



Proximate Composition of Cilok Mackerel Fish Head Flavor Powder

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study aims to determine the proximate composition of cilok mackerel fish head flavor powder. This trial was conducted for two months period at the Fishery Product Processing Laboratory, Faculty of Fisheries and Marine Science for the production of cilok mackerel fish head flavor powder, while the cilok proximate test carried out in the Laboratory Application of Chemical and Integrated Service, of the Science-Based Research Center Building Padjadjaran University. The parameters observed in this research are water content, ash content, fat content, and protein content. Based on the findings it was concluded that cilok mackerel fish head flavor powder has a water content of 48.92%; ash content of 2.02%; fat content of 0.07% and protein content of 0.21% respectively.

Keywords: Cilok flavor powder; mackerel fish head; proximate composition.

1. INTRODUCTION

Cilok is one of the local food products originating from West Java and becomes a favorite snack

for all circles, both children and adults. It has a round shape like meatballs but has different ingredients. Cilok made from tapioca flour with complementary spices such as sauce, soy

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sauce, and peanut sauce. Cilok has a chewy texture because it is made from tapioca flour [1]. Cilok has a protein content of 6.88% [2], fat content of 0.27 g / 100 g of food [3], and calcium content of 0.031% [4]. In the process of making cilok, other ingredients can be added such as tuna bone meal [4], catfish head meal [2], catfish meat, and Isolated Soy Protein (ISP) [5]. In addition, mackerel fish head flavor powder can also be added in the process of making cilok.

Mackerel fish is a type of seawater fish that has a distinctive taste. In 2017 the volume of mackerel fish production in West Java Province, Indonesia reached 4,223,764 kg [6]. The high public consumption of mackerel fish meat causes the resulting waste such as head, bones and organs in mackerel fish to increase. One of the efforts to utilize mackerel fish head waste is processing the mackerel fish head into flavor powder.

This flavor powder can be used to give the aroma and taste of mackerel in food. According to [7], mackerel fish head flavor powder has a water content of 7.33%, protein content 18.28% and fat content 3.87%. The addition of mackerel fish head flavor powder to cilok can affect its proximate composition, so it is necessary to do a proximate test to find out this. The proximate test is a chemical test to identify the nutrient content of food or feed such as water content, ash content, fat content, and protein content [8].

2. LOCATION OF THE STUDY

This research was conducted for two months from February to March 2020 at the Fishery Product Processing Laboratory, Faculty of Fisheries and Marine Sciences for the production of cilok mackerel fish head flavor powder, while the cilok proximate test was carried out in the Laboratory Application of Chemical and Integrated Service, of the Science-Based Research Center Building, Padjadjaran University.

2.1 Tools and Research Material

The tools used in this research are basin, scales, Sonic Electric digital scales with thoroughness 0.1 g, knives, cutting board, measuring cup, spoon, pan, stirrer, stove, strainer, oven, blender, and sieve Tyler 80 mesh. The ingredients used in making mackerel head flavor powder consist of 700 g mackerel fish

heads, 15% maltodextrin from the broth produced, garlic, onion, salt, pepper, turmeric, and water as much as 1400 ml. The ingredients used in making cilok for each treatment were 100 g tapioca flour, 50 g wheat flour, garlic, salt, pepper, mackerel fish head flavor powder, and warm water.

2.2 Research Method and Procedures

The following treatments were used in this experiment:

- Treatment A = Addition of 0% mackerel fish head flavor powder (control).
- Treatment B = Addition of 6% mackerel fish head flavor powder.

Addition of mackerel fish head flavor powder based on the weight of tapioca flour and wheat flour used in the making cilok.

The method used in proximate test refers to [9] which include estimation of water content using oven method, ash content using dry ashing method, fat content using the Soxhlet method, and protein content using the Kjeldahl method respectively.

