

MILLET FLOUR SUBSTITUTION FOR EGG ROLLS SEMPRONG

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ABSTRACT

Semprong is a traditional cookies from Indonesia. Semprong is tube or roll shaped and tastes uniquely. It also could be triangular and square shaped. Semprong is made from the main ingredients of wheat flour and rice flour. This research is aimed to: (1) Invent the right recipe of semprong that substituted by foxtail millet flour, (2) Know locals acceptance of semprong and also encourage them developing other patisserie products which made of foxtail millet flour so that produced high quality products.

Research type used is research and development based on 4D model (Define, Design, Develop, Disseminate). Define is the product planning stage by selecting one recipe out of three reference recipes. Design is the stage of making a product development plan from the selected reference recipe. Develop is the stage of validation test by selected expert. Disseminate is the stage of products testing to panelists and products introduction to locals. This research was taken place at the Catering Laboratory, Department of Food and Clothing Engineering, Faculty of Engineering, Universitas Negeri Yogyakarta between January-April 2019. Each product was taken for samples while the testing instruments are experimental forms, validation forms, panelist sensory test forms, and exhibition preference test forms. Data analysis used is both qualitatively and quantitatively description method.

Research results: (1) The proper recipe for semprong with millet flour substitution was turned out by 55%. Other ingredients are cornstarch, eggs, margarine, sugar, thick coconut milk, vanilla powder, black sesame seed. Sponge method was used and the dough was manually molded. (2) Local's level of acceptance is showed by the score of many aspects; 3,67 by color aspect, 3,68 by flavor aspect, 3,82 by texture aspect, 3,88 by taste aspect and 3,9 by the whole product aspect. Assessment score was ranged 1 – 4 which means 1 for very dislikeable and 4 for very likeable score. Mean score of the products is above 3, so it can be concluded that semprong with foxtail millet is well accepted among locals.

Keywords: Semprong (*cookies*), Foxtail Millet

INTRODUCTION

Foxtail millet is an annual grass that are rich in nutrients compared to rice and corn. It is a type of cereal with small seeds (millet) with upright plant stems, segmented, pasted, and inserts from the lowest buds. Foxtail millet is enriched by vitamins and minerals like *niacin*, *piridoxin*, and *folicin*. It composes carbohydrate by 84,2%, protein by 10,7%, fat by 3,3%, dan dietary fiber by 1,4%. It also contained by antioxidant and bioactive compounds. The fiber content of Foxtail Millet is relatively high thus it could be a potential foodstuff. (Anna Sulistya Ningrum, et al, 2017). Millet using as an innovation material for local

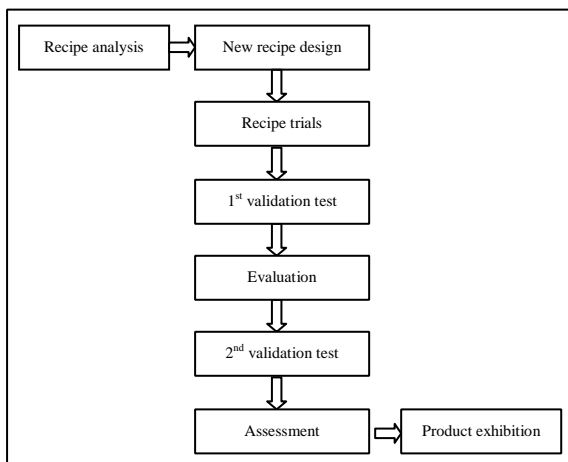
food is an alternative to produce food products that has high nutrients. Semprong is one of cookies or snacks that can be made by millet flour.

Semprong is a traditional cookies from Indonesia. Semprong is tube or roll shaped and tastes uniquely. It also could be triangular and square shaped. The taste is not too sweet, the texture is crunchy and savory when bitten and brownish colored. It need extra effort to make good yet healthy snacks like adding some additional ingredients which provides high nutritions. Semprongs are sold relatively expensive and even many are imported. This is not in accordance with consumer needs for healthy food at affordable prices. Millet flour utilization by Indonesian people who are still limited in food production, the large number of

flour-based bakery products has caused few use of local raw materials, especially millet flour. There are some reasons such lack of processing of millet creations in bakery products and limited processing of millet flour processing techniques. The high nutrient and fiber content in millet flour can be an alternative main ingredients of semprong's recipe which can increase nutrients value. That alternative can help locals of getting an healthy semprong with affordable price. Based on the description, the author is interested in conducting research on finding and processing of millet-floursubstituted semprong.

