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Formulation, Sensory, and Nutritional Characterization of Snack Bars Made from Moringa (*Moringa oleifera*) and Lumi-Lumi Fish (*Harpodon nehereus*)

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Abstract: *Moringa oleifera* leaves and Lumi-lumi (*Harpodon nehereus*) contain beneficial nutrients for the human body. The potential utilization of both materials as fortifying agents can improve the nutritional content of snack bars. This research aims to analyze the influence of moringa flour and lumi-lumi fish formulation on the sensory and chemical characteristics of snack bar products. The research design employed an experimental design with a Completely Randomized Design (CRD) involving three treatments: P1 (12 g moringa leaves + 30 g lumi-lumi), P2 (21 g + 30 g), and P3 (30 g + 30 g). Each treatment underwent proximate and organoleptic testing with 74 untrained panelists. The results showed significant differences in color and taste indicators between formulations (p-value <0.001 and 0.035), but no significant differences in aroma and texture (p-value 0.210 and 0.118). Formulation P1 was the most preferred by panelists. Its nutritional content includes 17.58% water, 2.78% ash, 22.18% fat, 2.83% protein, and 56.60% carbohydrates. In conclusion, snack bars made with a combination of moringa flour and lumi-lumi may serve as an acceptable alternative for meeting community macronutrient needs and support local food diversification.

Keywords: lumi-lumi; moringa leaf; nutritional content; organoleptic test; snack bar

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INTRODUCTION

Protein consumption in Indonesia still requires attention, although there is a tendency toward stability in these consumption figures. According to data from the National Food Agency, per capita protein consumption in Indonesia in 2024 was recorded at 61.7 grams per day, lower than the previous year's figure of 62.3 grams (Badan Pangan Nasional, 2025). This figure is still below the recommended protein intake suggested by the World Health Organization (WHO), which is 62-65 grams per capita per day for adults. In 2014, plant-based protein consumption still dominated, accounting for 68.9% of total protein intake. Animal protein consumption was only 31.1% and was lower overall compared to six years prior. Animal protein consumption only reached 26.6% of total protein intake (Anggraini et al., 2024; Bakhtiar et al., 2019).

A snack bar is a solid, bar-shaped snack made from cereals or nuts and fruits that is easy to carry and practical without requiring special conditions (Suloi et al., 2020). Snack bars are usually eaten to reduce hunger, but due to their high fat, sugar, and carbohydrate content, they can be harmful to health. Innovation is needed to make snack bars using other ingredients. The addition of other ingredients is expected to improve body health in addition to meeting energy needs. Moringa is a plant with complete nutritional content that is beneficial for the body (Azizaah, 2022). Research on consumer preferences for snack bars shows that people tend to prefer snack bars with high nutritional content and good taste. Ease of use is also a major reason why they choose it (Kim et al., 2016). Additionally, health-conscious consumers are increasingly interested in innovations in snack bar raw materials, such as the use of healthy natural ingredients (Herdianto et al., 2025).

Moringa oleifera is a type of plant that grows in tropical regions and is considered a miracle plant or superfood because it has incredible nutritional content, such as twice the protein of milk, three times the potassium of bananas, four times the vitamin A of carrots, four times the calcium of milk, and seven times the vitamin C of oranges (Pawiwara et al., 2023). Besides many vitamins and minerals, the moringa plant also contains 18 amino acids that the body needs to build new cells (Krisnadi, 2015).

Lumi-lumi fish, also known as *Harpodon nehereus*, is commonly found in the waters of the West Aceh district due to its delicious taste and affordable price, making it a popular choice among the community. The nutritional value of this fish is very high, with 70% protein and between 1500 and 2500 milligrams of calcium per 100 grams. Lumi-lumi fish usually live in coastal waters and are economically valuable when processed into salted fish. (Rahayu et al., 2023). This fish is generally processed into products like salted fish or fish floss because of its easy-to-process texture.

