ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue I, January 2025

The Influence of MOCAF and Rice Flour Addition on Proximate and Sensory Qualities of Oyster's Mushroom Nuggets

A. Alamsyah and E. Basuki*

Faculty of Food Technology and Agroindustry, University of Mataram, Indonesia

***Corresponding Author**

DOI : https://doi.org/10.51583/IJLTEMAS.2025.1401014

Received: 22 January 2025; Accepted: 27 January 2025; Published: 06 February 2025

Abstract :The objective of this study was to determine the proportion of MOCAF (Modified Cassava Flour) and rice flour that produced oyster's mushroom nugget with the best chemical quality (moisture, ash and protein content) and sensory (color, texture and taste). Completely Randomized Design (CRD), consisting of six treatments (T1=MOCAF 10%:Rice Flour 30%:OM 60 %;T2=MOCAF 16%: Rice Flour 24%:OM 60 %;, T3=MOCAF 22%: Rice Flour 18%:OM 60%; T4=MOCAF 28%: Rice Flour 12%:OM 60%; T5= MOCAF 34%: Rice Flour 6%:OM 60%; T6=MOCAF 40%: Rice Flour 0%:60%) with triplicate. The results of this study showed that the ratio of MOCAF and rice flour that produced the best quality oyster mushroom nuggets for chemical parameters was T1=MOCAF 10%: 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 T6=40% MOCAF: 0% rice flour: 60% oyster's mushrooms (color , taste and texture are preferred by the panelists).

Keywords: MOCAF,Nugget, Oyster's Mushrooms, Rice Flour.

I. Introduction

Nugget is a preserved food that is very popular and practical. According to [3], nuggets are a processed product from milled meat that is seasoned, then mixed using a filling flour, adding bread flour to the surface, then frozen to maintain the quality during storage. Nugget is a type of an emulsion-shaped meat product, where the quality of nuggets is determined by the characteristics of meat used as raw material. The ability to bind water and fat to stabilize emulsions is an essential characteristic for meat emulsion products, so products that have optimal physical and sensory properties can be obtained. Moedjiharto [9], nuggets are processed products that use restructuring technology by utilizing relatively small and irregular pieces of meat then reattaching them to a larger size aided by the binder. Fresh meat from different rigor phases has different characteristics as raw material [9]. The increasing demand for quality and durable nuggets makes most nuggets sellers have to add additional ingredients such as phosphate. The addition of phosphate in the nugget mixture is intended to produce chewy and long-lasting nuggets, but the use of phosphate is still doubtful for health. Factors that affect the success of a product is placed on the ability of binding between particles meat, and other ingredients are added [13]. 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 [11]. 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 [1]). Quality is the main factor that needs to be considered in the production of meat and processed products that can be formed. At present, the use of materials to improve the quality of quality processed products that are safe for health is a serious concern to be developed, one of which is a nugget. The use of chicken meat with the substitution of sago flour is an innovation of nugget products so that prices are lower than other substitution — ingredients that are always available and can be consumed by all people and without reducing the nutritional the nuggets is also value or acceptability of consumers. Apart from being influenced by the type of raw material, the quality of affected 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 water and emulsification of fat, while a binder is a material that can bind a certain amount water but has a small effect on emulsification [16]. 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 [7]. The filler used in this study is MOCAF which is derived from cassava flour used the principle of fermentation in cassava cells. Starch content in MOCAF can reach 73.59% [8]. According to Singal *et al*.,[16], starch content is a determinant of the ability of flour as a filler, where starch functions to increase water-holding capacity. Rice flour is the easiest rice processing product to manufacture. In general, rice flour is 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% [6]. 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 and Rice Flour Addition on Proximate and Sensory Qualities (Color, textur and aroma, protein, moisture and ash content) of Oyster Mushroom Nuggets.".

