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RECEPTIVITY OF BUTTER COOKIES USING MOCAF (Modified Cassava Flour) SUBSTITUTION

Kristian Triatmaja Raharja[1]
Hospitality Study Program, NSC Polytechnic Surabaya[1]
[1]kristiantraharja@gmail.com

ABSTRACT

Cassava has an important role in supporting national food security. Cassava is a local staple food with high productivity which increases steadily from year to year. Using post-harvest processing technology, cassava can be processed into MOCAF (Modified Cassava Flour) which provides several advantages. MOCAF substitution can be performed to diversify the products of processed cassava, one of which is butter cookies product. The objectives of this study are 1) to investigate the effect of MOCAF substitution on receptivity to color, aroma, flavor and texture of butter cookies. 2) to investigate the best butter cookies product with MOCAF substitution based on the average score of panelist's level of receptivity. This is an experimental research with 3 treatments of MOCAF substitution level of 80% (X1), 90% (X2), and 100% (X3). Observation method through hedonic test is used in data collection. The sample is assessed by 25 trained panelists. The results of hedonic test are analyzed using Friedman test. When difference is found in the receptivity, the analysis process shall be continued with Wilcoxon Signed Rank Test. The results indicate that: 1) MOCAF substitution affects butter cookies texture, but it does not give significant effect to color, flavor and aroma of butter cookies and 2) The best butter cookies product based on the average number of panelist's receptivity is X3. X3 products are butter cookies with 100% MOCAF flour substitution.

Keywords: local food, cassava, MOCAF, butter cookies

1. INTRODUCTION

Background of the Study

Sustaining food security of a region requires an exploration of local food that can provide abundant food supply. Indonesian staple food is still mainly rice. Thus, food diversification needs to be carried out. Despite of many obstacles faced in changing public's consumption pattern that has been formed all this years, diversification of food must remain and continue to be carried out. Cassava is one of staple foods which can potentially be a substitute for rice as a carbohydrate source. In fulfilling carbohydrate needs, cassava is the third food crop commodity in Indonesia, in addition to rice and corn (Ministry of Agriculture, 2016).

Cassava (*Manihot esculenta crantz)* is a plant produced throughout the year as it can grow in tropical and subtropical areas (Hartati, 2018). The growth of cassava productivity in Indonesia during 1980-2016 period tends to increase. The average growth rate increased by 2.64% per annum where the productivity of 97.51 ku / ha in 1980 becomes 239.13 ku / ha in 2016. The development of productivity during the last five years tends to increase by 2.85% (Ministry of Agriculture, 2016). Cassava has an important role in supporting national food security.

Cassava as a staple food commodity is still considered as an unimportant commodity, so any means to study the staple food as major staple food has not been carried out intensively (Anindita, 2017). In terms of consumption at the household level, survey results of *SUSENAS (Survei Sosial Ekonomi Nasional)* indicates that cassava consumption per capita is under estimate. From 2011 to 2014, the level of consumption continued to decline by 5.79, 3.60, 3.49, 3.42 kg/capita/year. The consumption level is predicted to continue to decline to 2.54 kg/capita/year by 2019 (Ministry of Agriculture, 2016).

However, by using post-harvest processing technology, cassava can be processed into MOCAF (*Modified Cassava Flour*). MOCAF is cassava flour obtained by modifying cassava cells through fermentation process. The growing microbes cause characteristic changes of the resulting starch in the form of increased viscosity, gelatiability, rehydration, and ease of solubility (Amanu, 2014). MOCAF has the advantages of high protein content, lower HCN, widespread application, is easier to disperse into food products and is easier to form 3 dimensions between components as to result in better product consistency (Tandrianto, 2014).

In application to the manufacture of food products, MOCAF can be a substitution for wheat flour. The resulting MOCAF has similar characteristics to wheat flour (Fadilah, 2015). In some studies, it was proven that MOCAF could substitute wheat flour used in cake, cookies, bread and more.

Butter cookies are food products that become public great demand. The market demand for cookies is quite high. It is seen from the number of cookies in the packaging ranging from cans to plastics of various sizes at relatively affordable prices, so it can be enjoyed by the public at large. Butter cookies are a type of pastry that contains a lot of butter, are generally small and round or square in shape, using sugar topping, have distinctive butter aroma and are golden yellow in color.

