

RESULT

Level of Likeability

Appearance

Appearance is a visual aspect that can be observed directly and plays a role in attracting the attention and interest of panelists in a product. In general, consumers or panelists tend to choose food with an attractive appearance (Akbar et al., 2020). The average results of the appearance of Kue Telur Gabus with the addition of tilapia fish meat flour from various treatments are shown in Table 2.

Table 2. Average Results of Appearance of Gabus Egg Cake with the Addition of Fish Meat Flour

Fish Meal Meal Treatment (%)	Median	Average Appearance
A (0)	9	8,3b
B (7,5)	9	8,2ab
C (10)	9	8,4b
D (12,5)	7	7,2a

Description: The averages given the same letter indicate that there is no significant difference based on the multiple comparison test at the 5% significance level.

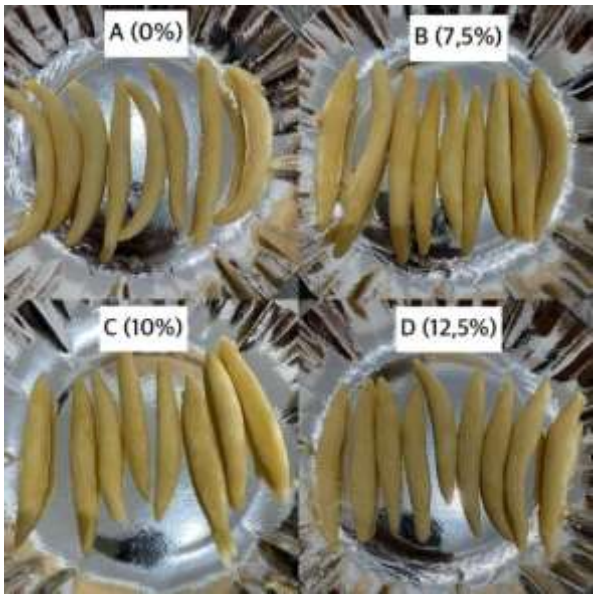

Figure 1. Gabus Egg Cake

Aroma

Aroma is one of the important factors in determining the good taste of a food product. Aroma itself is the smell produced by a food product, where the smell is a response to volatile compounds that enter the nasal cavity and are received by the olfactory system (Vanmathi et al., 2019). The average results of the aroma of Kue Telur Gabus with the addition of tilapia fish meat flour from various treatments are shown in Table 2.

Table 2. Average Results of Aroma of Gabus Egg Cake with the Addition of Fish Meat Flour

Fish Meat Flour Treatment (%)	Median	Average Aroma
A (0)	7	6,9a
B (7,5)	7	7,7a
C (10)	7	7,8a
D (12,5)	7	6,8a

Description: The averages given the same letter indicate that there is no significant difference based on the multiple comparison test at the 5% significance level.

Texture

The texture and consistency of an ingredient affect the taste produced by the food ingredient. Changes in texture can modify the taste, thus affecting the speed of stimulation of the salivary glands (Qamariah *et al.,* 2022). The average results of the texture of Kue Telur Gabus with the addition of tilapia fish meat flour from various treatments are shown in Table 3.

Table 3. Average Results of Egg Cake Texture with the Addition of Fish Meat Flour

Fish Meal Meal Treatment (%)	Median	Average Texture
A (0)	7	7,9a
B (7,5)	7	7,5a
C (10)	7	7,8a
D (12,5)	7	6,9a

Description: The averages given the same letter indicate that there is no significant difference based on the multiple comparison test at the 5% significance level.

Flavor

Taste assessment is done through the tongue as the sense of taste, which plays a role in assessing the taste of a food product by tasting it (Nafsiyah et al., 2022). The average results of the taste of Kue Telur Gabus with the addition of tilapia fish meat flour from various treatments are shown in Table 4.

Table 4. Average Results of Gabus Egg Cake Taste with the Addition of Fish Meat Flour

Fish Meal Meal Treatment (%)	Median	Average Texture
A (0)	7	7,7ab
B (7,5)	8	7,9ab
C (10)	9	8,1b
D (12,5)	7	6,6a

Description: The averages given the same letter indicate that there is no significant difference based on the multiple comparison test at the 5% significance level.