The high nutritional content and ease of processing make lumi-lumi fish a potential alternative raw material for the production of nutritious snack bars. However, there has been no research examining the use of lumi-lumi fish in the form of a snack bar product combined with other functional foods such as moringa leaves. By combining lumi-lumi fish with other ingredients like moringa flour, this snack bar product is expected to become a healthy snack alternative that is complete in nutrients and easy to consume daily. The high nutritional content and ease of processing make lumi-lumi fish a potential alternative raw material for the production of nutritious snack bars. However, there has been no research examining the use of lumi-lumi fish in the form of a snack bar product combined with other functional foods such as moringa leaves. By combining lumi-lumi fish

with other ingredients like moringa flour, this snack bar product is expected to become a healthy snack alternative that is complete in nutrients and easy to consume daily.

Previous studies have separately incorporated moringa leaves or fish flour into foods like biscuits, noodles, and bars (Pratiwi, 2018; Augustyn et al., 2017; Sarah et al., 2025), aiming to improve the protein, mineral, and sensory qualities of the products . However, no research has combined *Moringa oleifera* leaf flour and lumi-lumi fish (*Harpodon nehereus*) in snack bars—making this a novel approach to developing nutrient-dense, locally sourced functional snacks. Therefore, this study aims to analyze the effect of varying formulations of moringa flour and lumi-lumi fish on the sensory and nutritional characteristics of snack bars. The hypothesis was that different proportions of moringa flour will significantly affect the sensory acceptability and proximate composition of the snack bars.

METHODS

Design, Time, and Place

This research was conducted using an experimental design with a Completely Randomized Design (CRD) approach, employing three treatments and three replications. The study will be conducted from September to December 2024. This research was conducted at the Culinary Nutrition Laboratory, the Food and Nutrition Laboratory, the Agricultural Product Technology (THP) Laboratory of Teuku Umar University, and the Industrial Service Standardization Agency (BSPJI). The formulation of the snack bar using moringa flour and lumi-lumi flour can be seen in Table 1.

Table 1

Formulation of moringa and lumi-lumi snack bar

Formulation	Moringa flour	Lumi-lumi flour
P1	12 grams	30 grams
P2	21 grams	30 grams
P3	30 grams	30 grams

The primary raw materials are moringa flour and lumi-lumi fish meal. Other additional ingredients used are medium-protein wheat flour (blue triangle), chicken eggs, granulated sugar, full-cream milk powder, margarine, water, salt, and sesame seeds. The tools used in this manufacturing process include a bowl for mixing ingredients, a blender and chopper for grinding ingredients, an 80-mesh sieve for filtering dry ingredients, an oven and steamer for the heating process, baking pans as containers for shaping the dough, spoons for measuring ingredients, and a digital scale for precisely weighing the ingredients. The composition of the snack bar ingredients for each formulation can be seen in Table 2.

The production of snack bars begins with two (2) stages: making moringa flour and lumi-lumi flour and making the snack bar dough. It starts with making Moringa flour and lumi-lumi flour. Then, the snack bar dough is made. Snack bar production flowchart can be seen in Figure 1.

