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Utilization of Baked-Smashed Sweet Potato and Vegetables on Patisserie Product

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Abstract. The research was an experimental study in Green Skill Patisserie Course using Project-Based Learning model. It aims to complete the project development of pie named guramnis rainbow pie. Several experiments were carried out to produce a pie dough crust mixed with baked-smashed sweet potato and added with vegetables extract as the food coloring. The experiment method in order to make a better appearance or an attractive shape and to have more nutrition. In addition, the pie was filled with a mixture of sweet and sour gurame as Indonesian traditional food. By applying an organoleptic test to 10 respondents, the result shows that pie dough recipe using flour substituted by baked-smashed sweet potato with 2:1 of a ratio. Coloring pie dough adding extract vegetables (carrots, beets and celery) as color. We found that pie dough has more interesting pie color (90%) and the texture of the pie with a quite level of crispness (60%). Moreover, the pie taste is fairly (70%) and tasty (70%). Nutritional analysis results show that per size, serving guramnis rainbow pie contains energy as much as 81.72 calories, carbohydrates 12.5 grams, fat 2.32 grams and 2.77 grams of protein. The main findings are the pie appearance and taste was different compared to the previous pies because of the pie was served with gurame asam manis as the filling and had flour and cilembu sweet potato as the basic ingredients. The color of guramnis rainbow pie was resulted not only from food coloring but also from vegetables extract namely carrot (orange), bit (red), and salary (green). Thus, it had many benefits for health and adds the nutrition. The researchers recommend a further study in order to make pie dough with baked sweet potato and vegetables extract having an optimal level of crispness.

1. Introduction

Student who joined the course of patisserie project based learning was required to accomplish a project under the theme of patisserie product development [1]. The study develops pie production using sweet potato and vegetables as additives in making pie dough. The pie filling used Indonesian food namely *gurame asam manis* (fried *gurame* fish with sour-sweet sauce) or *guramnis*.

Sweet potato (*Ipomoea Batatas L*) is an alternative food as a carbohydrate source besides rice, corn, and cassava. Sweet potato has a big potential to be used as an alternative ingredient of many snacks [2]. It grows relatively fast in all seasons and does not need fertile soil. The researchers made a modification of pie dough by using Cilembu sweet potato comes from Sumedang West Java. Nowadays, *cilembu* sweet potato can be found easily there. It has a different characteristic compared to other sweet potatoes. It has a natural sweet taste. Moreover, it consists of carbohydrate, beta carotene (pro vitamin A), minerals (Ca, P, Fe, and K), fibers, and a good color and smell. The smashed *cilembu* sweet potato in

this study was used to enrich the pie dough nutrition. To make the pie dough more attractive, it was added with some natural colors from vegetables namely bit, carrot, and salary.

The modification of pie dough by using a mixture of sweet potato and vegetables was preferred to enrich the nutrition. Besides, a pie dough commonly had no variation in its color. The filling was also modified by using Indonesian food namely *gurame asam manis* (fried *gurame* fish with sour-sweet sauce) which is very popular and never been used before. A good pie has a tender, flaky crust that can top a variety of fillings. A pie can be sweet and served as a dessert. With various fruits as filling, a pie is a favorite way to add more fruit to your menus. It can be savory and filled with meat or vegetables [3]. Therefore, the researchers were interested to do an experiment to a patisserie product namely pie by making the dough from a mixture of *cilembu* sweet potato and vegetables and by filling it with an Indonesian food. The experiment included testing the product until the appropriate receipt formula was got, doing an organoleptic test, and measuring the nutrition facts.

2. Material and Method

2.1. Material

In the experiment, the ingredients of pie dough were *cilembu* sweet potato, moderate-protein flour, milk, egg, sugar powder, salt, green extract from salary, yellow extract from carrot, red extract from bit, and natural food coloring. For the filling, the researchers used *gurame* fish, pineapple, onion leaf, Bombay onion, garlic, onion, red paprika, yellow paprika, chili sauce, tomato sauce, salt, pepper powder, sugar, corn powder and cooking oil.

2.2. Method

To get good pie dough, we did the experiment three times by combining taro and *cilembu* sweet potato. The researchers used a pie basic recipe formula as the following:

Table 1. Pie dough basic formula

No	Ingredients	Amount
1	Wheat flour	200 g
2	Shortening	100 g
3	Salt	0.5 g
4	Water	10 ml

Then, the researchers developed the pie dough and the filling.

3. Result and Discussion

In the first experiment, the researchers developed a basic formula recipe of pie dough by adding 100 gr steamed taro. Besides, the amount of flour was lessened 50 g (25%), shortening was added 20 g (20%), egg yolk was added 25 g and water was replaced by milk. Taro was added into the pie dough to make it more nutritious and having a good taste. Moreover, the pie dough was given colors from bit for red, salary for green, and sweet corn for yellow. Table 2 shows the formula of the first experiment:

Table 2. The formula of pie dough receipt in experiment 1

No	Ingredient	Amount	Product Characteristic
1	Flour	125 g	The pie dough was less flaky crust, the color was too soft, the taste was plain
2	Taro	100 g	
3	Margarine	120 g	
4	Milk	10 ml	
5	Egg Yolk	25 g	
6	Salt	0.5 g	

Table 2. Cont.