METHODOLOGY

Research type used is research and development (R&D) based on 4D model (Define, Design, Develop, Disseminate). Research and development aims to produce new products which still in the developing stage (Mulyatiningsih, 2011). The whole procedure shows in the following diagram below.



Picture 1. Research Procedure and Methods

Millet flour did not made by process yet were bought in nearby store around Kepuh Kulon, Wirokerten, Banguntapan sub-distict, Bantul, Yogyakarta.

The making process used research and development (R&D) method based on 4D models which are define, design, develop, disseminate.

a. Define

In this stage, three recipes were collected from different sources. The three-recipe was analyzed

and then chosen one out of three as reference recipe to develop. Recipe was chosen based on aroma, texture, taste and color. The following table below shows all ingredients compositions of all three recipes.

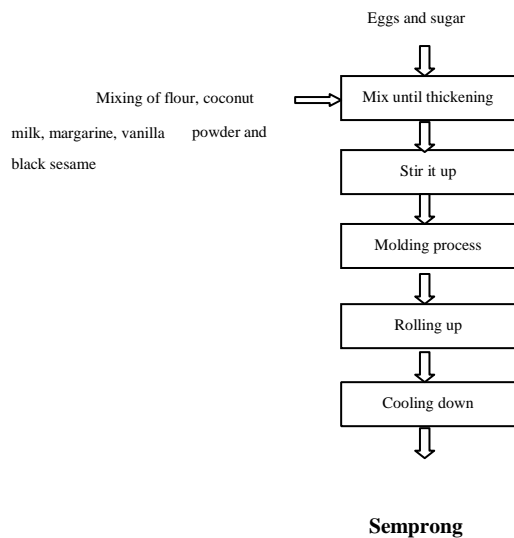
Table 1 Reference Recipe of Semprong

No.	Ingredients	1st Recipe	2nd Recipe	3rd Recipe
1.	Wheat flour	250 gr	250 gr	-
2.	Eggs	1	1	3
3.	Cornstarch	50 gr	25 gr	4 tbs
4.	Thick coconut milk	200 ml	200 ml	200 ml
5.	Vanilla powder	½ tsp	½ tsp	-
6.	Black sesame seed	30 gr	-	-
7.	Rice flour		25 gr	225 gr
8.	Margarine		50 gr	4 tsp
9.	White sesame seed		30 gr	40 gr
10.	Salt	-	-	¼ tsp

Source: 1st recipe (Rohel, 2018), 2nd recipe (Rita, 2019), 3rd recipe (Building, 2018)

The first recipe produced very impressive dough, in case of the color's dough, crunchy texture yet tastes less sweet. Whilst the second recipe results one point lower than the first one as it has thicker texture. Thus it would be difficult to form and the crispness was hard to maintain. On the other hand, the third recipe produced very impressive dough as the first one. Moreover it tastes sweet and easy to form. They were the basic recipes for making milletflour-substituted semprong. All recipes then remade and was analyzed for two times.

The research procedure and development were begun by the making of semprong. The following diagram below shows steps of the making of semprong.



Picture 2. The making process of Semprong

Explanations:

1. Mix eggs and sugar with electric mixer at highest speed until it thickened and swelled well.
2. Decrease the mixer speed into the lowest level then add up wheat flour, millet flour, cornstarch, vanilla powder, melted margarine, food coloring and coconut milk. Mix it until swelled well then add up black sesame seed.
3. Prepare the preheat molds (using electric molds).
4. Take a spoonful (of ladle) and put it down to the heating mold. Wait a moment until the mold's lamp is off. Take it up if the dough has been well dried and brownish.
5. Roll up the molded dough using the chopsticks. Repeat the procedures while it last.
6. Cool it down then put it in jar. Make sure that the jar is closed tightly.

b. Design

It was the third recipe that selected as the control recipe of millet semprong. The recipe was made in three millet flour combinations. It would be composed by 35%, 55% and 75% of millet flour. The percentage used was 55% of millet flour. The author tried to make a comparison that was close to the previous research results

which was around 55%, 20% below and 20% above. The comparison ingredients shows in the table below.