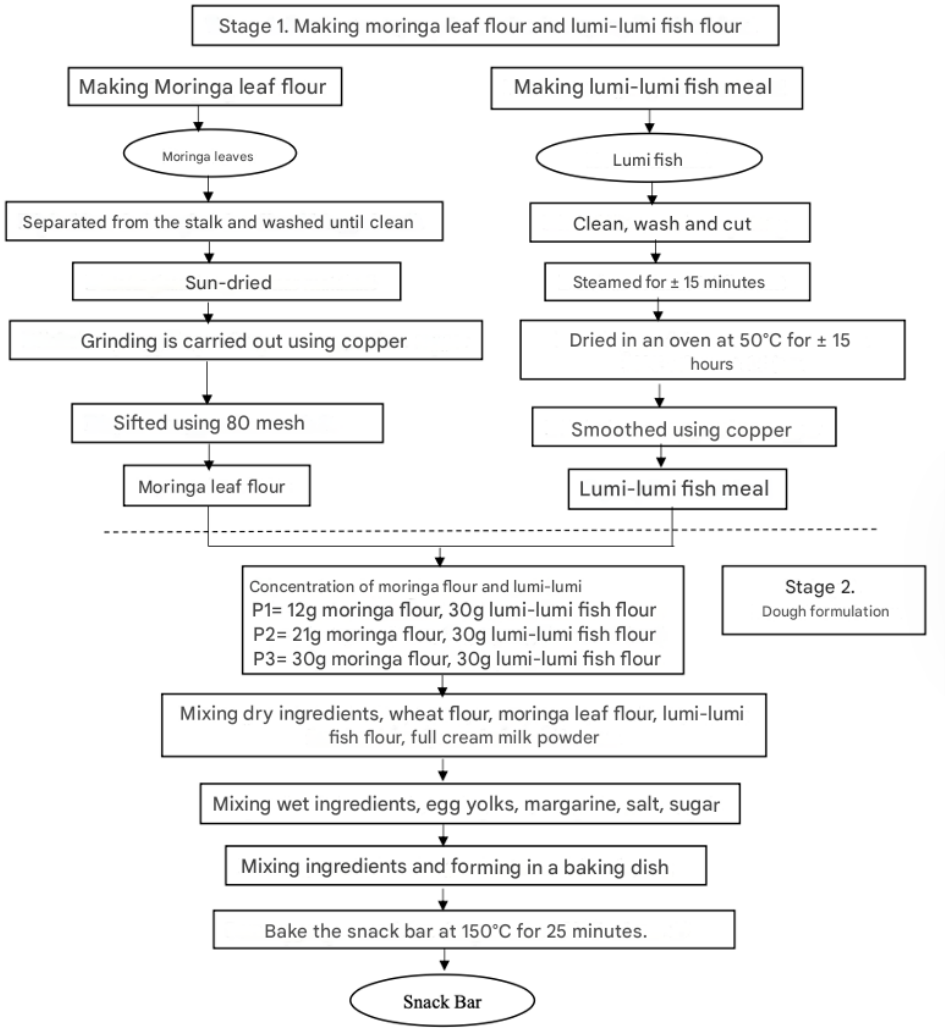
Table 2

Ingredients of moringa and lumi-lumi snack bar

Ingredients (grams)	Concentration of moringa flour and lumi-lumi flour		
	P1	P2	P3
Wheat flour	48	39	30
Moringa flour	12	21	30
Lumi-lumi flour	30	30	30
Egg yolks	30	30	30
Sugar	52	52	52
Milk powder	60	60	60
Margarine	40	40	40
Water	25	25	25
Salt	1	1	1
Sesame seeds	2	2	2
Total	300	300	300

Figure 1

Flowchart of snack bar production



A preference test was conducted on snack bars made from Moringa flour and lumi-lumi flour with three different treatments. The panelists used in the organoleptic test were students from Teuku Umar University who were willing to participate in the organoleptic test. The number of panelists used was 74, which meets the minimum standard for organoleptic testing with untrained panelists. Untrained panelists were selected to assess product acceptance levels from the perspective of the general consumer. Panelist criteria included being 18-25 years old, having no allergies to product ingredients, and being willing to follow testing procedures. Before the test was conducted, the panelists were given a brief explanation on how to fill out the evaluation sheets. The test was conducted in a quiet room with sufficient lighting. Panelists were asked to taste each sample and provide a score based on the attributes of color, aroma, taste, and texture using a 5-point hedonic scale, where 1=strongly dislike, 2=dislike, 3=somewhat like, 4=like, and 5=strongly like. (Lawless & Heymann, 2010).

Data Processing and Analysis

The data from this research study were analyzed using SPSS version 25 software. In the organoleptic test, the Kruskal-Wallis test was used. In the results of the organoleptic test, a normality test was conducted to determine whether the data were normally distributed or not. If the test results for the data have a p-value greater than 0.05 ($p>0.05$), then the data can be said to be normally distributed, whereas if the test results for the data have a p-value less than 0.05 ($p<0.05$), then the data can be said not to be normally distributed. Meanwhile, the nutritional content test was conducted using ANOVA analysis. If there were differences between treatments, Duncan's test was then used with a p-value of $p<0.05$.

RESULTS AND DISCUSSION

Organoleptic analysis

Table 3 shows the results of the organoleptic acceptance analysis of the snack bar formulation. The acceptance analysis in this study included an organoleptic evaluation involving several essential parameters, namely color, taste, aroma, and texture. Each of these parameters plays a role in determining the extent to which the panelists accept the formulated product. The results of this acceptability analysis provide an overview of the panelists' acceptance level of the snack bar formulation developed using Moringa flour and lumi-lumi flour.

