

# The Effect of MOCAF and Rice Flour Proportion on Some Quality Components of Oyster Mushroom' Nugget

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**Abstract:** The purpose of this study was to determine the proportion of MOCAF (Modified Cassava Flour) and rice flour that produced oyster mushroom nuggets with the best chemical quality (moisture, ash and protein content) and organoleptic (color, texture and taste). Completely Randomized Design (CRD), consisting of six treatments (MOCAF 0%: Rice Flour 30%; MOCAF 6%: Rice Flour 24%, MOCAF 12%: Rice Flour 18%, MOCAF 18%: Rice Flour 12%, MOCAF 24%: Rice Flour 6% and MOCAF 30%: Rice Flour 0%) with triplicate. Data were analyzed using analysis of variance at the 5% significance level using Co-Stat software and continued by Honestly Significant Difference (HSD). The results of this study showed that the proportion of MOCAF and rice flour that produced the best quality oyster mushroom nuggets for chemical parameters was MOCAF 0%: 30% rice flour: 60% oyster mushroom (water content 61.92%, ash content 1.80 % and protein content of 3.60%, while the organoleptic parameters were 30% MOCAF treatment: 0% rice flour: 60% oyster mushrooms (color, taste and texture preferred by the panelists).

**Keywords:** Nugget, Oyster Mushrooms, MOCAF, Rice Flour

## I. INTRODUCTION

Nugget is a food processing product which is usually made from grind fish, chicken, or beef and adding with food additives as a flavor enhancer then printed in a certain shape, steamed, cut and coated with flour adhesive. Chicken nuggets contain 18.82g / 100g of fat, 30g / 100g of protein and 0.9g / 100g of fiber. Foods high in fat and low in fiber can increase the risk of being overweight, having difficulty defecating, and high cholesterol (Nurmalia, 2011). One of the raw materials that have low fat content and high fiber content that can be used as an alternative in making nuggets is oyster mushrooms. In the medical world, oyster mushrooms are used to treat various diseases such as iron and niacin content which can increase red blood cells, fiber content can reduce body cholesterol levels, the polysaccharide content is able to suppress the growth of cancer cells and the content of folic acid is beneficial for pregnant women (Aditya, 2012).

Apart from being influenced by the type of raw material, the quality of the nuggets is also influenced by the fillers and binders that are added in the manufacture of the nuggets. Filler is a non-meat material that can increase the binding capacity of meat water and emulsification of fat, while a

binder is a material that can bind a certain amount of water but has a small effect on emulsification (Soeparno, 2005). Fillers and binders are distinguished by their protein content and carbohydrate content. Fillers contain lower levels of protein and higher levels of carbohydrates, while binders contain higher levels of protein and lower levels of carbohydrates (Khotimah and Hartatie, 2013).

The filler used in this study is MOCAF. MOCAF is a product derived from cassava flour which uses the principle of fermentation in cassava cells. Starch content in MOCAF can reach 73.59% (Muhammad, 2007). According to Singal, Nurah, Koapaha and Djarkasi (2013), starch content is a determinant of the ability of flour as a filler, where starch functions to increase water-holding capacity.

In general, rice flour is the easiest rice processing product and widely used as a raw material in the manufacture of various types of cakes, both wet and dry, as well as to enhance taste and aroma. Rice flour is used as a binding agent for nuggets because it has a high protein content compared to other flours, namely 6.98% (Immaningsih, 2012). Research on the use of MOCAF and rice flour in the manufacture of oyster mushrooms has not been widely conducted. Therefore, a research has been conducted on "The Effect of MOCAF Proportion and Rice Flour on Several Quality and Organoleptic Components of Oyster Mushroom Nuggets." This study aims to examine the effect of the proportion of MOCAF and rice flour which produces oyster mushroom nuggets with quality components (moisture content ash and protein content) and organoleptic

