Global Scientific JOURNALS

Fortification of *Nilem* (*Ostheochilus hasselti* CV) Fish Flour Against the Favorite Levels of the Dumpling Skin

Febrian Kris Avisca[1,*], Junianto[2], Evi Liviawaty[2], Ibnu Dwi Buwono[2]
[1]Fisheries Major, Fisheries and Marine Sciences Faculty, Padjadjaran University.
Jatinangor 45363, West Java, Indonesia

[2]Fisheries and Marine Sciences Faculty, Padjadjaran University.
Jatinangor 45363, West Java, Indonesia

*E-mail address : febkrisca17@gmail.com

Abstract

This research aims to determine the percentage level of addition of *nilem* fish flour to the production of the most preferred dumpling skin products organoleptically. The method in this research was experimental with 4 treatments the level of addition of *nilem* fish flour namely 0.0%, 2.5%, 5.0%, and 7.5%. The parameters observed were the level of preference for the color, aroma, texture, and taste of dumpling skin from all organoleptic treatments. The parameters observed were the level of appearance, aroma, texture, and taste of dumpling skin from all treatments carried out organoleptically and proximate testing (protein content, ash content, fat content, and moisture content) on the control treatment and the most preferred. The results of the study concluded that the addition of *nilem* fish flour by 5.0% was the most preferred treatment based on organoleptic characteristics with a median value of 7 colors, aroma 7, texture 8 and flavor 7 and an alternative value of 7.29 and having protein content 17.45 %, ash content 3.21%, fat content 23.84% and moisture content 3.22%.

Keywords: nilem, flour fish, favorite levels, dumpling skin.

1. INTRODUCTION

Nilem fish in Indonesia is known as *nilem*, *lehat*, *magut*, and carp. Spread areas include: Malaysia, Thailand, Vietnam, Cambodia, Indonesia (Java, Sumatra, Kalimantan and Sulawesi) can be seen in Figure 1. The classification of *nilem* fish is:

Phylum: Chordata
Class: Actinopterygii
Order: Ostariophysi
Family: Cyprinidae
Genus: *Ostheochilus*
Species: *Ostheochilus hasselti* CV

Figure 1. *Nilem* Fish *(Ostheochilus hasselti CV)*
Source: personal documentation

    Nilem fish contains protein content of 15.95%, moisture content of 77.37%, an ash content of 1.32%, and fat content of 4.35%. *Nilem* fish can be used as a variety of processed food products. *Nilem* fish have quite a lot of small thorns so that the lack of interest in processing in *nilem* fish. Production of *nilem* fish compared to other fish tends to decrease due to a lack of processing utilization of *nilem* fish.

    Indonesia is a country with a level of fish consumption of 46.49 kg/capita/year in 2017. This figure is relatively low when compared to other countries such as Singapore and Malaysia. The level of fish consumption in Singapore reaches 48.9 kg/capita/year and Malaysia reaches 56.2 kg/capita/year.

    Efforts to increase fish consumption and increase nutrition, especially its protein in food, can be done in the presence of food diversity. The diversity of food can be processed into various kinds of flour through various processing processes.

    Fish flour is a solid product produced by removing part of the water and some of the fat or entirely in fish or the rest of the fish. Fish meal contains protein, minerals, and vitamin B, high-quality fish meal contains 6 -10% water, 5-12% fat, 60 -75% protein, and 10-20% ash. Fish meal is one of the ingredients that have the potential as a source of protein. *Nilem* fish flour can be used as a preparation that can increase the protein content of a product. One example is dumpling skin.

    Dumplings are food products originating from China which are often called wonton. Wonton made from flour, tapioca flour, water, eggs, salt, and butter and printed in sizes 8-10 cm with a thickness of 0.5 - 1 mm. In general, wonton can be served by boiling or frying. In Indonesia wonton is known as dumpling skins. Dumpling skins content usually has a low protein content, only a high carbohydrate content due to flour-based. This is an added value for dumpling skins products if fortification or enrichment of the nutrients in fish is carried out. One food ingredient that has complete protein content, omega 3 sources, minerals and vitamins can be obtained from fish.

