Original Research Article

THE EFFECT OF ADDITIONOF NILEM FISH PROTEIN CONCENTRATE FLOUR ON THE PREFERENCE LEVELS OF MOCHI CAKE

ABSTRACT

Nilem fish (*Osteochilus hasselti*) is a type of freshwater fish that is widely farmed in West Java. Nilem fish can be made into fish protein concentrate (FPC) flour, so that it can have wide application. The addition of fish protein concentrate flour to the mochi cake might affect the organoleptic characteristics. This research aims to determine the proper concentration of nilem fish protein concentrate to get the mochi cake that was preferred by panelists.This research was conducted from August 2019 - January 2020 at the Laboratory of Fisheries Product Processing, Faculty of Fisheries and Marine Sciences, Padjadjaran University.The method used in this research was experimental with four treatments, which is the addition of 0%, 3.5%, 4.5% and 5.5% nilem fish protein concentrates from white glutinous rice flour was used. The parameters observed were the preference level of color, aroma, texture, and taste of Mochi cake.The results showed that mochi cake with the addition of 4.5% nilem fish protein concentrate flour produced a mochi cake that was preferred most by panelists, which has a characteristic ivory white color, a bit of fish smell, chewy but dense enough and sweet taste with a little typical flavor of nilem fish protein concentrate.

Keywords: Aroma, Color, Fish Protein Concentrate, Nilem Fish, Taste, Texture

1. INTRODUCTION

Nilem fish (*Osteochilus hasselti*) is a type of freshwater fish that is widely farmed in West Java [1]. Nilem has been developed into a superior product of freshwater aquaculture. People, in general, consume nilem fish in the form of fried, jerked, smoked, and pindang. Lack of serving style of nilem fish can make consumers uninterested. Nilem fish also have many fishbones that make consumers choose not to consume it. Another method ofprocessing of nilem fish is made into fish protein concentrate (FPC) flour.

Fish protein concentrate has a high protein concentration because during processing the water and fat are removed [2]. Fish protein concentrate is made into flour form, this is can have wide application. Fish protein concentrate flour can be applied to a variety of processed foods, especially low-protein food products [3]. Fish protein concentrate flour has a long shelf life because of less content of water and fat. Utilization of fish protein concentrate flour in food can attract public interest because it has a high protein content so that it becomes one of the sources of animal protein. Increasing the nutritional value of food products can be done by fortification of food ingredients, such as fortification of proteins, vitamins and minerals [4].

One kind of snack that loved by people is mochi cake. Mochi cake is one of the cake types originating from East Asia, especially China and Japan, which has glutinous rice flour as base ingredients [5]. Mochi cake is a type of semi-wet cake that has a sweet taste and chewy texture due to the gelatinization process from the ingredients [6]. Mochi cake has developed in Indonesia and is one of the typical foods from Sukabumi. Mochi cake can be made into various variants, such as dough, filling, and flavors. The addition of nilem fish protein concentrate flour to mochi cake can add value and increase people's interest in consuming fish. The addition of fish protein concentrate flour to the mochi cake can affect the organoleptic characteristics. Not much research has been done on mochi cake and nilem fish protein concentrate flour. Based on this, it is necessary to research the proper concentration of nilem fish protein concentrate to get the mochi cake that was preferred by panelists.

2. MATERIAL AND METHODS

2.1 TIME AND PLACE

This research was conducted from August 2019 - January 2020 at the Laboratory of Fisheries Product Processing, Faculty of Fisheries and Marine Sciences, Padjadjaran University.

2.2MATERIALS AND TOOLS

The materials used in this research were nilem fish size 150-250 g per fish from Majalaya, NaCl, N-Hexane solvent, water, Sodium bicarbonate ($NaHCO_3$), white glutinous rice flour, white sugar, peanuts, and tapioca flour. The tools used in this research were steaming pots, teflons, 10 and 50 ml measuring cups, calico cloth, jars, sieves, thermometers, digital scales, food processors, blenders, stainless steel bowl, ovens, and gas stoves.