Table 3

Sensory characterization of moringa and lumi-lumi snack bars

Parameter	Formulation			p-value
	P1	P2	P3	
Color	3.96 ± 0.85 ^{ab}	3.64 ± 0.85^{a}	3.28 ± 1,07^{a}	0.001
Taste	3.45 ± 0.94^{ab}	3.24 ± 1.16^{a}	2.96 ± 1.22^{a}	0.038
Aroma	2.97 ± 1.13^{a}	2.89 ± 1.11^{a}	2.66 ± 1.08^{a}	0.210
Texture	3.73 ± 0.98^{a}	3.57 ± 0.91^{a}	3.36 ± 1.14^{a}	0.118

Note: The data presented consists of mean ± standard deviation. Different letters in the same row and column indicate a significant difference ($p<0.05$).

Based on the acceptance level analysis presented in Table 2, it is known that the preferred color by the panelists is in P1 with an average score of 3.96 ± 0.85. Meanwhile, the lowest score is in treatment P3, which is 3.28 ± 1.07. The Kruskal-Wallis test results indicate that there is a significant difference among the three snack bar formulations ($p<0.001$). This shows that the formulation in P1 provides a better visual appeal compared to the other formulations.

For the taste attribute, formulation P1 also received the highest score from the panelists with an average of 3.45 ± 0.94, while the lowest score was for P3, which was 2.96 ± 1.22. Based on the results of the Kruskal-Wallis test, it was found that there was a significant difference among the three snack bar formulations ($p=0.038$). This result indicates that the ingredient formulation in P1 provided a taste that was preferred by the panelists compared to P2 and P3.

For the aroma attribute, the panelists preferred P1 with an average score of 2.97 ± 1.13, while the lowest score was for P3 at 2.66 ± 1.08. However, the Kruskal-Wallis test results showed no significant difference among the three snack bar formulations ($p=0.210$). This could be due to the use of similar ingredients in terms of aroma or the fact that the intensity levels of the aroma are not too different between the formulations.

The formulation texture attribute most preferred by the panelists was P1 with an average value of 3.73 ± 0.98, while the lowest value was found in P3, which was 3.36 ± 1.14. However, the Kruskal-Wallis test results again showed that there was no significant difference among the three snack bar formulations ($p=0.118$). This indicates that the texture of all three products is similar in terms of crispness or softness, according to the panelists' perception.

Color

Color is one of the main characteristics of food that determines consumer acceptance. Color is the identity of a product that can be seen on the product and gives an impression to customers about the product (Sulvia & Desparita, 2024). Based on the results of the Kruskal-Wallis test, it was shown that there were significant differences in the organoleptic test for color between the different formulations of Moringa flour and lumi-lumi flour ($p<0.05$). The panelists most preferred the P1 formulation in terms of color, likely due to the blend of ingredients that provided a natural green color, a distinctive but not overpowering aroma, and a balanced taste. From these results, it can be seen that the higher the addition of Moringa flour, the lower the panelists' level of preference for the snack bar product. The green color in the snack bar is caused by moringa leaves, which contain chlorophyll, a natural green pigment found in high concentrations (Krisnadi, 2015).

This is similar to a study on steamed sponge cake products with treatments involving the proportions of wheat flour, banana flour, and Moringa flour, where the cake's color becomes greener as the ratio of Moringa flour (2%) increases (Sari, 2019). Therefore, products containing a balanced amount of moringa leaves are preferred because they produce a color and flavor that is more appealing to the panelists. According to Martiyanti & Vita (2019), some factors that influence the color of brownies are the raw materials used, the processing method, and the chemical components.

Taste

Taste is the most important sensory component because panelists tend to prefer foods with good flavor (Rousmaliana & Septiani, 2019). Based on the statistical test results, the taste difference

between P3 and P1 is significant with a p-value < 0.05, indicating a clear difference in taste preference between the two treatments. Meanwhile, the taste differences between P3 and P2, as well as between P2 and P1, show p-values > 0.05, which means there are no significant differences in taste assessment among those treatments.

