Le'eclaire with the substitution of millet flour as local foodstuffs utilization

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Abstract. This study aims at: 1) finding the proper recipe of Le’Éclaire products 2) knowing the people's acceptance of Le’Éclaire 3) knowing the nutrient content of Le’Éclaire. The object of this research is eclair with millet flour substitution. This research employed Research and Development (R&D), with a 4D development model (Determine, Design, Development, and Dissemination). The determine stage was to find the recipe from many sources. The results of this research showed that: 1) The proper recipe of Le’Éclaire was containing with 50% millet flour substitution. The technique of making Le’Éclaire was baking, and then the package was using opp plastic and paper cup. 2) The public acceptance of Le’Éclaire products was seen from the limited-scale test with the overall average results of 3.73, while for the modification product was shown with the results of 3.8. The degree of acceptance on a broad scale was shown from the overall average of 3.8. 3) Le’Éclaire nutritional information based on proximate tests showed the nutritional content in 100 gr Le’Éclaire was 37.75% of water, 2.67% of ash, 9.37% of protein, 23.19%, of fat, 7.16% of fiber, and 19.87% of carbohydrates.

1. Introduction
Choux paste refers to a type of pastry with mild characteristics but has big volumes and strongly leavened with large cells. It has two forms, i.e. eclair (oval shape) and cream puff (round shape) [1]. Eclairs are made from a dough called éclaire paste or choux paste, or it is called pate a choux in French. Meanwhile, in Indonesia, it is known as soes cake. It is generally accepted by the Indonesian people. This cake has very diverse contents and its skin can be modified to make a new model of soes cake [2].

Éclaire is usually made from a mixture of water, sugar, salt, butter, wheat flour, and eggs. The wheat flour in making choux paste functions as a framework for choux paste. This flour contains starches and proteins as skeletons. The formation of the dough skeleton can occur with the ability of gelatinized starch when the dough is roasted. Thus, the role of starch found in wheat flour can be replaced with other flour which has the same relative content. The type of local flour that can be used instead of flour is millet flour.

Millet is a group of plants originating from the grass family subgroup (Graminae) [3]. It is a small seed cereal that belongs to a minor economic crop with nutritional content similar to other food crops, such as rice, corn, and wheat. Millet can live in low soil fertility, low humidity, or high temperatures. In Indonesia, millet plants are usually cultivated in areas such as Buruh, Jember, South Sulawesi such as Enrekang, Sidrap, Maros, Majene, and other areas. The Millet type that is usually found in Indonesia, such as barley, cantel, ote, red millet, and yellow millet. Millet has low glycemic index levels and can reduce high blood pressure compared to wheat or rice and it is believed to be able to prevent cardiovascular diseases, such as strokes and heart attacks.
Many Indonesian people who are not familiar with millet as food even usually it is only used as bird feed. This plant is the potential to be processed into healthy food and to support food security [4]. The advantage of millet processing into flour is to increase its usability and value. Moreover, it is easy to be processed into products that have high economic value. It is also easily mixed with flour or other ingredients since millet flour has higher protein content than corn and rice. Another positive characteristic is its low gluten. Millet flour has a water content of 9.19%, ash of 1.80%, fat of 2.58%, protein of 11.29%, starch of 56.53%, carbohydrates of 74.52%, and crude fiber of 2.01% [5].

The use of millet flour to create food products can complete the nutritional content, as well as reducing the content of gluten. The gluten is difficult to digest by the body so that it may threaten the digestive system. The use of millet flour in food products such as wheat flour-based food products is expected to reduce the dependence of Indonesian people on wheat flour.

This study aims at 1) finding the proper recipe of Le’Éclaire products 2) knowing the people's acceptance of Le’Éclaire 3) knowing the nutrient content of Le’Éclaire. The object of this research is eclair with millet flour substitution.

2. Methods and Equipment
This research employed research and development (R&D) method with the 4-D model [7]. It consisted of 4 main steps, namely Define, Design, Develop, Develop, and Disseminate. This research method was chosen because it aimed to produce product development in the form of eclair-shaped pastry products with millet flour substitution. The developed products are then tested for its feasibility by validation and the semi-trained panelist preference test.

