Protein, Fat, and Organoleptic Test of Shredded Mackerel (*Rastrelliger* sp., *Kanguarta* L., *Brachysoma*) for Stunting

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ABSTRACT

Stunting cases in Indonesia are still quite high reaching 21.7%. Namely in 2023 reaching 21.7%. Mackerel is one of the most widely found sources of animal protein in Indonesia, but its processing has not been maximized. The purpose of this study is to determine the content of protein, fat, and organoleptic tests in shredded mackerel (Rastrelliger Sp, Kanguarta L, Brachysoma) for stunted toddlers.

This study used the Complete Random Design (RAL) method, consisting of three treatments, namely p1 Rastrelliger Sp, p2 Rastrelliger kanguarta L, and p3 Rastrelliger Brachysoma with two repetitions. Protein and fat content analysis using the Kjeldahl and Soxhlet methods and hedonic tests conducted by 25 panelists.

The research showed that Shredding mackerel using different types of mackerel has a significant effect on protein and fat levels. The average protein content of Rastrelliger Sp mackerel shredded is 33.66%, 33.4%. shredded mackerel Rastrelliger Kanagurta is 22.22%, 31.23%. Rastrelliger Brachysoma is 29.13%, 40.85%. The selected treatment was p1, namely the type of mackerel (Rastrelliger Sp) using the MPE method, in this study the organoleptic results of the average aroma 2.72±0.866, 2.80±0.666, 2.60±0.818, 2.12±0.811. The protein yield is at least 15% according to the SNI standard, while the fat in this study exceeds the limit required by SNI 01-3707-1995 (BSN 1995), which is a maximum of 30%.

Keywords: *Shredded Mackerel, Toddler Stunting, Protein, Fat, Organoleptic.*

INTRODUCTION

Stunting or stunted growth is one of the chronic nutrition problems that occur in many parts of the world, including Indonesia. The World Health Organization (WHO) said that the prevalence of stunting among children under 5 years old in Indonesia touched 31.0% (1). Based on data from the 2022 National Nutrition Status Survey (SSGI), in Indonesia the stunting rate is 21.6% lower than the previous year, which was 24.4%. West Java ranks first with 971,792 cases (2). Data from the 2023 Indonesian Health Survey (SKI) with the stunting category is 21.7%, while Cirebon district is at 22.9% (3).

Choosing foods that contain good nutrition is important to support the growth of stunted children. Generally, the body needs 6 nutritional contents, namely, carbohydrates, proteins, fats, vitamins and minerals, each of which has an important role in the human body. (4). PMT has very important benefits for stunted toddlers, where this program is specifically designed to meet the needs of additional nutrients that are not enough from breast milk or daily family food (5). Research conducted by Kamilla et al., (2023) said that there are many obstacles to the PMT program, including toddlers feeling bored with the food provided because there is no

innovation, as well as many parents who provide additional food that is not in accordance with nutritional needs, meaning that parents give their food based on toddlers' preferences and price factors (6).

Fish can be used as PMT that can answer problems about the obstacles of the PMT program (7). fish that are easy to find in the coastal area of the North Coast of Java, especially in the waters of Cirebon, namely mackerel. The price of mackerel in the market is relatively cheaper, but the processor is not far from fried, yellow spices or balado (8). Food processing technology allows the use of fish into various processed products that are durable and practical such as shredded fish. This is the background for the author to conduct a research, with the title Analysis of Protein, Fat and Organoleptic Test of Shredded Mackerel (*Rastrelliger Sp, Kanagurta L, Brachysoma*) for Stunted .

MATERIAL AND METHODS

The experimental design used in this study is a Complete Random Design (RAL) The formulation in this study used 3 different types of mackerel with 2 repetitions each. This research was carried out in the laboratory of the West Java Provincial Government, Marine and Fisheries Service, UPTD Testing and Implementation of Quality of Fishery Products. Sutawinangun No. 2 Cirebon 45131

Tools used in making mackerel shredded stoves, panics, pans, scales, blenders, cutting boards, basins, knives, filter paper, fat squash, Erlenmeyer squash, measuring cups, filter krtas, upright coolers, funnels, funnel supports, burettes, burette supports, aluminium foils, boiling stones, kjeldahl flasks 100 ml, a set of distillation tools (Gerhard), burettes 10 ml, Erlenmeyer 100 ml, measuring cups 100 ml and droppers.

