

UTILIZATION OF DRIED OKARA AS A FLOUR MIXTURE OF BREAD-MAKING

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Abstract

Soybean residue (Okara) is a good material which be reused and it has been described as having a great potential ingredient and higher economic value, such as dried Okara. Dried Okara has a component that can still be maintained, more durable and can be formulated and processed into a variety of bakery products. This study aims to understand the utilization of dried Okara as a flour mixture of bread-making. Product research and development conducted on March-May 2015 at International Bali Institute of Tourism Pastry and Bakery Kitchen Laboratory. The research method used is the ADDIE Model, namely: Analysis, Design, Development, Implementation, and Evaluation. Implementation of research is done through Phase: 1) Collecting the recipes, 2) Selection of recipe, 3) Design of the product, 4) Products manufacture test, 5) Assessment by panelists, 6) Evaluation. Assessment by panelists is made using an instrument test, which then performed the data analysis. Data analysis was performed by calculating the score given by the panelists based on texture, taste, color and aroma. The results obtained were: Utilization of 10% dried Okara has the highest score, 82.8% of the expected, so the maximum amount of dried Okara as a flour mixture is 10% of the flour used in bread-making.

Keywords: Utilization, dried Okara, bakery, ADDIE

Introduction

The recorded amount of *Okara* produced nationally are 731,501.5 tons and 48,153 tons of those produced in West Java (Bisnis UKM, 2009). This waste is usually used as animal feed and some others used by some villagers to be processed into material for “*tempeh gembus*”.

Assessed by its chemical compositions, *Okara* can be used as a protein source. As the Animal Husbandry Department of East Java Province reported in 2011, *Okara* contains 8.66% protein, 3.79% fat, 51.63% water and 1.21% ash. If *Okara* is not promptly handled, it will easily covered by microbes.

Okara can be converted to a greater potential ingredient and higher economic value, such as dried *Okara*. Dried *Okara* has a component that can still be maintained, more durable and can be formulated and processed into a variety of bakery products. The products that will be developed in this research by utilizing okara flour is white bread.

White bread is one of the best choices for breakfast or tea time. People served it with their choice of spread and jam, accompanied by coffee or tea. White bread can also be used for a variety of meal, such as sandwich and toast. Because of people's interest in white bread, then came the idea to utilize dried *Okara* as a flour mixture of bread-making.

White bread is made from dough without eggs with a little sugar, or not at all. The use of sugar in bread-making is only to accelerate the fermentation process (Mudjajanto, 2004). Bread has a smooth texture, light and fresh taste. The main ingredients in making bread is wheat flour. Flour itself has a wide variety of types with different uses. Flour used in making bread is high protein wheat flour.

The flour mixture will be made by mixing high protein wheat flour and dried *okara*, then in bread making, the flour mixture will be mixed with other ingredients as written on the recipe. This research will find the right formula in utilizing dried *okara* as a flour mixture of bread-making in order to produce qualified bread based on flavor, color, aroma, and texture.

Making the bread with the flour mixture is done to utilize *Okara* that were still lack of utilization, and also to increase the economic value of *okara*. Innovation of dried *Okara* as a flour mixture is expected to produce qualified bread without decreasing its quality in general.

Literature Review

Research on "Utilization of Dried *Okara* in Making Cookies Products", this research aims to: 1) Understand how dried *Okara* is made, 2) Determine the formula of chocolate *Okara* cookies, crescent *Okara* cookies, lemon pie *Okara* cookies, 3) Understand the techniques of making chocolate *Okara* cookies, crescent *Okara* cookies, lemon pie *Okara*, 4) Understand the consumers' appreciation of the chocolate *Okara* cookies, crescent *Okara* cookies, lemon pie *Okara* cookies, 5) Understand the best presentation of chocolate *Okara* cookies, crescent *Okara* cookies, and lemon pie *Okara* cookies.

The method used in this research is ADDIE, through several stages, namely, 1) Analyzing the formula, 2) Designing new formula chocolate cookies, crescent cookies and lemon pie cookies by using dried *Okara*, 3) Performing a pre-experiment in developing a product, then making the cookies products for first product trials (Validation I) and the second product trials (Validation II), 4) To test the panelists and exhibitors to determine consumer appreciation of the product development, 5) Perform data analysis of public appreciation of the product by descriptive and qualitative.

