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Modified Cassava Flour Utilizing as a Wheat Flour Substitution in Chochochip Cookies

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ABSTRACT
The purpose of this study is to create Chocochip cookies using local ingredients thus support food security. Mocaf is used as the main substitution of wheat flour in chocochip cookies. Mocaf made from surrounded dried cassava. The characteristics of a mocaf are similar to wheat flour, but the protein and water content is very low. This experimental study was carried out in a food laboratory with descriptive analysis. Product quality is obtained organoleptically by trained panelists using sensory test instruments that cover 10 criteria. The results obtained from the chocochip cookie mocaf formula, showed (a) the use of 100% mocaf by reducing the recipe's weight (15% lighter than flour, due to its low water content). The addition of eggwhite is needed, so that cookies are not easily broken due to low protein in mocaf. (b) meet the requirements as cookie, i.e. crispness; flavorful cookies; scented mocaf; light brown color. (c) Community acceptance of mocaf products is very good, meaning that they really like mocaf chocochip cookies. But the criteria is lower for the acceptance of the aroma. This finding will have implications that mocaf can be used as a substitute for wheat flour in making fine quality chocochip cookies.
Keywords: *cassava, chocochip, cookies, local, mocaf*

I. INTRODUCTION

At present, wheat and wheat flour as derivative products are the biggest imported food consumed by the people of Indonesia daily, even shifting the consumption of local agricultural products. The results of the National Socio-Economic Survey (Susenas) show that the consumption of rice per capita in Indonesia is consistently reduced, a decrease in consumption of rice per capita by 1.5% per year is one of the government's targets in the field of food, this is a positive development (BPS, 2016). Interesting facts about the development of food consumption patterns in recent years have not resulted in an increase in local food consumption, but there has been an increase in consumption of wheat flour.

Based on BPS data in 2015 (Nugroho, 2016) in the table on the Development of Food Commodity Production in the Province of Bali, it appears that the production of cassava commodities has decreased every year, even cassava production throughout Indonesia. Reduced consumption or use of cassava as an alternative food, which causes the production of this commodity to decline, farmers do not plant cassava because it is less attractive to the community and also limited cassava products. Efforts to diversify food by utilizing local food ingredients are needed, as an alternative to process cassava into flour (intermediate product). In previous research (Ariani, 2014), mocaf can be used into various cake variations, namely roll cake, chiffon cake, steamed sponge, sponge cake, brownies, and fruits cake as food processed products that can compete with flour cake products.

Wheat and wheat flour as derivative products play an important role as the main ingredient in public consumption, so it needs an import restriction policy. Another alternative is by substituting flour with local food ingredients. Current technological developments, cassava can be producedinto semi-finished products (intermediate products) such as mocaf instead of wheat flour. This process is a way of preserving crops, especially for high-water and perishable commodities, such as cassava. Other advantages, as flexible raw materials for advanced processing industries, are safe in distribution, and save space and product storage costs. The difference in composition of several of flour types is described in the following table 1:

Table 1. Composition of various flour: mocaf, cassava flour and wheat flour

Component	Mocaf (%)	*Cassava flour (%)	**Wheat flour (%)
Water content	6.9	12	12
Protein levels	1,2	1,2	Aug-13
Ash content	0.4	0.4	1.3
Starch content	87.3	82	60 - 68
Fiber content	3.4	3.34	2 - 2.5
Fat level	0.4	0.32	1.5 - 2

* Suprapti 2006
** Depkes. 2005
Source: Analisis Lab. TP, UNUD. 2018

Cassava will experience browning after peeling, this is due to oxidation with air so that browning reactions are formed by enzymes in these foods (enzymatic browning), this is a reaction between oxygen and a phenol compound catalyzed by polyphenol oxidase. To avoid brown color in cassava by soaking water or 1% salt solution. High-quality cassava harvesting period is carried out at 8-10 months of plant life. Harvesting too early will produce cassava with low starch content, late harvesting will produce high crude fiber. Cassava flour through a method of preparation, began in 1993 as an improvement in the traditional way of making cassava flour. The superiority of this process is higher yield than dried cassava flour which is from 20-22% to 25-30%, hygiene, long lasting, better nutrition, can substitute wheat flour partially. The flour used in this study is modified cassava flour or also called mocaf, made in a simple way, fresh cassava is processed by washing and stripping, gcoarse grated, soaking with the addition of a starter, then the drying and sanding process..