2.3PROCEDURE OF MAKING MOCHI CAKE

The procedure of making mochi cakes[5] which was modified by adding of nilem fish protein concentrate. The first step is making nilem fish protein concentrate flour. The second step is making mochi cake dough. White glutinous rice flour and white sugar are mixed on stainless steel bowl. Nilem fish protein concentrate flour is added according to treatment. All materials are mixed with water little by little to prevent clot until the mixture is homogeneous. The steaming pots are heated until the water is boiling (100°C), then the mixture is steamed for 10 minutes. The mixture is taken away and stirred for 1-2 minutes, then steamed again for 20 minutes until cooked. Dough that has been cooked is put on a base that has been sprinkled with roasted tapioca flour and then flattened and cooled at room temperature. The third step is making mochi cake filling. Roast the peanuts and removed the seed coat, then refined with a blender. Peanuts that have been refined, mixed with sugar and then add water so that become denser. The last step is mochi cake forming. Mochi cake dough is cut and filling put into the dough. Mochi cake is formed into round shape and coated with roasted tapioca flour. The formulation of mochi cake with the addition of nilem fish protein concentrate flour is shown in Table 1.

Table 1. The formulation of mochi cake withthe addition of nilem fish protein concentrate flour [5]

Ingredients	A (0%)	B (3.5%)	C (4.5%)	D (5.5%)
Mochi Cake Dough				
White glutinous rice flour (g)	100	100	100	100
White sugar (g)	60	60	60	60
Water (ml)	100	100	100	100
Nilem fish protein concentrate flour (g)	0	3.5	4.5	5.5
Mochi Cake Filling				
Peanuts (g)	50	50	50	50
White Sugar (g)	20	20	20	20
Water (ml)	5	5	5	5

2.4RESEARCH METHOD

The method used in this research is experimental with four treatments bya hedonic test. The hedonic test was carried out using 20 semi-trained panelists who were students of the Faculty of Fisheries and Marine Sciences, Padjadjaran University who had experience in organoleptic testing. The characteristics tested included the color, aroma, texture and taste of the mochi cake. The level of each characteristics are 1(dislikeextremly), 3(dislike), 5(Neither like or dislike), 7(like), and 9(like extremly). The treatments in this research are: 1) Treatment A: 0% addition of nilem FPC, 2) Treatment B: 3.5% addition of nilem FPC, 3) Treatment C: 4.5% addition of nilem FPC, and 4) Treatment D: 5.5% addition of nilem FPC, from the white glutinous rice flour used.

2.5DATA ANALYSIS

Data from the organoleptic test using hedonic test were analyzed using Friedman's two-way variance analysis at the 95% confidence level. This analysis aims to determine if there is an effect of the additionofnilem fish protein concentrate flour on the mochi cake preference level. If the treatment has a significant effect on the object, the analysis followed by a multiple comparison test. This analysis aims to determine the differences between treatments. Decision making is done using the Bayes method. The Bayes method is used by considering the criteria value and median values [7].

3. RESULTS AND DISCUSSION

3.1PREFERENCE LEVEL ON COLOR OF MOCHI CAKE

The panelists first judged a product based on its appearances, such as shape and color. Shape and color are the first sensory that can be seen directly by the panelists. Determination of the quality of foodstuffs generally depends on the color they have, colors that did not deviate from the way it should be can give a special impression for the panelists [8]. The preference level value of mochi cake color is shown in Table 2.

Table 2. The median and average values of preference level of mochi cake color from various treatments by adding nilem FPC flour

Treatment	Median	Color Average
A (0%)	7	7.70a
B (3.5%)	7	7.00a
C (4.5%)	7	7.60a

D (5.5%)	7	6.50a

The highest average value of preference level onthe color of mochi cake color is treatment A (0%) at 7.70, followed by treatment C (4.5%) at 7.60 and the lowest is treatment D (5.5%) at 6.50. The color of mochi cake without the addition of the nilem fish protein concentrate flour is most preferred by the panelists and its characteristics were clean white color and have a round shape like mochi cakes atthe public market.