7	Bit extract	5 ml
8	Sweet corn extract	5 ml
9	Salary extract	5 ml

In making the pie dough, the researchers found many obstacles such as it became sticky, slick, and dropped when baking. For the filling in the first experiment, the researchers used *rendang* Padang but it was too oily and made the dough wet. As the result, when eating the rainbow *rendang* pie, the taste was not balanced for the filling was too dry. Meanwhile, the dough was tough but easily broken for it did not use sugar.

In the second experiment, the researchers tried to develop the pie dough by adding 100 gram baked *cilembu* sweet potato. The flour was lessened 50 g (25%), shortening was added 20 g (20%), egg yolk was added 25 g, and water was replaced by milk. The researchers also added 20 gram sugar powder to make the dough tastier and sturdier rather than the previous experiment. The sugar caramel when baking strengthened and united all dough ingredients; thus, it was not easily broken [5]. The filling used in this experiment was *gurame asam manis* (fried gurame fish with sour-sweet sauce) which was made from *gurame* fillet which was fried crispy with flour and egg and was poured with a sour-sweet sauce on top. The sour sweet sauce was preferred to balance the pretty sweet taste of the pie dough. The table 3 below shows the pie dough recipe formula in the second experiment.

Table 3. The pie dough recipe formula in the second experiment

No	Ingredient	Amount	Product Characteristic
1	Flour	125 g	The dough was pretty flaky crust, the color was too soft, and the taste was plain
2	*Cilembu* sweet potato	100 g	
3	Margarine	120 g	
4	Milk	10 ml	
5	Sugar powder	20 g	
6	Egg Yolk	25 g	
7	Salt	0.5 g	
8	Bit extract	20 ml	
9	Sweet corn extract	20 ml	
10	Salary extract	20 ml	

In the previous experiment, the pie dough color was less attractive. Therefore, the researchers added carrot extract to make it yellow, bit extract to make it red, and salary extract to make it green. Besides, they also added food coloring but the formula recipe of the dough and the filling was still the same. The following table 4 shows the recipe.

Table 4. The recipe formula of pie dough in the third experiment

No	Ingredient	Amount	Product Characteristic
1	Flour	125 g	The pie dough was flaky crust, the color was interesting, and the taste was good.
2	*Cilembu* sweet potato	100 g	
3	Margarine	120 g	
4	Milk	10 ml	
5.	Sugar powder	20 g	
6	Egg Yolk	25 g	
7	Salt	0.5 g	
8	Bit extract	20 ml	
9	Carrot extract	20 ml	
10	Salary extract	20 ml	
11	Food Color (green, red, yellow)	3 ml	

In this experiment, the pie dough which previously used color from sweet corn extract was added with carrot extract for the color of sweet corn was less striking. The color of vegetable extract was soft, which made the dough pale. Therefore, the researchers added a small amount of natural food coloring to get a good color. They tried to perfect the experiment so the result can be maximal. For the technique of dough color fusion, the researchers piled up some dough with different colors and rolled them up. Thus, the dough colors were spread evenly, which made easy the process of molding the pie dough into pan. The researchers named it rainbow pie for the dough color was like rainbow. The scheme 1 shows the process of dough making in the last experiment.

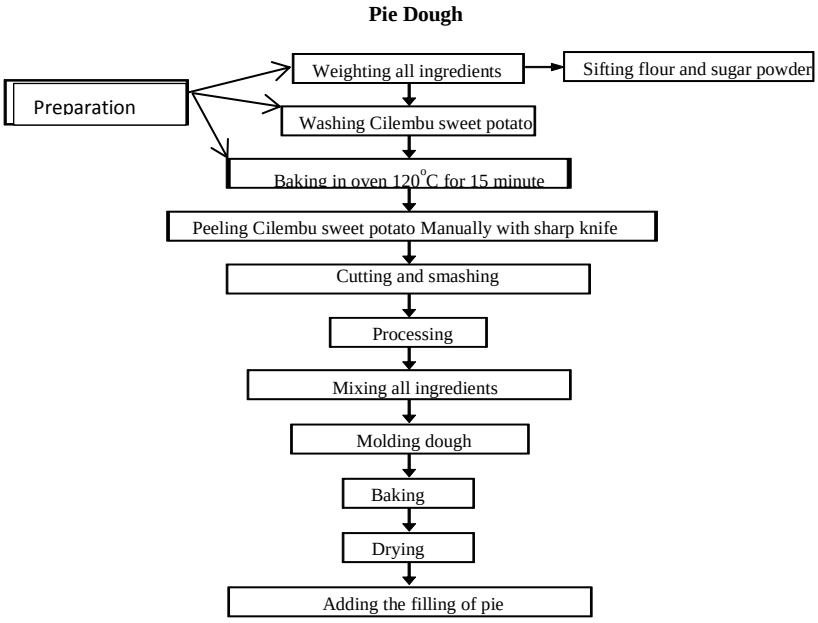

Figure 1. The process of pie dough making

In the last experiment, the researchers found the recipe formula of pie dough, analyzed the nutrition facts, and did an organoleptic test to 10 panelists. The recipe formula of pie filling is shown in table 5 below.