    Fortification is defined as the addition of nutrients to food ingredients. Fortification of food aims to increase the nutritional value of food and also to increase the consumption of certain nutrients by the community. Efforts to improve nutrition in food products especially dumpling skin can be done by adding fish flour. All types of fish can be used as fish flour, one of which is *nilem* fish. *Nilem* fish flour has a high protein content, so it can make food products high in protein content. The addition of *nilem* fish flour which will be added to the dumpling skins mixture must also have a limitation of additions to remain favored by consumers. This research aims to determine

the percentage level of addition of *nilem* fish flour to the production of the most preferred dumpling skins products organoleptically.

2. MATERIALS AND METHODS
2.1   Materials and Tools

Tools used: digital scales, pans, basins, stoves, spatulas, roll pins, spoons, label stickers, knives, ovens, 100 mesh sieves, plastic bags, plates, grinders, cutting boards, *langseng*, stirrers, and stationery. Dumpling skins dough ingredients used: flour, tapioca flour, chicken eggs, salt, butter, water, *baking powder*, *nilem* fish flour, and cooking oil.

2.2   Research Methods

The method used in this research is the experimental method. The treatment used is by adding *nilem* fishmeal based on the weight of flour, as follows:
1.   Treatment A (control): without adding *nilem* fish flour.
2.   Treatment B: The addition of *nilem* fish flour as much as 2.5%.
3.   Treatment C: addition of *nilem* fish flour as much as 5%.
4.   Treatment D: addition of *nilem* fish flour as much as 7.5%.

The formulations used in this research are as follows:

Table 1. Formulation of Dumpling skins Making

Material	Treatment (%)			
	A	B	C	D
Wheat Flour (g)	100	100	100	100
Nilem Fish Flour (g)	0	2.5	5	7.5
Tapioca Flour (g)	10	10	10	10
Salt (g)	2	2	2	2
Butter (g)	5	5	5	5
Chicken Eggs (g)	10	10	10	10
Water (g)	5	5	5	5
Backing Powder (g)	1	1	1	1

Source: Putri (2015) modified

A.   The Process of Making *Nilem* Fish Flour
Making *nilem* fish flour refers to the modified Nutrition Research Institute (Efrianti 2013) as follows:
1.   *Nilem* fish are washed and separated and then drained.

2. Next, the fish meat is steamed until soft, this steaming takes ± 15 minutes from when the water starts to boil.
3. Steamed *nilem* and then the meat is taken and roughly ground using a food processor.
4. Coarse grind on *nilem* fish meat then oven at 150 ° C for 45 minutes / 100 grams of *nilem* fish meat mill.
5. Next, the *nilem* fish flour is ground again using a mortar and press it to get a smooth *nilem* fish flour.
6. The resulting flour is sifted using a sieve (100 mesh) so that it gets smooth *nilem* fish flour.

B.   The Process of Making Dumpling Skin
The process of making dumpling skins refers to the research modified Putri (2013). The stages of making fish dumpling skins are as follows:
1. Making the dough: flour, tapioca flour, *nilem* fish flour (according to the dose concentration of 0%, 2.5%, 5%, 7.5%) and salt, mixed and then sifted then eggs and butter are put into the mixture. After that, the mixture is kneaded. After being smooth, the mixture is rounded.
2. Dough printing: the dough is inserted and ground thinly on the roll pin mill with a thickness of No. 8 and repeated 2-3 times until slippery. The higher the thickness number the thinner the dough sheet. Finally, the dough is printed with a square shape with a side length of 5 cm.
3. Frying: oil is heated in medium heat until the oil feels hot at ± 160oC, a piece of dumpling skin the one that has been printed is then fried using a lot of oil until it's all submerged in oil (deep frying). During the frying process, the product continues to be stirred to get even and good development of dumpling skin. Frying is done for ± 3 minutes. Lift until the dumpling skin is brownish yellow and dry.

2.3   Parameters Observed
Observations made are organoleptic (hedonic test) and composition proximate (protein, water, ash, and fat). Organoleptic carried out by hedonic tests include observing the color, aroma, texture, and taste of dumpling skin. The test was carried out by 20 semi-trained panelists. Panelists are asked to fill the Favorite Level Test Questionnaire according to personal opinion. The numerical scale consists of five types, namely; 1 (very dislike), 3 (dislike), 5 (neutral / normal), 7 (like), and 9 (really like). Composition proximate (protein, water, ash, and fat) in *nilem* fish flour, dumpling skin without additions *nilem* fish flour and dumpling skin with the best treatment additions *nilem* fish flour.

