

Nutritional Content of Milkfish Nuggets with Addition of Mocaf Flour

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ABSTRACTS

Milkfish is protein source. Utilization of milkfish is not easy because has lot of fish bones. Processing milkfish into nuggets could increase the acceptability of consumption. The addition of mocaf flour also increases local food commodities which add to the nutritional value of milkfish nuggets. This study aims to determine the nutritional content of protein, fat, carbohydrates, calcium milkfish nuggets with the addition of mocaf flour. Pre-experimental research design. There are 3 formulations of milkfish nuggets with a ratio of milkfish and mocaf flour, namely F1 (80%: 20%), F2 (70%: 30%), F3 (60%: 40%), then the nutritional content test was carried out. Analysis of protein content by micro kjehdal method, fat by Soxhlet, carbohydrates by calculation by deference, and calcium by AAS. The protein content of milkfish nuggets F1, F2, F3 respectively were 15.02%, 14.58%, 13.25%. The fat content of F1, F2, F3 is 12.89%, 11.53%, 10.76%. The carbohydrate content of F1, F2, F3 is 23.63%, 31.44%, 33.95%. The calcium content of F1, F2, F3 is 0.041%, 0.051%, 0.052%. Of the three milkfish nugget formulas, the nutritional content in F1 meets the quality requirements of SNI No. 7758:2013 fish nuggets.

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1. Introduction

Milkfish is a fishery commodity that is quite popular in Indonesian society, especially in the Pati area, Central Java. The main advantage of milkfish compared to other fish is the complete composition of the amino acid content and the ease with which it can be digested by the body. Omega-3 which consists of EPA and DHA fresh milkfish oil is 0.95% and 1.45% while in dry form is 1.45% and 2.28% (Aziza, 2015). Fat in milkfish is a source of unsaturated fatty acids. Fresh milkfish contains 19.56% omega-3, 7.47% omega-6, and 19.24% omega-9 (Agustini, 2010).

Milkfish is favored by the communities because of its high protein content, affordable prices, and ease to obtain, but milkfish has high water content so that the material decomposes quickly and has a short shelf life. Public consumption of milkfish is less because it's spines and difficult to consume, especially for children because of the risk of being stabbed. The number of spines found on the back of milkfish are 42 pairs, in the middle 12 pairs of short spines, in the abdominal cavity 16 spines, and near the tail 12 pairs of spines (Sasongko, 2012). Fishery products usually sell fresh fish, while in the processed form in presto. Therefore, it is necessary to diversify processed fishery products and more durable preservation methods. One of the processed milkfish products is nuggets. Nugget is a form of ground beef product that is seasoned, then covered with breadcrumbs adhesive, and frozen to maintain its quality during storage, but the price is still high enough to make nugget products unaffordable to all people (Nurlaila, 2017). Today's society tends to have an instant consumption pattern even in the lower middle class. Processing of thornless milkfish made of processed nuggets is an effort to increase milkfish consumption for the community (Vatria, 2010).

Nugget is a type of ready-to-eat food that is practical to consume with high protein nutritional content, and can be consumed by all age groups. Generally, nuggets are made from chicken meat. Milkfish can replace chicken as a raw material for making nuggets because the price of milkfish is more affordable and the nutritional content, especially protein, is still adequate. The texture of nuggets depends on the original material (Astawan, 2007). The use of fish as raw material for making nuggets has the advantage that fish has a little connective tissue so that the resulting nugget texture will be softer and more supple (Simanjuntak, 2017).

Additional ingredients for making nuggets are wheat flour or white bread as a binder for nugget dough. Wheat is an Indonesian imported commodity, so local food is needed to replace flour. The potential of cassava which is widely available in Indonesia has not been used optimally by the community. One of its uses can be to make mocaf flour to be used as a substitute for wheat flour and increase the shelf life of cassava.

Mocaf (Modified cassava flour) has advantages, namely good binding power, forming a strong gel, not easily broken and damaged so that it supports as an adhesive in making nuggets. Mocaf also contains lactic acid which serves to give a distinctive aroma to the flour so that it is expected to cover the fishy aroma of milkfish. The white color of mocaf will produce the appearance of nuggets that are preferred by consumers (Simanjuntak, 2017). In addition, mocaf contains much more soluble fiber than cassava flour, has a calcium content of 58% higher than 6% rice and 16% wheat, has the same swellability as type II wheat (medium protein content), and has a much better and faster digestibility than tapioca flour. (Damayanti, 2014). The basic difference in nutritional content is that mocaf does not contain gluten (a substance found in wheat flour), which determines the elasticity of food. Mocaf is richer in carbohydrates and has lower gelation than wheat (Salim, 2011).

Based on this background, it is necessary to develop animal side dishes with high taste and contain nutrients to meet the needs. Researchers are interested in examining the nutritional content of nuggets made from bedeng fish with the addition of mocaf flour.

2. Materials and Methods

2.1. Study Design

This study uses an Experimental Design design with three formulation ratios, namely formula 1 (F1) with a ratio of milkfish: mocaf flour (80%: 20%), formula 2 (F2) with a ratio of milkfish: mocaf flour (70%: 30%). and formula 3 (F3) with a ratio of milkfish: mocaf flour (60%: 40%). This research was conducted in August 2020. The formulation of milkfish nuggets with the addition of mocaf flour was carried out at the Food Laboratory of the Nutrition Study Program, Ngudi Waluyo University. The analysis of the nutritional content was carried out at the Laboratory of the Semarang Industrial Pollution Prevention Technology Center.

