Utilization of millet flour as the basic material to make millcoff cake (millet coffee cake)

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Abstract. Indonesia is rich in local food sources of cereals, but imports of wheat continues to rise each year. Substitution of wheat flour is one solution to cope with the high number of imported wheat. The cereals that can be used as a substitute material is millet. The purpose of this study is to determine the right recipe, knowing the nutrient content and determine consumer acceptance of millcoff cake. Millcoff cake is a product made from sponge cake flavored coffee that is substituted with millet flour and stuffing mixed with avocado mouse. This type of research is the research and development with 4D development model (Define, Design, Develop and Desimination). Selection of the recipe selected based on the sensory properties of the 4 aspects of color, taste, texture and aroma. Furthermore, the three treatments on prescription elected in substitution of millet flour that is 30%, 40% and 50%. The results showed that the chosen cake is cake with millet flour substitution as much as 50% because it has characteristics which approach control and still be acceptable to consumers. Nutrient content contained in cake millcoff showed 17.9897% carbohydrate content, protein content 7.6541% 14.6541% fat content, moisture content and ash content of 53.0830% 0.9202%.

1. Introduction

Wheat flour is needed in the food industry, especially patiseri product. Use wheat flour increased with increasing number of food industry flour-based products. Need for flour in Indonesia met from imports that imports of wheat increased from year to year. Central Statistics Agency recorded total wheat import Indonesia during 2016 reached 10.53 million tons, up 42% from a year earlier, that number will continue to grow over time. The high rates of wheat consumption, it means that people have started to leave the local food consumption of cereals and switched to wheat and its processing products. The import problem can be overcome by replacing wheat flour with local food cereals, namely millet flour. Development of millet as a food commodity is very necessary, especially in food diversification efforts. Millet including minor economic crops but contains nutrients that are similar to other food crops such as rice, corn, wheat and grain crops [1]. In Indonesia, millet flour utilization at present is still not widely known, its use has not developed in the community [2]. Millet is one of the main sources of energy providers, proteins, vitamins and minerals, rich in B vitamins, especially niacin, B6 and folacin also essential amino acids such as isoleucine, leucine, phenylalanine and threonine. Millet seed contains carbohydrates and protein that is not inferior to rice [3]. Development of millet is prospective in an effort to provide a local source of carbohydrates so that millet can be used as an alternative food ingredient because of millet can help meet their food needs. Carbohydrate and protein content similar to the content of millet flour. The fiber content in millet is also higher than the content of the flour, from these data can be predicted that millet flour can be used
as a substitute for wheat flour and millet flour can be used as a base material patiseri the manufacture
of products rich in fiber. This study aims to determine the proper prescription, determine consumer
acceptance of the product development and know the nutritional information found on the product
development.

Development cake with local food millet flour is expected to produce a preferred and interesting
presentation though made of local food. The products to be developed are millcoff cake, cake millcoff
development will utilize local food is millet. Millcoff cake is an innovative product that uses the basic
ingredients patiseri sponge cake coffee flavor by stuffing avocado mouse and coffee pudding resulting
blend taste millet, avocado and coffee specialties. Millcoff cake served with a weight of 100 grams. Millcoff
serving this cake using a dessert plate as a serving tool. Garnish used is a praline chocolate, mint leaves
and edible flower. Packaging to be used for this cake is millcoff mica rectangular box and
label products using Ivory paper 310 grams.

2. Method

2.1 Types of research
This type of research is the research and development (Research and Development). R & D aimed at
producing new products through the development process. Each product developed requires different
research procedures.

2.2 Place and Time Research
Product research place of the trial process recipe development, fixing, making and testing products
proximate product development conducted in the Department of Technical Education Laboratory
Culinary and Clothing Faculty of Engineering, State University of Yogyakarta. Time to create a
product of the testing process recipe development, repair, create and test products proximate product
development is carried out in January 2019 until April 2019.

2.3 Material
In this study, the main material used is white millet (Panicum Miliceum L.) and wheat flour. In
addition to the main ingredient other necessary materials are sugar, eggs, milk powder, coffee powder,
margarine, emulsifier, avocado, gelatin, whipping cream and gelatin.

2.4 Tools
The equipment used in this study are mixers, scales, measuring cups, dough bowl, spatula, pan
measures 24 cm x 24 cm x 24 cm and oven. The tools used for product testing which the ballpoint,
sesoris test sheet, plate, spoon, and water as a neutralizer.

