

## Formulation of Longgi Flour-Based Brownies Substituted with Tilapia Flour

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### Abstract

This study aims to formulate Longgi (*Xanthosoma sagittifolium*) flour-based brownies substituted by tilapia (*Oreochromis niloticus*) flour. The research consists of two stages: a preliminary study and the main study. In the preliminary study is that the manufacture of tilapia flour and Longgi brownies. The main study is the formulation stage. Organoleptic analysis of the data used was Kruskal-Wallis test with a parameter that is the taste, texture, aroma, color and appearance. If the result of significant ( $p < 0.05$ ), then followed by a further test of Duncan. Results of research on the formula flour-based Longgi brownies with flour substitution of tilapia provides a real influence on organoleptic aroma criteria is "like very much", the taste criteria is "like very much" and texture to the criteria of "a little like" to "like".

Keywords: Flour-based; *Xanthosoma sagittifolium*; Tilapia; *Oreochromis niloticus*; brownies.

### Introduction

Tilapia is one of the the species farming community cultivated in fish cages in the lake Limboto. Demand of tilapia consumption is quite high and it is a potential source of animal protein for nutrition (Margaretha, 2010). Tilapia in Lake Limboto have high potential but untapped well and still have economic value so low that sales efforts are needed to diversify the fishery processed as fishmeal.

High-quality fish flour which contains water 6-10%, fat 5-12%, protein 60-75%, and ash 10-20% (Latif, 2006). Manufacture of fish flour made from tilapia can be one alternative form of foodstuffs. In addition to having a long shelf life compared to fresh fish, fish flour may increase the economic value and utilization. The use of fishmeal as an ingredient in the manufacture of brownies substitution can improve the nutritional quality. From preliminary research results content of tilapia flour: water 9.83%, 71.02% protein, 4.46% fat, 9.64% ash.

Brownies are bakery products which fall into the category of cake. Bakery products include breads, cookies, and cake is a product widely consumed (Bakke, et al., 2007). Wheat flour is the basic ingredient in the manufacture of brownies, but the wheat flour (wheat) can not be produced in Indonesia. The main ingredient in making brownies are still

dependent on the flour, then to reduce dependence on the use of other materials needed wheat flour to replace wheat flour, easily obtainable and utilization is still not maximized to improve the nutritional value brownies.

One of the materials that can be used to replace Pegunaan taro flour is flour. Talas is better known by the name Gorontalo people Longgi, taro were used in this study for the manufacture of flour is Belitung taro (*Xanthosoma sagittifolium* (L.) Schott).

Utilization of Longgi flour as a raw material in the manufacture of brownies can be combined with flour sourced from other materials so that a composite flour. The combination is done to complement the nutritional content of the flour Longgi which add value to the material. Longgi protein content is low, therefore, needs other materials used to make up the shortfall from Longgi, one of which is flour tilapia protein content is high at 71.02%. Based on these descriptions, researchers interested in utilizing Longgi flour and fish meal as a substitute for wheat flour in making brownies as well as to increase tilapia nutrition to those who consume them.

The purpose of this research is to create formulations brownie cake flour-based Longgi (taro belitung) are substituted with tilapia fish meal.

Research Methodology

Implementation of the research was conducted in September to January 2016. For the manufacture of starch and brownies conducted at the Laboratory of the Polytechnic Gorontalo and organoleptic testing laboratory is housed in the Department of Fishery Product Technology Faculty of Fisheries and Marine Sciences, State University of Gorontalo.

This research was done in 2 stages: preliminary and main research. The preliminary study which is

making flour and flour Longgi Tilapia and making brownies. This preliminary study was conducted by trial and error with two experiments to determine the concentration of flour and flour Longgi tilapia.

The main research is the manufacture brownies Longgi with flour substitution of tilapia at 3 concentration is 30%, 50%, and 70% as the treatment can be seen in Table 1.

Table1 Formulation of tilapia flour longgi brownies

Tilapia flour	Longgi flour	Ingredients					
		sugar	egg	Margarin	C. powder	C. bar	Vanilla
30%	70%	150gr	3	200g	40g	200g	½ ts
50%	50%	150gr	3	200g	40g	200g	½ ts
70%	30%	150gr	3	200g	40g	200g	½ ts

Hedonic organoleptic test was conducted based on the score sheet hedonic. Data form the panel assessment results obtained from hedonic organoleptic test were analyzed using non-parametric statistical methods Kruskal-Wallis test (Walpole, 1993). If the results of the treatment significantly affect the hedonic value then tested further by using Duncan test to find out which treatments are significantly different with the parameters analyzed.

Result and Discussion

Phase formulation Brownies made from flour Longgi with flour substitution of tilapia is the formula I (flour Longgi 70%, flour tilapia 30%), formula II (flour Longgi 50%, flour tilapia 50%), (flour Longgi 30%, flour tilapia 70%). Organoleptic testing performed by semi-skilled panelists who totaled 25 people.