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue I, January 2025

II. Material and Methods

The experimental design used in this study was a Completely Randomized Design (CRD) with one factor the combination of MOCAF + Rice Flour (RF) and Oyster mushroom (OM) concentrations are as followed: T1=10 % MOCAF : 30% RF: 60 % OM; T2=16% MOCAF : 24 % RF : 60% OM; T3=22% MOCAF : 18% RF: 60% OM; T4=28% MOCAF : 12% RF: 60% OM ; T5=34% MOCAF : 06% RF: 60% OM and T6=40% MOCAF : 0% RF: 60% OM. The concentration of MOCAF + RF +OM as the independent variable which affects the quality (chemical and organoleptic) were analyzed using Analysis of Variance (ANOVA) at the 5% significance level [4]. MOCAF and Rice flour were obtained accordingly and each proportion of treatmens was processed into nuggets following method of Rasyida [12]. Briefly, Oyster Mushroom were sortage then washed and added of salt and iced block. The proportion of MOCAF, RF and OM and ingredient were grinded using a conventional grinder. Then blanched in hot water (74 °C) for a period of twenty minutes. Nuggets are the cut to a size of about 4X 10 cm then stored in freezer before cooking and dipped in egg beaters then smeared with bread four. After that the initial frying freezer before cooking was done in a cooking oil for 20 second at 200 °C. Nugget and then are packed in plastic and stored in freezer before cooking.. Moisture was determined using hot air oven. Crude Protein was analyzed by Kjehdahl's apparatus.Ash content was determined by using muffle furnace. [18]. The experiment was a complete randomized design. Each proportion represent a treatment, making a total of six treatments then replicated three times. The organoleptic test used is a hedonic test and hedonic quality test.

Tests are conducted to determine the level of preference and impression of the product on preferences, colors, textures, and aromas. The range of values used is 1-5 with some untrained panelists of 20 people. Scale values used are: 5 = very liked, 4 = liked, 3 = sligthly like, 2 = not

liked, 1 = very disliked. While palatability is tested with non-parametric statistics is a test of preference that involves a person's judgment about the nature or quality of a material that causes people/panelists to like (Sukarto, 1981). The panelists presented samples arranged individually and asked to rate samples based on their enjoyment according to the scale of the grades provides [11].

III. Results and Discussion

1. Protein content

The protein content of oyster mushroom nuggets ranges from 2.95% - 3.60% with the lowest protein content found in the MOCAF 30%: 0% RF: 60% OM, 2.95% while the highest protein content is found at 0% MOCAF treatment: 30% RF: 60% OM that is 3.60%. Therefore, the protein content of oyster mushroom nuggets for all treatments did not comply with the fish nugget quality standards set by SNI 7758: 2013 [3], namely a maximum of 5%.

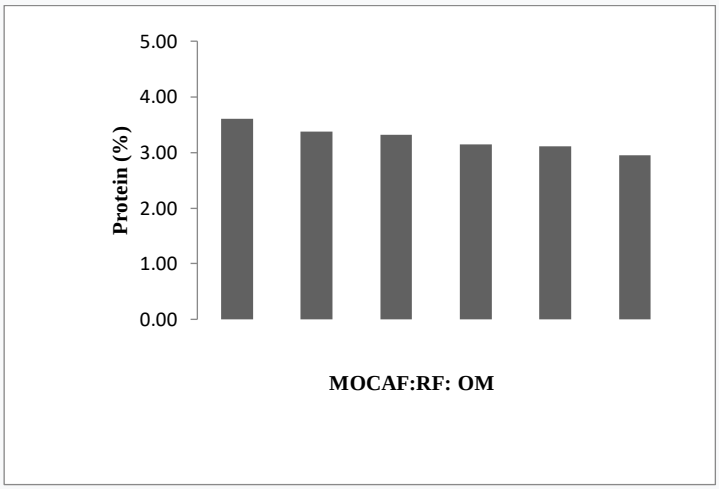


Figure 1. The Influence of Proportion of MOCAF and Rice Flour on Protein of Oyster Mushroom Nuggets

The average protein content in the oyster mushroom treatment is 60% + 12% carrots + 8% porang flour + 20% MOCAF is 1.79% agree with Ariatama's (2016). 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 content.

2. Moisture Content

Based on data from observations and analysis of diversity, the treatment of the ratio of MOCAF and rice flour had no significant effect on the moisture content of oyster mushroom nuggets (Fig. 2). Oyster mushroom nuggets ranged from 61.92% -64.80% with the lowest water content found in the MOCAF 0% : 30% RF: 60% OM, namely 61.92%, while the highest water content was found in the 30% MOCAF : 0% RF: 60% OM that is 64.80%.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue I, January 2025

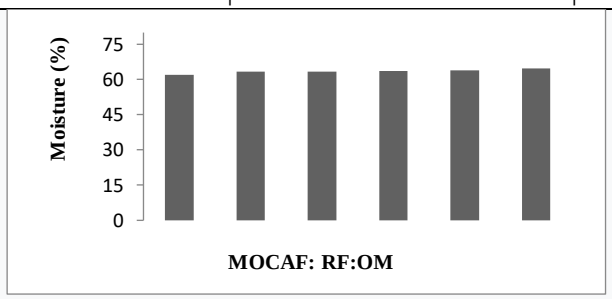


Figure 2. The Influence of Proportion of MOCAF and Rice Flour on Moisture Content of Oyster Mushroom Nuggets

Therefore, the water content of oyster mushroom nuggets for all treatments did not comply the fish nugget standards set by SNI 7758: 2013, namely a maximum of 60%. The higher the ratio 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*. [6], that the more flour added, the water-holding capacity of the protein will decrease consequently that dough moisture content will raise.

