

# Local Food Material Processing Technology from Taro Tuber: Composite Study of Flour Substitution Materials on Taro Puff Banana Products

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**Abstract.** This study aims to find the right formula in making Taro puff pastry and knowing the community's acceptance of Taro puff pastry. The type of research used in making this product is the 4D development model (Define, Design, Develop, Dissemination). The subjects of the study were Culinary Engineering Education Yogyakarta students with a total of 35 students. Data collection methods used are observation, interviews, and documentation. The results obtained from this study are: 1) the right recipe for taro puff pastry products is by substituting taro flour as much as 30%, using high dough processing techniques, then finishing with baking techniques using a temperature of 180 ° C for ± 45 minutes, and 2) test the preference for taro puff pastry products with substitution of taro flour showed that the product was acceptable to consumers with a favorite percentage of taro puff pastry as much as 96%.

**Keywords:** taro, puff pastry, taro puff pastry

## 1 Introduction

Indonesia has a wealth of natural resources, especially in the types of local food crops such as tubers, but until now the use of tubers is not optimal. One of them is local ingredients for taro tubers. Taro or *Colocasia esculenta* is known as food called yam in Brazil [1]. In Brazil, taro is an unusual plant from other plants because farmers mainly used for substitution materials cultivate it [2]. In the opinion of the United Nations Food and Agriculture Organization (FAO), in 1993 and 2013, the main producers of taro tubers were African countries with 75.2% of world production, followed by Asia (20.8%), Oceania (3.8%) and America [3]. (0.3%) Taro is included in one type of tubers. Taro grows easily in Indonesia. In 2011, in the implementation of alternative food area exhibition activities, the number of taro production or production from several regions in Indonesia could reach 661 quintals/hectare [4]. The words of this patisserie come from French, namely Pâtisserie means cakes. Because of that, the patisserie can be interpreted as a science or knowledge that learns about the ins and outs of cakes, both continental, oriental and Indonesian cakes ranging from preparation, processing to the presentation. In this era, patisserie is learned about a science and art in processing and serves a variety of cakes, both traditional and modern pastries. Patisserie products are a popular product, also a type of food favored by Indonesian people [5]. Patisserie products in the community are known as sweet bread, fresh bread, pastries/cookies, cakes, archipelago cakes, and pastry products. Therefore, researchers tried to make processed

bread and cake products from the substitution of taro tuber flour, namely puff pastry products. Puff pastry is made from dough filled with sweet or savory stuffing, this puff pastry consists of varied products and has multi-layered skin, puff pastry is a product made from unleavened dough and developer ingredients [6]. Puff pastry is one of the lightest and crispy pastry products made from some flour and fat. The layers are formed due to the use of margarine or butter and when baked the water is trapped between the layers in the dough, together with hot water steam pushes the mixture until it expands. Puff pastry expands higher and is richer in flavor than other pastries. A sheet found on this pastry mixture can be produced by mixing folding big dough or commonly called margarine pastry and also known as corsvet [7]. The uniqueness of this pastry dough is that the folded fat is not mixed into a mixture but is smeared thinly and evenly on the surface of the mixture. Then the dough is folded and then thinned again. In the process of folding and then coating the corsvet and thinning the dough is done repeatedly so that the final mixture that looks like a single sheet is obtained. When roasting or burning in the oven, the sheets in the mixture will expand so that the final result of the cake shows a lot of thin, fused layers. Puff pastry can expand higher and create multiple lines and is richer in flavor compared to other pastries [8]. In this study, the puff pastry will be substituted with taro into the name Taro Puff Pastry [7]. The purpose of substitution research of taro tuber flour in the manufacture of Taro Puff Pastry is the use of local food ingredients as a basic ingredient of patisserie products and to add nutritional value to the product, given the lack of public knowledge about taro tuber processing. By substituting taro tubers in the manufacture of patisserie products, it is expected to be accepted by the general public both regarding taste, aroma, texture and different shapes.

## **2 Methode**

### **2.1. Procedure**

Research procedure for developing a dictionary with pictorial equipment Research using four stages, namely define, design, develop and disseminate. Define scene is the stage of gathering information including curriculum analysis, student analysis, material analysis and formulating goals. The design phase is the design stage of the researcher making a prototype or product design. The development phase is the stage of producing the final product after going through the process of validation, revision, and trial. The disseminate stage is the stage of dissemination carried out by researchers, namely by field testing on students of the Faculty of Engineering, Yogyakarta State University.

### **2.2. Data, instruments and data collection techniques**

In this study, the data collected from observations were used to observe and find out the problems in the lack of utilization of local materials in Indonesia, interviews were conducted to determine the state of local material use in the community, validation was used to conclude the evaluation results of experts/experts, questionnaires were used to conclude the feasibility of taro puff pastry which is expected to be accepted by the general public both in terms of taste, aroma, texture and different shapes.

### **2.3. Data analysis technique**

Data analysis techniques used in this study are descriptive and quantitative or expert appraisal. Includes data that can be calculated consisting of taste, color, texture, and aroma. Quantitative is data that can be measured in this study. Quantitative information is obtained from the results of the panelists' acceptance of the products received and those not received.