A.   Hedonic test (favorite test)

This test aims to identify the panelist's response to crackers based on organoleptic characteristics that include the appearance, smell, flavor, and texture. Based on its favorite level, the organoleptic test is done with 20 semi-trained panelists the favorite level of the panelist is used in a range from 1 to 9, namely:
   • 1 = very dislikes
   • 3 = Do not like
   • 5 = neutral/Ordinary
   • 7 = Likes
   • 9 = very fond
The rejection limit for this product is if the product is tested to acquire a value of ≥ 5 then the product is stated to be accepted by a panelist.

A.   Proximate Testing
1. Protein Content
Protein content Analysis of protein content is done with method Kjeldahl. The determination method covers stages of destruction, distillation, and titration. Stage destruction does for change the protein inside ingredients into ammonium salt sulfate.
✓   The length of destruction

The destruction stage is carried out to convert the protein into the material into an ammonium sulfate salt. This salt is reacted with bases and ammonia is evaporated to be absorbed in a solution of boric acid. The amount of nitrogen contained can be determined by the stage of titration with HCl.

- A sample of 2 grams is inserted into the 30 Kjeldahl flask ml
- Added 1.9 gr K_2SO_4, kjeltab 40 mg type HgO and 2.5 ml H_2SO_4 concentrated
- The sample is boiled until the clear liquid is approximately 1-1.5 hours, cool the sample and transfer it to a distillation device
- Rinse with water 5 to 6 times with distilled water (20 ml) and the rinse water is also included in the container below the condenser with the tip of the condenser submerged in it.
- Add a 40% NaOH solution to 20 ml into the test tube. The liquid at the end of the condenser is accommodated with 125 ml Erlenmeyer containing a solution of H_3BO_3 and 3 drops of indicator (0.2% methyl red mixture in alcohol and 0.2% methylene blue in alcohols with a ratio of 2: 1 which is placed under the condenser.

✓ Distillation stage
- Distillation is carried out until approximately 200 ml of distillate is mixed with H_3BO_3 and the indicator in Erlenmeyer.

✓ Titration stage
- Distillation is titrated by using 0.1 N HCl until the color changes from green to red.

The volume of the titrant is read and recorded.

Percentage sample protein levels counted with formula :

$$\text{Protein Content} = \frac{(b-c) \times N \times 0{,}0105 \times 14{,}008 \times 100\%}{\text{Weight example} \times 100\%}$$

$$\% \text{ Protein} = \% N \times 5{,}70$$

Description :
b = blank titration
c = titration example

B.   Moisture Content

Analysis of moisture content is based on differences in the weight of the sample before and after drying. The aim is to determine the amount of water in a material determined from the weight reduction of a material that is heated at the test temperature. The working steps for testing moisture content are as follows:

- The empty cup to be used is dried in the oven for 15 minutes then weighed.
- A total of 2 g of the sample was put into a cup and dried in an oven with a temperature of 105-110°C for 3-4 hours until constant.
- The cup is cooled in a desiccator.
- The cup is weighed back.

Percentage sample moisture content counted with formula:

$$\text{Moisture }(\%) = \frac{B1 - B2}{B} \times 100\%$$

Description:

B   = Sample weight (g)
B1   = Weight (sample + cup) before drying
B2   = Weight (sample + cup) after drying

C.   Ash Content

Analysis of grade ash used the oven method, which is combustion or ignition of organic materials which are broken down into water (H_2O) and carbon dioxide (CO_2) but substance inorganic does not burn out. This inorganic substance is called ash. Procedure analysis of grade ash as following: the cup which will use oven especially first for 30 minutes at a temperature of 100 to 105ºC, then cooled in a desiccator to remove moisture and weigh (A). Sample weighed as much as 5g in the dried cup (B) and then burned on a burner until it was not smoky and continued with the ignition in a furnace with a temperature of 550-600ºC until perfect blending. The ignited sample is cooled in a desiccator and weighed (C). The stage of combustion in the kiln is repeated until a constant weight is obtained.