2.2. Tools and Materials

The tools used in making milkfish nuggets with the addition of mocaf flour are food scales, basins, baking sheets, steamers, bowls, plates, spoons, forks, frying pans, stilts, frying pans. Milkfish ingredients are obtained from milkfish sellers at Tayu Market, Sambiroto Village, Tayu District, Pati Regency. The mocaf flour material was obtained from Sabrangan Village, Gunungpati District, Semarang City, with the Tepung Sari brand. Other ingredients, namely chicken eggs, breadcrumbs, onions, garlic, margarine, ground pepper, salt, and cooking oil are obtained from Tayu Market. The protein analysis test used the semimicro Kjeldhal method, the fat analysis used the Soxhlet method, the carbohydrate analysis used the calculation method, and the calcium analysis used the AAS method.

2.3. Procedures

The research was carried out in several stages which included the preparation process for making standard nugget recipes and developing recipes into 3 formulations to be tested. The next stage is the implementation of making milkfish nuggets with the addition of mocaf flour with a ratio of milkfish: mocaf flour F1 (80%: 20%), F2 (70%: 30%), and F3 (60%: 40%). Then proceed with the analysis of the nutritional content including protein, fat, carbohydrates, and calcium.

2.4. Data analysis

Data analysis was conducted to determine the nutritional content of milkfish nuggets with the addition of mocaf flour by tabulating the nutritional value of milkfish nuggets with the addition of mocaf flour. All data was processed using Microsoft excel program.

3. Results and Discussion

3.1. Protein Analysis

The first nutrient is protein. The results of the analysis of protein values can be seen in Table 1.

Table 1. Protein Content of Milkfish Nuggets and Mocaf

No	Nugget formula	Protein (%)
1	F1 (80% : 20%)	15,02
2	F2 (70% : 30%)	14,58
3	F3 (60% : 40%)	13,25

Table 1 shows that the highest protein content of milkfish nuggets is formula 1 as much as 15.02%. This is because in F1 the ratio of the composition of milkfish at most is 80%. In addition, other additives such as eggs and margarine also contribute to the protein content of

nuggets. The protein content in F2 was 14.58% and F3 13.25% tended to decrease as the number of milkfish decreased and the amount of mocaf flour added was increased. The protein content of mocaf flour is only 1.2 grams/100 grams, while the protein content of milkfish is 20 grams/100 grams (TKPI, 2018). The results of this study are in accordance with what was conveyed by Rahmah (2018) that the more addition of mocaf flour will reduce the protein content, because the protein content of mocaf flour is very low.

The high protein content is sufficient for the nuggetic quality requirements of SNI No. 7758:2013, which is a minimum of 5% protein. Compared to the 2019 RDA, each serving of nuggets (25 grams) can meet the protein needs of 8.9 - 9.3% of children aged 6-12 years. Milkfish nuggets are recommended for children aged 6-12 years because they contain high protein to support growth and development in children.

3.2. Lipid Analysis

Lipid analysis in milkfish nugget and mocaf could be seen in table 2.

Table 2. Lipid content of milkfish nugget and Mocaf

No	Formula of nugget	Lipid (%)
1	F1 (80% : 20%)	12,89
2	F2 (70% : 30%)	11,53
3	F3 (60% : 40%)	10,76

Table 2 shows that the highest fat content of milkfish nuggets is milkfish nugget formula 1 (80%: 20%) as much as 12.89%. The fat content of formula 1 is higher than the fat content of formula 2 and formula 3 because the addition of milkfish in formula 1 is at most 80%, while in mocaf flour it is only 20%. The fat content of milkfish is 4.8 grams while in mocaf flour it is only 0.6 grams (TKPI, 2018). Chicken eggs and margarine also contribute to the fat content of nuggets.

The fat content in the three nugget formulas was low. The low fat content is sufficient for the quality requirements of fish nuggets SNI No. 7758:2013, namely the maximum fat content of nuggets is 15%. When compared to the 2019 RDA, each serving of milkfish nuggets with the addition of mocaf flour (25 grams) can meet 5.1% of the fat needs of children aged 6-12 years.

3.3. Carbohydrate Analysis

Table 3. Carbohydrate content of milkfish nugget and Mocaf

No	Nugget formula	Carbohydrate
1	F1 (80% : 20%)	23,63
2	F2 (70% : 30%)	31,44
3	F3 (60% : 40%)	33,95

Table 3 shows that the content of The highest carbohydrate of milkfish nugget is milkfish nugget formula 3 (60% : 40%) as much as 33.95%. Carbohydrate content in F3 is higher than F1 and F2 because in formula 3 the ratio of mocaf flour added is 60% more than the addition of flour in other formulas. The carbohydrate content of mocaf flour is 85 grams. So if you add more mocaf flour, the carbohydrate content will be higher. This is in accordance with Pratama's (2019) statement that the more mocaf flour is added, the higher the carbohydrate content produced will increase. This is because the starch content in mocaf flour is high, which is 87.3% in 100 grams (Salim, 2011). According to Subagio (2006) the starch content of mocaf flour ranges from 85 - 87%. So that the more use of mocaf flour the carbohydrate content of

milkfish nugget with the addition of mocaf flour will be higher.

Quality requirements for fish nuggets SNI No. 7758:2013 does not include carbohydrate content, but the quality requirements for chicken nuggets are SNI No 6683:2002, namely the maximum carbohydrate content of nuggets is 25%, so that the carbohydrate content of F2 and F3 does not meet the quality requirements of nuggets. Compared to the 2019 RDA, each serving of milkfish nuggets with the addition of mocaf flour can meet the carbohydrate needs of children aged 6-12 years around 2.8% to 2.9%.

4. Conclusions

The results obtained can be concluded that formula 1 has the highest protein and fat content of 15.02% and 12.89%, respectively. While formula 3 has the highest carbohydrate content of 33.95%. Milkfish nuggets that meet the quality requirements for fish nuggets are formula 1.

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