Results of this research are: 1) *Okara* were produced by washing thoroughly and squeezed then roasted for 45-60 minutes over low heat and then blended and sifted twice into powder. 5 kg of wet *Okara* produced 1 kg of dried *Okara* or 20% dried *Okara*, 2) the right formula for making Chocolate Cookies, Crescent Cookies and Lemon Pie Cookies using dried *Okara* is mixing with a ratio of 60:40% (wheat flour: dried *Okara*), 3) The result of consumer appreciation for Chocolate *Okara* Cookies is 90%, Crescent *Okara* Cookies is

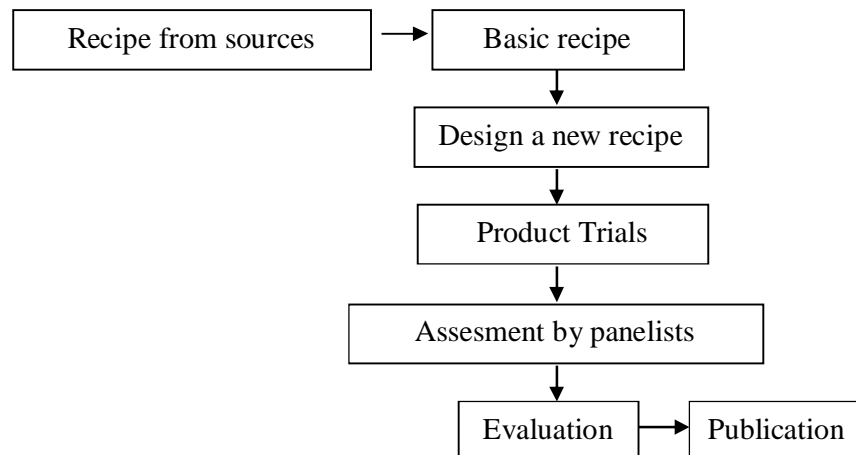
83%, Lemon Pie *Okara* Cookies was 83%, 4) Presentation of Chocolate *Okara* Cookies, Crescent *Okara* Cookies, Lemon Pie *Okara* Cookies served on a dinner plate and in a jar, 5) The best techniques of making chocolate *Okara* cookies, crescent *Okara* cookies, lemon pie *Okara* were using the technique of molded cookies (Noor, 2012).

Methodology

Research and Product Development Model (Research and Development) which will be used is the ADDIE models. In this research the activities or stages to be carried out based on ADDIE is (Mulyatiningsih, 2011:183-186) :

1. *Analyze*, looking for a basic recipe from the source books, the Internet or other sources, then determining the basic recipe as a reference.
2. *Design*, design the experiments and recipe development using mixed flour (dried *Okara*).
3. *Development*, experiment or attempt to make a product that has been designed.
4. *Implementation*, products have been developed implemented in real conditions. The results of experiments tested to the expert (Bakery Lecturers) as panelist to get feedback.
5. *Evaluation*, based on the feedback given, then the products will be evaluated and improved to produce a better product than the first trials.

Below is the workflow of research and development models :



Source : Mulyatiningsih (2011:149)

Figure 1
Workflow of Research and Development Models

Results and Discussion

Experiments were performed to produce 4 (four) white breads, which is bread without dried *Okara* (P0), white bread with a mixture of 10% dried *Okara* (P1), white bread with a mixture of 20% dried *Okara* (P2), and the bread with the mixture of 30% dried *Okara* (P3).

To calculate the average score of white bread with and without dried *Okara*, first, ideal score for the bread has to be determined. Ideal score = $4 \times 4 \times 4 = 64$ (4 = highest score of the answer, 4 = 4 instrument parameters, 4 = the number of panelists). Furthermore, the ideal score for each instrument item = $4 \times 4 = 16$ (4 highest score, 4 the number of panelists).