Table 1. Comparison of Ingredients Formula

Ingredients	A	B	C	D
Wheat flour	250 gr	87,5 gr	137,5 gr	187,5 gr
Cornstarch	50 gr	50 gr	50 gr	50 gr
Millet flour	-	162,2 gr	112,5 gr	187,5 gr
Sugar	250 gr	250 gr	250 gr	250 gr
Eggs	1	1	1	1
Margarine	50 gr	50 gr	50 gr	50 gr
Coconut milk	250 ml	250 ml	250 ml	250 ml
Vanilla powder	2 gr	2 gr	2 gr	2 gr
Food colouring (green)	sck	sck	sck	sck
Black sesame seed	25 gr	25 gr	25 gr	25 gr

Notes: A (reference recipe); B (35% of millet flour); C (55% of millet flour); D (75% of millet flour)

This stage, a sensory test was conducted by two experts to choose the proper recipe that will be used to make a better product of millet semprong. Results show in the table 3 and 4.

Table 2. 1st Panelist's Assessment Results

Point of characteristics	1 st formula (35%)	2 nd formula (55%)	3 rd formula (75%)
Warna	Brownish	Brownish	Brownish
Flavor	Cocnut falvor	Vanilla flovor	Frowsty
Texture	Crunchy	Crunchy	Hard-bitten
Taste	Less sweet	Sweet	Sweet

Table 3. 2nd Panelist's Assessment Results

Point of characteristics	1 st formula (35%)	2 nd formula (55%)	3 rd formula (75%)
Warna	Brownish	Brownish	Brownish
Flavor	Cocnut falvor	Vanilla flovor	Frowsty
Texture	Crunchy	Crunchy	Hard-bitten
Taste	Less sweet	Sweet	Sweet

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Taste	Less sweet	Sweet	Sweet

Both tables show the result that the second formula (55% of millet flour) is the proper recipe and will be developed by two panelists. The recipe formula ingredients will be described in the table below.

Table 4. Resep Semprong Jewawut Substitusi 55%

Ingredients	2nd Formula (55%)
Wheat lour	87,5 gr
Cornstarch	50 gr
Millet flour	162,2 gr
Sugar	250 gr
Eggs	1
Margarine	50 gr
Coconut milk	250 ml
Vanilla powder	2 gr
Food coloring	sck
Black sesame seed	25 gr

The second formula that contained 55% of millet flour substitution had resulted the best taste of semprong. It also had vanilla flavor and well crispness.

Proximate Analysis in Food Testing

The analysis was calculated in every 100 grams of semprong. Proximate test was conducted two times and results show in the following table below.

Table 5. Proximate Test Result of Millet-Floursubstituted Semprong

Type of Analysis	Analysis Result	
	1st trial	2nd trial
Moisture content (%)	1,43	1,48
Content of ash (%)	2,74	2,74
Fat content (%)	10,43	10,51
Total Protein: 6,25 (%)	6,35	6,13
Crude fiber (%)	1,07	1,12
Carbohydrate by diff (%)	78,05	79,15

Table. 6 Nutrition Adequacy Rate Millet Flour Substitution For Semprong Serving Size 100 gr

Water	29,6 gr
Ash	54, 8 gr
Fat	210, 2 gr
Protein	127 gr
Coarse fiber	22, 4 gr
Carbohydrate	1, 56 gr

a. Moisture content

The lowest moisture content in every 100 grams of semprong dough was the first trial. It was valued 1,43 and 1,48 by the second trial. It means that the second trial has higher level of moisture. The amount of added flour, cornstarch, millet flour affects the level of starch in the formulation. The more of those ingredients added for the dough, the higher level of starch content. It means that there were slight cavities in the dough. Starch is like absorbing water (Winarno, 2017).