This study is conducted to determine the effect of MOCAF substitution on the receptivity of butter cookies by measuring the level of preference (hedonic test) for color, aroma, flavor, and texture of butter cookies.

2. RESEARCH METHODS

A. Experimental Design

The experimental design used in this study was single variable design, in which all factors remain the same except the treatment of which effect will be compared (Raharja, 2016). The treatments given were MOCAF flours of 80, 90, and 100% of weight of wheat flour. The experimental design is presented in Table 1 and the prescription research formulation is presented in Table 2.

Table 1 Experimental Design

(X) Independent Variable	(Y) Dependent variable Hedonic Test			
	Yes	Yb	Yc	Yd
X1				
X2				
X3				

Information:

Independent Variable (X):

X1: MOCAF flour 80% / weight of wheat flour
X2: MOCAF flour 90 % / weight of wheat flour
X3: MOCAF flour 100 % / weight of wheat flour

Dependent variable (Y):

Ya: the level of preference for color
Yb: the level of preference for aroma
Yc: the level of preference for flavor
Yd: the level of preference for texture

Table 2. Recipe Formulation Used in the Study

Materials	Prod. X1	Prod. X2	Prod. X3
MOCAF	80 g	90 g	100 g
Wheat flour	2 0 g	10 g	0 g
Corn Starch	25 g	25 g	25 g
Butter	100 g	100 g	100 g
Fine sugar	150 g	1 50 g	150 g
Egg	50 g	50 g	50 g

B. Procedures in Producing MOCAF flour

Cassavas were sorted, peeled, washed, and sliced in 0.5 mm thick. The next stage was cassavas were soaked in yeast water solution with a ratio of 1:1, for 16 hours. The yeast used was the yeast to make *tape*. The cassavas were then drained and dried in the sun. Dried cassavas were indicated by which becoming easily to break. The dried cassavas were then milled into 80 mesh in size (Fiqtinovri, 2017).

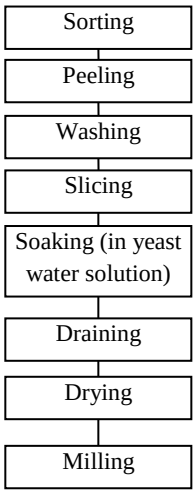

Figure 1. MOCAF Flour Making Procedure

C. Data Collection

This study used observation methods with hedonic test (Test A). The criteria for hedonic scores were highly preferred (5), preferred (4), regular/ neutral (3), dislike (2), very dislike (1). Hedonic test in this study included color, aroma, flavor, and texture categories. This test aimed at finding out the preferred composition of MOCAF flour substitution treatment according to panelists. This study employed 25 trained panelists.

D. Data Analysis

SPSS version16.0 was used to analyze statistical data. Meanwhile, *Friedman* test was used to analyze the result of Hedonic test. When there was a difference in receptivity (color, flavor, texture and flavor), should the analysis be continued with the *Wilcoxon Signed Rank Test*. The statistical test was performed with 95% confidence level.

3. RESULTS AND DISCUSSION

Table 3. Distribution of MOCAF *Butter Cookies* Level of Preference

Characteristics	Average Score of Receptivity			Friedman Test
	X1	X2	X3	
Color	4.4 0	4.36	4.48	0.766
Flavors	3.88	3.88	4.04	0.39 0
Aroma	3.92	3.8 0	3.8 0	0.565
Texture	3.32[c]	3.48[b]	4.28[a]	0,000
Total	**15.52**	**15.52**	**16.6**	

Information:

If the letter next to the number is difference, it indicates difference, based on Friedman test at α = 0.05

X1 = MOCAF flour 80%
X2 = MOCAF flour 90%
X3 = MOCAF flour 100%

The panelists' receptivity to the MOCAF butter cookies product is presented in Table 3. According to the data, it indicates that the receptivity to color, flavor, aroma and texture of MOCAF butter cookies is in the range of "regular" (neutral) to "preferred". The color of MOCAF butter cookies receives the highest receptivity which is at the range of "preferred". Meanwhile, the lowest level of preference is addressed to the cookies texture which is at the range of "regular".

