

DEVELOPMENT OF MACARON CAKE WITH BLACK RICE FLOUR

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ABSTRACT

This study aims to develop cake products with the substitution of black rice flour. The cake product developed is Macaron Cake. Products that have been developed have been tested for preferences to assess community acceptance. Then the product is analyzed for nutrition. This study uses the R & D (Research & Development) method with the 4D development procedure (Define, Design, Develop, Disseminate). The panelists used in this study were 2 trained panelists, 30 semi-trained panelists, and 60 untrained panelists. The results of this study indicate that the amount of black rice flour substitution received is 40%. In the semi-trained panelist test, Macaron Cake's development products were not significantly different from the reference products. As well as the panelists who were not trained, Macaron Cake's development products were included in the preferred category with a score of 3 and above on all characteristics. Nutritional analysis shows that Macaron Cake products are classified as high-fat products.

Keywords: Cake, Macaron Cake, Black Rice Flour

INTRODUCTION

Wheat is one of the main staple foods in Indonesia. Wheat is not a plant that can grow in Indonesia, therefore to meet the needs of wheat, Indonesia must import wheat from abroad. Australia is Indonesia's largest wheat import destination country. Based on data from the Indonesian Wheat Flour Association (APTINDO) the volume of Indonesian wheat imports in 2017 rose by around 9% to 11.48 million tons from the previous year. (Badan Pusat Statistika, 2017). This increase in imports indicates that Indonesia is still very dependent on the presence of wheat which has resulted in low Indonesian food security. To deal with this, the Indonesian government held a local food consumption movement.

Local food in Indonesia is quite diverse, ranging from cereals to tubers. Some local foods that are quite common in Indonesia include taro tubers, brown rice, corn, cassava and black rice.

Black rice (*Oryza sativa* L.) is one of the local food ingredients whose existence is still unfamiliar among Indonesian people. People only know black rice for consumption in the form of rice that is good for health. Because

black rice contains anthocyanin which functions as an antioxidant and anti-cholesterol in the body. The anthocyanin content in black rice reaches 200-400 milligrams per 100 grams. Rice from black rice has a low glycemic index (GI) of 42.3 when compared to white rice which has a GI reaching 89. This shows that black rice can be used as an alternative to prevent the risk of diabetes and manage pre-diabetes. Behind the benefits that are good for health, the use of black rice is still rare in Indonesia. For this reason, it is necessary to develop products from black rice. One product that can be made using black rice is cake products, namely Macaron Cake.

Macaron Cake is one of the new cake product creations. Macaron Cake is inspired by a Macaron made from almond flour with cream filling in the middle. Therefore, Macaron Cake also has a similar form to Macaron. The difference is in the cake. Cakes on Macaron Cake are made from Sponge Cake. The texture of a soft cake and sweet stuffing is the perfect blend for this product. It's just that, Macaron Cake products are not popular among the people because this product is a development of cake that is more common in the community.

In this study a product will be developed in the form of Macaron Cake substituted with black rice flour. The research starts from determining the recipe that will be used as a basic recipe, then the selected recipe will add black rice flour in various concentrations and choose the best one. The selected recipe will be tested by trained panelists, semi-trained panelists, and panelists not trained to know the community's acceptability. Next determine the selling price of the product and nutritional analysis.

METHOD

A. Method

This research uses the R & D method (Research and Development with the 4D development procedure (Define, Design, Development, and Dissemination). R & D is a series of processes or steps in order to develop a new product or perfect an existing product to be accountable (Departemen Pendidikan Nasional, 2008)

B. Procedure

The first stage carried out in this study was:

1. Define

At this stage, the preparation of research proposals includes all aspects of the product to be studied, product constraints, and product development processes.

At this stage, a recipe will be used to make the development product. The researcher looked for 3 reference prescription products then determined the best recipe to be used. Reference prescriptions were found through literature review during the proposal preparation process.

2. Design

At this stage the design of the reference product development was made. Product development includes the development of recipes, engineering, and presentation techniques. Designing based

on literature studies that have been carried out at the next stage.

3. Develop

At this stage product development, topping or sauce will be used to complement the main product. Then product trials and trained panelists were tested.

4. Disseminate

At this stage a product show exhibition is conducted by testing using an untrained panelist test for visitors with a minimum of 60 untrained panelists. Then the data obtained in the form of forms which will then be analyzed to get the results of the study.

C. Material

The ingredients used in making Macaron Cake include black rice flour, flour, cornstarch, margarine, eggs, granulated sugar, ovalet, milk powder, xanthan gum, buttercream, orange flavor filling, and orange essences.

Black rice flour is obtained from Kusuka Ubiku, Bantul, Yogyakarta. Xanthan Gum is obtained from the Metasanjaya online store. And other ingredients are obtained from supermarkets and cake ingredients stores in Yogyakarta.