From these results, the more Moringa flour added to each treatment, the less it is liked by the panelists. This is because moringa leaves have a bitter taste. Moringa leaves have a unique taste due to their tannin content; when tannins are consumed, cross-links between tannins and proteins form, which can cause an astringent taste (Rosyidah & Ismawati, 2016). This is in accordance with research conducted by Ellya Noor Azizaah (2022), which states that the more Moringa flour is used, the lower the hedonic sensory value of the taste, or the less the panelists like it. This result is consistent with research conducted by (Ardianti et al., 2019), which states that there is a significant difference in taste between products with a small amount of moringa leaf added and those with a larger amount added.

Aroma

Aroma is a stimulus perceived by the olfactory sense. The assessment of aroma is directly related to the sense because it is one of the quality components that can only be measured subjectively (Muntikah & Maryam, 2017). Based on the results obtained, it can be seen that the panelists' level of preference for the product's aroma varies for each formulation. Formulations with a lower amount of Moringa flour tend to be more preferred by panelists, as they produce a more neutral and less pungent aroma. The less preferred aroma is likely due to the increased amount of moringa leaves, which contain chlorophyll and volatile compounds such as the lipoxygenase enzyme that causes a stale odor. This is in line with the research by Augustyn et al. (2017), which states that the aroma of biscuits changes when Moringa flour is added because the musty smell of the Moringa flour has masked the ingredients used. Increasing the amount of Moringa flour used makes the musty aroma of the snack bar stronger.

Similar support was also found in the research by Indriasari et al. (2019), which stated that the more Moringa flour added to food, the more pungent the characteristic moringa leaf smell produced. Moringa leaves have a distinctive fishy aroma. According to Roihanah and Ismawati (2014), this fishy aroma is due to the presence of the enzyme lipoxygenase, which is often found in green vegetables. This enzyme breaks down fats into compounds that cause the fishy smell, including hexanal and hexanol (Ilona & Ismawati, 2015).

Texture

Texture is a physical characteristic of a material or food. Texture can also affect the quality of the material and product; the composition of raw materials used in the processing significantly influences the texture of the food produced (Haeruddin & Ansharullah, 2020). Based on the panelists' observations, the differences in preference levels for texture indicate that the formulation of ingredients plays a significant role in determining the final product outcome. The more preferred textures are generally produced from a balanced combination of ingredients, particularly the amount of Moringa flour and lumi-lumi flour. Adding too much Moringa flour can cause the product to

become firmer and less favored. This is believed to be due to the relatively high fiber content in moringa leaves, which affects the softness of the product.

This finding is consistent with research conducted by Hermawan et al. (2023), the texture of the cookies with the addition of 15 grams of Moringa flour resulted in a cookie texture preferred by the panelists. The analysis of the organoleptic test differences among the three treatments showed that the snack bar made from Moringa flour and lumi-lumi flour did not have a significant difference among the three treatments. Based on the results above, it can be seen that the panelists' assessment of the snack bar's texture decreased as more Moringa flour was added. The more Moringa flour is added, the harder the resulting snack bar becomes.

This is because the flour content varies in each treatment, which affects the amount of water absorbed from the snack bar, impacting the resulting texture. This is because water content influences the appearance, texture, and flavor of food. The texture of a food product is affected by high water content, which makes the product less crispy, while lower water content makes the product crispier (Nurhusna et al., 2020).

Proximate Analysis

The proximate analysis in this study includes the analysis of moisture content, ash content, fat content, protein content, and carbohydrate content. This proximate analysis is used as a parameter for the nutritional content of the snack bar. The results of the nutritional content analysis can be seen in Table 4.