Feature

Hedonic organoleptic test result data against the appearance of brownies made from flour with flour substitution Longgi tilapia can be seen on the histogram.

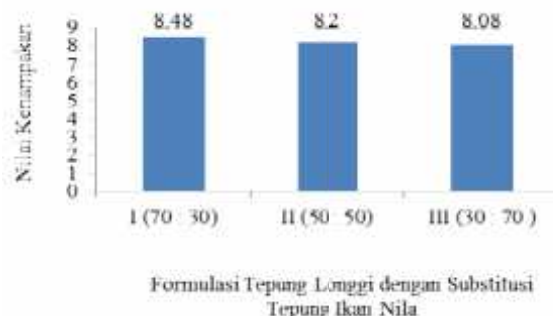


Figure 1 Histogram results of hedonic appearance test with different concentrations of longgi flour and tilapia flour.

Figure 1 shows that the organoleptic value hedonic brownies appearance is in the interval 8.08-8:48 with receipt of the same scale that is really like.

Kruskal-Wallis test results showed that the concentration of flour and flour Longgi different tilapia effect no significant effect on the appearance of the resulting brownies. Appearance brownies Longgi with tilapia fish meal substitution resulted in the appearance of different colors that are not different, because it has the same appearance and the same color brownies are dark brown so it is preferred by the panelists. This is because the main ingredient of making brownies using the same materials, namely chocolate, eggs, margarine and sugar. The color brown brownies can also be caused due to tilapia fish meal. According to research conducted by Melapa

(2014) that baked brownies made from brown flour daluga tubers due to the addition of cocoa powder or cocoa powder.

The brown color on cocoa powder occurs during cacao converted into cocoa powder. At which time the manufacture of chocolate powder Maillard reaction occurs that causes the formation of a brown color. Roasting causes the development of specific flavor of chocolate with the Maillard reaction, caramelization of sugars, protein degradation and the formation of volatile components such as pyrazin which is one component of the desired flavor (Kusnandar, 2011).

According to Talib (2005) that the appearance is a parameter that can be seen visually on the cake which led panelists interested and liked the product. The appearance of a product meal is a major pull factor before panelists liked the quality of other sensory properties such as taste, aroma, and texture. In general, consumers choose foods that have attractive appearance.

### Colour

Hedonic organoleptic test result data to the color brownies made from flour with flour substitution Longgi tilapia can be seen in the histogram below



Figure 2 Histogram results of hedonic colour test with different concentrations of longgi flour and tilapia flour.

Figure 2 shows that the organoleptic hedonic value brownies color is in the interval 8.16- 8:28 with receipt of the same scale that is really like.

Kruskal-Wallis test results showed that the concentration of flour and flour Longgi different tilapia effect no significant effect on the resulting color brownies.

Color brownies Longgi with flour substitution of tilapia produce color that is not different, because all colors with the same brownies are dark brown, so it is preferred by the panelists. This is due to the chocolate. According to research conducted by Melapa (2014) that baked brownies made from brown flour daluga tubers due to the addition of cocoa powder or cocoa powder. Besides the emergence of brown color on the product can also be caused by the browning reaction (the Maillard reaction) because of the presence of protein and sugar in the manufacture of brownies.

### Aroma

Hedonic organoleptic test data on the aroma of brownies made from flour with flour substitution Longgi tilapia can be seen in the histogram below.

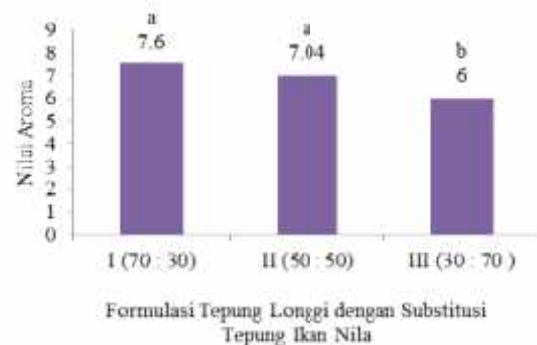


Figure 3 Histogram results of hedonic aroma test with different concentrations of longgi flour and tilapia flour.

Figure 3 shows that the organoleptic value hedonic aroma 6- brownies are at intervals of 7.60 to the scale of the reception rather like to really like. The highest value criteria are very fond of the formula I is 7.60 or 8 with the scale of the reception is very like and the lowest value contained in the formula III with the scale of the reception is rather like.

Kruskal-Wallis test results showed that the concentration of flour and flour Longgi tilapia significantly affect the resulting aroma. The test results showed that Duncan on the aroma of formula I and II were not significantly different, tetepai formula I and II are significantly different from the formula III.

