

## Tuna, Tempe, and Moora-Based Nuggets Prevent Stunting: Organoleptic Tests, Water Content, and ASH Content

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### ABSTRACT

**Background:** Stunting is associated with suboptimal brain development, which has long-term implications for cognitive abilities, school performance, and future employment. There is a relationship between fish consumption and the incidence of stunting in children. Fish nuggets are one alternative to increase fish consumption. Fish nuggets combination of tempeh and moringa leaves can be taught to the community to increase children's protein intake. The nugget formulation used consists of 60% tuna, 20% tempeh, and 20% moringa leaves. The purpose of this study was to determine organoleptic tests, water content and ash content of nuggets made from a mixture of tuna, tempeh and moringa leaves.

**Research Methods:** This study is an experimental research. The research was conducted in the laboratory of the Faculty of Food Technology and Agroindustry, University of Mataram to analyze the water content and ash content of nuggets. Research was also conducted at the taste test laboratory of the Health Polytechnic of the Ministry of Mataram.

**Research Result:** Overall reception 60% Panelists really liked the nuggets made from Tuna, Tempeh and Moringa Leaves. Water content and ash content meet the quality requirements of SNI fish nuggets.

**Conclusion:** The results of the organoleptic test with the parameters of color, taste, aroma, texture, and overall acceptability concluded that the overall acceptability was 60%. Panelists liked Tuna, Tempeh, and Moringa fish-based nuggets. The water and ash content meet the SNI quality requirements for fish nuggets.

### BACKGROUND

Stunting is associated with suboptimal brain development, which long-term impacts cognitive abilities, achievement at school, and future employment (Dewey, 2016). The first 1000 days of life, from conception to two years, is the most critical period for body and brain development (Blake-Lamb et al., 2016). Research on the incidence of stunting in children aged 2-5 years associated with fish consumption has obtained significant results (Nailis et al., 2017). Food ingredients rich in protein, vitamins, amino acids, and minerals are fish (Hosomi et al., 2012). Consumption of marine fish has essential functional components of omega-three polyunsaturated fatty acids such as eicosapentaenoic acid or EPA and docosahexaenoic acid or DHA, which play a rapid role in improving health, including for stunted children (Lordan et al., 2011).

On the other hand, fish with high nutritional value have areas for improvement regarding shelf life and limited processing time, so people are sometimes reluctant to buy and process fish because it takes much time to clean and process the fish (Palmeira et al., 2016). Fish nuggets are an alternative to increasing fish consumption in the form of processed fish products that are easy to make and liked by children. Making fish nuggets can also increase the selling value and reduce post-harvest fish losses. Fish nuggets are a modern

food produced from fish fillets or ground fish meat, with spices, binders such as eggs, various flours, and milk solids coated with a coating (Sarkar et al., 2016).

Moringa has good nutritional value and has been used to prevent malnutrition. It contains vitamins C A, calcium, protein, potassium, and iron (Mbikay, 2012). Moringa bioactive compounds have many biological activities, such as antioxidant, antihyperglycemic, anti-inflammatory, antidiabetic, antimicrobial, and anticancer (Vergara-Jimenez et al., 2017). Research into preventing stunting in children can start during pregnancy when Moringa oleifera leaf extract intervention is given to prevent stunting (Basri et al., 2021).

Tempeh is rich in prebiotics, a type of fiber that can help the growth of good bacteria in the digestive system. The content of dietary fiber and enzymes produced by yeast or *Rhizopus oligosporus* is believed to be very good for children's digestion, so it can reduce digestive problems in children (Dimidi et al., 2019). Tempeh has several advantages compared to soybeans themselves. The advantages of tempeh include high protein, eight essential amino acids, low levels of saturated fat and cholesterol, high in vitamin B12, easy to digest due to its unique cell texture and contains antibiotics, and has a growth-stimulating effect (Rizzo et al., 2016). Research on giving fermented tempeh nuggets (tempeh) can have a good weight gain effect on toddlers, so it is recommended that tempeh nuggets be taught to the public (Suriani et al., 2021).

## METHODS

Organoleptic test analysis uses sensory analysts consisting of 30 trained panelists. Trained panelists know the sensory properties to be assessed, have received basic training, and understand sensory explanations. The panelists were students from the final semester of the Nutrition Department. The panelists explained the test's purpose so that conclusions were not drawn incorrectly. The categories of taste, color, texture, aroma, and overall are organoleptic assessment criteria that use a 5-level hedonic scale: very like, like, dislike, do not like, really do not like. Making nuggets in this study used one formulation, namely 60% tuna, 20% tempeh, and 20% moringa. They used one egg and 100 g of bread flour for additional ingredients. Water content was analyzed using the oven method with the procedure: (1) The oven was conditioned until it was stable at a temperature of 95°C-100°C (2) The empty cup was placed in the oven for 120 minutes (3) The cup was moved using a desiccator for 30 minutes with the results weighing the weight of the empty Ag cup (4) 2 g which has been homogenized then put it in the Bg cup (5) The nugget cup is vacuumed at a temperature of 95°C-100°C, air pressure not more than 100 mmHg for 5 hours (6) The cup is moved into the desiccator for 30 minutes then weigh the Cg (7). The test is carried out at least twice (Duplo).