The data assessment conducted by four (4) panelists on the trial results of white bread without flour okara (P0) is as follows:

Table 1
White Bread Without Dried *Okara* (P0) Score

No. Panelists	Instrument Parameters				Total
	a	b	c	d	
1	2	3	3	3	11
2	3	4	3	3	13
3	1	2	3	3	9
4	4	4	4	4	16
Total	10	13	13	13	49

Descriptions :

a = Texture c = Flavor
b = Color d = Aroma

Based on Table 1, the total score is 49. Therefore an overall score of bread = $49 : 64 = 0,766$ or 76,6% of the expected criteria. White bread without dried *Okara* score, based on texture = $10 : 16 = 0,625$ or 62,5% of the expected criteria. Score based on color = $13 : 16 = 0,813$ or 81,3% of the expected criteria. Score based on flavor = $13 : 16 = 0,813$ or 81,3% of the expected criteria. Score based on aroma = $13 : 16 = 0,813$ or 81,3% of the expected criteria. So the lowest score of white bread without dried *Okara* is on the aspect of texture, which is 62.5% of the expected.

Second, the data assessment on the trial results of white bread flour mixture of 10% dried *Okara* (P1) is as follows:

Table 2
White Bread with a Mixture of 10% Dried *Okara* (P1) Score

No. Panelists	Instrument Parameters				Total
	a	b	c	d	
1	3	3	3	3	12
2	4	4	3	3	14
3	3	2	3	3	11
4	4	4	4	4	16
Total	14	13	13	13	53

Descriptions :

a = Texture c = Flavor
b = Color d = Aroma

Based on Table 2, the total score is 53. Therefore an overall score of bread = $53 : 64 = 0,828$ or 82,8% of the expected criteria. White bread with a mixture of 10% dried *Okara*, based on texture = $14 : 16 = 0,875$ or 87,5% of the expected criteria. Score based on color = $13 : 16 = 0,813$ or 81,3% of the expected criteria. Score based on flavor = $13 : 16 = 0,813$ or 81,3% of the expected criteria. Score based on aroma = $13 : 16 = 0,813$ or 81,3% of the expected criteria. So the lowest score of white bread with a mixture of 10% dried *Okara* is on the aspect of color, flavor, and aroma, which is 81.3% of the expected.

Third, the data assessment on the trial results of white bread flour mixture of 20% dried *Okara* (P2) is as follows:

Table 3
White Bread with a Mixture of 20% Dried *Okara* (P2) Score

No. Responden	Instrument Parameters				Total
	a	b	c	d	
1	3	3	3	3	12
2	3	3	3	3	12
3	3	2	2	3	10
4	4	3	4	4	15
Total	13	11	12	13	49

Descriptions :

a = Texture c = Flavor
b = Color d = Aroma

Based on Table 3, the total score is 49. Therefore an overall score of bread = $49 : 64 = 0,766$ or 76,6% of the expected criteria. White bread with a mixture of 20% dried *Okara*, based on texture = $13 : 16 = 0,813$ or 81,3% of the expected criteria. Score based on color = $11 : 16 = 0,687$ or 68,7% of the expected criteria. Score based on flavour = $12 : 16 = 0,75$ or 75% of the expected criteria. Score based on aroma = $13 : 16 = 0,813$ or 81,3% of the expected criteria. So the lowest score of white bread with a mixture of 20% dried *Okara* is on the aspect of color, which is 68.7% of the expected.

Fourth, the data assessment on the trial results of white bread flour mixture of 30% dried *Okara* (P3) is as follows:

Table 4
White Bread with a Mixture of 30% Dried *Okara* (P3) Score

No. Responden	Instrument Parameters				Total
	a	b	c	d	
1	2	3	2	3	10
2	2	2	3	3	10
3	2	2	2	3	9
4	1	2	3	3	9
Total	7	9	10	12	38

Descriptions :

a = Texture c = Flavor
b = Color d = Aroma

Based on Table 4, the total score is 38. Therefore an overall score of bread = $38 : 64 = 0,594$ or 59,4% of the expected criteria. White bread with a mixture of 30% dried *Okara*, based on texture = $7 : 16 = 0,437$ or 43,7% of the expected criteria. Score based on color = $9 : 16 = 0,562$ or 56,2% of the expected criteria. Score based on flavour = $10 : 16 = 0,625$ or 62,5% of the expected criteria. Score based on aroma = $12 : 16 = 0,75$ or 75% of the expected criteria. So the lowest score of white bread with a mixture of 30% dried *Okara* is on the aspect of texture, which is 43.7% of the expected criteria.

