The Use of Durian Seed Flour as Tapioca Substitution in Colorful Catfish Meatball Processing

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Abstract. Meatball is very popular and well-liked by all the people in Indonesia. Meatball is made from basic ingredients binding (source of starch), meat and seasonings. The source of starch in making meatball is tapioca starch. Currently, the source of starch that has not been widely used is durian seed starch, where durian seeds are by-products that are generally discarded after fruit meat is eaten. This study aimed to determine utilize durian seed flour as an alternative to tapioca substitutes, either in part or in whole in the making of colorful catfish meatball. The research method used was an experimental study, which carried out experiments in making colorful meatball with a completely randomized research design (CRD) of one factor, namely the addition of durian seed starch 0%, 50%, and 100%. The results showed that the meatball with 50% durian seed flour substitution to the best organoleptic tapioca starch both in terms of appearance, texture and taste.

1. Introduction

Fish is a source of protein that is widely consumed today, the high price of protein source food products is one of the factors increasing the case of malnutrition, and especially in children aged over five years and elementary school. Food source products for protein to overcome the problem of malnutrition in children at this time food product that allows for development are fish balls. Meatballs are a type of food that is commonly known in cities and even in rural areas, affordable by various economic circles and preferred by various ages. The main factor affecting the quality of meatball is a binding agent such as tapioca starch. The lack of land for cassava plants producing tapioca, due to the rapid development of housing at this time will have an impact on the provision of tapioca in the future. Therefore, to anticipate the scarcity of tapioca, it is necessary to find cheap and abundant sources of starch.

Starch can be obtained by extracting from plants that are rich in carbohydrates (starch). Availability of abundant and inexpensive sources of flour such as jackfruit seeds, avocados, and durian seeds. These grains have so far been considered waste because they are underused even they can be used as a source of starch. Starch is carbohydrates derived from plants as a result of photosynthesis, which are stored in certain parts of plants as food reserves.
The nature of starch depends on the type of plant and its storage. Two types of starch are often used in industry, namely natural starch and modified starch. Natural starch (original starch) is starch produced from tuber sources and has not been processed or undergone changes in physical and chemical properties. Durian seeds have a high carbohydrate content, so they can be used as a potential source of starch raw materials. The utilization of durian seed flour is used to diversify foods such as materials for making meatball. In general, the main ingredient in making meatball is using tapioca flour.

Further development requires innovative research that examines the use of durian seeds as substitutes for tapioca in making colorful catfish meatball. Tapioca flour is feared to be rare and expensive, so we need an alternative replacement with the same quality. Based on the results of previous studies that colorful catfish balls, can be accepted or liked by consumers, especially school children. Based on this case, it is necessary to research on the use of durian seed flour as an alternative to tapioca flour substitute for fish balls. This study aimed to determine utilize durian seed flour as an alternative to tapioca substitutes, either in part or in whole in the making of colorful catfish meatball.

2. Materials and Methods

2.1. Material
The main raw material used in this study is catfish (*Pangasius hypophthalmus*) cultivated in Kampar district, Riau. In addition, the ingredients used to make colorful fish meatball, namely tapioca flour, durian seed flour, sugar, onion, garlic, pepper powder, sucrose, sorbitol, garlic, salt, natural coloring (kuku leaves, carrots, and Red yeast rice) and chemicals for quality analysis (hexane, filter paper, $K_2S0_4$, $H_2SO_4$, HgO, NaOH, $H_3B0_3$, Heli, and $Na_2S_20_3$ and packaging materials.

2.2. Research methods
This research was conducted by an experimental method, namely an experiment in making colorful fish meatball. The treatment given is granting meatball with 3 levels, namely red (Red yeast rice), green (Katu leaf) and yellow (carrot).

2.3. Research Implementation
This research was carried out in several stages, namely: preparation and initial handling of catfish, making surimi, making catfish meatball and analyzing the quality of the resulting meatball. Selection and initial handling of catfish meat is selected from fish with a minimum size of 500 - 700 grams per fish. Fresh fish is cleaned, thrown head and tail, also cleaned the inside of the stomach. Furthermore, the meat is separated from the spine and skin, so that fresh mashed fish is obtained.