A. Color

According to the result of *Friedman* test on color receptivity, it is obtained P (value)> *a* = 0.05 of 0,766 which indicates that there is no effect of the use of MOCAF 80%, 90%, and 100% on color receptivity of butter cookies. Butter cookies with MOCAF substitution variations have an attractive brownish yellow color. The average preference score of the color of MOCAF butter cookies ranges from 4.36 to 4.48 (preferred) and the highest score of the color of butter cookies is addressed to those made of 100% (X3) MOCAF flour.

Color is an important parameter in determining whether or not a food product will be consumed. Garber's (2000) study indicates that food color affects the consumers' ability to correctly identify flavors, form different flavor profiles, and dominate other sources of flavor information, including labeling food products. Color of MOCAF butter cookies is brownish yellow, which is not different from butter cookies in general. The use of other additives such as sugar causes a browning reaction resulted from heating during baking process (Putra, 2017).

B. Flavor

Friedman test on flavor receptivity shows P (value)> *a* = 0.05 of 0,390 which indicates that there is no effect of the use of MOCAF substitution 80%, 90%, and 100% on flavor receptivity of butter cookies. Butter cookies with MOCAF substitution variations have a distinctive butter cookie flavor with a dominant taste of butter. The average preference score on flavor of MOCAF butter cookies ranges from 3.88 to 4.04 (preferred) and the highest score is addressed to those made of 100% (X3) MOCAF flour substitution.

Flavor is a combined sensation of aroma, texture, food temperature, and taste. When taste is combined with aroma, then the food flavor will develop. If someone has problem with sense of smell, then the perception of flavors will usually also be reduced (Handayani, 2011). The flavor of MOCAF butter cookies are sweet with the taste of butter. Taste of butter is dominant due to the proportions of its use is 100% of the main ingredient.

C. Aroma

Friedman test on the aroma shows value of P (value)> *a* = 0.05 of 0,565 which indicates that there is no effect of *the use of* MOCAF substitution 80%, 90%, and 100% on aroma receptivity of butter cookies. Butter cookies with MOCAF substitution variations have dominant butter aroma. The average preference score on aroma of MOCAF butter cookies ranges from 3.8 to 3.92 (preferred) and the

highest score is addressed to those made of MOCAF flour substitution of 80% (X3).

Aroma is associated with volatile chemical compounds (Raharja, 2016). Volatiles are compounds easily to volatilize, especially if there is an increase in temperature. Aroma plays important roles in food production which are enhancing flavor and enhancing the appeal of these food products (Antara, 2012). Aroma of butter cookies with MOCAF substitution= are butter aroma. The use of butter in cookies dough can improve the aroma of butter and cover up the distinctive aroma of MOCAF.

E. Texture

Friedman test on texture acceptability shows P (value) < *a* = 0.05 of 0.000 which indicates that there is effect of MOCAF on texture receptivity of *butter cookies*. To notice the exact difference to the texture of MOCAF *butter cookies*, the analysis is followed by *Wilcoxon Signed Rank Test.*

Results *Wilcoxon Signed Rank test* shows difference on receptivity between X1 and X2 products with the value of p = 0.046 (p <0.05). A significant difference also exists between X1 and X3 products with the value of p = 0,000 (p <0.05). There is also a significant difference between X2 and X3 products, with the value of p = 0,000 ((p <0.05).

Food texture gives a sensory signal to the consumer. Most of these signals stimulate a consumer's response to the good or bad condition of a food. One of the important roles of texture in product success is an indication of the freshness and stability of food products. The mechanical properties of food textures such as hardness, crispness, elasticity, and density are easy indicators to determine the freshness of food products (Civille, 2010).

4. CONCLUSIONS AND SUGGESTIONS

A. Conclusion

Based on the analysis of hedonic test data on butter cookies with MOCAF flour substitution, it can be concluded as follows:

1. The results showed that substitution of MOCAF flour affects butter cookies texture, but it does not have significant effect to color, flavor and aroma of butter cookies.
2. The best butter cookies product based on the average score of panelists' receptivity is X3. X3 products are butter cookies made of 100% MOCAF flour substitution.

B. Suggestion

1. The use of MOCAF as a local staple food substitute for wheat flour and as a local culture should be widely promoted to the public.
2. This study can be used as a reference in development of a study related to the utilization of local food, especially cassava.

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