## II. MATERIAL AND METHODS

The experimental design used in this study was a Completely Randomized Design (CRD) with one factor was used in experiment, namely the combination of MOCAF + Rice Flour and Oyster mushroom concentrations are as followed:

t1 = MOCAF (0%), Rice flour (30%), Oyster Mushrooms (60%)

t2 = MOCAF (6%), Rice flour (24%), Oyster Mushrooms (60%)

t3 = MOCAF (12%), Rice flour (18%), Oyster Mushrooms (60%)

t4 = MOCAF (18%), Rice flour (12%), Oyster Mushrooms (60%)

t5 = MOCAF (24%), Rice flour (6%), Oyster Mushrooms (60%)

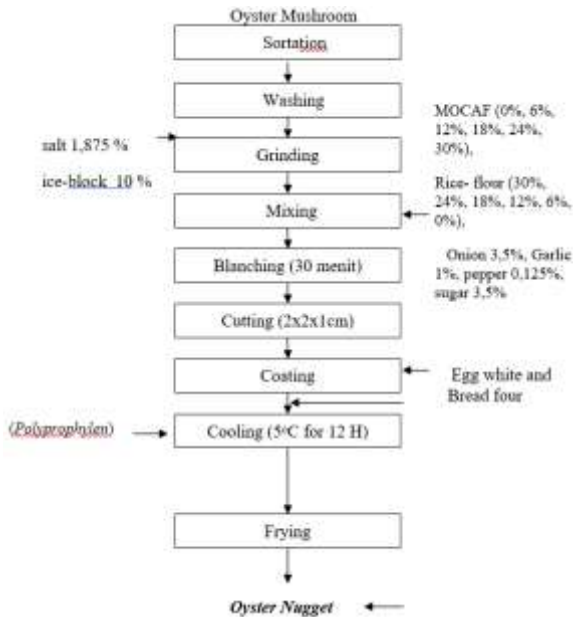
t6 = MOCAF (30%), Rice flour (0%), Oyster Mushrooms (60%)

Each treatment was repeated 3 times in order to obtain 18 experimental units. The concentration of MOCAF + rice flour as the independent variable which affects the quality (chemical and organoleptic) will be seen. Data from chemical and organoleptic observations were analyzed using Analysis of Variance (ANOVA) at the 5% real level using Co-Stat software. and a further test using the Honest Real Difference (BNJ) test (Hanafiah, 2012).

**Research Stages**

Making oyster mushroom nuggets is done by modifying the Rasyda method (2016) into 9 stages, namely sorting raw materials, washing, grinding oyster mushrooms, mixing, steaming, printing, coating, cooling and frying.

Figure 2. Flow Chart of Oyster Mushroom Nugget Making



Source: Rasyda (2016), with modifications

**Parameters**

The parameters observed in this study were chemical parameters, namely moisture content, ash content using the dry ash method, protein content using the Kjehdahl method (Sudarmadji *et al.*, 2007), and organoleptic (color, texture and taste) with the affective method of hedonic testing and scoring (Rahayu, 1998).

**III. RESULTS AND DISCUSSION**

**1. Moisture Content**

Based on data from observations and analysis of diversity, the treatment of the proportion of MOCAF and rice flour had no significant effect on the moisture content of oyster mushroom nuggets.

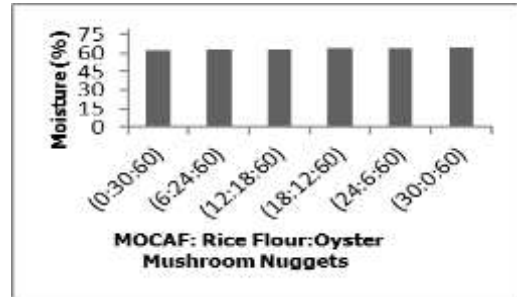


Figure 1. The Effect of Proportion of MOCAF and Rice Flour on Water Content of Oyster Mushroom Nuggets

Oyster mushroom nuggets ranged from 61.92% -64.80% with the lowest water content found in the MOCAF 0% treatment: 30% rice flour: 60% oyster mushrooms, namely 61.92%, while the highest water content was found in the 30% MOCAF treatment: 0% rice flour: 60% oyster mushrooms that is 64.80%. Therefore, the water content of oyster mushroom nuggets for all treatments did not meet the fish nugget standards set by SNI 7758: 2013, namely a maximum of 60%. The higher the proportion of MOCAF (filler), the higher the water content of the oyster mushroom nuggets. This is presumably because the more MOCAF addition, the less protein content in the dough so that the water-holding capacity of the protein of rice flour and oyster mushrooms decreases. This is also consistent with the statement of Hendronoto *et al.* (2009), the more flour is added, the water-holding capacity of the protein will decrease so that the water content in the dough will increase.