In this study the first time flour was made from durian seeds, with the following procedure: Durian seeds obtained were washed thoroughly, then peeled the outer shell and thinly sliced or cut into small pieces. After that blended with the addition sufficient water, then pressed with cloth and the filtrate is collected in a container, then the filtrate is deposited for 48 hours by replacing the water every 24 hours so that starch deposits are obtained. To next step starch deposits are dried using a solar heat dryer or electric oven with a temperature of 50 °C - 80 °C for 24 hours, and dry starch is mashed with a blender and sieved to get flour.

To determine the best comparison of tapioca starch binder and durian seed starch, a preliminary experiment was made of fish meatball with levels, namely $B_0$ (100% tapioca, 0% durian seeds), $B_1$ (50% tapioca, 50% durian seeds) and $B_2$ (100% durian seeds, 0% tapioca). Furthermore, making a colorful catfish fish balls with formulations such as the following. Multicolored catfish meatball formulations with starch binding agent durian seeds and tapioca starch.
Table 1. Formulation Meatball.

| Material      | B₀ (Red) g | B₀ (Red) % | B₁ (Green) g | B₁ (Green) % | B₂ (Yellow) g | B₂ (Yellow) % |
|---------------|------------|------------|--------------|--------------|----------------|--------------|
| Fish meat     | 800        | 80         | 800          | 80           | 80             | 80           |
| Durian seeds  | 50         | 5          | 50           | 5            | 50             | 5            |
| Starch        | 50         | 5          | 50           | 5            | 50             | 5            |
| White eggs    | 30         | 3          | 30           | 3            | 30             | 3            |
| Garlic        | 20         | 2          | 20           | 2            | 20             | 2            |
| Onion         | 20         | 2          | 20           | 2            | 20             | 2            |
| Salt          | 20         | 2          | 20           | 2            | 20             | 2            |
| Sugar         | 10         | 1          | 10           | 1            | 10             | 1            |

Noted: B₀ (100% tapioca, 0% durian seeds), B₁ (50% tapioca, 50% durian seeds) and B₂ (100% durian seeds, 0% tapioca)

Dyes used for red yeast rice, katuk leaves (*Sauropus androgynus*) for green and carrots (*Daucus carota*) for yellow. The process of making colorful fish meatball is as follows: 1) Mashed meat mixed with garlic and onion until homogeneous, then add a binder (durian seed starch and tapioca starch) according to the treatment and stir until homogeny. Added others such as eggs, onions, garlic, salt, sugar and natural coloring, then ground using a food processor so that the mixture is evenly mixed. Then the formation of the dough into a meatball ball by hand, the way is to take a handful of dough and knead and pressed toward the thumb and then the dough coming out of the hole between the thumb and index finger is formed into a circle and then taken with a spoon. Furthermore, the meatballs are cooked with two cooking steps, namely setting (temperature 40 °C) and cooking (temperature 85-100 °C). Cooked fish meatball (floating) after the cooking process is finished, cooled and packed in HDPE plastic packaging and aluminium foil to be stored in cold temperatures.

2.4. Meatball Quality Assessment

The assessment of the quality of the meatball produced was an organoleptic assessment (preference test) and proximate analysis of the selected meatball. Organoleptic test (consumer / hedonic acceptance) of the product is carried out with. Hedonic test with panellists of school children with a total of 80 people.

2.5. Proximate analysis

Proximate analysis of products including water, protein, fat, and ash content was analyzed according to [1] while carbohydrate content was analyzed by the By Difference method.

2.6. Data Analysis

The data obtained will be processed if the data, tabulated and graphed, then the processed data will be analyzed descriptive statistic.

3. Results and Discussion

3.1. Yield

The fillet process that has been carried out on catfish weighing 500 - 700 grams per head, produces about 50% fillet meat and 10% - 20% minced meat. Thus the resulting mashed meat ranges from 60-70%. Fish meat yield varies greatly depending on fish species, size, body shape and age [2].