b. Ash of content

There is no difference in proximate test result based on ash of content. It was valued 2,74 by both trials.

c. Fat content

Table 6 shows that the second trial has higher result of fat content that the first trial. The mean score of fat content difference was 0,08 higher by the second trial. The higher value of fat content comes from the added margarine and coconut milk.

d. Content of Protein

The first trial result of protein content was 6,35 while the second trial scored 6,13. The protein source comes from eggs that being one of ingredients used in the recipe. **e. Crude fiber**

Based on the result that shows in table 4 above, the lowest value in crude fiber content was in the first trial scored 1,07. After being repeated in second trial, the crude fiber content was increased by 0,05.

f. Content of carbohydrate

Based on the result, it shows that the second trial scoed higher than the first trial. It was score 79,15 whilst the first was 78,05. It was caused by carbohydrate content in millet flour is higher than wheat flour and cornstarch.

c. Develop

The chosen recipe was evaluated and assessed by two experts. The recipe then being analyzed and developed by both experts. In this stage, there were two validation tests. Test was taken place at Department of Food Engineering, Faculty of Engineering, Universitas Negeri Yogyakarta in March 14th 2019.

Tables below show two validation test result.

Table 7. Result of first Validation Test

No.	Assessment Poins	Expert I	Expert II
1.	Shape	3	3
2.	Size	3	3
3.	Color	3	4
4.	Flavor	4	4
5.	Texture	4	4
6.	Taste	4	4

First validation test is conducted to collect experts's advices and suggestions to fix things that are still lacking.

Assesment aspects on second validation test were indifferent from the first test. It was involved the shape, size, color, flavor, texture ans taste of millet semprong. This attempt was to develop product quality and whether the product was acceptable for locals.

Table 8. Result of second Validation Test

No.	Assesment Points	Expert I	Expert II

1	Shape	4	3
2	Size	4	4
3	Color	4	3
4	Flavor	4	4
5	Texture	4	4
6	Taste	4	4

Second validation test was conducted to attempt what experts' suggested before. Based on the result, all the aspects scored almost perfect. The product's packaging was also ready to sell.

d. Disseminate

In this stage, product was tested by 30 panelists in Chemical Science Laboratory, Department of Food and Clothing Engineering. This test was conducted to determine the level of product acceptance in the community towards substitute products using local food ingredients in the form of millet flour. There were few characteristic points to be assessed such as shape, color, flavor, texture, taste and the whole appraisal of millet semprong. Results then were used to estimate level of local's acceptance of millet semprong. Results draws in the table below.

Table 9. Semi-Trained Panelists' Level of Preferences

No.	Assessment Point	Level of Preferences			
		1	2	3	4
1.	Color	-	4	21	5
2.	Flavor	-	5	17	8
3.	Texture	-	-	16	14
4	Taste	-	3	16	11
5.	Whole Product	-	-	20	10

Notes:

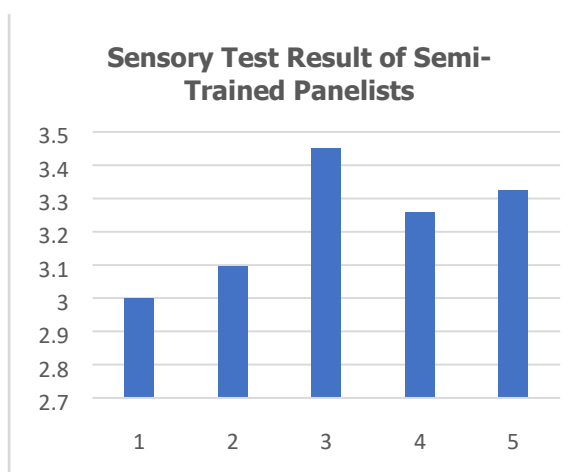
- 1 = very dislikeable
- 2 = dislikeable
- 3 = likeable
- 4 = very likeable

The collected score then being averaged and here is the table that contain the mean score of each assessment point.