The process of making mackerel fish head flavor powder refers to [7] research with some modifications. The process of making mackerel fish head flavor powder begins with fresh mackerel fish heads washed thoroughly then weighed. Mackerel fish head mixed with water and spices (garlic, onion, salt, pepper, and turmeric). The ratio of mackerel fish head to water is 1:2. All ingredients are put in a pan and boiled for 60 minutes at a temperature of 85°C-100°C. The broth from the stew is filtered using a sieve to obtain pulp-free liquid (filtrate). Then the broth (filtrate) was added by maltodextrin as much as 15% from the weight of the resulting broth and then stirred for several minutes until homogeneous. The liquid flavor was dried using an oven at 75°C for 60 minutes by pouring it on a baking sheet with a thickness of about 0.2 cm. The dry flavor was crushed using a blender to form a powder. Flavor powder was sieved using a Tyler 80 mesh sieve to obtain the desired size of flavor powder.

The process of making cilok mackerel fish head flavor powder begins by mixing the ingredients (tapioca flour, wheat flour, salt, pepper, crushed garlic, flavor powder, and warm water) and stirring until became smooth. The dough was formed into small spheres with a diameter of

about 2 cm, and then boiled with boiling water until it floats on the water surface. Cilok that has floated can be removed and drained. The formulation of cilok mackerel fish head flavor powder making refers to [5] with some modification. The formula is presented in Table 1.

2.3 Observed Parameters

The parameters observed in this research are water content, ash content, fat content, and protein content of cilok mackerel fish head flavor powder.

2.3.1 Water content

Water content determination was carried out by oven method which refers to [9]. The principle is to evaporate the free water molecules found in the sample. The sample is weighed until a constant weight is obtained which assumes all the water contained in the sample has been evaporated. The difference in weight before and after drying is the amount of water evaporated. The percentage of water content was calculated using the formula below:

$$\text{Water Content (\%)} = \frac{B1 - B2}{B} \times 100\%$$

Description:

- B = Weight of sample (g)
- B1 = Weight (cup + sample) before drying (g)
- B2 = Weight (cup + sample) after drying (g)

2.3.2 Ash content

The determination of ash content was carried out by dry ashing method which refers to [9]. The principle is to oxidize all organic substances at high temperatures around 550°C and then weighing substances left after the combustion process. The percentage of ash content was calculated using the formula below:

$$\text{Ash Content (\%)} = \frac{B_2 - B_1}{\text{Sample weight}} \times 100\%$$

Description:

- B1 = Weight of cup (g)
- B2 = Weight of cup + sample after cooled (g)

2.3.3 Fat content

The fat content estimation was carried out with the Soxhlet method refers to [9]. The percentage of fat content was calculated using the formula below:

$$\text{Fat Content (\%)} = \frac{W_3 - W_2}{W_1} \times 100\%$$

Description:

- W1 = Sample weight (g)
- W2 = Weight of flask (g)
- W3 = Weight of flask and sample (g)

2.3.4 Protein content

Determination of the protein content of the test sample was carried out using the Kjeldahl method which refers to [9]. The principle is the oxidation of carbonaceous materials and the conversion of nitrogen to ammonia by sulfuric acid, then ammonia reacts with the excess acid to form ammonium sulfate. The ammonium sulfate formed is decomposed in the alkaline solution using NaOH and the ammonia evaporates which is bound by boric acid. The amount of nitrogen contained in the solution is determined by titration using an acid standard solution. The percentage of protein content can be calculated using the formula below:

$$\text{Protein Content (\%)} = \frac{(V_A - V_B) \text{ HCl} \times N \text{ HCl} \times 14,007 \times 6.25 \times 100\%}{W \times 1000}$$

Description:

- V_A = HCl for sample titration (ml).
- V_B = HCl for blanko titration (ml).
- N = Standard HCl normality used.

Table 1. Cilok formulation with the addition of mackerel head flavor powder

Treatments	Tapioca flour (g)	Wheat flour (g)	Salt (g)	Garlic (g)	Pepper (g)	Water (ml)	Mackerel head flavor powder (g)
A	100	50	5	2	0.4	100	0
B	100	50	5	2	0.4	100	9

3. RESULTS AND DISCUSSION

The proximate test results of cilok mackerel fish head flavor powder is given in Fig. 1.

3.1 Water Content

Water content is the amount of water evaporated from a material when food is heated at a certain temperature which is not much higher than the boiling point of water [10]. The results of the water content test can be seen in Fig. 2.