3.2. Organoleptic Assessment
Organoleptic assessment of multicolored meatball using durian seed starch as a binder substitute for tapioca starch. Instant organoleptic assessment of catfish meatball of various colors including color, taste, aroma and texture. Organoleptic value is based on the level of consumer acceptance with a panel of 80 school children through a preference test. Organoleptic assessment results can be seen in Table 2.

**Table 2.** Organoleptic assessment of multicolored meatball using durian seed starch.

| Material | B₀ (Red) | B₁ (Green) | B₂ (Yellow) |
|----------|----------|------------|-------------|
|          | g        | %          | g           | %          |
| Appearance | 7        | 70         | 8           | 80         |
| Texture   | 8        | 80         | 8           | 80         |
| Flavor    | 8        | 80         | 8           | 80         |
| Taste     | 8        | 80         | 8           | 80         |

*Noted: B₀ (100% tapioca, 0% durian seeds), B₁ (50% tapioca, 50% durian seeds) and B₂ (100% durian seeds, 0% tapioca)*

The organoleptic assessment results in the Table above show that all organoleptic parameters (color, taste, odor, and texture) show an average value of 8. These results indicate that the use of durian seed starch as a substitute for tapioca starch is acceptable or preferred by panelists, due to its solubility flavor components contained in fish balls are influenced by ingredients of spices. The natural dyes used in instant different-colored catfish meatball are natural dyes that are safe, do not cause residues and add to the nutritional value of the product. According that the use of natural dyes in food products will be safer for health if consumed for a long time.

The green color of fishball comes from katuk leaves which contains chlorophyll, vitamin C, vegetable protein and carbohydrates [3]. Likewise with the yellow color of carrots that are rich in carotene which is a chemical compound that forms vitamin A [4]. The red color of fish balls comes from Red yeast rice which is the result of rice fermented using the fungus *Monascuspurpureus*. An assessment of the texture, odor and taste of instant colorful catfish meatball for all levels of treatment, the panelists gave an organoleptic value of 8 (very good). This shows that all treatment levels, preferably panelists. According to [5] that multicolored products cause stimulation of taste in school-age children. According to [6], the taste of a product can be influenced by the addition of seasoning during the manufacturing process; while the texture of food is determined by the water content contained in the product.

3.3. Proximate Composition

Proximate analysis is a way to determine the content of food substances in a food so that it can determine the quality of a food, namely: levels of ash, water, fat, protein and carbohydrates. The results of the proximate analysis that have been carried out on colorful fish meatball can be seen in Table 3 below.

**Table 3.** Proximate composition of instant colorful fish meatball.

| Material  | B₀  | B₁   | B₂  |
|-----------|-----|------|-----|
| Moisture  | 4.84| 5.32 | 5.06|
| Protein   | 50.78| 50.68| 50.73|
| Fat       | 7.62| 7.50 | 7.59|
| Mineral   | 1.40| 1.36 | 1.35|
| carbohydrate | 35.36| 35.14| 35.27|
Noted: $B_0$ (100% tapioca, 0% durian seeds), $B_1$ (50% tapioca, 50% durian seeds) and $B_2$ (100% durian seeds, 0% tapioca)

Table 3 showed that results of proximate analysis on colorful catfish meatball having a moisture content ranging from 4.84 to 5.32%, ash content 1.35% - 1.40%, protein content 50.68% - 50.78%, content fat 7.50% - 7.62%, and carbohydrate content 35.14% - 35.36%. Proximate composition of colorful catfish fish meatball has fulfilled SNI 01-3819-1995 standards meatball quality. In this research showed than meatball with treatment 100% durian seeds flour a higher protein than another treatment. According to [7] meatball form fish contain to high protein (minimal 9%). Meatball with caragenan contain protein up 11% [8].

4. Conclusions
Based on the results of research that has been done can be concluded that the use of durian seed flour as much as 50% substitute for tapioca starch can be accepted by panelists, both organoleptically and proximate composition. In addition, Organoleptic assessment results show that the colorful fish balls produced have an average value of 8 (good).

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