Table 10. Mean Score Result of Semi-Trained Panelists' Level of Preferences

No.	Assessment Points	Mean score	Notes
1.	Color	3	Likeable
2.	Flavor	3.10	Likeable
3.	Texture	3.26	Likeable
4.	Taste	3.45	Likeable
5.	Whole Product	3.32	Likeable

Mean score of the test was also depicted the sensory test result from all panelists. It is then drawn by this graph below.



Picture 3. Graph of Semi-Trained Panelists' Level of Preferences

Local's Level of Acceptance for Millet Semprong

Millet semprong were widely shared to visitors in exhibition. In that exhibition, there were 80 pieces of millet semprong provided. All the visitor who ate millet semprong had to fill form about the product. Eventually 80 forms were collected for the research.

Table 11. Exhibition Visitors' Level of

Preferences

No.	Assessment Points	Level of Preference			
		1	2	3	4
1.	Color	-	-	40	40
2.	Flavor	-	1	17	62
3.	Texture	-	-	11	69
4.	Taste	-	-	7	73
5.	Whole Product	-	-	5	75

Notes:

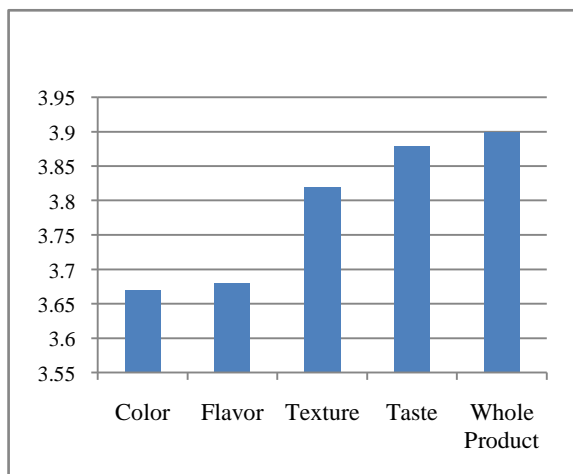
- 1 = very dislikeable
- 2 = dislikeable
- 3 = likeable
- 4 = very likeable

The result of sensory test then being averaged and here is the table that contain the mean score of each assessment point.

Table 12. Mean Score Result of Exhibition Visitors' Level of Preferences

No.	Assessment Points	Mean score	Notes
1.	Color	3.67	Very Likeable
2.	Flavor	3.68	Very Likeable
3.	Texture	3.82	Very Likeable
4.	Taste	3.88	Very Likeable
5.	Whole Product	3.9	Very Likeable

Based on the table above, visitors had given the very-likeable score for millet semprong which served in exhibition. Mean score of visitor's level of preferences for millet semprong showed in a graph below.



Sensory Test Result of Visitors

Picture 4. Graph of Visitors' Level of Preferences

Graph above shows that the-whole- product aspect was scored the highest. It depicts that the whole millet semprong served is well accepted by the locals. On the other hand, other characteristics were still well rated above average (valued very likeable).

CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

This research aims to find the proper recipe of semprong whose ingredients substituted by millet flour. In short, this research could be concluded by some conclusions which are:

1. The proper recipe for millet semprong is composed by 55% of millet flour and 45% of wheat flour. Other ingredients are eggs, sugar, margarine, cornstarch, coconut milk, vanilla powder and black sesame seed. Sponge method was used for the processing method meanwhile pan frying method was used for the molding method (using twosided semprong's mold).
2. Food testing was conducted by involving 30 semi-panelists and 80 exhibition visitors. There were five aspects that has been assessed such as product's color, flavor, texture, taste and the whole product appearance. Based on the result, millet semprong was well accepted by locals. It is depicted in the mean score of sensory test of

millet semprong. Locals has valued it as a very likeable snack.

B. Recommendations Here are the recommendations obtained by the research results:

1. The dough that is being molded must be reversed immediately in order to be cooked well. Each semprong needs about one minute to cook then rolled up immediately. You have to put it down in to the tightlyclosed jar in order to keep the crispness.
2. Millet flour shall be roasted before making the dough. It aims to reduce unpleasant smells.
3. The better composition of millet flour for semprong making process is 55%. It produces good taste of millet semprong. Hence it is recommended to use millet flour as substitute flour ingredients for semprong recipe, besides it contains many nutrients. However locals is able to change the percentage of millet flour according to any preferences.