The ingredients used are 100 grams of mackerel, 9.75 grams of shallots, 5 grams of white shallots, 0.85 grams of hazelnuts, 45 grams of galangal, 3 grams of bay leaves, 1.25 grams of salt, 1 gram of sugar, 29 grams of cooking oil, and 75 grams of coconut milk.

The analysis of protein and fat content data is descriptive, meaning describing the protein and fat levels in shredded mackerel, to find out whether or not there are differences in mackerel types on protein and fat levels. The data analysis uses ANOVA (Analysis of variance), the test is carried out at a confidence level of 95% with a value of $p>0.05$ with $a=0.05$. If the <p value is 0.05, then Ho is rejected, meaning there is no difference in protein content and fat content. After that, further tests were carried out using the duncan test.

Organoleptic quality evaluation includes taste, aroma, color and texture attributes using a scale of 1 - 5 carried out by 25 trained panelists. Organoleptic test data was analyzed using Kruskal-wallis because the data results obtained from the data normality test were not normally distributed. After the Kruskal-wallis test, if the data shows a real difference, the Mann Whitney test will be continued to see where the difference lies.

RESULT

Table 1. Analysis of protein levels of shredded mackerel

Treatment	deuteronomy		Mean ± SD	Information
	1	2		
Treatment 1	27,05	27,40	27.22 ±0,27[a]	*Rastrelliger sp*
Treatment 2	31,00	31,47	31.23 ±0.33[b]	*Rastrelligar kanagurta*
Treatment 3	41,64	40,60	41.12 ±0,73[c]	*Rastrelliger brachysoma*

Remarks: Numbers followed by different letters show a noticeable difference on the Post Hoc Duncan test

Table. 1 shows that the perberand fish species used as the main ingredient for making shredded fish produce differences in the protein content of each treatment. The highest protein content was found in treatment 1 sample (*Rastrelliger* sp.) which had a value of 33.66%, while the lowest protein content was treatment 2 (*Rastrelliger kanagurta* L.) which had a protein value of only 23.22%. This means that the difference in the type of mackerel used for mackerel shredded products affects the protein content in shredded fish.

The results of the statistical test (ANOVA) prove that there is a clear difference in the protein content of mackerel shredded made from different types of mackerel. The Duncan test, which was used to identify specific differences between groups, showed that the difference in protein levels between shredded fish made from treatments 1, 2, and 3 was statistically significant. This means that the type of mackerel used has a strong influence on the protein content of the final product.

Table 2. Analysis of fat levels of shredded mackerel

Treatment	deuteronomy		Mean ± SD	information
	1	2		
Treatment 1	33,21	34,11	33.66 ±0.63a	*Rastrelliger* sp
Treatment 2	22,40	22,05	23.22 ±0.24b	*Rastrelligar kanagurta*
Treatment 3	29,22	29,05	29.13 ±0.12c	*Rastrelliger brachysoma*

Remarks: Numbers followed by different letters show a noticeable difference on the Post Hoc Duncan test

Table 2 shows that perberand fish types as the main ingredient in making shredded fish produce differences in the fat content of each sample. The highest fat was found in treatment 3 (*Rastrelliger Brachysoma*) at 41.12%, while the lowest fat was in treatment 1 sample (*Rastrelliger Sp*) which had a fat content of only 27.22%. This means that the difference in the type of fish as the main ingredient used for mackerel shredded products affects the fat content in shredded fish.

The results of the statistical test (ANOVA) prove that there is a clear difference in the fat content of mackerel shredded made from different types of mackerel. The Duncan test, which was used to identify specific differences between groups, showed that the difference in fat content between shredded made from treatments 1, 2, and 3 was statistically significant. This means that the type of mackerel used has a strong influence on the fat content of the final product.

Table 3 Results of organoleptic tests

Parameter	Mean Value of Organoleptic Test		
	Treatment 1	Treatment 2	Treatment 3
Aroma	2.23 ± 0,748[a]	2.60 ± 0,816[a]	2.72 ± 0,843[a]
Color	2.80 ± 0,866[a]	2.28 ± 0,843 [a]	2.68 ± 1.030[a]
Texture	2.60 ± 0.816[a]	2.64 ± 0.907[a]	2.64 ± 0.952[a]
Taste	2.12 ± 0.881[a]	2.72 ± 0.936[b]	2.72 ± 0.936[cb]

Remarks: Different letters in the same column show a real difference (p<0.05). a.b = similar letter notation means that there is no noticeable difference in the Mann-Whitney test

Based on the results of the normality test in Table 3, the results of the organoleptic test of color parameters showed that the value of p<0.05 which means that there was no real difference in the aroma parameters of either treatment 1, treatment 2 or treatment 3, then the data was tested using non-paramteric Kruskal wallis and a significant value of (0.89) > (0.05) was obtained, then it was concluded that there was no real difference between treatment 1, Treatment 2 and Treatment 3.