3. Ash content

The ash content of the oyster mushroom nuggets ranged from 1.69% - 1.89% with the lowest ash content found in the 12% MOCAF : 18% RF: 60% OM namely 1.69% while the highest ash content was found at 6% MOCAF : 24% RF: 60% OM, namely 1.89%. Therefore, the ash content of oyster mushroom nuggets for all treatments has complyt the fish nugget standard set by SNI 7758: 2013, namely a maximum of 2.5%.

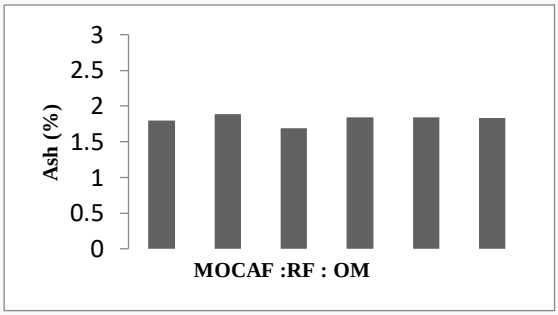


Figure 3. The Influence of Proportion of MOCAF and Rice Flour on Ash Content of Oyster Mushroom Nuggets

Although the ash content of oyster mushroom nuggets fluctuates, the results of the analysis of diversity show that the 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 [2].

4. Color (Hedonic and scoring)

The effect of the ratio of MOCAF and rice flour on the color (hedonic and scoring) of oyster mushroom nuggets shows that 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 : 0% RF: 60% OM while the lowest was in the MOCAF 0% : 30% RF: 60% OM and 12% MOCAF: 18% RF: 60% OM while the scoring test ranges from 2.55 - 4.30 (panelists' scores range from brownish yellow to yellow) with the highest score at

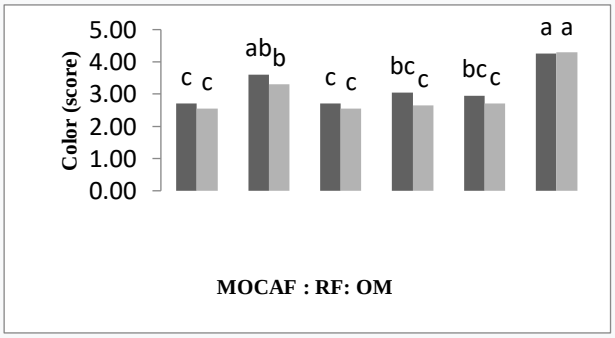


Figure 4. The Influence of Proportion of MOCAF and Rice Flour on Oyster Mushroom Nugget Color .

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue I, January 2025

MOCAF 30% : 0% RF: 60% OM and the lowest was 0% MOCAF: 30% RF: 60% OM and 12% MOCAF: 18% RF: 60% OM. The average colour organoleptic in chicken nuggets is in the range of 2.93–3.25, respectively. The colour of the nugget is affected by the colour of oyster mushroom and the additional ingredients that are used. The deep-frying process can be caused the color of the nugget became to a slight brown. As a result of the non-enzymatic browning reaction from reducing sugar contained in addition to MOCAF, with the result that orange in the inside of nugget. The results of the analysis of diversity showed that the ratio of MOCAF and RF had a significant effect on the color scoring showed that MOCAF 6%: 24% RF: 60% OM is significantly different from MOCAF 0%: 30% RF: 60% OM, 12% MOCAF: 18% RF: 60% OM, MOCAF 18%: 12% RF: 60% OM and 24% MOCAF: 6% RF: 60% OM. 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.