Table 4

Nutritional value of moringa and lumi-lumi snack bars

Nutritional value	Mean ± SD			p-value
	P1	P2	P3	
Water content	17.58 ± 0.17^{c}	11.61 ± 0.51^{a}	14.60 ± 0.14^{b}	0.001
Ash content	2.78 ± 0.02^{b}	2.51 ± 0.01^{a}	2.83 ± 0.07^{b}	0.008
Fat content	22.18 ± 0.07^{a}	24.92 ± 0.09^{c}	24.27 ± 0.16^{b}	0.001
Protein content	2.83 ± 0.01^{a}	2.77 ± 0.11^{a}	2.95 ± 0.02^{a}	0.159
Carbohydrate content	56.60 ± 0.95^{a}	59.63 ± 0.26^{b}	57.16 ± 0.19^{a}	0.027

Note: The data presentation in the table is the mean ± standard deviation. Different letter notations indicate significant differences ($p<0.05$).

Water Content Analysis

The moisture content of snack bar products is influenced by the type and proportion of ingredients used, including Moringa flour and lumi-lumi flour. The variation in water content between treatments indicates that the higher the addition of Moringa flour, the greater the material's ability to bind water. This is supported by the statement of Arwani et al. (2019) that Moringa flour can break hydrogen bonds, causing proteins to bind water and partially coagulate. Additionally, another factor influencing the high-water content is the addition of food ingredients such as margarine, eggs, and sugar. Eggs are a watery food with a water content of 87.8 g (Kemenkes, 2018). Additional supporting ingredients with a reasonably high-water content are margarine at 16 grams

(Alwi et al., 2021). Water content in sugar is 5.4 g (Kemenkes, 2018). Additionally, the high-water content in snack bars can be influenced by several factors, such as the raw materials used, the processing method, the shape, size, thickness, baking time, and baking temperature (Alwi et al., 2021).

According to Pratiwi (2018), the food bar made from Moringa flour and catfish flour had a moisture content of 1.29% (w/w). The results of this analysis showed that the moisture content in the Moringa flour and lumi-lumi flour snack bar was 11.61-17.58%. These results indicate that the moisture content produced was higher compared to the food bar made from moringa flour and catfish flour. As the addition of Moringa flour and lumi-lumi flour increased with each treatment, the moisture content also increased.

The high-water content in the snack bar can affect the organoleptic testing of the product, resulting in a less crispy texture (Nurhusna et al., 2020). The water content in food can affect the raw material's resistance to microbes, so low water content in food can make it last longer and extend the product's shelf life (Amanto et al., 2015).

According to SNI 01-2973-1992 regarding ready-to-eat snack foods, the recommended maximum moisture content for snack bar products is 12%. Therefore, moisture content exceeding this limit can accelerate spoilage and reduce product quality during storage. It is thus essential to maintain moisture content within the recommended limits to ensure that snack bars have a good texture and optimal shelf life.

Ash Content Analysis

Ash content is a mixture of inorganic or mineral substances present in food and organic residue from the burning or oxidation of organic matter. A product's mineral content indicates the amount of minerals in the material, determining the weight of the mineral residue after burning, which is a parameter of the food's nutritional value and is closely related to the material's purity and cleanliness (Simamora et al., 2018). The type and proportion of additional ingredients, such as Moringa flour and lumi-lumi flour, influence the ash content in the snack bar. The higher the content of mineral-rich ingredients like moringa leaves or fish, the higher the ash content tends to be. The analysis results in this study indicate that the ash content produced is lower compared to similar products, such as food bars made from catfish and Moringa flour, which were reported to have higher ash content (Pratiwi, 2018). This is likely due to the different proportions of ingredients and the varying mineral content in each ingredient. Additionally, the roasting process and the use of binding agents can also affect the final ash content of the product.

Based on research conducted by Yuliaet al. (2024), the higher the concentration of Moringa flour in the snack bar formulation, the more the ash content produced tends to increase. This is due to the high mineral content of moringa leaves. The addition of fish meal to the snack bar also contributes to the ash content due to the mineral content of the animal ingredients. According to Dewi et al. (2021) a decrease in ash content can occur due to the use of water in the processing, as the minerals contained can dissolve and be carried away by the water. Additionally, a decrease in ash content can also be caused by differences or variations in the raw material sources used. Other factors influencing the ash content in a food product can also be caused by roasting (Setyadi, 2016).