Problems that occur in the community are the many kinds of snacks or cakes that use wheat flour as the main ingredient in making cakes, one of which is cookies. Cassava is a food ingredient that can be processed into flour, it is expected that mocaf flour can replace the function of flour in making cookies. Although the characteristics of the flour are almost the same, this research needs to optimize the substitution of flour with mocaf flour to obtain classical variations of quality cookies made from local ingredients. Cookies are identical to celebrations or holidays, such as Lebaran, Christmas, New Year, Chinese New Year, and Nyepi. Some cookies are made or presented at celebration events and served to guests or as souvenirs or parcels.

In addition to the main ingredients of cookies, other ingredients

(1) shortening as a source of fat in pastry products are useful to provide a fatty and tender / crunchy taste on the product, improve the eating quality of the product, add flavor, act as an emulsifier and help tie the product. (2) eggs for making cookies are to add flavor and savory flavor, help shrink the dough and add nutritional value. The egg has a binding reaction so that when used in large quantities, the cookies are more inflated than wide. The dough that uses egg white causes the resulting cookies to have a harder texture and vice versa when more egg yolks are used. (3) sugar is used for making cookies, refined sugar and syrup sugar from sucrose, fructose, glucose or maltose. The use of various types of sugar will affect the appearance of the surface of the cookies, (4) salt serves to add flavor, remove tasteless flavor and unpleasant taste from other ingredients.

(5) powdered milk to provide an attractive crust color, provide a specific flavor, increase water absorption and the ability to add gas in the dough and add nutritional value. (6) water serves to help the formation of gluten when using wheat flour, controls the temperature of the dough, dissolves the ingredients and helps the gelatinization process of starch.

The process of making cookies is divided into 3, namely the process of mixing, panning and baking. One of the most important stages in making cookies is the mixing process. The mixture is stirred so that all ingredients can be mixed as homogeneously as possible. One method of mixing is called the creaming method, namely milk, shortening, sugar, and salt mixed and stirred until homogeneous, plus water and eggs when needed, then flour is put into the mixture and stirred until homogeneous with a low rotational speed. In this process there is absorption of liquid so that the resulting clay mixture is produced, to produce a solid mixture and can be processed into a quality final product. The panning process to obtain cookies products is uniform and improves appearance, usually done manually. During roasting there is the development of dough, protein coagulation, starch gelatinization and water evaporation. To get good roasting results, cookies are removed from the oven while still soft, baking is continued in a hot baking pan outside the oven. The average baking temperature is around 150-200 °C

In order to obtain locally based food processing, it is necessary to substitute wheat flour with mocaf, so that the problem is raised, how to use mocaf as a substitute for wheat flour in making quality mocaf chocochip cookies ?. The research objective is to obtain the use of mocaf as a substitute for wheat flour optimally in making chocochip cookies, so as to obtain a quality product and be liked by the community, as well as an estimate of its storability. This utilization procedure can be documented as a tutorial learning media.

II. METHODOLOGY

The initial step of the research is to experiment with chocochip cookies with the main ingredient 100% wheat flour, followed by the processing process as a control formula. The first experimental step, the formula for mocaf chocochip cookies with substitution of 100% mocaf flour, then the processing is carried out. Then the product is assessed organoleptically, if it matches the criteria of cookies, the experiment is stopped, but if it does not match the experimental criteria, the treatment is recommended by the research team through discussion. The next experiment uses repetition techniques with improvements to the formula or processing. Data analysis was carried out descriptively in order to obtain mocaf chocochip cookies products according to criteria. Based on various theories about cookies (Stewart, 2008; Suarni, 2009; Ariani, 2014;
Wibowo, 2015; Gunawan, 2015; Chendawati, 2017), the criteria for cookies are explained according to table
as follows:

Table 2. Criteria Criteria for Cookies

NO.	CRITERIA COOKIES	DESKRIPSI
1	Fragility	the level of crispness in cookies when eaten, but the shape of cookies remains intact / not destroyed
2	Aroma Cookies	fragrant cookies that can be felt by the senses of smell (nose) derived from ingredients of cookies, such as eggs, butter, vanilla etc. (other than mocaf flour)
3	Aroma of Cassava	Fragrant cookies that can be felt by the senses of smell (nose) are derived from mocaf flour.
4	Granules	level of subtlety and flatness of cookies
5	Dry	Dryness level of cookies, meaning cookies are not moist / sluggish.
6	Sweetness	the level of sweetness of cookies obtained from the taste bud (tongue) comes from the sugar used. (in kaastengels, the sweet taste is replaced with salty level)
7	Taste of cookies	the level of taste of cookies obtained from the taste bud (tongue) comes from a mixture of ingredients used.
8	Form	the cookie frame is clearly visible (in the form of a striped drop) and flatness or similarity in shape.
9	Color brightness	colors are not dull, but shiny / bright according to the type of cookies
10	Cooking time	the cooking time cookies gives the right color and taste (not bitter and burnt)

The research step is to obtain the optimal formula in the first trial by substituting flour as the main ingredient of cookies by 100%. If the product produced does not meet the cookie quality criteria (wheat flour cookies as a control), then the second step (trial II) is carried out according to the research team's discussion. The third step is done, if the pastry in the second trial does not meet the quality criteria by improving the material formulation or processing procedure. The pastry formula will be made in the third step (trial III), if it has not met the expected criteria, it will be tested IV and so on. If the trial V has not / does not meet the criteria, it means that substitution of wheat flour with mocaf flour is not successful or not optimal, meaning that the main ingredient of cookies is wheat flour.

Data on the suitability of cookies criteria is obtained based on a combination of the seven researchers' assessments consisting of 2 lecturers and 5 trained students for the assessment of cookies. Quality tests are carried out by data collection techniques using quality assessment rubrics with regard to the characteristics of mocaf. This experimental research was carried out in the Laboratory of Culinary, Faculty of Engineering and Teaching (FTK), University of Education Ganesha.

Experiment repetition is done several times because of the characteristics of making cookies, usually three to five repetitions. Then after obtaining cookies with the best formula, continued knowing the acceptability of the community through taste test or preference test with a range of dislikes (0), dislike (1), likes (2), and really like (3). The next step of the research is to test the storability so that it knows the estimated shelf life of cookies. All of these research activities are documented as learning media.

III. RESEARCH RESULTS

Cookies are a type of modern cake that is much preferred because of its sweet taste, attractive appearance, and high taste, this type of cake is the choice of dishes, because in addition to its delicious taste and soft texture can also be stored in a longer time compared to traditional pastries . Failure to make cookies can be caused by several influencing factors such as material composition, dosage, tools used, and procedure accuracy. Success in making a good cookie is not only dependent on the recipe, but also an understanding of the function of each ingredient to avoid failure. The right formulation will produce good cookies, this is influenced by the quality of the ingredients, the composition of the ingredients, the process of shaking, forming, ovening to the packaging process.

Chocochips cookies are a classic pastry with a sweet taste that feels very brown, the chocolate feels even more with small pieces of chocolate (chocolate chips) mixed in the mixture. The formation process uses dropped technique, because this mixture is usually not too soft / not dense. The way the dough is taken with a spoon, then placed in a pan with another spoon, then flattened using a fork.

a. First Experiment (I)

Experiment I was carried out by determining the formula using 100% wheat flour as a quality control. Then the treatment on the formula replaces 100% wheat flour with mocaf, without reducing the ingredients of other cookies. This means testing this formula from 100% mocaf and all other ingredients according to the cookie control formula.

b. Second Experiment (II)

