Physical Characteristics, Organoleptic Property And Dietary Fiber Content On Gourd Fruit Flour Additions To Nile Tilapia Nugget

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Abstract. Gourd Fruit is a fruit that is rarely used by people, which has a fiber content of 0.5% per 100 g, and when used as fiber quantity of the flour added, flour can increase. Processed meat products have potential to be added with dietary fiber such as processed tilapia nuggets. The average Indonesian population consumes 10.5 g of fiber per day. This value only reaches half of the recommended fiber adequacy. To know the effects of Physical Characteristics, Organoleptic Property And Dietary Fiber Content of food on Nile tilapia nugget making with addition of gourd fruit flour. Types of pure experimental studies, RAL trial design, with 4 variations of Gourd Fruit starch addition (0%, 5%, 10% and 15%). Data collected are the data on physical properties, organoleptic and dietary fiber content. The best physical properties result is the color on nugget C (yellow packing) and aroma on nugget D (typical of Gourd Fruit) from variant nuggets. As for taste (typical of fish) and texture (rather hard) are the same for all variations. All nuggets have the same flavor (all typical of fish) and texture (rather hard). There is a difference of nuggets favorability level for color indicator (p = 0.004) based on variation of kundur fruit flour. The addition of Gourd Fruit flour did not give the difference of aroma (p = 0.254), flavor (p = 0.063), and texture (p = 0.318) nuggets. The higher the addition of Gourd Fruit powder to the nuggets, the higher the nugget fiber content (p <0.001). There are some effects of adding Gourd Fruit flour to the color and fiber content of Nile tilapia nugget.

1. Introduction
Fruits are one of Indonesia's natural horticultural products that have an important role for Indonesian agricultural development. Fruits have very important functions for metabolic processes in the body because it contains a lot of vitamins and minerals. It means that fruits have good prospects to develop [1].

Gourd Fruit (Bligo Fruit) are one of the fruit vegetables belonging to the Cucurbitaceae family. This fruit is usually found in hot climates, especially in the Nanga Pino, West Kalimantan. Kundur fruits or often referred to as Bligo fruits rarely consumed by people, so it has not been widely cultivated [2]. The plain taste of the Bligo fruits caused the consumption range of this fruit is very limited.

Bligo fruit (Benincasa hispida) contains a high enough moisture content of 94.5%, causing a short storage period due to its high water content [3]. Therefore, a process is needed so that the water content in the fruit is reduced, so that it can be stored longer.

One of the processes to reduce the moisture content of the Bligo fruit is through the drying process. This process aims to reduce the water content of a material to reach a certain level and limit the growth of decomposing microbes in it, one of the processes is through drying process into flour. Flour formed will make it easier to store these ingredients, save storage...
space, and also materials will be easier to process into certain products that are more acceptable to the community [4].

The product made in this study is fish nuggets because nowadays nuggets are made from chicken meat. Fish nuggets commonly made from mackerel and snapper [5], so it is necessary to diversify fish nuggets, namely tilapia. Tilapia is easy to get at a relatively cheap price and has a high protein content according to the List of Indonesian Food Composition (2000) which is equal to 14.8 g / 100 g bdd [6].

Bligo fruit has a fiber content of 0.5% [7], and the fiber content will increase when used as flour. Processed meat products have not contained fiber so it needs to be utilized from the addition of Bligo fruit flour so that the fiber content of the nuggets also increases.

Good fiber intake has been proven to prolong the transit period of food in the digestive organs so that it makes feeling full last long [8]. According to data from the Ministry of Health 2008 the average Indonesian population consumes fiber in general, which is 10.5 g / day. This value only reaches half of the recommended fiber adequacy. Recommended fiber requirements based on the Nutrition Adequacy Rate (AKG) for children aged 9-13 years are 26-35 g / day and for teenagers and adults it is recommended to consume 30-32 g / day [9].

Based on the research above, the author wants to utilize Bligo flour in tilapia nuggets which are processed into innovative food.

2. Methods

2.1. Time and Place of Research
The type of research used is pure experimental with 4 treatments. Complete Random Design with three experimental units and four treatments. Four tilapia nugget treatments with addition of Bligo fruit flour, namely: (A) 0%, (B) 5%, (C) 10% and (D) 15%. The variables studied included physical properties, organoleptic properties and food fiber content.

Making Bligo fruit flour, testing the physical and organoleptic properties of nuggets was carried out at the Dietetic and Kulinari Laboratory of Respati University, Yogyakarta. The organoleptic level of preference used 25 rather trained panelists, namely Nutrition Science students, Health Sciences Faculty, Respati University of Yogyakarta. Food fiber content testing is carried out at the Primary Chemix Laboratory.