Comparison between white bread without dried *Okara* and white bread with a mixture of 10%, 20%, 30% Dried *Okara* is as follows:

Table 5
Comparison between white bread without dried *Okara* and white bread with a mixture of 10%, 20%, 30% Dried *Okara*

P0	Parameter	P1	P2	P3
62,5%	Texture	87,5%	81,3%	43,7%
81,3%	Color	81,3%	68,7%	56,2%
81,3%	Flavor	81,3%	75%	62,5%
81,3%	Aroma	81,3%	81,3%	75%
76,6%	Average	82,8%	76,6%	59,4%

Description :

P0 = White Bread without Dried *Okara*

P1 = White Bread with a Mixture of 10% Dried *Okara*

P2 = White Bread with a Mixture of 20% Dried *Okara*

P3 = White Bread with a Mixture of 30% Dried *Okara*

Based on Table 5, 3 (three) trials of making bread with dried *Okara* as a flour mixture, and it shows that the best texture is the white bread with a mixture of 10% dried *Okara* (P1), the score is 87.5% of the expected criteria. The bread is well-risen, dense and soft. The worst texture is bread with a mixture of 30% dried *Okara* (P3) the score is 43.7% of the expected criteria. Samples P3 can not rise completely so the bread becomes sodden. The mass of dried *Okara* is heavier than wheat flour, that causes white bread with a mixture of 30% dried *Okara* (P3) can not rise completely.

The highest score for color is white bread without dried *Okara* and white bread with a mixture of 10% dried *Okara* (P1) with the same total score, that is 81.3% of the expected criteria. The results color is brown. The worst color is white bread with a mixture of 30% dried *Okara* (P3), the score is 56.2% of the expected criteria, the bread color is pale.

The best flavour of 4 (four) samples of bread is white bread without dried *Okara* and white bread with a mixture of 10% dried *Okara* (P1), the score is 81.3% of the expected criteria. The unpleasant taste is bread with a mixture of 30% dried *Okara* (P3), the score is 62.5% of the expected criteria. P3 samples has a low score because bread was sour caused by a mixture of 30% dried *Okara*.

P0, P1 and P2 have the same score for the aroma, which is 81.3% of the expected criteria. The lowest score is P3, that is 75% of the expected criteria, because the smell of acid produced as a mixture of 30% dried *Okara*.

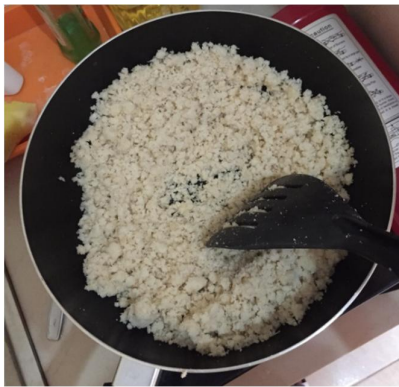
Based on data processing, resulting that the utilization of dried *Okara* with a percentage of 10% has the highest value, which is 82.8% of the expected criteria, whereas with a mixture of 20% dried *Okara* = 76.6% of the expected criteria and 30% flour mixture okara = 59.4 % of the expected criteria, so the mixture of 10% dried *Okara* is the right formula to make bread using dried *Okara* as a flour mixture.

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Attachment

- Dried *Okara* Production



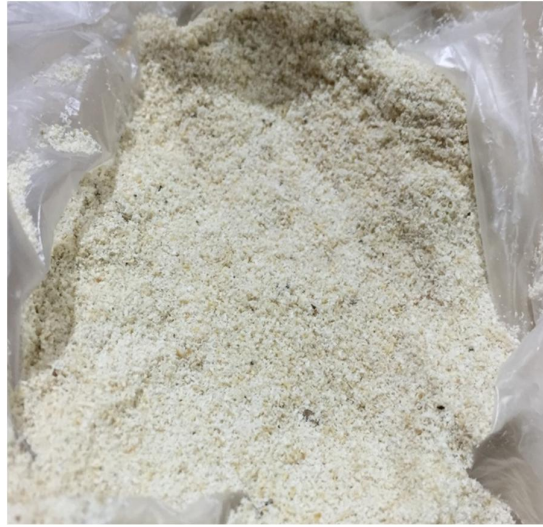
Roasted



Sifting Process



Blending Process



Dried *Okara*

- Bread-making