The first experimental results were discussed to determine the quality of mocaf cookies according to criteria, then decided by giving treatment to add liquid so that the cookie dough could be formed. Formula cookies are made with the main ingredient of mocaf, without reducing the ingredients of other cookies, so that it is close to the softness of the dough of flour cookies. Adding water as much as 5 tablespoons (tbsp) or 25 ml.

c. Third Experiment (III)

The second experimental result was discussed to determine the quality of mocaf cookies according to the criteria, then it was decided to give the treatment of adding white eggs according to the number of egg yolks used so that the cookie dough could be formed. Trial of Mocaf Cookies uses 100% mocaf and all other ingredients, with the treatment of adding white eggs according to the number of egg yolks used to replace water. The use of egg whites will also strengthen or glue the dough so that cookies are not brittle and crushed, so the use of one egg.

d. Fourth Experiment (IV)

The results of the third experiment were discussed to determine the quality of mocaf cookies according to the criteria, then it was decided to treat by reducing the amount of mocaf, by 10% of the initial formula so that it approached the flour mixture, the flavor and taste of mocaf was reduced, and increased the aroma and taste of cookies. Formula cookies are made with the main ingredient mocaf, without reducing the ingredients of other cookies.

e. Fifth Experiment (V)

The fourth experimental result was discussed to determine the quality of mocaf cookies according to the criteria, then it was decided the results were still not in accordance with the criteria, so it was decided to treat by reducing the amount of mocaf flour by 20% from the initial formula so that the mocaf cookie mixture resembled a flour cookie mixture, and increased aroma and taste of cookies.

The fifth experimental result meets the criteria for cookies, so that the standard formula for mocaf chocochip cookies is obtained. Treatment of formulations and processing of mocaf cookies, as well as experimental results are presented in table 3. as follows;

Table 3. Criteria Description of Cookies

Exp.	Treatment	Experimental results
1	F 100% wheat flour is replaced with mocaf	* the dough is dry and can be rounded, but the dough cannot be formed with the drop system, because it breaks when flattened.
2	F adding 25 ml of water P the addition of water is done before the process of dough formation	* the dough can be formed, but after being cooked the cookies are very fragile and easily destroyed (more 50% destroyed)
3	F replace water with the addition of egg white 25 grams (use of one egg) P eggs are added to the shaking of egg yolks and butter	* the dough can be formed, but it breaks when flattened * after ripe brittle cookies, but not destroyed. * dominant aroma and taste of mocaf compared to the aroma and taste of cookies.
4	F reduce mocaf 10% (wheat flour) from the control formula P Mocaf reduction is done in the preparation process	* the dough can be formed, but the texture is less soft than the mixture of flour cookies * after cooked cookies are more fragile, than wheat cookies * the aroma and taste of mocaf cookies still feels.
5	F reduce mocaf 20% (wheat flour) from the control formula P Mocaf reduction is done in the preparation process	* Mocaf flour dough cookies resemble flour cookie dough. * after ripe brittle cookies, but not destroyed. * the aroma and taste of mocaf cookies resembles flour cookies, although there is still a typical mocaf.