**2. Ash content**

Based on data from observations and analysis of diversity, the treatment of the proportion of MOCAF and rice flour has no significant effect on the ash content of oyster mushroom nuggets.

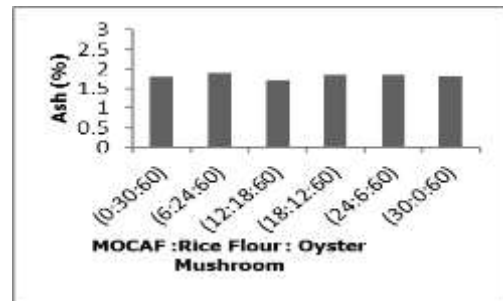


Figure 2. The Effect of Proportion of MOCAF and Rice Flour on Ash Content of Oyster Mushroom Nuggets

The ash content of the oyster mushroom nuggets ranged from 1.69% - 1.89% with the lowest ash content found in the 12% MOCAF treatment: 18% rice flour: 60% oyster mushroom namely 1.69% while the highest ash content was found at 6% MOCAF treatment: 24% rice flour: 60% oyster mushrooms, namely 1.89%. Therefore, the ash content of oyster mushroom nuggets for all treatments has met the fish nugget standard set by SNI 7758: 2013, namely a maximum of 2.5%. It can be seen that the ash content of oyster mushroom nuggets fluctuates, the results of the analysis of diversity show that the treatment of the proportion of MOCAF and rice flour has no significant effect on the ash content of oyster mushroom nuggets. This is presumably because the ash content in MOCAF and rice flour are both less than 1%, resulting in the proportion of MOCAF and rice flour not having a significant effect on the ash content of the oyster mushroom nuggets.

### 3. Protein content

Based on the data from the observation and analysis of diversity, the treatment of the proportion of MOCAF and rice flour had no significant effect on the protein content of oyster mushroom nuggets.

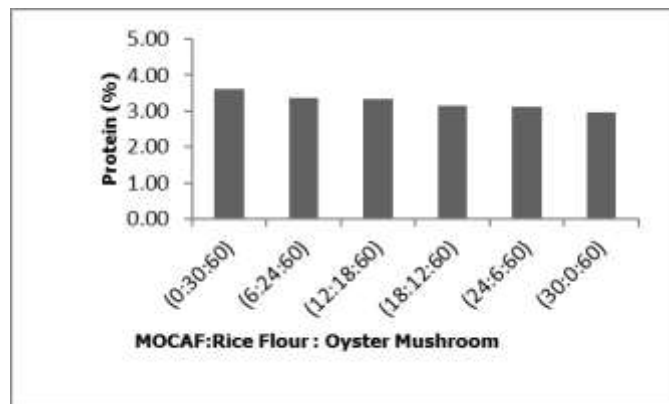


Figure 3. The Effect of Proportion of MOCAF and Rice Flour on Protein of Oyster Mushroom Nuggets

The protein content of oyster mushroom nuggets ranges from 2.95% - 3.60% with the lowest protein content found in the MOCAF 30% treatment: 0% rice flour: 60% oyster mushroom, 2.95% while the highest protein content is found at 0% MOCAF treatment: 30% rice flour: 60% oyster mushroom that is 3.60%. Therefore, the protein content of oyster mushroom nuggets for all treatments did not meet the fish nugget standards set by SNI 7758: 2013, namely a maximum of 5%. This is in accordance with the results of Ariatama's research (2016), which states that the average protein content in the oyster mushroom treatment is 60% + 12% carrots + 8% porang flour + 20% MOCAF is 1.79%.