2.2. Materials and tools
The raw materials used are 0 g, 2.5 g, 5 g, 7.5 g of Bligo flour, 250 g of tilapia, 50 g of wheat flour, 50 g of chicken eggs, 25 g of skim milk, 2 bh of garlic, pepper 1 tsp, 1 tsp salt, 50 g flour pan, 1 liter cooking oil. Chemicals used include: petroleum benzene, sodium phosphate buffer, thermamyl, water destilata, pepsin, NaOH, HCl, pancreatin, ethanol, acetone. The equipment used is tools for making nuggets, analytic balance, erlenmeyer, measuring flasks, buchner funnels, drop pipettes, measuring cups, condensers, ovens, hotplates, vacuum pumps and desiccators.

2.3. Procedure for Making Bligo Fruit Flour
The initial stage is sorting to get material with good quality physically, there are no scratches on the fruit skin and is greenish white and has solid fruit contents. The second stage is peeling and only the flesh is taken. Washing of Bligo flesh uses flowing clean water, then thinly sliced in order to make it easy and speed up the drying process. The next step is drying for 2 days, within 14 hours, using an oven with a temperature of 105 °C to facilitate grinding or milling. Milling of dregs is done after the dried fruit meat has dried. The dried Bligo flesh is being broken down
using a blender, starting from the lowest speed level to the highest to prevent clumping until it becomes smooth. The final stage is sieving so that the flour is finer.

### 2.4. Procedure for Making Tilapia Nugget

The preparation stage is the selection of tilapia which is then filled to be taken for meat. Fish meat is washed with running water. The initial stage of the implementation is grinding fish meat, mixing ingredients consisting of wheat flour, 0%, 5%, 10% and 15% gourd flour, ingredients consisting of a mixture of fish meat, bligo fruit flour, salt and then added flour, garlic, pepper, yolks, form the mixture and steam for 20 minutes, leave it for 10 minutes then cut it. **Battering** the cut dough is put into albumen egg. **Breading** the dough that has been put on the egg albumen then rolled on bread flour, in the final stage fry the mixture for 5 minutes with an oil temperature of 120°C.

### 2.5. Test for physical and organoleptic properties

The physical properties of nuggets were observed subjectively by researchers in color, taste, aroma, and texture. Organoleptic nugget tests included hedonic tests conducted on 25 rather trained panelists, with four variations of nuggets, namely (A) 0%, (B) 5%, (C) 10% and (D) 15%. Parameters tested include color, taste, aroma and texture. The hedonic test assessment is determined descriptively on a scale of 1 = very dislike, 2 = dislike, 3 = dislike, 4 = rather like, 5 = like, 6 = very like. Testing of organoleptic properties using **Kruskall Wallis** test. If the data produced there are differences, the analysis is continued with the **Mann Whitney** test.

### 2.6. Food fiber content

Testing of food fiber levels using enzymatic methods.

### 3. Results

Tilapia nugget formulation with the addition of Bligo fruit flour is presented in (Table 1). Each formulation of variations of fish nuggets produces different colors, aromas, flavors and textures.

<table>
<thead>
<tr>
<th>Tabel 1. Tilapia nugget formulation</th>
<th>Composition</th>
<th>Formulations</th>
<th>A 0%</th>
<th>B 5%</th>
<th>C 10%</th>
<th>D 15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gourd Fruit Flour (gram)</td>
<td>0</td>
<td>2.5</td>
<td>5</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nile Tilapia File (gram)</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat flour (gram)</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicken egg</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garlic (clove)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pepper (teaspoon)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salt (teaspoon)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread crumb (gram)</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skim Milk (gram)</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coconut oil (liter)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.1. Physical Properties
Assessment of physical properties include colors, aromas, tastes, and textures. The results show: A nugget is rather yellowish, typical of fish nuggets, typical of fish nuggets, tender. Nugget B is golden yellow, rather typical of Bligo fruit, typical of fish nuggets rather hard. Nugget C is golden yellow, rather typical of kundur fruit, typical of fish nugget, rather hard, and on the D nugget that is brownish yellow, typical of Bligo, typical of fish nuggets, rather hard.

3.2. Organoleptic properties
Organoleptic properties were carried out to determine the level of preference for tilapia nugget by adding Bligo fruit flour. Testing of organoleptic properties using 25 panelists from Nutrition Science students.

3.2.1. Color
The highest score on the color (most preferred) is the nugget A and the lowest score (not preferred) is the nugget D. The results of the Kruskal-Wallis test on the color of fish nugget variations in addition of Bligo fruit flour with 4 (four) treatments there are significant differences with the results (p = 0.004) on tilapia nugget color.

3.2.2. Aroma
The highest score for aroma (most preferred) is nugget A and the lowest score (not preferred) is nugget C. The results of the Kruskal-Wallis test on the aroma of fish nugget have no significant differences due to the results (p = 0.254). Fish nugget with the addition of Bligo fruit flour.

3.2.3. Taste
The highest score for taste (most preferred) is the nugget A and the lowest score (not preferred) is C. nugget. The results of the Kruskal-Wallis test on fish nuggets have no significant differences due to the results (p = 0.063) this indicates that the taste affects fish nuggets by adding Bligo fruit flour.