Based on the statistical analysis of Friedman's two-way variant test at a 95% confidence level, the treatment of the addition of nilem fish protein concentrate did not significantly affect the preference level on thecolor of mochi cake that was produced (Fcalculate (6.142) < Ftable (7.81)). This shows that the preference level of thecolor of mochi cake from all treatments was relatively equal. The color and shape of the mochi cake for all treatments can be seen in Figure 1.

(A:0%) (B:3.5%) (C:4.5%) (D:5.5%)

Fig. 1. The appearance of mochi cake according to treatment

Mochi cake which was added 4.5% nilem fish protein concentrate flour had an average value which was slightly lower than the 0% treatment. The results showed that some panelists dislike the mochi cake which added by 4.5% nilem fish protein concentrate flour. The addition of fish protein concentrate flour made the color of mochi cake become slightly brownish, not as white as mochi cake from 0% treatment. According to the other research[9], fish protein concentrates contain proteins that can react with fat oxidation products and form an imine compound then become brownish.

3.2PREFERENCE LEVEL ON AROMA OF MOCHI CAKE

The preference level on the aroma of a product in the food industry is considered important because it can quickly provide an assessment of the production result, whether the product is accepted or not by consumers [10]. The preference level value of mochi cake aroma is shown in Table 3.

Table 3. The median and average values of preference level of mochi cake aroma from various treatments of adding nilem FPC flour

Treatment	Median	Aroma average
A (0%)	7	6.80a
B (3.5%)	7	6.30a
C (4.5%)	7	7.50a
D (5.5%)	7	6.30a

The highest average value of the preference level of mochi cake aroma is treatment C (4.5%) at 7.50 and lowest is treatment B (3.5%) and D (5.5%) each at 6.30. Based on the statistical analysis of Friedman's two-way variant test at a 95% confidence level, the treatment of addition of nilem fish protein concentrate did not significantly affect the preference level on the aroma of mochi cake that was produced (Fcalculate value (7.67) < Ftable (7.81)). This shows that the preference level on the aroma of mochi cake from all treatments was relatively equal.

Mochi cake with the addition of 4.5% nilem fish protein concentrate flour, has a slightly distinctive aroma derived from nilem fish, while the addition of 5.5%, the fish smell is stronger. This strong aroma causes it to be less favored by panelists. Based on the other research[9], mochi cake with the addition of 4.5% snakehead fish protein concentrate flour has the highest aroma value with a characteristic aroma of snakehead fish and no additional odor, while 0% treatment only has a neutral aroma of glutinous rice flour.

3.3PREFERENCE LEVEL ON TEXTURE OF MOCHI CAKE

The texture is a material characteristic as a result of a combination of several physical quality which includes size, shape, amount and elements of material form that can be felt by the sense of touch and taste, including the senses of mouth and vision [11]. Preference level value of mochi cake texture is shown in Table 4.

Table 4. The median and average values of preference level of mochi cake texture from various treatments of adding nilem FPC flour

Treatment	Median	Texture average
A (0%)	7	7.10b
B (3.5%)	7	7.00a
C (4.5%)	7	7.10b
D (5.5%)	5	5.30a

The highest average value of preference level of mochi cake texture is treatments A (0%) and C (4.5%) each at 7.10, followed by treatment B (3.5%) at 7.00 and the lowest is treatment D (5.5%) at 5.30. Based on the statistical analysis of Friedman's two-way variant test at a 95% confidence level, the treatment of the addition of nilem fish protein concentrate did significantly affect the preference level on the texture of mochi cake that was produced (Fcalculate (10.6) > Ftable (7.81)).

The texture of mochi cake with the addition of 4.5% nilem fish protein concentrate flour is most preferred by the panelists because it has the characteristic of being chewy, quite dense, flexible and soft when chewed, while on the addition of 5.5% the mochi cake is less chewy and denser. Based on the other research[9], mochi cake with the addition of 4.5% snakehead fish protein concentrate flour has the highest texture value with chewy, supple and soft characteristics (not too hard or too soft). White glutinous rice flour is the main ingredient in making mochi dough. Based on that, mochi cake has chewy and supple characteristics. Glutinous rice flour has 79.45% starch content and contains amylopectin ([12], [13]). Amylopectin is what makes sticky characteristics in glutinous rice when cooked [14]. Carbohydrates have important functional properties in food processing and play a role in determining the rheological characteristics of various types of food ingredients or products [15].