Table 5. The recipe of pie with *gurame asam manis* (fried gurame fish with sour-sweet sauce) filling

No	Ingredients	Amount
Basic Ingredient		
1	*Gurame* fish	500 g
Sauce		
1	Water	400 ml
2	Pineapple	250 g
3	Leek, slice aslant	2
4	Onion, slice round	½ clove
5	Garlic, slice	3 cloves
6	Red onion, slice	2 cloves
7	Red paprika	1
8	Yellow paprika	1
9	Chili sauce	4 spoons
10	Tomato	5 spoons
11	Salt	1 tea spoon
12	Pepper powder	1/2 tea spoon

Table 5. Cont.

13	Sugar	1/2 spoon
14	Cornstarch, dissolve	3 spoons
15	Cooking oil	100 g
Dressing		
1	Garlic	2 cloves
2	Lime	1
3	Pepper powder	1/2 teaspoon
4	Salt	1/2 teaspoon
Coating		
1	Flour	50 gram
2	Cornstarch	2 spoons
3	Pepper	1/2 teaspoon

Based on the recipe formula in table 5, the researchers made the pie filling from *gurame asam manis*. The following is the procedure of cooking the pie filling.

1. Discard fish scales, fillet, and cut into some parts. Wash them and also the head. Smear them with the dressing, keep for 30 minutes.
2. Roll the fish parts on the coating until spreading evenly. Pat them to avoid clumps of flour. Fry the fish in a hot cooking oil with a medium fire until the color is golden. Lift, drain, and set aside.
3. Heat two spoons of cooking oil, fry onion, garlic, red onion, and paprika until the smell is good. Pour water then add salt, sugar, and pepper. Add pineapple chunks and leek.
4. Pour tomato sauce and chili sauce into pan, stir well. Cook all ingredients until boiling then add cornstarch solution. Stir well until the sauce becomes thickened. Turn off the heat. Serve the fish with sour and sweet sauce as the dressing.

The experiment combined pie dough with *gurame asam manis*. For the next, the researchers named it *guramnis* rainbow pie. The result of organoleptic test of the product, which was tested to 10 panelists, involved some aspects namely pie dough color, pie dough flaky crust, taste, and aroma. Organoleptic method is comparing the food products at different variations with standard of the food products [6]. The following is the result of organoleptic test.

Table 6. The result of organoleptic test of the product

No	Aspect	Percentage (%)
1	Pie dough color	90
2	Pie dough flaky crust	60
3	Taste	70
4	Aroma	70

Serving size 100 g

According to the result of organoleptic test in table 6, it was known that the pie dough color, the taste, and the aroma were categorized as good. However, the dough flaky crust still needed improvement. The researchers found the product primacy as follows:

1. The pie appearance was different compared to the previous pies because of the rainbow colors which made the pie more beautiful.
2. The color of *guramnis* rainbow pie was resulted not only from food coloring but also from vegetables extract namely carrot (orange), bit (red), and salary (green). Thus, it had many benefits for health and adds the nutrition.
3. The taste of *guramnis* rainbow pie was different compared to the previous pies. Basically, a pie filling had a sweet taste such as vanila la, strawberry vla and so on. Nevertheless, *guramnis* pie was served with *gurame asam manis* as the filling and had flour and *cilembu* sweet potato as the basic

ingredients. They made a new taste for this pie was never exist before, which may increase the selling price.

The nutrition of per serving size of *guramnis* rainbow pie was shown in table 7 below.

Table 7. The nutrition facts of *guramnis* rainbow pie

Energy	Carbohydrates	Fat	Protein
81.72 calories	12.5 grams	2.32	2.77 grams

Serving size 60 g

Table 7 shows that the first fruit pie carp weighing 60 grams contains 81.72 calories of energy, carbohydrate 12.5 grams, 2.32 grams of fat, protein content by weight of 2.7 grams. Pie *guramnis* is a snack that can be eaten as a snack or a small meal that can be served as a complement to a cup of tea in the morning or afternoon. Presentation *guramnis* pie as a snack is very suitable, due to two pieces of pie *guramnis* is equivalent to two bowls of green bean porridge consisting of 25 grams of green beans + sugar + milk 13 grams and 50 grams = 175 calories can be eaten for 2 times in the morning and afternoon [7].

4. Conclusion

Guramnis rainbow pie is an innovative patisserie product which is resulted from a project-based learning. The innovation can be seen from the use of complementary ingredients namely *cilembu* sweet potato and vegetables extract for the pie dough. The study recommends a further experiment on pie dough flaky crust.

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