The results of the organoleptic test of texture parameters showed that the value of p<0.05 which means that there was no real difference in the texture parameters of either treatment 1, treatment 2 or treatment 3, then the data was tested using non-paramteric Kruskal wallis and a significant value of (0.96) > (0.05) was obtained, then it was concluded that there was no real difference between treatment 1, Treatment 2 and Treatment 3.

Based on the results of the normality test of the taste parameter data, a significant value of (0.00) < (0.05) was obtained which showed that the data was not normally distributed, then the data was tested using Kruskal wallis and a significant value of (0.022) < (0.05) was obtained, it can be concluded that there is a real difference between treatment 1, treatment 2 and treatment 3 in the mackerel shredded taste parameter.

Based on the man whitney test in column one, there was a difference between treatment 1 and treatment 2 (0.01 < 0.05), treatment 1 and treatment 3 there was a difference (0.01 < 0.05), while treatment 2 and treatment 3 had no difference (1.00 > 0.05).

DISCUSSION

1. Levels Protein

Protein is a long chain of amino acids, which is an important component in our body. Its main function is as a building material to form and repair cells, tissues, and organs. In addition, proteins also function as enzymes that accelerate chemical reactions in the body, hormones that regulate various physiological processes, and antibodies that protect the body from infections (9). Fish has always been known as a protein-rich food and is affordable. The protein in fish is very beneficial for our body because it has good properties and contains complete nutrients (10)

Analysing proteins in food aims to find out how much protein is in it, assess how good it is for our body, and study the chemical properties of the protein itself (11). The results of the analysis of the protein content of shredded mackerel (Rastrelliger sp) were 33.66%, mackerel (*Rastrelliger Kanagurta*) was 22.22% and mackerel (*Rastrelliger Brachysoma*) was 29.13%. The high protein content in the mackerel shredded research is suspected to be due to the heating process, namely frying, where the water content decreases

so that the protein content in the mackerel shredded increases. This statement is in line with the research of Simarmata et al., (2022) which said that the less water content in a foodstuff, the higher the protein content. This often happens when we process food using heat (12). In addition, the type of fish and additives used also play a role in determining the final protein content of the product (13).

2. Fat content

Fat is one of the main components in food besides carbohydrates and proteins, therefore the role of fat in determining the characteristics of food is quite large. Fats are a very effective source of energy compared to carbohydrates and proteins. One gram of fat can produce 9 kcal/gram of energy while carbohydrates and proteins only produce 4 kcal/gram (14). Fat in food products functions to improve shape, physical structure, add nutritional value, calories and savoury taste (15). The increased fat content in food products is due to the presence of spices used as complementary ingredients (16). In addition, in a study conducted by Mandjurungi et al., (2022) said that the addition of coconut milk can increase fat levels. The analysis of fat content in a product aims to find out the fat content in a food product (17).

The results showed that the fat content of mackerel shredded fish was 33.04% for Janis (Rastrelliger Sp), the fat content of mackerel shredded fish was 31.23% for the type (*Rastrelliger Kanagurta*) and 40.85% for the type of fish (*Rastrelliger Brachysoma*). Thus, the three shredded fish have fat levels that exceed the limit required by SNI 01-3707-1995 (BSN 1995), which is a maximum of 30%. The increase in fat content is suspected because the frying process can lead to a reduction in moisture content which is then followed by the absorption of oil by the ingredients. The absorption of this oil will cause an increase in fat content in the material. The longer the frying process, the more oil absorption will also occur. This is supported by research that has been conducted by Huthaimah et al., (2017) (18).