Fat Content Analysis

The fat content of snack bars is highly influenced by the additives used in the formulation, such as margarine, milk powder, egg yolk, as well as Moringa flour and fish flour. Each ingredient has a different fat content, so the combination and proportion of ingredients will determine the final fat content of the product. For example, margarine contains 81 g of fat per 100 grams, powdered milk 30 g, and egg yolks 10.8 g (Kemenkes, 2018). In contrast, Moringa flour contains approximately 2-3 g of fat per 100 grams (Krisnadi, 2015).

The high fat content in the tested product is most likely caused using these ingredients in sufficiently dominant amounts, especially margarine as the main fat ingredient. Additionally, variations in fat content among treatments can occur due to differences in the proportions of each ingredient in the formulation. High fat content also contributes to the texture, flavor, and shelf life of the product, but excessive amounts can impact storage stability and consumer health.

Protein Content Analysis

Protein is a very important nutrient for the body because, in addition to serving as an energy source, it also builds tissues, supports growth, provides structure, and strengthens the immune system. Proteins play a crucial role in the body's iron metabolism because transferrin transports iron from the intestines to the bone marrow to form hemoglobin (Kusharto & Damayanthi, 2017). The protein content in snack bars formulated with Moringa flour and lumi-lumi flour is influenced by the composition of the raw materials used. Moringa flour has a relatively high plant-based protein content, while lumi-lumi flour is a source of complete animal protein. The combination of both results in a product with sufficiently good protein content to support consumers' nutritional needs.

However, the protein content produced tends to be lower compared to fish-based fish bars made from catfish flour. This can be caused by differences in the protein content of each raw material. Moringa flour, although it contains protein, has a lower content compared to catfish flour. Additionally, the ratio of ingredients, cooking process, and protein loss during heating also contribute to the differences in the final results. Adding a high amount of moringa leaves can indeed increase the micronutrient content, but it does not necessarily significantly increase the protein content. This is consistent with findings from other studies that show the protein level in similar products is also influenced by the type of fish used, drying methods, and formulation recipes.

Carbohydrate Content Analysis

Carbohydrates are the main food that contains calories and are used by the body to produce energy (Adi, 2017). The carbohydrate content in snack bars made with Moringa flour and lumi-lumi flour shows differences between treatments, which can be caused by variations in the proportions of ingredients and the types of flour used. The high carbohydrate level in the product indicates its potential as a greater energy source for consumers. When compared to similar products made with Moringa flour and catfish, the carbohydrate content in this snack bar does not differ significantly, suggesting that the use of lumi-lumi fish does not have a notable impact on carbohydrate content. Variations in carbohydrate levels are also influenced by other additional ingredients in the formulation, such as wheat flour, powdered milk, eggs, and margarine. Each of these ingredients has different carbohydrate contents, so changes in their proportions will affect the final value. According

to the Ministry of Health (2018), carbohydrate contents in some ingredients like wheat flour (74.2 g per 100 g), powdered milk (52 g per 100 g), and eggs (0.7 g per 100 g) contribute significantly to the total carbohydrate content of the product.

This study demonstrates the potential of combining *Moringa oleifera* leaf flour and lumi-lumi fish (*Harpodon nehereus*) to create nutritious, acceptable snack bars. The formulation supports food innovation using local marine and plant-based resources to promote sustainable, functional foods. The results can guide the food industry and small enterprises in developing value-added products with good sensory and nutritional balance.

However, the study was limited by a small scale, a single formulation, and untrained panelists from one age group. It also lacked shelf-life and microbiological analyses. Future research should involve more diverse panelists, assess product stability, and test various processing methods to optimize flavor and nutrition.

CONCLUSION

A snack bar formulated with a combination of *Moringa oleifera* leaf flour and lumi-lumi flour (*Harpodon nehereus*) has the potential to be developed as an alternative food product that can be accepted by the community for meeting macro nutritional needs. For future research, it is recommended to optimize the processing methods and calculate the product's shelf life.

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Author Contribution Statement

Willi Yanti Rumapea: Conceptualization; Methodology; Data Collection; Laboratory Analysis; Writing Original Draft**. Hanif Muchdatul Ayunda:** Supervision; Project Administration; Writing; Review & Editing; Correspondence; Translation. **Safrida Safrida:** Data Curation; Validation; Review Article. **Irzal Fanany:** Data Curation; Validation; Review Article.

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