2.5 Development Procedure
Models in this research is the development of 4D (Define, design, develop and desimination) [4]. At
the stage or stages lowest define a stage to define specific terms of research. The second stage is a
design stage that is a stage whose aim is to design products that will be produced. The next stage is the
stage of develop, develop stage is the stage to produce the product development carried out through a
two-step validation, the validation by an expert assessment, to be further improvements and the second
conducted trials development. The final stage is the stage disseminate, at this stage, the development
of product promotion in order to be accepted by consumers.

2.6 Product Testing Data Sources
In this study, researchers used several panelists as a data source. Panelists provide an assessment of
sensory tests which include taste, color, aroma, texture and preference for products. Source data can be
seen in Table 1 below.
Table 1. Sumber Product Testing Data

| Research Stage   | Data source           | Total       |
|------------------|-----------------------|-------------|
| Validation I     | Expert                | 2 persons   |
| Validation II    | Expert                | 2 persons   |
| Test of Preference | Semi-trained panelists | At least 30 people |
| Desseminate      | Exhibition Visitors   | At least 80 people |

2.7 Data Analysis Methods

Methods of data collection is done by using the product acceptance test. Assessment carried out by at least 30 semi-trained panelists on each product with borang sheet product acceptance as a reference assessment. In this study, quantitative data obtained from the 30 panelists acceptance of the products received as well as products that are not acceptable. Then the test data were analyzed products paired t-test on a limited scale sensory test results.

3. Results and Discussion

3.1 Define

In this study, the define phase is done by reference recipe search. In search of a reference recipe using a valid prescription and has been tested and successfully. In this study only one recipe reference only used later developed. Sponge cake recipe reference can be seen in Table 2, below.

Table 2. Reference Sponge Cake Recipe

| Ingredients   | R1                | R2                | R3                |
|---------------|-------------------|-------------------|-------------------|
| Egg           | 4 items           | 4 items           | 4 items           |
| Wheat flour   | 110 grams         | 65 grams          | 110 grams         |
| Sugar         | 100 grams         | 100 grams         | 125 grams         |
| Margarine     | 50 grams          | 75 grams          | 70 grams          |
| Cocoa powder  | 15 grams          | 10 grams          | 30 grams          |
| Milk powder   | 10 grams          | -                 | 10 grams          |
| Emulsifier    | 1/2 tsp           | -                 | 10 grams          |

R1: Recipe Ions Culinary College
R2: Recipe Jobsheet patiseri 1 UNY
R3: Recipes Magazine *Pastry & Bakery*

Based on Table 2 recipes selected reference adapted to the characteristics of the desired sponge cake include taste, color, aroma and texture is a reference recipe R3.

3.2 Design

Determination of the original formula of this product is based on trial with several different reference recipes are then selected recipe with the best flavor. From the recipe chosen (R3) treatment performed by the substitution of wheat flour using millet flour. The resulting formula can be seen in Table 3 below.

Table 3. Development of Sponge Cake Recipe

| Ingredients   | F1  | F2  | F3  |
|---------------|-----|-----|-----|
|               | (30%)| (40%)| (50%)|
| Millet flour  | 33 grams | 44 grams | 55 grams |
| Wheat flour   | 77 grams | 66 grams | 55 grams |
| Egg           | 4 items | 4 items | 4 items |
Based on Table 3 Selected formula that is still acceptable in sensory terms of color, aroma, flavor, texture and overall is F3 with a composition of 50% millet flour.

Selection is based on the formula of the journal entitled Quality Characteristics of Sponge Cake Containing Various Levels of Millet Flour written by Hak-Gil Chang that the research results sponge cake with millet flour substitution as much as 20% is still acceptable for sensory [5]. The next stage is the determination of mouse avocado recipe development. Mouse avocado recipe development can be seen in Table 4 below.

### Table 4. Development of Avocado Recipe Mouse

| Ingredients       | F1          | F2          | F3          |
|-------------------|-------------|-------------|-------------|
| Avocado           | 200 grams   | 225 grams   | 250 grams   |
| Sugar             | 10 grams    | 10 grams    | 10 grams    |
| Gelatin           | 5 grams     | 5 grams     | 5 grams     |
| Liquid milk       | 20 ml       | 20 ml       | 20 ml       |
| Whipping cream    | 100 grams   | 100 grams   | 100 grams   |

Based on Table 4 formula selected according to the desired criteria and still be acceptable sensory terms of color, aroma, flavor, texture and overall is F3 with avocado 250 grams of composition.

### 3.3 Preparation of Millcoff Cake

First mixing millet flour, wheat flour, sugar, milk powder, coffee powder, and emulsifiers. Then the addition of liquid margarine until homogeneous. Furthermore, the printing and baking. Roasting is sponge cake with a temperature of 170°C until cooked [6].