3. Organoleptic Test Results

A. Aroma

Aroma is one of the most important things in making food taste good. We can judge how good a food is by smelling it. In the food industry, testing the aroma is very important because we can immediately know whether the resulting product will be liked by consumers or not (19). The highest acceptance of panellists to the aroma parameter of mackerel shredded mackerel was in treatment 3 (*Rastrelliger brachysoma*) at 2.72%, and the lowest in treatment 1 (*Rastreliger sp*) at 2.23%. The results of the analysis of the data normality test using the Shapiro wilk test stated that the data was abnormal after which the Kruskal-Wallis test stated that there was no difference ($p > 0.05$) this is suspected to have no effect on the aroma of shredded mackerel with different types of treatment, the manufacturing process uses the same type of spices and also the comparison of the same amount, in accordance with the research conducted by Anwar et al., (2018) that the production of shredded fish with different types of fish does not have a real influence on its aroma (20).

B. Colour

Colour is one of the characteristics of food that consumers pay great attention to. When a person sees food, the first thing they notice is its colour. If the colour of the food looks attractive, then consumers will be more interested in tasting it (21). The brown colour in shredded fish is produced from the Maillard reaction, this reaction is a non-enzymatic browning reaction which

is a reaction between proteins and reducing sugars. The reaction sequence ends with the formation of a brown nitrogen polymer (22). The length of frying time has an effect on the colour of shredded fish, according to the results of research conducted by (23) excessive addition of coconut milk can affect the colour of shredded fish (24) The results of the Kruskal-Wallis analysis of the organoleptic value of fish shredded fish colour show that the treatment of fish species on colour parameters has an insignificant effect ($p>0.05$) on the organoleptic value of the colour of shredded fish produced. This is suspected because the frying time carried out and the amount of coconut milk added to all treatments are the same.

C. Texture

Texture is one of the properties of food that we immediately feel when we eat it. A good texture will make the food more delicious. Shredded fish generally has a soft texture, but if too much seasoning sticks to the meat during processing, the texture can become rough and unpleasant. The texture is a distinctive feature that distinguishes shredded fish from other processed fish products. The soft and fibrous texture is the most preferred feature of shredded fish. The right texture will make shredded fish more delicious and liked by many people (25). The results of the non-parametric test of Kruskal Wallis with different treatment of fish species did not have a significant effect ($p > 0.05$) on the organoleptic value of the texture of shredded fish produced. This is in line with research conducted by Anwar et al., (2018) that the treatment of fish species does not have a real influence on the texture of shredded fish due to the uniform weeding process and the same tools (20).

D. Taste

Taste is the main determining factor whether a food product will be accepted by consumers or not. Even if the appearance of the food (colour, aroma, texture) is attractive, if it doesn't taste good, consumers will reject it. The taste we feel is the result of a combination of various ingredients used and how they are processed. Good taste is one of the signs of good product quality (13). The results of non-parametric analysis of kruska-wallis organoleptic value of shredded fish flavour showed that the treatment of fish species had a real influence ($p >0.05$) on the organoleptic value of shredded fish flavour produced.

Further analysis uses man-whetnay which states that there is a significant difference in the taste parameters of shredded fish. The obvious difference was that treatment 1 (*Rastrrlliger Sp*) and treatment 2 (*Rastralliger Kanagurta*) were significantly different, treatment 1 (*Rastralliger Sp*) and treatment 3 (*Rastralliger Brachysoma*) were significantly different, while treatment 2 (*Rastralliger Kanagurta*) and treatment 3 (*Rastralliger Brachysoma*) were not significantly different. The results of the hedonic test of the treatment with the highest value were two treatments, treatment 2 (*Rastralliger Kanagurta*) and treatment 3 (*Rastralliger Brachysoma*), the lowest was treatment 1 (*Rastralliger Sp*), this occurred allegedly because of the different types of fish used.

CONCLUSION

1. The average protein content in shredded mackerel with different types of mackerel used as a base ingredient was treatment 1 (Sp mackerel) of 33.66%, treatment 2 (kanagruta mackerel) 22.22% and treatment 3 (Brachysoma mackerel) 29.13%.
2. The average fat content in mackerel shredded with different types of mackerel used as the main ingredient

was treatment 1 (Sp mackerel) of 33.04%, treatment 2 (Kanagurta mackerel) 31.23% and treatment 3 (Brachysoma mackerel) 40.85%.

3. The results of the hedonic test of the most preferred Aroma parameters were P3, colour parameter P1, texture parameters P2 and P3, taste parameters P1 and P2.

ACKNOWLEDGEMENT

Authors expresses his deepest gratitude to STIKes KHAS Kempek for all forms of support and assistance that have been provided in the implementation of this activity.

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