### 3 Results and Discussion

In the process of making Taro Puff Pastry uses a type of R & D research, the 4D model consists of several stages, namely define (product analysis), design (product design), development (manufacturing and product testing), and dissemination (product exhibition)[9], [10].

#### 3.1. Define Stage

Analysis of the taro puff pastry formula is done by collecting basic recipes from 3 different sources. The following are the results of the trial of the three reference formulas found in the table below.

**Table 1.** Puff Pastry Reference Formula

No.	Name of material	Formula		
		Reference 1	Reference 2	Reference 3
1	Cakra Flour	1000 gr	500 gr	310 gr
2	Segitiga flour	-	-	230 gr
3	Salt	25 gr	10 gr	10 gr
4	Water	500 gr	250 gr	240 gr
5	Corvettes	500 gr	300 gr	510 gr
6	Lemon Juice	-	-	25 ml
7	Butter	100 gr	75 gr	55 gr
8	Egg	150 gr	-	-

The technique used in making Taro Puff Pastry is in a straight dough. The straight dough technique is the most used technique in making puff pastry products because it is straightforward to process. In this process, all ingredients are put together then put the liquid ingredients while being dyed evenly. Based on the three references to the formula and the evaluation of characteristics accompanied by the consideration of the supervisor, the first formula is chosen as the formula for the recommendation of the research product [8]. This first formula can produce puff pastry products that are crisp, savory, and layered as expected by consumers. The following are the results of the trials of the three formulas. From the test of the three recipes, the following is a reference formula selected for the manufacture of taro puff pastry products.

**Table 2.** Results of puff pastry trials

Characteristic	Trial Results		
	Formula 1	Formula 2	Formula 3
Color	Good	Good	Good
Aroma	Good	Good	Good
texture	Crispy	less crispy	less crispy
Taste	savory	More savory	savory

### 3.2. Design Stage

In the design phase, the formula that has been selected will then be substituted with local food ingredients, namely with taro. This stage there is a possibility that the trial will be carried out more than once based on the evaluation and input by the supervisor/expert at the time of validation. In making this taro puff pastry, the substitution of the pure taro flour used was 0%, 20%, 30%, and 40%. The following is a draft product formula for taro puff pastry.

**Table 3.** Design of the Taro Puff Pastry product formula

No.	Material	Selected Reference Formula	Design of Formula 1	Design of Formula 2	Design of Formula 3
1	Cakra Flour	200 gr	160 gr	140 gr	120 gr
2	TaroFlour	-	40 gr	60 gr	80 gr
3	Salt	5 gr	5 gr	5 gr	5 gr
4	Ice Water	80 gr	80 gr	80 gr	80 gr
5	Corvettes	80 gr	80 gr	80 gr	80 gr
6	Butter	20 gr	20 gr	20 gr	20 gr
7	Vanilla essence	¼ tsp	¼ tsp	¼ tsp	90 gr
8	Butter cream	100 gr	100 gr	100 gr	100 gr

The selected reference formula is then tested again to find the right method with the proper comparison. The following are the results of the trials of the three recipes above.

**Table 4.** Results of the trial of Taro Puff Pastry

Characteristic	Trial Results		
	Formula 1	Formula 2	Formula 3
Color	Pale Red	Pink	Brownish red
Aroma	Good	Good	Good
texture	Crispy, layered texture	Crispy, layered texture	layered Less crispy, less layered
Taste	Savory	More savory	savory

Based on the three formulas, the best recipe is the design of the second formula using 30% taro flour substitution formula because it has excellent color characteristics compared to other methods. It has a crisp and layered texture, pleasant aroma, and savory taste.

### 3.3. Stage Develop

At this stage, an expert appraisal on the products of taro puff pastry was carried out, and there were several appropriate changes from the input from the expert during validation I and II. The following is an explanation of the changes in the process at the first and second validation.

#### 3.3.1 Validation I

The results of the trial on the first validation with a substitution of taro flour comparison of 30:70 (pure taro flour: high protein wheat flour) for the amount of formula has no change but has a text that is still as hard as hard. To anticipate this, the eggs are only replaced with egg yolks, with the hope that the texture of taro puff pastry can be more tender.



**Fig 1.** Taro Puff Pastry validation II

#### 3.3.2. Validation II

In validation II, the comparison used remains the same, namely 30:70 (taro flour: high protein flour). In the second validation stage, there was a change that was better than the time of validation I. The taro puff pastry product at the second validation already had a crunchy and tender texture from the time of validation I. the taste of taro puff pastry was sweet enough, for the form to change more attractive and given an additional pink color to increase the attractiveness of the product. The aroma of this product is excellent.



**Fig 2.** Taro puff pastry in stage II

### 3.4. Disseminate stage

At this stage, a limited-scale panelist test is conducted, so it is obligatory to make changes by the panelist's advice by consulting the supervisor. After the product is ready, then enter the full-scale preference test (exhibition).

#### 3.4.1. Panelist (limited)

The product acceptance test was carried out by 30 semi-trained panelists who were taken from students of culinary majors in Yogyakarta State University.