5. Texture

The hedonic test showed that the level of preference for the panelists increased along with the increase in the texture score of the oyster mushroom nuggets, where the panelists preferred the yellow oyster mushroom nuggets ratio of MOCAF and rice flour on the texture hedonic test showed that the level of preference for the panelists increased along with the increase in the texture score of the oyster mushroom nuggets, where the panelists preferred the yellow oyster mushroom nuggets ratios of MOCAF and rice flour on the texture. The average organoleptic (texture) oyster mushroom nugget is in the range of 3.01–3.99, respectively. It found that the T6 sample had the maximum average score if compared to another sample, whereas T3 had the minimum average score.

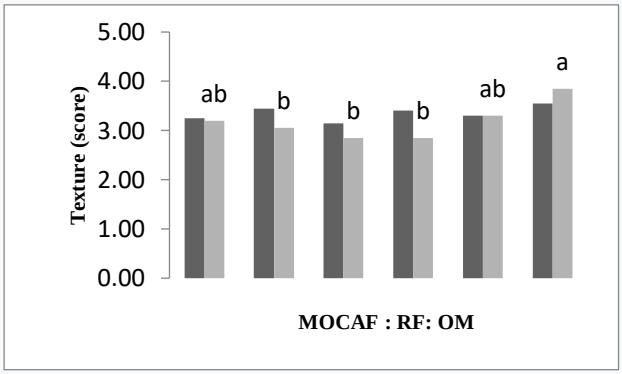


Figure 5. The Influence of Proportion of MOCAF and Rice Flour on Oyster Mushroom Nugget Texture

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

The texture is one indicator of the organoleptic quality characteristics of a product. The nugget texture is determined by the ingredients used, the mixing process and the cooking process. To determine the effect of treatment on the organoleptic test of the texture of oyster mushroom nuggets a statistical analysis was performed.

The results of the variance analysis showed that the administration of MOCAF to the quality of broiler chicken nuggets had no significant effect (P> 0.05) on the organoleptic texture test. This is because the nugget using fillers in the form of MOCAF starch produces a texture of fried nuggets that is more springy and in accordance with the nugget texture in general, the grinding rocess may also affect the texture of the nugget, the texture of the meat that has been milled is different from the texture of whole meat. It is because during the grinding process it is suspected that the muscle fibers are cut off by the grinding machine, thus affecting the texture of the ground meat. Nurmalia (2011), states that milling or reduction in size functions so that the surface area of the meat extends so that that protein extraction can occur. Protein extraction is significant because if it does not happen extraction, the meat cannot blend when cooked, and this can affect the texture of the nugget produced

The result of texture of oyster mushroom nugget had an effect by proportion of flour that was used as filler ingredients. Organoleptic texture affected in moisture content found in nugget, because if the maximum water content contained in a nugget, afterward the texture will be more flaccid [12]. As stated in Nurmalia [9] explained the water content can be affected by texture and savouring in comestible also comes to decide the freshness and durability of comestible. The toughness and the tenderness had a relation to the amount of water contained in a product, if the product consisted of maximum water content, then the texture will be flaccid compared to a product that consisted of a minimum of water. 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% RF: 60% OM and the lowest was the 12% MOCAF treatment. : 18% RF: 60% OM, 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% RF: 60% OM. This is consideration to be due to the higher concentration of rice flour, the more compact the nuggets produced. According to Prihantono [12], 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 [19] who states that the use of rice flour of more than 10% causes the texture to tend to be denser

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue I, January 2025

and harder.The results of the analysis of diversity showed that the proportion of MOCAF and RF 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 : 6% RF: 60% OM and the lowest at 0% MOCAF : 30% RF: 60% OM, while for the scoring test ranged from 2.75 - 3.35 (slightly tasting oyster mushrooms) with the highest value in the 30% MOCAF : 0% RF: 60% OM and MOCAF 6%: 24% RF: 60% OM and the lowest was 12% MOCAF : 18% RF: 60% OM (Figs 6). The results of the ratio 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 RF 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

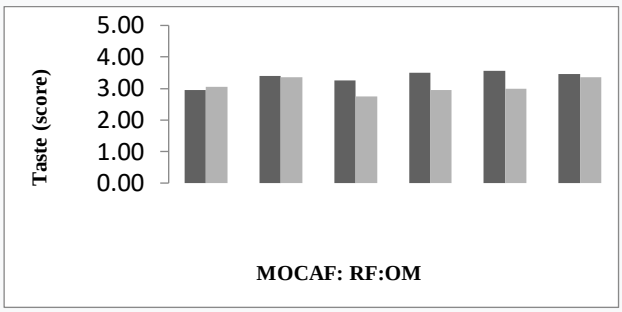


Figure 6. The Influence of Proportion of MOCAF and Rice Flour on Oyster Mushroom Nugget Taste .