Results of the analysis showed cilok water content obtained from the addition of mackerel fish head flavor powder is lower than the cilok obtained from the control. The water content value of cilok 6% treatment was 48.92% while the cilok control treatment was 52.71%. Cilok

water content tends to decrease with increasing concentration of the mackerel fish head flavor powder. It is caused by mackerel fish head flavor powder which binds water in cilok. Besides, the use of maltodextrin as filler in flavor powder making is also able to absorb water [11]. According to Erfiza, et al. [12], reduced water due to heating at high temperatures can cause an increase in protein, carbohydrates and fat content in food on dry matter basis.

3.2 Ash Content

Ash is an inorganic substance leftover from the combustion of an organic material whose composition and content depend on the material and method of ashing [13]. The results of the ash content test can be seen in Fig. 3.

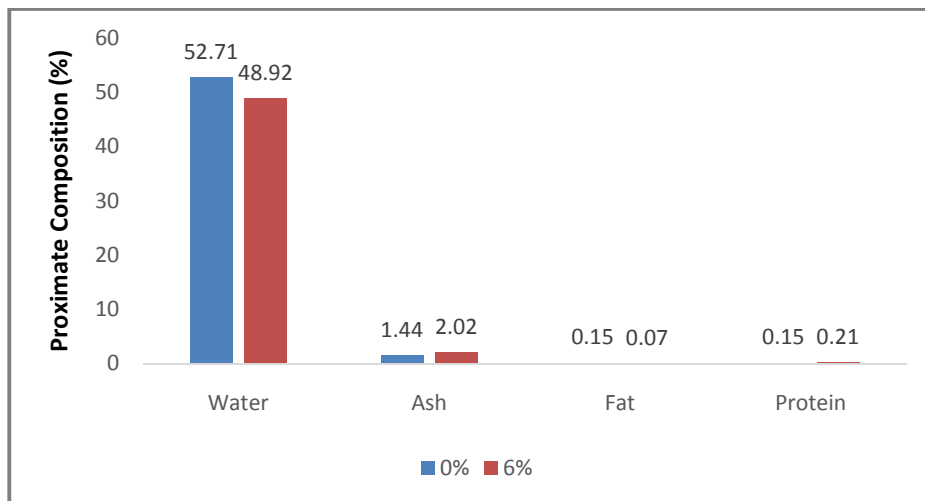


Fig. 1. Proximate composition of cilok mackerel fish head flavor powder

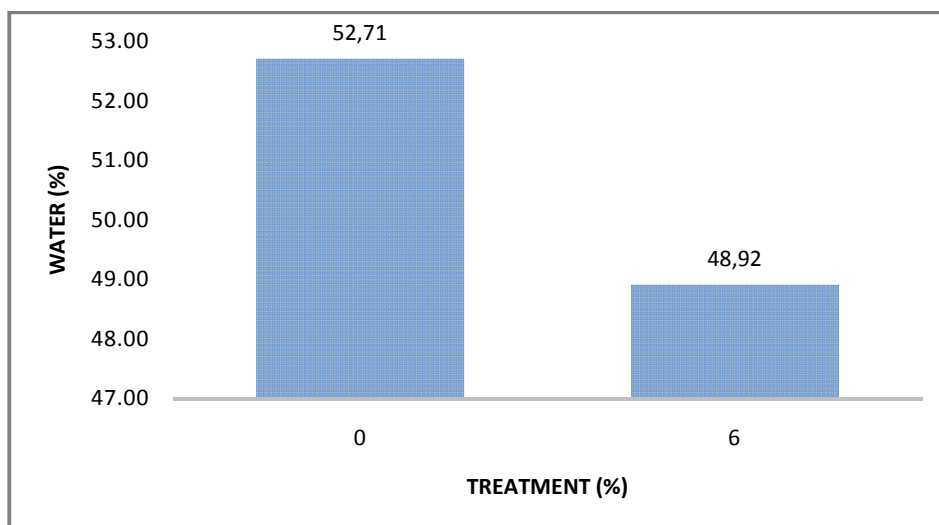


Fig. 2. Cilok water content

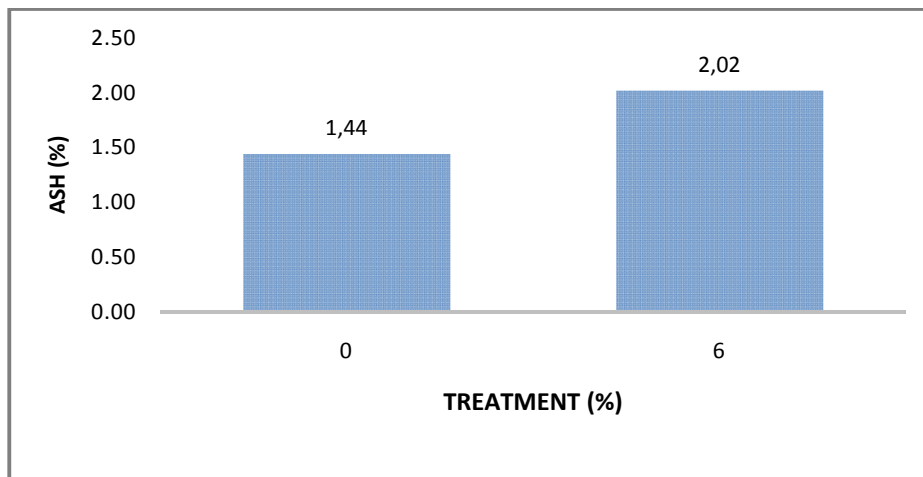


Fig. 3. Cilok ash content

The results of the analysis showed that the ash content of cilok with the addition of 6% mackerel fish head flavor powder was higher than cilok obtained from treatment 0% (control). The ash content value of cilok at 6% treatment was 2.02% while the cilok control treatment was 1.44%. Cilok ash content tends to increase along with the increasing concentration of the mackerel fish head flavor powder. According to [14], increased ash content was influenced by the number of minerals contained in the foodstuffs. Ash content is closely related to water content. When the water content is high, the ash content is low. This is because the material still contains a lot of water. Ash is a material produced after combustion [15].

3.3 Fat Content

Fats are a group of organic compounds consisting of elements of carbon, hydrogen, and oxygen. Fats are soluble in certain solvent substances (petroleum, benzene, ether, and chloroform) and cannot be soluble in water [10]. The results of the fat content test can be seen in Fig. 4.