The research subjects were conducted on 2 experts in the validation stages 1 and 2, then the panelist preference test was addressed to 30 semi-trained panelists, and at the final stage of the acceptance test, it was conducted during the exhibition was aimed at 80 untrained (public) panelists through assessment forms.

| No | Research stage                  | Data source      | Number  |
|----|---------------------------------|------------------|---------|
| 1  | Presentation: Proposal seminar  | Expert           | 2 people|
| 2  | Validation                      | Expert           | 2 people|
| 3  | Presentation: Sensory test      | Semi-trained panelists | 30 people|
| 4  | Presentation: Product exhibition| The audience of the exhibition | 80 people|

The Trial Form was used to find out whether a product can close the criteria that can be used for development. This form was used for 3 reference included color, aroma, taste, and texture. The results of the research were used as input for product development.

The form of sensory test validation I for Le’Éclaire products referred to a tool for sensory testing by experts including name, date, product name, valuation and signature. The expert assessed the product based on the characteristics of its color, aroma, taste, and texture. The results of the assessment were served as suggestions for product improvement.

The sensory test forms (panelists) were used to test the acceptance during the limited scale products to 30 semi-trained panelists. The method of using the sensory test form was that panelists asked to give a rating to their favorite products including the color, aroma, taste and texture as well as comments. The grading system was in the form of crosses that represented the numbers from “strongly dislike”, “dislike”, “like”, “strongly like”. Having the acceptance test forms, product validation and sensory testing, the results of developed products in the form of raw recipes were then exhibited to introduce products that had been made to the public and to conduct a large-scale test or acceptance. The form contains the name, date, product name, and rating. The rating level of product preference in the form of “like” or “dislike”.

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This research used descriptive qualitative research methods. Satori mentions that qualitative research was conducted because this kind of study is trying to explore phenomena that cannot be quantified, such as the process of a work step, the formula of a recipe, the notions of a diverse concept, the characteristics of an item and others [6].

Sensory or organoleptic evaluation is using the human senses to measure the texture, appearance, aroma and flavor of food products. The consumer acceptance of a product began with its assessment of appearance, flavor and texture. The sensory testing (panelist test) played an important role in product development by minimizing the risk in decision making. The panelists can identify sensory properties in order to help to describe the product. The panelists were asked to give their personal responses about likes or vice versa (dislike). Besides the panelists expressing their preference, like or reverse responses, they also expressed their preference level. These levels are called the hedonic scale, for example strongly like, like, dislike, strongly dislike. Meanwhile, T-test is a type of statistical test that aims to compare the average of two groups that are in pairs. The paired samples can be interpreted as a sample with the same subject but experience 2 different treatments or measurements, namely measurements before and after the given treatment.

3. Results & Discussion
To utilize local foodstuffs, further testing is needed to investigate millet flour as raw materials for Le’Eclaire. There are several stages carried out during the study as follow.

3.1 Stage I: Proposal Seminar
In this stage, the activity was in the form of proposal presentation in front of the supervisor and examiner, the purpose of this stage was to obtain criticisms and suggestions that were useful for improving the research.

3.2 Stage II: Validation and Revision
Here, the product development which has been substituted by local foodstuffs was tested by 2 experts. in the first validation stage, when the product development was not considered good, the validation stage would be repeated. The criticisms and suggestions during the expert validation were recorded in the provided forms.

| Characteristic | Validation Sample I | Validation Sample II |
|----------------|---------------------|---------------------|
|                | Reference products  | Product development (Expert 1) | Product development (Expert 2) | Reference products  | Product development (Expert 1) | Product development (Expert 2) |
| Form           | 3                    | 3                    | 3                    | 3                    | 4                    | 4                    |
| Size           | 3                    | 3                    | 4                    | 3                    | 4                    | 4                    |
| Color          | 3                    | 3                    | 4                    | 3                    | 4                    | 3                    |
| Aroma          | 3                    | 3                    | 3                    | 3                    | 4                    | 4                    |
| Taste          | 3                    | 3                    | 4                    | 3                    | 4                    | 4                    |
| Texture        | 2                    | 2                    | 3                    | 3                    | 4                    | 4                    |
| Overall Characteristic | 3 | 3 | 4 | 3 | 4 | 4 |
| Presentation   | 3                    | 3                    | 4                    | 3                    | 3                    | 3                    |
| Packaging      | 3                    | 3                    | 4                    | 3                    | 3                    | 4                    |

*Explanation:
1. Strongly dislike
2. Dislike
3. Like
4. Strongly like
Based on Table 2 above, it can be seen that in the first validation stage, the product development evaluation carried out by expert 1 and expert 2 indicated that the product had the weakness in its texture. The expert expected some improvement in the second validation stage. Finally, in the second validation stage, the assessment of the two experts gave good results in overall aspects with the value of 4 which means that the product was strongly liked. Therefore, the product was declared to pass the expert validation stage.