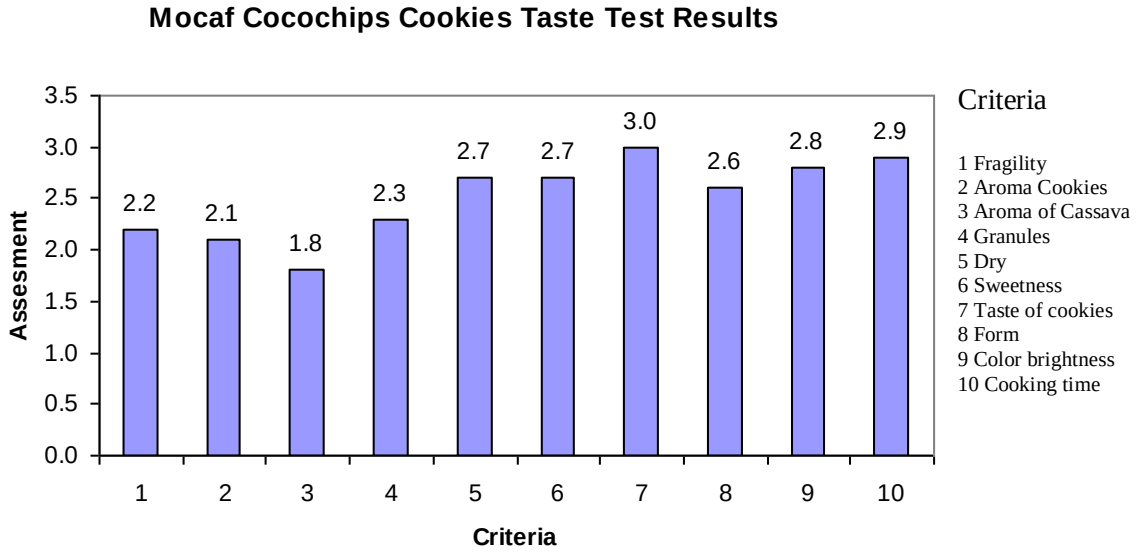
This fifth experiment produces the formula of mocaf chocochip cookies with standard processing procedures, so that the products produced are in accordance with the criteria of chocochip cookies control. Then several repetitions of experiments were carried out with this formula to make sure the formula of the mocaf chocochip cookies was in accordance with the chocochip cookies control.

IV. CONCLUSION

The first treatment of the formula obtained in this study without using wheat flour, but using mocaf as much as 80% of the amount of wheat flour used in the initial formula (control). This means that the use of mocaf as the main ingredient has less weight, compared to the amount of flour. This is also because mocaf has less water content, causing the dough to not be formed so that it requires more ingredients than other wheat flour (other cookies are not reduced or the same as control cookies). The second treatment with the addition of egg white, because the control cookies do not use egg white. Egg white serves to strengthen cookies to keep them crispy, but not easily destroyed. Thus, it can be interpreted that the formula for mocaf chocochip cookies is the finding of cookies that use 100% mocaf (without flour) by using more ingredients and require additional egg whites.

This mocaf chocochip cookies formula is in accordance with all the expected cookies criteria, namely (1) fragility or the level of crispness of cookies according to their shape and intact / not destroyed; (2) the aroma of dominant cookies (highly flavoured cookies) comes from the ingredients of cookies, other than mocaf; (3) the aroma of mocaf can be felt a little and not dominant; (4) granules or degree of smoothness and flatness of cookies / granules accordingly; (5) the level of dryness of cookies is appropriate, not moist / sluggish; (6) the level of sweetness of cookies according to the taste bud (tongue); (7) the taste of cookies according to the mixture of ingredients used; (8) striped cookies shaped frame and flatness / similarity in shape accordingly; (9) the brightness of the color matches, glossy brown with chocochip; (10) the cooking time level of cookies is appropriate.

Furthermore, the taste test of mocaf chocochip cookies was conducted using research instruments on 35 panelists from the general public. Taste test is carried out on August 2 to 6, 2018 at the 2018 Buleleng Festival in front of the Regent's Office of Buleleng Regency, Bali Province. The results of the taste test were obtained as follows



Community acceptance of this mocaf product is described through the strong taste of cookies obtained from a mixture of ingredients (7); really like the cooking time of cookies (10), really like the form of cookies (9), really like the level of cookies dryness (5) and the level of sweetness of cookies (6); While the aroma of cassava (cassava) between less like and like (3), affects the aroma of cookies (2). Overall, the average criteria value is 2.51, which means people really like mocaf chocochip cookies, even though at the lower limit they really like it.

This finding will have implications for the use of mocaf as a substitute for wheat flour to make mocaf chocochip cookies that fit the criteria by utilizing cassava as local food. Although obtaining mocaf cookies with a substitution of 100% flour, but the problem of using mocaf is not yet known to the public, so it needs a community service program to use mocaf instead of wheat flour.

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