Proximate Analysis of Egg Cake

Proximate analysis is an analysis carried out to determine the chemical properties of carbon produced in a food product. Proximate components include water content, ash content, fat content, protein content, and carbohydrate content (Masud et al., 2023).

The chemical analysis carried out was on the control treatment A (0%) and the most preferred treatment, namely treatment C (10%). The following are the results of the chemical analysis on Kue Telur Gabus listed in Table 5.

Table 5. Results of Proximate Analysis of Gabus Egg Cake

Parameters	Egg Cake Products		Unit	SNI 2973:1992
	Treatment 0%	Treatment 10%		
Water	2,58	3,90	%	maks. 5
Ash	1,62	1,56	%	maks. 2
Fat	35,55	26,21	%	min. 9,5
Protein	4,25	8,52	%	min. 6
Carbohydrate	56,00	59,81	%	min. 70

DISCUSSION

Based on Table 1, it shows that the level of addition of tilapia fish meat flour affects the level of panelists' preference for the appearance of Kue Telur Gabus. The higher the level of tilapia fish meat flour added to the food product, the color of the product will be different in each treatment. This is in line with research by (Safitri et al., 2023) which states that the higher the addition of tilapia fish flour to fish flakes, the darker the color of the fish flakes will be. Treatment C (10%) is the treatment most preferred by panelists because it has the highest average result of 8.4 with the characteristics of a golden yellow appearance, smooth texture, and does not break. This is in accordance with (Ulfa *et al.,* 2024) that Kue Telur Gabus mackerel that is liked and in demand by consumers is the intact form and golden yellow color. While the treatment with the lowest average is in treatment D (12.5%) at 7.2 has a yellow and slightly brownish appearance so that the color is not too bright. The color change occurs after the Kue Telur Gabus frying process due to the Maillard reaction.

The treatment of the level of addition of patin fish meat flour did not significantly affect the level of preference for the aroma of Kue Telur Gabus. In treatment C (10%) the highest average value was obtained, namely 7.8. Treatment C (10%) has a distinctive aroma of tilapia fish meat flour. The lowest average value for aroma was in treatment D (12.5%), namely 6.8,

because it had a dominant aroma of fish and a less specific aroma of margarine and eggs. The addition of margarine and eggs will cover the aroma of Kue Telur Gabus shrimp waste flour which is not so fishy and is still preferred by panelists (Azizah & Mariani, 2021). Increasing the concentration of fish flour added to a product will strengthen the fish aroma produced in the product (Safitri *et al.,* 2023).

In the treatment of the level of addition of tilapia fish flour, there was no significant effect on the level of preference for the texture of Kue Telur Gabus. In treatment A (0%) it had the highest average value with a value of 7.9. While in treatment D (12.5%) it had the lowest average value with a value of 6.9. The texture of Kue Telur Gabus with treatment A (0%) had a crunchy texture and was not easily brittle. Kue Telur Gabus with treatment D (12.5%) had a texture that was easily brittle, rough like sand. In addition, the addition of the percentage of fish flour will increase the protein content in Kue Telur Gabus, so that it will produce a higher water content because the protein absorbs more water and the cake will lose its softness and brittleness. This is reinforced by Istinganah *et al.* (2017), that the increasing hardness value indicates that the texture of the product becomes less crispy, because the higher the water content in the product, the lower the level of crispiness.

The level of addition of tilapia fish flour affects the level of preference for the taste of Kue Telur Gabus. The panelists' assessment of the level of preference for Kue Telur Gabus was at the lowest average value of 6.6 in treatment D (12.5%), while the highest average value was 8.1 in treatment C (10%) which had a distinctive taste in Kue Telur Gabus, namely slightly salty and savory from margarine and eggs, and there was a slight aftertaste of fish but not too strong. In treatment D (12.5%) it had a strong distinctive fish aftertaste compared to the other treatments, because of the high percentage of tilapia fish flour addition. However, the higher the percentage of tilapia fish flour addition to Kue Telur Gabus, the panelists' level of preference for the taste of the cake tended to decrease. This was due to the panelists' habits who were not yet accustomed to the new dominant taste due to the addition of tilapia fish flour. This opinion is in line with Winarno (2004) who stated that the taste of food is one of the main factors influencing the level of consumer acceptance.