3.3 Stage III: The Sensory Test in Limited-Scale Panelist (30 Semi-trained Panelists)
In this stage, the sensory tests were conducted on 30 trained semi-panelists. The reference products and product development were made as many as 30 products. Each panelist had 2 product samples, panelists were asked to provide an assessment on each product, but they certainly did not know which was the referenced products and the developed product. The reference product was given the code of 214, while the product development was given code 516. Below are the results of the semi-trained panelist's favorite test. The sensory tests conducted at this stage include tests on color, aroma, texture, taste, and overall product.

| Characteristic | Control | Development | P-Value | T-test |
|----------------|---------|-------------|---------|--------|
| Color          | 3,73    | 3,86        | 0,10    |        |
| Aroma          | 3,66    | 3,73        | 0,29    |        |
| Texture        | 3,6     | 3,76        | 0,08    |        |
| Taste          | 3,67    | 3,73        | 0,29    |        |
| Overall        | 3,73    | 3,8         | 0,27    |        |

Table 3 shows the results that the obtained number of p-value from the control and the development products is more than 0.05, so it can be said that the product is not significantly different and the product is accepted.

3.4 Stage IV: Large-Scale Acceptance Test (80 untrained/public panelists)
In this stage, the acceptance test was carried out during the exhibition. The researchers made 80 developed products to be assessed by the public community (untrained panelists). This stage was done to see the visitors’ response towards the developed product regarding their acceptance level. The final results of the large-scale acceptance test are presented in the following table based on the number of forms of 80.

| Characteristic | Mean score |
|----------------|------------|
| Color          | 3,7        |
| Aroma          | 3,8        |
| Texture        | 3,7        |
| Taste          | 3,8        |
| Overall        | 3,8        |

*Explanation:
1. Strongly dislike
2. Dislike
3. Like
4. Strongly like
Based on the average score from the untrained panelist test in Table 4 above, the results of the taste, and aroma aspect had the score of 3.8 meaning that it was strongly liked, while for the color, the texture, and the overall gained the score of 3.7 which mean it was liked.

3.5 Proximate Test
The proximate Test in this study was done in Chem-Mix Pratama Laboratory on April 4, 2019. The purpose of this test that was to determine the water content, ash, protein, fat, crude fiber, carbohydrate, and energy showed the following results:

| Sample Code | Analysis  | Test 1 | Test 2 |
|-------------|-----------|--------|--------|
| Le’Eclaire  | Water     | 37.77  | 37.72  |
|             | Ash       | 2.58   | 2.75   |
|             | Protein   | 9.30   | 9.44   |
|             | Fat       | 23.04  | 23.34  |
|             | Fiber     | 7.23   | 7.09   |
|             | Carbohydrate | 20.07 | 19.67 |
|             | Energy    | 325.52kal | 327.20kal |

In Table 5 above, it showed the results of the proximate test per 100g from the developed product. The proximate test was carried out in twice repetitions to make sure the accuracy of the data results. Based on the above results, it can be seen that the biggest content in the product was water with 37.77gr and the smallest is the ash with 2.58gr. Also, this developed product contains the energy of 325.52cal / 100gr.

4. Conclusion
Based on the research results, several conclusion can be drawn as follow: 1) The proper recipe of Le’Eclaire was containing with 50% millet flour substitution. The technique of making Le’Eclaire was baking, and then the package was using opp plastic and paper cup. 2) The public acceptance of Le’Eclaire products was seen from the limited-scale test with the overall average results of 3.73, while for the modification product was shown with the results of 3.8. 3) Le’Eclaire nutritional information based on proximate tests showed the nutritional content in 100 gr Le’Eclaire was 37.75% of water, 2.67% of ash, 9.37% of protein, 23.19%, of fat, 7.16% of fiber, and 19.87% of carbohydrates.

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