3.2.4. Texture
The highest score for texture (most preferred) is nugget A and the lowest score which (not preferred) is nugget D. The results of Kruskal-Wallis texture on fish nuggets have no significant differences due to results (p = 0.318) this indicates that the texture affects nuggets fish with the addition of Bligo fruit flour.

3.2.5. Fiber Content
Food fiber content test results for four variations of tilapia nuggets with the addition of Bligo fruit flour increased. The more addition of Bligo fruit flour, the higher the fiber content of fish nuggets. Food fiber content on A nugget was 10.76%, B nugget was 11.87%, nugget C was 12.11% and the highest was 12.45% on nugget D. The ANOVA test showed that the four variations of tilapia nuggets there is a significant difference (p = 0.00) to the fiber content of food in tilapia nuggets.

4. Discussion

4.1. Physical Properties
Physical properties and conditions of food ingredients can be observed with the sense of sight, sense of smell (aroma) which it can assess the changes of food aroma, and sense of touch [10].
The color produced by tilapia nuggets by mixing Bligo fruit flour varies due to the influence of the percentage addition of Bligo fruit flour given. The more Bligofruit flour is added, the more different colors it would be, namely brownish yellow. This is because the carbohydrate content is high enough in the Bligofruit which is about 4%. Carbohydrates are one of the factors that can cause browning of food after heat treatment. This occurs due to the presence of amino acids and reducing sugars in the reacting materials so that brown melanoidin compounds are formed [11].

The aroma of fish nuggets is generally dominated by the smell of fish because fish work as the main ingredient in making nuggets. Nugget D is the most flavorful of Bligo fruit because the most additions are taken from Bligo fruit flour. The distinctive smell of Bligo fruit is caused by a slightly distinctive odor in the Bligo fruit [12].

The taste produced by fish nuggets A, B, C and D which is typical of tilapia nuggets and the distinctive taste of Bligo fruit is not felt because the Bligo fruit is tasteless [13]. The results of the A nugget texture are soft, while the B, C and D nuggets have a hard texture because of the addition of Bligo fruit flour. According to Maliluan l, the higher the level of food fiber, the harder the texture of the product it would be [14].

The level of hardness can be affected by the amount of water in the food. The presence of fiber can cause less water in the material to become lesser because water is absorbed in the molecular structure of the fiber so that it can affect the hardness of the nugget [15].

4.2. Organoleptic properties
Consumers pay close attention to the colors because they will be attracted to any food if the color of the food is attractive or does not deviate from the normal color, then the food will be chosen.

The aroma of food determines the delicacy of food. Aroma is a smell that is released by food which is a very strong attraction and is able to stimulate the sense of smell resulting in increased appetite. Each treatment did not affect panelists' preference for the aroma of tilapia nugget. This research is in line with Afriyaati's research on the manufacture of grilled fish cake Judging From Physical Properties, Organoleptic Traits and Food Fiber Levels, that there were no significant differences in each treatment aroma of grilled fish cake [16]. This study was not in line with research Mimaula MG, .Which showed that the formulation of white flour and tapioca flour in milkfish nuggets gave a very significant effect on the assessment of organoleptic aroma of milkfish nugget which means that all treatments have unequal aroma [17].

Taste is a way of assessing food, the taste is different from the aroma that the taste involves taste buds or tongue. Taste buds can be divided into four main flavors: sweet, sour, salty and bitter [18].

Texture is a sensation of pressure that can be observed using mouth (when bitten, chewed and swallowed), or by touching the fingers [19]. The nugget texture that is assessed is elasticity and the inside of nuggets which is good according to SNI 01-6682-2002 is soft chewy and thick dough. Tapioca flour contains amylose and amylopectin which affect the texture of nuggets which is solid and chewy [20].

4.3. Food Fiber Content
The more addition of Bligo fruit flour in making tilapia nuggets, the higher the fiber content in the nuggets. The different results of fiber content in each treatment is due to each addition of Bligo fruit flour is different. The lowest fiber content is in the B nugget with the addition of the least amount of Bligo fruit flour which is 11.87% where the content of crude fiber / insoluble fiber is around 11.54%. This content is in accordance with the recommended consumption of
crude fiber ranging from 5-8 g / 100 g according to the American diet Burkitt et al., In Kusharto [21]. According to Ahmad, the fiber content in the Bligo fruit is 0.5% / 100 g so that by making Bligo fruit flour which is added to processed meat in the form of tilapia nugget, the fiber content in the fish nugget is increased [22].

The average fiber content of food in tilapia nuggets is increasing along with the addition of Bligo fruit flour with an increasing percentage as well. These results are in line with research conducted by Silaban M., Which showed that fiber nugget levels as a whole had increased along with the increasing addition of bamboo shoots and the decreasing addition of catfish in making nuggets [23].

5. Conclusion and Recommendation
There are some effects of adding Gourd Fruit flour to the color and fiber content of Nile tilapia nugget. The best nugget can be sold is nugget B because food fiber content of sufficient recommended fiber consumption and panelists very like nugget B.