Results of the proximate analysis showed cilok with the addition of 6% mackerel fish head flavor powder has lower fat content than cilok obtained from treatment 0% (control). The value of fat content of cilok 6% treatment was 0.07% while the cilok control treatment was 0.15%. Cilok fat content tends to decrease along with the increasing concentration of the addition of mackerel fish head flavor powder. This can occur because the value of protein and ash content in the proximate test increases so that the value of fat content in cilok decreases. This is by

Pratama, et al. [16] research regarding the addition of jangilus fish bone flour in biscuits. The fat content of biscuits tends to decrease along with the increasing addition of jangilus bone meal. Similar result was shown by [17] research on the proximate analysis of wet noodles fortified with crab shell flour. Based on this research, the percentage of fat content decreased with the addition of crab shell flour. Fat in food can cause a savory taste that is preferred by consumers.

3.4 Protein Content

Protein is a source of amino acids containing elements C, H, O, and N. Protein functions as a fuel in the body building and in regulatory mechanism. The main function of protein for the body is to form new tissue and maintain the existing tissue [18]. The results of the protein content test can be seen in Fig. 5.

The results of the proximate analysis showed cilok protein content with the addition of 6% mackerel fish head flavor powder was higher than the cilok control treatment. The 6% treatment cilok had protein content value of 0.21% while the 0% treatment (control) cilok was 0.15%. Cilok protein content tends to increase with increasing concentration of the addition of mackerel fish head flavor powder. This is under [2] research, the higher the concentration of adding catfish head flour to the cilok dough, the higher the protein content. Cilok with the addition of catfish head flour has protein content ranging from 6.88% - 7.945%.

Cilok protein content can be affected by the protein content of mackerel fish head flavor powder added. The protein content of mackerel

fish head flavor powder is 18.28% [7]. However, cilok protein content in this study was low. It is allegedly caused by the high water content of cilok, which range from 48.92% - 52.71%. According to [16], the high or low protein content of a material can be affected by the amount of water lost (dehydration). The measured protein content value will be greater if the amount of water lost is greater.