Figure 3 also shows that the less use of rice flour (binder), the less protein content in the material. This is presumably because the protein content of rice flour is higher than the MOCAF protein content.

### 4. Color (Hedonic and scoring)

The effect of the proportion of MOCAF and rice flour on the color (hedonic and scoring) of oyster mushroom nuggets.

The level of preference ranges from 2.70 - 4.25 (the level of preference for panelists is between somewhat like to like) with the highest value in the 30% MOCAF treatment: 0% rice flour: 60% oyster mushroom while the

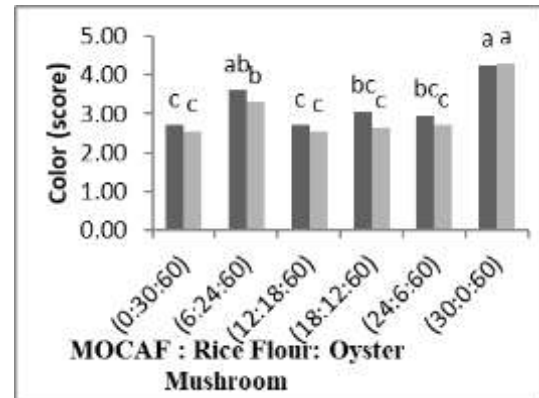


Figure 4. Graph of the Effect of Proportion of MOCAF and Rice Flour on Oyster Mushroom Nugget Color

(Note: The numbers followed by the same letters in the same column show no significant difference at the 5% level.)

lowest was in the MOCAF treatment 0%: 30% rice flour: 60% oyster mushrooms and 12% MOCAF: 18% rice flour: 60% oyster mushrooms while the scoring test ranges from 2.55 - 4.30 (panelists' scores range from brownish yellow to yellow) with the highest score at MOCAF 30% treatment: 0% rice flour: 60% oyster mushroom and the lowest was 0% MOCAF treatment: 30% rice flour: 60% oyster mushroom and 12% MOCAF: 18% rice flour: 60% oyster mushroom.

The results of the analysis of diversity showed that the proportion of MOCAF and rice flour had a significant effect on the color scoring. Based on Figure 6, it can be seen that MOCAF 6%: 24% rice flour: 60% oyster mushroom is significantly different from MOCAF 0%: 30% rice flour: 60% oyster mushroom, 12% MOCAF: 18% rice flour: 60% oyster mushroom, MOCAF 18%: 12% rice flour: 60% oyster mushrooms and 24% MOCAF: 6% rice flour: 60% oyster mushrooms. This is presumably because the deep frying method was not used during the frying process, so that not all nuggets were evenly immersed in oil. Even so, if the score is converted to the color scoring criteria it will still read the same, namely brownish yellow, so that when viewed as a whole it can be concluded that the more Organoleptic Quality. Figure 4 also shows that the proportion of MOCAF and rice flour has a significantly different effect on hedonic color.

### 5. Texture (Hedonic and scoring)

The hedonic test results showed that the level of preference for the panelists increased along with the increase in the color

score of the oyster mushroom nuggets, where the panelists preferred the yellow oyster mushroom nuggets proportion of MOCAF and rice flour on the texture (hedonic and scoring) of oyster mushroom nuggets (Figure 5).

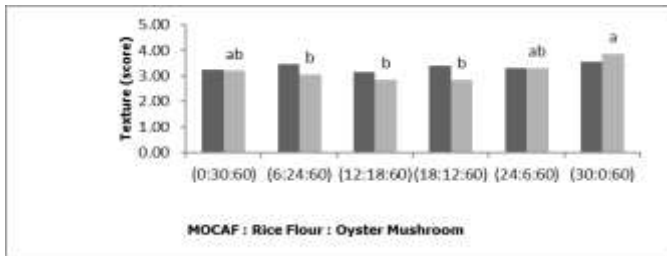


Figure 5. Effect of Proportion of MOCAF and Rice Flour on Oyster Mushroom Nugget Texture

(Note: The numbers followed by the same letters in the same column show no significant difference at the 5% level)