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. In this revealed 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 sensory parameters was MOCAF 30% treatment: 0% rice flour: 60% oyster mushrooms (preferred color and texture as well as a rather preferred taste by the panelists).

References

1. Abiala,O. M. Abiala, M, B. Omojola. 2022. Quality attributes of chicken nuggets extended with different legume flour. Food Production, Processing and Nutrition 4: 20: 1-11.
2. Ariatama, A. S. (2016). The formulation of Oyster Mushrooms, Carrot, MOCAF, and Porang Flour on Nugget Product Quality. Essay. Faculty of Food Technology and Agroindustry. Mataram University. Mataram.
3. BSN. (2013). SNI 7758-2013: Fish Nugget. National Standardization Agency. Jakarta.
4. FAO, 2020. Food and Agricultural Organization Rural Livehoods Information System.
5. Hanafiah, K.A. (2008). Experimental Design: Theory and Application. Pt. Raja Grafindo Persada. Jakarta.
6. Hendronoto, A., S. Lilis, and M.I. Anshory. (2009). Effect of using various percentage levels of canna starch (*Canna edulis* Ker) on the physical properties and acceptability of chicken nuggets. National Seminar on Production System Development and Utilization of Local Resources for Self-Reliance of Animal-Originated Food. Faculty of Animal Husbandry, Padjadjaran University, West Java.
7. Immaningsih, N. (2012). Gelatinization Profile of Several Flour Formulations for Estimating Cooking Properties. J. of the Food Nutrition Panel. 35 (1): 13- 22.
8. Khotimah, K. and E.S. Hartati. (2013). Physical and Chemical Quality of Chicken Sausage by Using Red Pumpkin as an alternative to dyes and antioxidants. Journal of Animal Science. 13 (1): 35 - 38.
9. Moedjiharto, T. J. (2002). Usaha Industri Rumah Tangga Fish Nugget. Malang, Indonesia: Laboratorium Ilmu dan Teknologi Pangan Fakultas Teknologi Hasil Pertanian. Universitas Brawijaya.
10. Muhammad, A. R. (2007). Studying the Chemical and Physical Characteristics of Tapioca Flour and Mocaf as a Coating for Peanuts in Coated Peanut Products. Faculty of Agricultural Technology. IPB. Bogor.
11. Nurmalia. (2011). Oyster Mushroom Nugget (*Pleurotus ostreatus*) As an Alternative to Fast Food, Low in Fat and Protein and High in Fiber. Essay. Department of Nutrition, Faculty of Medicine, Diponegoro University.
12. Prihantono, S. (2003). Vegetable-Based Nugget Product Development with Binder for Rice Flour as Functional Food. Essay. Faculty of Agricultural Technology. Bogor Agricultural Institute, Bogor.
13. Rahardjo, S., Dexter, D.R., Worfel, R.C., Sofos, J. N., Solomon, M. B., Shults, G. W., & Schmidt, G. R. (1995). Quality Characteristic of Restructured Beef Steak Manufactured by Various Techniques. J. Food. Sci., 60(1), pp. 68-71.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue I, January 2025

14. Rahayu, W.P. (1998). Organoleptic Assessment Practicum Guide. Faculty of Food Technology. Bogor Agricultural Institute. Bogor.
15. Rasyda, R. Z. (2016). The Effect of Proportion of MOCAF and Porang Flour on Quality of Mackerel Fish Nugget. Essay. Faculty of Food Technology and Agroindustry. Mataram University. Mataram.
16. Singal, C.Y., E.J.N. Nurah, T. Koapaha and G.S.S. Djarkasi. (2013). Effect of adding Carrot Flour (*Daucus carota* L.) on the Making of Cork Fish Sausage (*Ophiocephalus striatus*). Cocos 3 (6): 1-8.
17. Soeparno. (2005). Meat Science and Technology. Gadjah Mada University Press. Yogyakarta.
18. Sudarmadji, B. Haryono and Suhardi. (2007). Procedure for Analysis of Food and Agricultural Materials. Faculty of Agriculture. Gadjah Mada University. Yogyakarta.
19. Surawan, F. E. D. (2007). Use of Wheat Flour, Rice Flour, Tapioca Flour and Maizena Flour on Texture and Sensory Properties of Tuna Fish Nugget. Journal of Indonesian Animal Science. Vol 2 (2): 39-45.--