3.5 Overall Observation Results

Results of the overall observation on research that has been conducted on water content, ash content, fat content, and protein content of cilok with the addition of the mackerel fish head flavor powder are presented in Table 2.

Based on the results of the proximate analysis, cilok water content of 0% treatment was 52.71% while the 6% treatment cilok was 48.92%. This shows a decrease in water content along with the increasing concentration of the addition of mackerel fish head flavor powder. Then the ash content of cilok 0% treatment was 1.44% while

the cilok 6% treatment was 2.02% which meant an increase in the ash content of 0.58%. Furthermore, the fat content of the 0% treatment cilok was 0.15% while the 6% treatment cilok was 0.07%. The protein content of cilok 0% treatment was 0.15% while the 6% treatment cilok was 0.21%.

In addition to water content, ash content, fat content, and protein content there is also a determination of cilok carbohydrate content using the by difference method [9]. Calculation of carbohydrate content using by difference method is done by a 100% reduction with the amount of water content, ash content, fat content, and protein content. The carbohydrate content of the cilok control treatment was 45.55%, while the cilok at 6% treatment was 48.78%. The carbohydrate content calculated by difference method is influenced by other components such as water content, ash content, fat content, and protein content. Carbohydrates are the main source of calories that play a role in determining the characteristics of food ingredients such as color, taste, and texture [19].

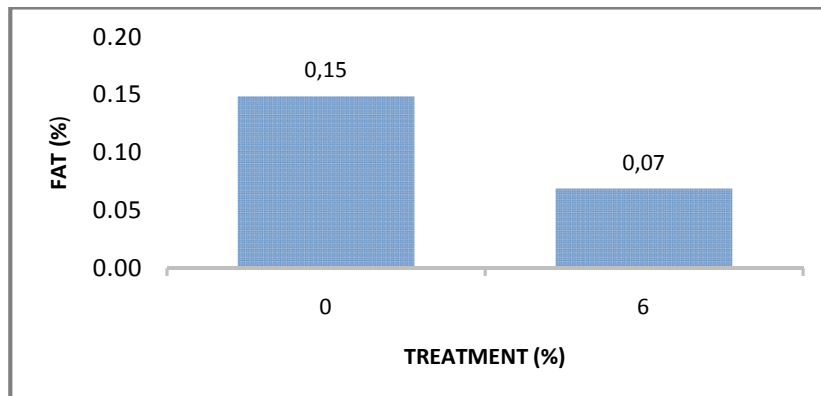


Fig. 4. Cilok fat content

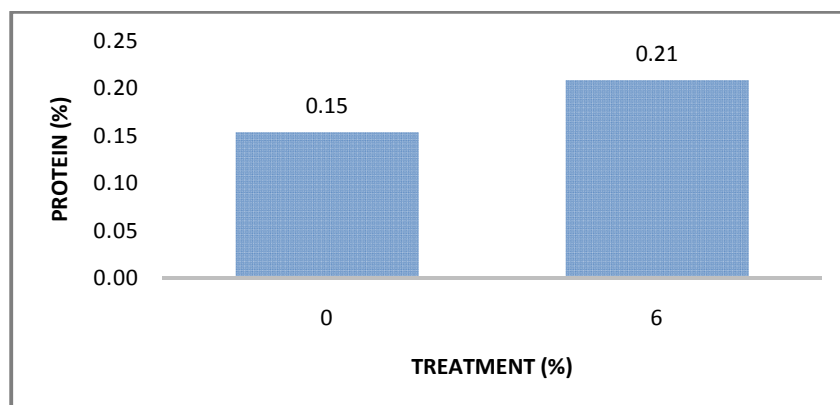


Fig. 5. Cilok protein content

Table 2. Overall observation results

Observation proximate test (%)	Addition of treatment of mackerel fish head flavor powder	
	0%	6%
Water Content	52.71	48.92
Ash Content	1.44	2.02
Fat Content	0.15	0.07
Protein Content	0.15	0.21

4. CONCLUSION

Based on research that has been done, cilok with the addition treatment of mackerel fish head flavor powder at 6% has a lesser water and fat content while higher ash, protein, and carbohydrates content in comparison to control.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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