D. Sensory Test

The sensory test used is the hedonic method or testing the level of preference. The scale used in testing validation 1 is a scale of 1-5 ranging from very disliked to very preferred. While the scale used in the validation test 2, the semi-trained panelist test and the untrained panelist test used a 1-4 scale ranging from highly disliked to preferred. In this test the panelists were asked to assess product characteristics, among others, color, taste, aroma, texture, taste, and overall. Products given to panelists have been prepared 1 day before the test time.

Panelists needed 2 trained panelists, 30 semi-trained panelists, and 60 untrained panelists.

E. Nutritional Analysis

The kinds of analysis carried out on Macaron Cake products include analysis of water content, ash content, fat, protein, and carbohydrate content.

F. Data Analysis

The data in this study were analyzed descriptively quantitatively. The semi-trained panelists used the t-test analysis with a significance level set at 0.05, while the panelists did not practice using the mean test.

RESULTS AND DISCUSSION

A. Recipe for Development

In the following table, Macaron Cake's recipe is presented with a comparison of the amount of black rice flour 30%, 40%, and 50%.

Table 1. Recipe for Macaron Cake Development

Ingredient, unit	Control	Recipe 1 (30%)	Recipe 2 (40%)	Recipe 3 (50%)
Wheat flour, gr	50 gr	35 gr	30 gr	25 gr
Black rice flour, gr	-	15 gr	20 gr	25 gr
Egg, pcs	4 pcs	4 pcs	4 pcs	4 pcs
Egg yolk, pcs	4 pcs	4 pcs	4 pcs	4 pcs
Sugar, gr	100 gr	100 gr	100 gr	100 gr
Milk powder, gr	8 gr	8 gr	8 gr	8 gr
Ovalet, gr	12 gr	12 gr	12 gr	12 gr
Margarine, gr	100 gr	100 gr	100 gr	100 gr
Cornstarch, gr	8 gr	8 gr	8 gr	8 gr
Xanthan gum, gr	-	0.29 gr	0.29 gr	0.29 gr

Following is the flow diagram of the process of making Macaron Cake.

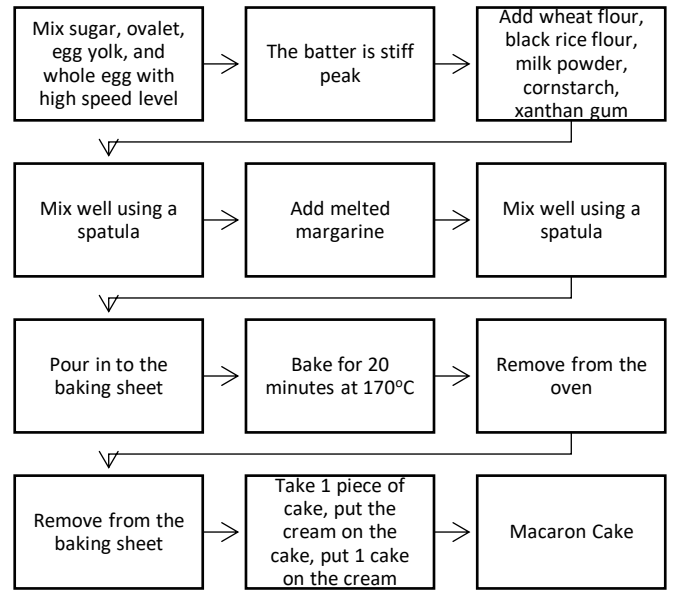


Figure 1. Macaron Cake Flow Chart

B. Tested Trained Panelists

1. Development Recipe

The following is a sensory test form presented by Macaron Cake recipes by experts.

Table 2. Sensory Development Recipe Test Results

Characteristics	Score			
	Control	30%	40%	50%
Color	5	3	4	3
Flavor	5	5	5	5
Texture	5	2	4	3
Taste	5	5	5	5
Overall	5	3	5	4

From the table above it can be concluded that the recipe with the amount of black rice flour as much as 40% is preferable to the recipe with the amount of black rice 50% and 30%. The recipe was chosen as a recipe for development.

2. Validation

Below is a sensory validation test table 1.

Table 3. Panelist Sensory Test Results 1 Validation 1

Characteristics	Control	Development
Color	4	4
Flavor	4	4
Texture	3	3
Taste	4	3
Overall	4	3

Table 4. Panelist Sensory Test Results 2 Validation 1

Characteristics	Control	Development
Color	5	4
Flavor	5	5
Texture	5	5
Taste	5	5
Overall	5	5

From the two tables above, the researcher made changes to the product contents, filling in products that were originally made from buttercream and orange essences added with orange flavored filling to enrich the taste of the product. The following are the results of the sensory validation test 2.

Table 5. Panelist Sensory Test Results 1 Validation 2

Characteristics	Control	Development
Color	4	4
Flavor	4	4
Texture	4	3
Taste	4	4
Overall	4	4

Table 6. Panelist Sensory Test Results 2 Validation 2

Characteristics	Control	Development
Color	4	3
Flavor	4	4
Texture	4	4
Taste	4	4
Overall	4	3

After conducting validation 2, development products were received by both trained panelists and continued on testing of semi-trained panelists.

3. Semi-Trained Panelist Test

Below is a table of test results for semi-trained panelists.