Ash content was analyzed using the method recommended by SNI, namely dry ashing using a furnace. The equipment is a porcelain cup, electric furnace, and analytical balance. How the ash content analysis works is as follows: (1) 2 g of nuggets are weighed into a cup of known weight (2) Arrested over a burner flame and then ashed in an electric furnace with a maximum temperature of 550°C until complete ashing (3) Cool in a desiccator, then weighed until the weight remains constant.

## RESULTS AND DISCUSSION

### Organoleptic Test Of Nuggets

**Table 1. Organoleptic Test Results With Parameters of Color, Taste, Aroma, Texture, and Overall Acceptability**

Test Parameters	n	%
<b>Color</b>		
Really like	11	36,7
Like	15	50
Do not like it much	4	13,3
Do not like	0	0
Very dislike	0	0
<b>Flavor</b>		
Really like	16	53,3
Like	12	40
Do not like it much	2	6,7
Do not like	0	0
Very dislike	0	0
<b>Aroma</b>		
Really like	12	40
Like	18	60
Do not like it much	0	0
Do not like	0	0
Very dislike	0	0
<b>Texture</b>		
Really like	11	36,7
Like	17	56,6
Do not like it much	2	6,7
Do not like	0	0
Very dislike	0	0
<b>Overall receptivity</b>		
Really like	18	60
Like	12	40
Do not like it much	0	0
Do not like	0	0
Very dislike	0	0

Based on Table 1, it can be seen that 36.7% of the panelists liked the color of the nuggets, and 53.3% of the panelists liked the taste of the nuggets. In the nugget aroma category, 60% of panelists said they liked it, while 36.7% liked the nugget texture. Overall acceptance: As many as 60% of panelists said they liked the nuggets based on Tuna, Tempeh, and Moringa fish. Other studies also used the exact parameters of questions about color, taste, aroma, and overall acceptability given to participants to determine whether they noticed changes in the food made after modification. In some cases, evaluations were conducted using local consumers/volunteers, while other studies used laboratory evaluations and experts for sensory panels. Studies observed varying levels of parameters in foods, and high overall acceptability was reported in most studies (Wegmüller et al., 2006).

### Nugget Water Content

**Table 2. Nugget Water Content**

Weight of empty weighing bottle (g) A	Sample		Weigh bottle + sample before oven (g) B	Weighing bottle + sample After oven (g) C	Water content (%)
	Code	Heavy (g) W			
16,5855	Nugget	2,0253	18,6108	17,7612	41,95

Calculation of nugget water content uses a calculation formula :

$$\text{Water content} = \frac{B - C}{B - A} \times 100\%$$

Based on Table 2, the nugget water content results were 41.95%. The results of measuring the water content of tuna, tempeh, and moringa-based nuggets still meet the fish nugget quality requirements set by SNI 7758-2013, not exceeding 60.0% water content.

### Nugget Ash Content

**Table 3. Nugget Ash Content**

Empty Crucible Weight (g) <b>W2</b>	Sample		Crucible weight + sample after ashing (g) <b>W1</b>	Results
	Code	Initial weight (g) <b>W</b>		Ash Content (%)
27,1492	Nugget	2,0673	27,1761	1,30

Calculation of nugget ash content uses a calculation formula:

$$\text{Ash Content} = \frac{W1 - W2}{W} \times 100\%$$

The ash content in this study was 1.30%, which means that fish nuggets based on tuna, tempeh, and moringa meet the SNI requirements for fish products with an ash content not exceeding 2.5%. The results of this research are in line with other research on tuna fish mixed with spinach with a higher tuna fish formulation (80:20), which is the best nugget processing and also meets the quality requirements for fish nuggets (SNI 01-7758-2013) with a water content of 56.82% , ash content 1.44% (Hamzah et al., 2022).

### CONCLUSIONS

The results of the organoleptic test with the parameters of color, taste, aroma, texture, and overall acceptability concluded that the overall acceptability was 60%. Panelists liked Tuna, Tempeh, and Moringa fish-based nuggets. The water and ash content meet the SNI quality requirements for fish nuggets.

### SUGGESTION

Further research regarding the macro and micronutrient content of Tuna, Tempeh, and Moringa fish-based nuggets.

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