3.4PREFERENCE LEVEL ON TASTE OF MOCHI CAKE

Taste is influenced by several factors namely chemical compounds, temperature, concentration and interactions with other taste components [16]. The preference level value of mochi cake taste is shown in Table 5.

Table 5. The median and average values of preference level of mochi cake taste from various treatments of adding nilem FPC flour

Treatment	Median	Taste average
A (0%)	7	6.70a
B (3.5%)	7	6.40a
C (4.5%)	9	7.90b
D (5.5%)	5	5.60a

The highest average value of preference level of mochi cake taste is treatment C (4.5%) at 7.90, followed by treatment A (0%) at 6.70, then treatment B (3.5%) at 6.40 and the lowest is treatment D (5.5%) at 5.60. Based on the statistical analysis of Friedman's two-way variant test at a 95% confidence level, the treatment of addition nilem fish protein concentrate did significantly affect the preference level on the taste of mochi cake that was produced (Fcalculate (17.6) > Ftable (7.81)).

Mochi cake with the addition of 4.5% nilem fish protein concentrate has a sweet taste with a slight taste from the nilem fish protein concentrate flour, while the addition of 5.5% fish flavor is more stronger. The sweet taste of Mochi cake comes from the sugar added in the process of making it.Sugar is a general term that is often interpreted for any carbohydrate used as a sweetener. White sugar from sugar cane has 99.8% purity (sucrose) and 0.1% moisture content [17]. If food is treated, it can be influenced by a combination of flavors caused by existing components [12]. These results are the same as other research[9], where mochi cake with the addition of 4.5% snakehead fish protein concentrate flour has the highest taste value with good specific taste characteristics. Amino acids and fats in snake-head fish give extra taste to mochi which is good distinctive taste.

3.5DECISION MAKING USING BAYES METHOD

Decision making using Bayes method needs information in form of probability of each alternative present to deal with the problemand next will be result prospect value as base for decision making [18]. The assesment of decision making using bayes method of mochi cake is shown at Table 6.

Table 6. Matrix of mochi cake valuation decisions by Bayes method

Treatment	Color	Aroma	Texture	Taste	Alternative value	Priority value
A (0%)	7.70	6.80	7.10	6.70	6.89	0.26
B (3.5%)	7.00	6.30	7.00	6.40	6.59	0.25
C (4.5%)	**7.60**	**7.50**	**7.10**	**7.90**	**7.63**	**0.28**
D (5.5%)	6.50	6.30	5.30	5.60	5.67	0.21
Criteria value	0.08	0.10	0.25	**0.56**		

The quantification results of criteria value of color, aroma, taste and texture of mochi cake showed that the taste has the highest criteria value, this proves that the taste criteria has most influence on the assessment of mochi cake and become the main consideration for selecting products [19].

Based on the alternative value by Bayes method, shows that the treatment C which is mochi cake with the addition of 4.5% nilem fish protein concentrate flour has the highest alternative value at 7.63. These results were followed consecutively with treatments A (0%), B (3.5%) and C (5.5%). Based on these alternative values, mochi cake with the addition of 4.5% nilem fish protein concentrate flour was a more preferred treatment by panelists compared to other treatments. The mochi cake characteristics is an ivory white color, a bit of fish smell, chewy texture but dense enough and sweet taste with a little typical flavor of nilem fish protein concentrate.

4. CONCLUSION

The results showed that mochi cake with the addition of 4.5% nilem fish protein concentrate flour produced mochi cake which panelists preferred over other treatments. The mochi cake characteristics is an ivory white color, a bit of fish aroma, chewy texture but dense enough and sweet taste with a little typical flavor of nilem fish protein concentrate.

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