REFERENCES

- Amirahsari, H. P. (2018). NILAI ORGANOLEPTIK DAN AKTIVITAS ANTIOKSIDAN KUE SEMPRONG DENGAN PENAMBAHAN TEPUNG TEMPE DAN SELAI UMBI BIT SEBAGAI SNACK PMT BALITA (3-5 TAHUN). 1-12.
- Anju T Jr and Sarita S. 2010. *Suitability of Foxtail Millet (Setaria Italica) and Barnyard Millet (Echinochloa frumentacea) for Development of Low Glykemic Index Biscuits*. Malaysian Journal of Nutrition. 2010 Dec; 16(3): 361- Available: <http://www.ncbi.nlm.nih.gov/pubmed/22691989>
- Anna Sulistya Ningrum, nFN Rahmawati, & Muhammad Aqil. (2017). KARAKTERISTIK TEPUNG JEWAWUT (FOXTAIL MILLET)

- VARIATES LOKAL MAJENE DENGAN PERLAKUAN PERENDAMAN. *Jurnal Penelitian Pascapanen Pertanian*.
- Bongoura M.L., Atindana J.N., Ming Z.H., Wei P, Mothibe K.J and Xue Z.K., 2012. *Starch Functional Properties and Resistant Starch from Foxtail Millet [Setaria italica (L.) P. Beauv] Species*. Pakistan Journal of Nutrition, 11: 919-928.
Available:
<http://www.pjbs.org/pjnonline/fin2434.pdf>
- Building, P. S. (2018). *Resep Tanpa Oven, Sukses Membuat Aneka Kue & Roti Enak*. Jl. Panjang No. 8A Kebon Jeruk Jakarta: Gramedia.
- Cahyono JKA. 2015. *Formulasi food bar dengan bahan juwawut (Setaria Italica sp) dan kacang merah (Phaseolus vulgaris): Uji Sifat Organoleptik, Sifat Fisiko-Kimia, serta Penentuan Indeks Glikemik*.
Available:
http://etd.repository.ugm.ac.id/index.php?mod=book_detail&sub=BookDetail&act=view&typ=html&book_id=84032&obyek_id=4&unitid=&jenis_id Hasan, L., Nikmawatisusanti, & Mile, L. (2014). KARAKTERISTIK ORGANOLEPTIK KUE TRADISIONAL SEMPRONG RUMPUT LAUT (*Kappaphycus alvarezii*). *KARAKTERISTIK ORGANOLEPTIK KUE TRADISIONAL SEMPRONG RUMPUT LAUT (Kappaphycus alvarezii)*, 10.
- Mulyatiningsih, E. (2011). *Metode Penelitian RTerapan Bidang Pendidikan*. Yogyakarta: Riset Terapan (Bidang Pendidikan dan teknik).
- Pertanian, K. P. (2017, Februari 21). *Jewawut Kaya Kandungan Nutrisi*. Available: www.litbang.pertanian.go.id
- Rita. (2019, Januari Sabtu). Resep Kue Semprong. (P. Sari, Interviewer)
- Rohel. (2018, Juli Kamis). Resep Kue Semprong. (J. P. sari, Interviewer)
- Winarno, F. (2017). *Kimia Pangan dan Gizi*. Jakarta: PT Gramedia Utama Yati Sudaryati Soeka, & Sulistiani. (2017). Kualitas Kue Semprong. *Profil vitamin, kalsium, asam amino, dan asam lemak tepung jewawut (Setaria italica L.)*, 85-96.
- Yuliana, W. K. (2016). *Manajemem Mutu Kue Semprong*. Surakarta: Laporan Hasil Praktikum. Fakultas pertanian, Universitas Sebelas Maret. Available: <https://id.scrib.com/doc/294711237/manajemen-mutu-kue-semprong-pada-01-November-2018>