In making avocado mouse, the first step is mixing avocado puree, gelatin, milk, sugar and whipping cream. Furthermore, settling in refrigerator for 3 hours. In the first stage of making coffee pudding is mixing gelatin, liquid milk, powdered sugar and coffee. In making millcoff cake, the first step is cutting sponge cake with a size of 5 cm x 5 cm. Furthermore, coating with avocado mouse and put sponge cake on top. The next stage is the coating of coffee pudding on top then given garnish whipping cream, chocolate pralines and torenia edible flower.

### 3.4 Develop

At this stage of manufacture and testing of products are tested first product, the second product trials, and trials panelists to be a reference at the time of the exhibition. The trial results are used to improve the product. The results of the first validation test can be seen in Table 5 below.

### Table 5. Results of Validation I

| Characteristic | Reference Product | Development Product |
|----------------|-------------------|---------------------|
| Form           | 5                 | 5                   |
| Size           | 5                 | 5                   |
| Color          | 4                 | 5                   |
| Aroma          | 5                 | 5                   |
| Taste          | 4                 | 4                   |
| Textures       | 5                 | 5                   |
| Overall        | 4                 | 5                   |
Based on the results of the validation Table 5 I in product development shows that the flavor aspect has a value corresponding whereas aspects of shape, size, color, aroma, texture and overall had a very appropriate value. Validation II test results can be seen in Table 6 below.

Based on the results of the validation II Table 6 on product development shows that the aspect of shape, size, color, aroma, flavor, texture, overall, presentation and overall packaging has not really like.

| Characteristics | Reference Products | Product Development |
|-----------------|--------------------|---------------------|
| Form            | 4                  | 4                   |
| Size            | 4                  | 4                   |
| Color           | 3                  | 4                   |
| Aroma           | 4                  | 4                   |
| Flavor          | 4                  | 4                   |
| Texture         | 4                  | 4                   |
| Whole           | 4                  | 4                   |
| Presentation    | 4                  | 4                   |
| Packaging       | 4                  | 4                   |

Test panelists conducted 30 semi-trained panelists by panelists from Boga Technical Education student of fourth semester. Panelists provide an assessment of sensory tests which include taste, color, aroma, texture and overall for the product. A test result by semi-trained panelists on a reference product and development can be seen in Table 7 as follows.

| Characteristics | Sig (2-tailed) | Information |
|-----------------|----------------|-------------|
| Color           | 0.420          | Ho          |
| Aroma           | 0.326          | Ho          |
| Flavor          | 0.245          | Ho          |
| Texture         | 0.601          | Ho          |
| Overall         | 0.845          | Ho          |

Based on the above table if Ho is more than 0.05 (> 0.05), the control and development were not significantly different, Ha is less than 0.05 (<0.05), the control and development of real different. It can be concluded from the table that the aspect of color, aroma, flavor, texture and overall there was no difference between the reference product and development.

3.5 Proximate Analysis Millcoff Cake

After the acceptance test performed proximate test to determine nutrient content contained in cake millcoff product. Nutrient content contained in cake millcoff can be seen in Table 8 below.

According to the table 8 can be seen the nutrients contained in the cake weighing 100 grams millcoff showed levels carbohydrate 17.9897% 7.6541% protein content, fat content of 14.6541% 53.0830% moisture content and ash content of 0.9202%.
3.6 Disseminate
At this stage the dissemination products. Products tested on 80 panelists at the time of the final project exhibition. The results of the acceptance test by panelists to millcoff cake based on the characteristics of color, aroma, flavor, texture and overall in the category of "highly favored". Below is a graph of the average reception millcoff cake.

![Average Millcoff Cake Product Acceptance](image)

**Figure 1. Graph Average Millcoff Cake Product Acceptance**

Based on Figure 1 can be seen that from the aspect of color, aroma, texture, flavor and overall millcoff cake shows categorized as "extremely displeased" that can be accepted by consumers.

4. Conclusion

Based on the results of this study concluded that the right recipe for the manufacture of Millcoff Cake is using 50% flour and 50% millet flour producing products in accordance with the criteria. this result is the same as the correct recipe from le'éclair was containing with 50% millet flour substitution [6]. Consumer acceptance of these products from the aspect of color, aroma, flavor, texture and overall in the category of "highly favored" so that the resulting product can be accepted by society into one product innovation millet flour. Nutrient content contained in cake millcoff showed levels carbohydrate 17.9897% 7.6541% protein content, fat content of 14.6541% 53.0830% moisture content and ash content of 0.9202%.

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