Figure 5 shows that the level of preference ranged from 3.15 - 3.55 (the panelists' preferred level was between somewhat like to like) with the highest value in the 30% MOCAF treatment: 0% rice flour: 60% oyster mushroom and the lowest was the 12% MOCAF treatment: 18% rice flour: 60% oyster mushroom, while for the scoring test ranged from 2.85 - 3.85 (slightly chewy to chewy) with the highest value in the 30% MOCAF treatment: 0% rice flour: 60% oyster mushroom and the lowest was 12% MOCAF treatment: 18% rice flour: 60% oyster mushrooms and 18% MOCAF: 12% rice flour: 60% oyster mushrooms.

The results of the analysis of diversity showed that the proportion of MOCAF and rice flour had a significant effect on the scoring texture. This is thought to be due to the higher concentration of rice flour, the more compact the nuggets produced. According to Bean (1986) in Prihantono (2003), the use of rice flour of more than 10% in a food product requires attention to the characteristics of rice flour. This is supported by Surawan (2007) who states that the use of rice flour of more than 10% causes the texture to tend to be denser and harder.

The results of the analysis of diversity showed that the proportion of MOCAF and rice flour had no significant effect on the hedonic texture. This is presumably due to the taste of the panelists who really like oyster mushroom nuggets with a slightly chewy to chewy texture.

#### 6. Taste (Hedonic and Scoring)

The level of preference ranges from 2.95 - 3.55 (the panelists' preference level is between somewhat like to like) with the highest value in the 24% MOCAF treatment: 6% rice flour: 60% oyster mushroom and the lowest at 0% MOCAF treatment: 30% rice flour: 60% oyster mushrooms, while for the scoring test ranged from 2.75 - 3.35 (slightly tasting oyster mushrooms) with the highest value in the 30% MOCAF treatment: 0% rice flour: 60% oyster mushrooms and MOCAF

6%: 24% rice flour: 60% oyster mushrooms and the lowest was 12% MOCAF treatment: 18% rice flour: 60% oyster mushrooms.

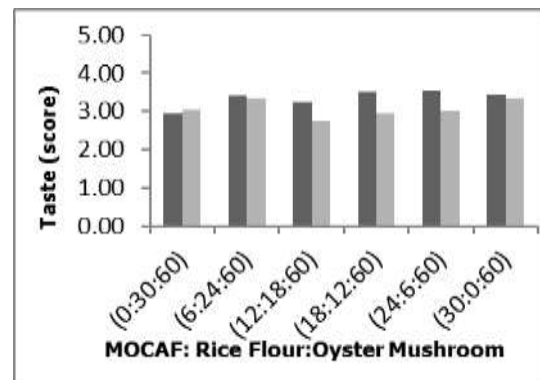


Figure 6. Graph of the Effect of Proportion of MOCAF and Rice Flour on Oyster Mushroom Nugget Taste.

The results of the analysis of diversity showed that the proportion of MOCAF and rice flour had no significant effect on the taste of oyster mushroom nuggets, both hedonic and scoring. This is presumably because MOCAF and rice flour do not have a specific distinctive taste, so the proportion of both of them does not really affect the taste of the oyster mushroom nuggets.

#### IV. CONCLUSION

Based on the analysis results and discussion descriptions that are limited to the scope of this study, it can be concluded that the proportion of MOCAF and rice flour has no significant effect on water content, ash content, protein content, texture (hedonic) and taste (hedonic and scoring). However, it has a significantly different effect on color (hedonic and scoring) and texture (scoring). Meanwhile, the parameters of water content and protein content have not met the quality standard, while the ash content has met the quality standards of fish nuggets that have been set by SNI 7758-2013. Based on the results of the analysis, it can be concluded that the best treatment for chemical parameters is MOCAF 0% treatment: 30% rice flour: 60% oyster mushroom (water content 61.92%, ash content 1.80% and protein content 3.60%), while the treatment The best for organoleptic parameters was MOCAF 30% treatment: 0% rice flour: 60% oyster mushrooms (preferred color and texture as well as a somewhat preferred taste by the panelists).

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