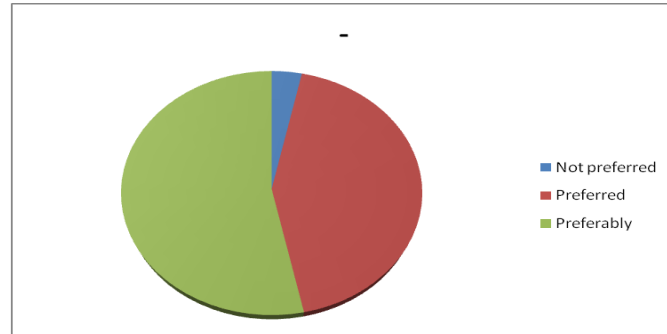
**Table 6.** Final results of the recipe after panelist testing

No.	Material	Use	Changes after panelist test
1	Cakra Flour	140 gr	140 gr
2	TaroFlour	60 gr	60 gr
3	Salt	5 gr	5 gr
4	Ice Water	80 gr	80 gr
5	Corvettes	80 gr	80 gr
6	Butter	20 gr	20 gr
7	Egg Yolks	80 gr	80 gr
8	Red Color	-	Pinker
9	Essence vanilla	¼ tsp	¼ tsp
10	Buttercream	100 gr	100 gr

Final test results for product acceptance for a limited scale trial are as follows:

**Table 7.** Test of Taro Puff Pastry Panelists

Value Scale	Assessment Criteria
Very disliked	-
Not preferred	1
Preferred	13
Preferably	16



**Fig 3.** Diagram of panelist taro puff pastry test

According to the table and figure above, it can be concluded that 53% of panelists like taro puff pastry products, 44% like taro puff pastry products, and only 3% don't like taro puff pastry products.

#### 4 Product Exhibition

After doing various trials, then get the final recipe that produces better products. Products that enter this stage are products that have passed panelist tests. The final result of this dissemination stage is by testing product acceptance at the exhibition visitors as many as 35 people. Here is a recipe for taro puff pastry products.

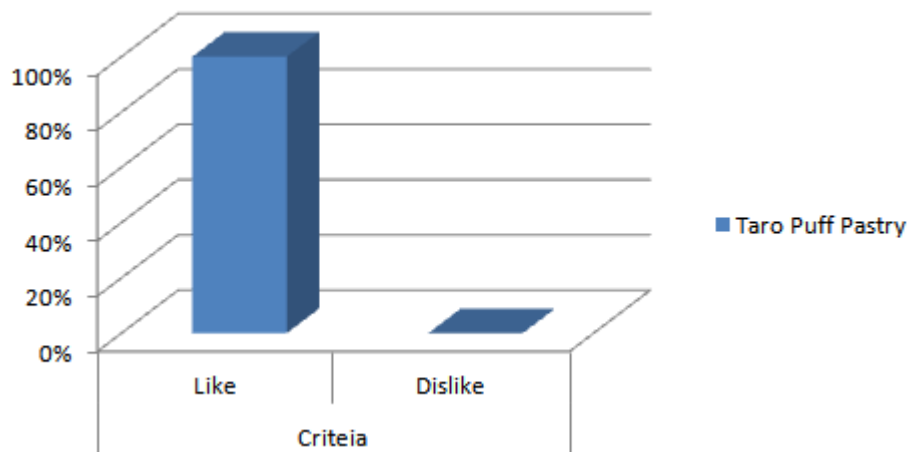
**Table 8.** Taro puff pastry product recipes

No.	Bahan	Penggunaan
1	Cakra Flour	140 gr
2	TaroFlour	60 gr
3	Salt	5 gr
4	Ice Water	80 gr
5	Corvettes	80 gr
6	Butter	20 gr
7	Egg Yolks	90 gr
8	Red Color	¼ tsp
9	Essence vanilla	¼ tsp
10	Buttercream	100 gr

In the exhibition's favorite test, it was different from the analysis of preference at the panelists, because the panelists' tests were assessed including color, taste, aroma, and texture. While at the time of testing the exhibition preference is only asked for an assessment of likes or dislikes. So that the percentage of people who don't like taro puff pastry products is also different [11]–[13].

**Table 9.** Test the preferences of the dissemination stage

Product Name	Criteria	
	Like	Dislike
Taro Puff Pastry	35	0



**Fig 4.** Test diagram of the preferred dissemination stage

At the dissemination stage of the table and the picture above it can be concluded that taro puff pastry is liked and accepted by the community.

## Conclusion

The conclusion of this report is based on the results of observations, analysis, and data obtained from the results of the study are the right recipe for taro puff pastry products is to substitute kilmpul taro flour with a ratio of 30% kimpul taro flour and 70% high protein flour using baking techniques. The acceptance of consumers at the time of the panelists who received taro puff pastry products were 53% of the panelists were very fond of rato puff pastry products, 44% liked rato puff pastry products, and only 3% did not like rato puff pastry products. The level of preference in the dissemination stage for taro puff pastry products is 100% preferred.

## Acknowledgments

Thank-you notes the author would like to thank the Family Welfare Education, Postgraduate, Yogyakarta State University for accompanying the author to write this article, they deserve.

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