Formula I is brownies with panelists preferred aromas for sweet-smelling aroma Longgi odorless and tilapia fish meal. This is due to the small flour substituted tilapia. Formula II is no different statistical

tests of the formula I. The formula III rather preferred by the panelists because the flour substitution of tilapia more to produce less fragrant aroma, a little smell of fish, no smell aroma Longgi. It is suspected panelists are still not familiar with the smell of fish that are too dominant in the brownies. This is consistent with the statement Ismanadji et al (2000) in Maulida (2005), that the higher the level of concentration of tuna fish meal used in cookies then decreasing preference level panelists.

**Taste**

Hedonic organoleptic test result data to the taste of brownies made from flour with flour substitution Longgi tilapia can be seen on the histogram hedonic taste test results can be seen in Figure 4.

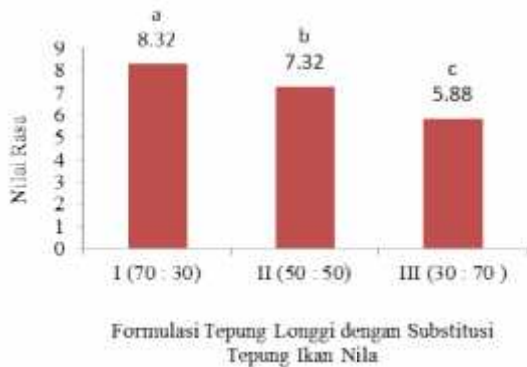


Figure 4 Histogram results of hedonic taste test with different concentrations of longgi flour and tilapia flour.

Figure 4 shows that the organoleptic hedonic value brownies taste is in the interval 5.88- 8:32 scale reception rather like to really like. The highest value contained in formula I with a revenue value love and the lowest value contained in the formula III with a revenue value rather liked.

Kruskal-Wallis test results showed that the concentration of flour and flour Longgi tilapia significantly affect the resulting flavor. The test results showed that Duncan to taste formula I, II and III were significantly different.

Brownies formula I are brownies that taste is preferred because tastes sweet, does not feel tilapia fish meal and Longgi. This is because the use of fewer tilapia fish meal, in addition to the use of other materials such as chocolate can mask the taste of the fish. Formula II with a ratio of flour and flour Longgi

tilapia produce the same flavor preferred by the panelists. While the formula III rather preferred by the panelists because the substitution of tilapia more flour to produce a sense of fishmeal. This is according to research conducted by Maulida (2005) and Bunta (2013) that the higher the level of concentration of tuna fish bone flour in cookies lead to decreased levels of A panelist on the taste of the cookies were assessed because the flavor of the fish that dominates.

**Texture**

Hedonic organoleptic test data on the texture brownies made from flour with flour substitution Longgi tilapia can be seen on. histogram texture hedonic test results below.

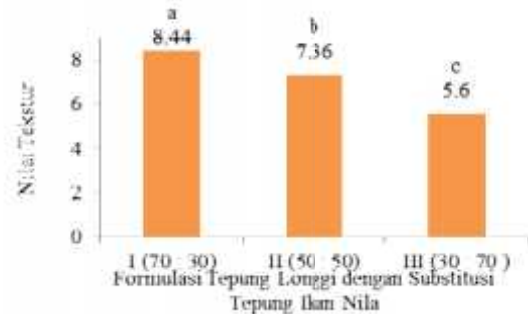


Figure 5 Histogram results of hedonic texture test with different concentrations of longgi flour and tilapia flour.

Figure 5 shows that the organoleptic value of texture hedonic brownies are at intervals of 5.6- 8:44 scale reception rather like to really like. The highest value contained in formula I with a revenue value love and the lowest value contained in the formula III with a revenue value rather liked.

Kruskal-Wallis test results showed that the concentration of flour and flour Longgi tilapia significantly affect the resulting texture. Duncan on the texture test results show that formula I, II and III were significantly different.

Brownies brownies formula I are highly preferred by the panelists texture because the texture of dense brownies. This is because the use of taro flour more than tilapia flour. Formula II with a ratio of tilapia flour and flour Longgi produce the same texture preferred by the panelists is rather solid. While the panelists preferred formula III rather because the flour

substitution of tilapia more resulting in a less dense texture.

As in the study Maulida (2005), the addition of bone meal of tuna 20% on the cookies have very low hedonic value of the texture parameters of the concentration of 10%, because the more the addition of the fish bone meal produced less dense cookies.

According to Winarno (2008) that the texture of a material will affect the taste of foodstuffs caused by them. From research conducted showed that changes in the texture of foodstuffs can change the taste and smell.

## Conclusion and Suggestion

Based on the results of this study concluded that the substitution of tilapia fish powder formulations using flour brownies Longgi significant effect on organoleptic aroma criteria is "like very much", the taste criteria is "like very much" and texture to the criteria of "a little like" to "like".

For further research, it is advisable to do research on a chemical test to determine what type of fat that is on brownies and make brownies formula by adding additional material to reduce the levels of fat in brownies.

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