Table 7. Semi-Trained Panelist Test Results

Characteristics	Control	Development	P value
Color	3.4	3.3	0.476
Flavor	3.2	3.3	0.625
Texture	3	3	0.813
Taste	2.9	3.03	0.283
Overall	3.1	3	0.255

Based on the table above, if the P value is more than 0.05, then the control and development are not significantly different. If

the P value is less than 0.05, then the control and development is significantly different.

From table 7 it can be concluded that the characteristics of color, aroma, taste, texture, and overall product control and development are not significantly different. Which means that development products are accepted by panelists.

4. Test Untrained Panelists

The following are the results of the untrained panelists.

Table 8. Test results of untrained panelists

Characteristics	Score
Color	3.6
Flavor	3.7
Texture	3.6
Taste	3.6
Overall	3.7

Information for categorizing scores is as follows; score 1 for "very disliked", score 2 for "disliked", score 3 for "preferred", and score 4 for "very liked".

From table 8 it can be concluded that the color, taste, aroma, texture, and overall product are preferred. Which means the product is received by untrained panelists.

5. Selling Prices

The following is a table of raw materials for making Macaron Cake for 1 recipe accompanied by raw material prices. 1 Macaron Cake recipe produces 10 products. Calculation of selling prices using the BEP method.

Table 9. Material and Calculation of Macaron Cake Prices

Ingredient	Amount	Unit Price	Total price
Wheat flour	30 gr	Rp. 8.110 /kg	Rp. 243.3
Black rice flour	20 gr	Rp. 45.000 /kg	Rp. 900
Egg	4 pcs	Rp. 20.000 /kg	Rp. 5.200
Egg yolk	4 pcs	Rp. 20.000 /kg	Rp. 2.600
Sugar	100 gr	Rp. 10.148 /kg	Rp. 1.014,8
Milk powder	8 gr	Rp. 1500 /bks	Rp. 444,4
Ovalet	12 gr	Rp. 12.805 /bks	Rp. 2.048,8

Margarine	100 gr	Rp. 7.100 /500 gr	Rp. 1.420
Cornstarch	8 gr	Rp.17.000 /750 gr	Rp. 181,3
Xanthan gum	0.29 gr	Rp. 10.000 /100 gr	Rp. 29
Butter cream	300 gr	Rp. 28.000 /kg	Rp. 8.400
Orange filling	100 gr	Rp. 6.300 /500 gr	Rp. 1.260
Orange esens	5 ml	Rp. 9.500 /botol	Rp. 791,6
Packaging & sticker	10 pcs	Rp. 2.800 /buah	Rp. 28.000
Total			Rp. 52.533,2

Food cost	:	Rp. 52.533,2
Depreciation	:	
10% x Rp. 52.533,2		Rp. 5.253,32
Labor	:	
20 % x Rp. 52.533,2		Rp. 10.506,64
		----- +
		Rp. 68.293,16
Profit	:	
30% x Rp. 68.293,16		Rp. 20.478,9
		----- +
		Rp 88.781,108

Selling price	:	Rp 88.781,108/10 pcs
		: Rp 8.878,1
Rounded to	:	Rp 9.000/pcs

It can be concluded that the price of 1 package of Macaron Cake is Rp. 9000,-

6. Nutritional Analysis

The following are the results of nutritional analysis of 100 grams of Macaron Cake products.

Table 10. Results of Nutrition Analysis

Kinds of analysis	Analysis Result (% wb)
Water	13.12
Mineral	0.98
Fat	28.68
Protein	7.13
Carbohydrate	50.09
Calories*	487.00 kkal/100 gr

*Energy is calculated based on the energy content of micro nutrient components

From the nutrition analysis above, nutrition facts are obtained as follows:

Table 11. Nutrition Facts

NUTRITION FACTS		
Serving size 2 pcs (50 gr)		
Serving per Container : 2		
AMOUNT PER SERVING		
Calories 250 Kal		
Calories from fat 130 Kal		
		% AKG
Total fat	14,5 g	21 %
Protein	4 g	6 %
Total Carbohydrates	25 g	8 %
% AKG are based on a 2150 calorie diet.		
Your daily values maybe higher or lower.		

Based on% AKG, Macaron Cake products are classified as high-fat products.

CONCLUSION

Black Rice is a local food that needs to be developed in Indonesia, especially in the culinary sector. Black rice flour can be added to the manufacture of patiseri products such as cake. The product of Macaron Cake development with 40% percent substitution of black rice flour can be accepted after testing trained, semi-trained, and untrained panelists. In trained panelists testing, Macaron Cake's development products are not significantly different from the reference products. Starting from color, taste, aroma, texture and overall get a P value above 0.05. while the panelists are not trained, Macaron Cake products get a score above 3 which means the product is liked by the panelists. Analysis of nutritional value states that Macaron Cake products are classified as high-fat products.

From this study it can be concluded that black rice flour can be one of the local food ingredients that can replace wheat flour. Although it cannot replace all wheat flour in a recipe, it can at least reduce the use of wheat flour in the food industry.

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