The water content of Kue Telur Gabus in the 10% treatment with the addition of tilapia meat flour increased by 1.32%. The water content of Kue Telur Gabus in the 0% and 10% treatments is in accordance with SNI 2973:1992, namely SNI for dry cake water content with a maximum of 5%. In treatment C (10%) there is the addition of tilapia meat flour which causes the water content in Kue Telur Gabus to increase. The water content will tend to increase with the use of the percentage of tilapia meat flour added to a food product (Safitri et al. 2023). In addition, supported by research by Adawyah et al., (2020) the greater the percentage of addition of patin fish meat flour, the water content in dry milk tends to increase, so that the level of product weight loss becomes lower. According to Juniasti et al. (2017), it states that the water content in a product can be influenced by various factors, including the type of raw material used such as fillers, as well as the processing methods applied during the manufacturing process.

In treatment A (0%) it was 1.62, treatment C (10%) it was 1.56. This is a decrease in the ash content after the addition of tilapia fish meat flour by 0.06%, but the decrease is not too significant. This value is still in accordance with SNI 2973:1992 with a maximum value of 2%. The decrease in ash content in Kue Telur Gabus is in line with the opinion of Santoso et al., (2013) that minerals in food can experience changes in chemical structure during the cooking process or due to interactions with other ingredients.

The fat content of treatment A (0%) was 35.55%, while treatment C (10%) was 26.21%. This shows that the fat content produced from Kue Telur Gabus that has been supplemented with tilapia fish meat flour has decreased by 9.34%. This is still in accordance with SNI

2973:1992 with a minimum value of 9.5%. The fat content of Kue Telur Gabus is influenced by the fat content in tilapia fish meat flour which is lower than tapioca flour. Tilapia fish meat flour generally has a high protein content and low fat content. When tilapia fish meat flour is added to the Kue Telur Gabus dough, it will replace some of the other ingredients that have the potential to have higher fat content such as eggs or butter. Therefore, there will be a decrease in the proportion of ingredients containing high fat in the content of food products, thereby reducing the total fat content in the final product (Naseri *et al.,* 2013).

The protein content of treatment A (0%) was 4.52%, while treatment C (10%) was 8.52%. So it can be seen that there is an increase in protein levels after the addition of tilapia fish meat flour to Kue Telur Gabus by 4.27%. The protein content of Kue Telur Gabus with the addition of tilapia fish meat flour is in accordance with SNI 2973:1992 with a minimum protein content of 6%. This increase in protein levels is influenced by the supplementation of tilapia fish meat flour in Kue Telur Gabus. This is in line with the research of Safitri et al. (2023) that fish flakes with the addition of tilapia fish meat flour experience an increase in protein levels. This is because tilapia contains protein so that the higher the tilapia fish flour added will cause the protein levels to increase (Jamaluddin *et al.,* 2023). Therefore, the increase in protein levels in Kue Telur Gabus is influenced by the addition of tilapia fish meat flour which is rich in protein.

The carbohydrate content of treatment A (0%) was 56.00%, while treatment C (10%) was 59.81%. So it can be seen that there was an increase in carbohydrate content after the addition of tilapia fish meat flour to Kue Telur Gabus by 3.81%. The carbohydrate value of Kue Telur Gabus without treatment and with the treatment of adding tilapia fish meat flour did not comply with SNI 2973:1992 with a minimum value of 70%. According to Zu'aimana *et al.,* (2023) stated that the carbohydrate content calculated using the difference method (by difference) is influenced by the content of other nutrients in the product. This happens because the main ingredient of Kue Telur Gabus is tapioca flour. This is in line with Rahmadani (2022) that the carbohydrate content will increase if other carbohydrate ingredients are added together with fish flour, such as the addition of carbohydrate sources such as potatoes or cassava in the process of making food products.

CONCLUSION

Based on the results of the research that has been done, it can be concluded that the addition of tilapia fish meat flour can affect the organoleptic and proximate characteristics of Kue Telur Gabus. The concentration of the addition of tilapia fish meat flour that can produce Kue Telur Gabus most preferred by panelists is 10%. The average value of the level of preference in treatment C (10%) has an average value of appearance of 8.4 (like), texture 7.8 (like), aroma 7.8 (like), taste 8.1 (like). Treatment C (10%) has a water content of 3.90%, ash content of 1.56%, protein content of 8.52%, fat content of 26.21%, and carbohydrate content of 59.81%.

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