Percentage sample ash content counted with the formula:

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

Description:
A: the weight of an empty cup is expressed in gram
B: the weight of the cup + the initial sample is expressed in gram
C: the weight of the cup + the dry sample is expressed in grams

D.   Fat Content

Analysis of fat content was done with the Soxhlet method, which is fat found in the sample extracted using non-polar fat solvents. The procedure of fat content analysis as the following: fat pumpkin was put in the oven for 15 minutes at a temperature 105ºC, then cooled in the desiccator for eliminating steam for 15 minutes and weighed (A). Sample weighed as much 5 grams (B) then wrapped in paper lead, closed with fat-free and included too into Soxhlet extraction that has been connected with a fat pumpkin that has been oven and known its weight. Solvent hexane poured to sample submerged and done reflux or extraction of fat for 5-6 hours or solved fat down to colored pumpkin fat clear. Solvent fat already used, distilled and accommodated after that existing fat extract in fat pumpkin dried in the oven at 100-105ºC for 10 minutes, then fat pumpkin cooled in a desiccator for 15 minutes and weighed (C).

Percentage sample fat content counted with the formula:

$$\% \text{ Fat} = \frac{C-A}{B} \text{ x } 100\%$$

Description:
A: the weight of an empty round flask is expressed in gram
B: the weight of the sample is expressed in gram
C: the weight of the round bottom and fat flask extracted in grams

2.4   Data Analysis

Data obtained in the form of organoleptic data and composition proximate (protein, water, ash, and fat). in *nilem* fish flour, dumpling skin without additions *nilem* fish flour and dumpling skin with additions *nilem* fish

flour by 5%. Organoleptic data were analyzed non-parametric statistically using a two-way analysis of the test *Friedman*. The purpose of the *Friedman* test was to determine the effect of fish flour fortification on the observed parameters (color, texture, aroma, and taste). The statistics used in the Friedman test are defined by the following formula:

$$X^2 = \frac{12}{bk(k+1)} \sum_{i=1}^{t} (Rj)^2 - 3b\,(k+1)$$

Information:
X^2 =Statistics *Friedman Test*
B   = Repeat
K   = Treatment
Rj   = Total Ranking of each treatment

Furthermore, to determine the best treatment, the *Bayes* method is used. *Bayes* method is one technique that can be used to carry out analysis in the best decision making from several alternatives to produce gains that consider various criteria. The criteria in question are parameters of color, aroma, texture, and taste. The geometric formula is:

$$X_G = \sqrt[n]{\Pi\,,Xi}$$

Information:
X_G = geometric average
Π = permutation
N   = number of panelists
Xi   = rating from the i panelist

Completion of the results of the comparison is done by matrix manipulation to determine the criteria weight.

Proximate data analyzed in manner descriptive comparative, with compare composition chemical on dumpling skin without additions *nilem* fish flour with dumpling skin best treatment added with *nilem* fish flour.

3. RESULTS
3.1 Hedonic Test
3.1.1 Color

Assessment color is a judgment that first is seen by consumers who determines reception panelist before finally spread to factors other things (aroma, texture, and taste). Results test the level of preference for the dumpling skins color are listed in Table 2.

Table 2. Color Favorite Level Test Results

Addition *Nilem* Fish Flour (%)	Median Value	Average Color
0	7	7,2 a
2,5	7	7,2 a
5	7	7,5 a
7,5	7	6,8 a

Information: Values followed by the same letters vertically show no significant difference based on the Friedman test at the level of 5%.

The results of the statistical analysis showed that the addition of *nilem* fish flour to dumpling skins did not affect the level of color preference. The results of the panelist's assessment of the dumpling skins color were known as the median value of 7 and the average value ranged from 6.8 to 7.2, which means that the dumpling skins color ranged normally or was still accepted by panelists. The highest average color value is found in the treatment of the addition of *nilem* fish flour by 5%, namely 7.5 and the median value of 7 (preferred) with a brownish yellow color. The lowest average value of color is found in the additional treatment of 7.5% which is 6.8 and the median value is 7 (preferred) with the brownish dumplings color. The higher the addition of *nilem* fish flour will produce a darker dumpling skin color.

This is following the Iman (2017) statement, which states that the use of fish flour which is higher will affect the color of the darker color, but it does not affect the level of acceptance of the panelists.

The speed and pattern of browning reactions are influenced first by the nature of amino acids or proteins that react and the nature of carbohydrates also by temperature, pH, water, oxygen, metal, phosphate, sulfur dioxide and other inhibitors which means that each type of food can show a pattern different browning. The difference in color levels in each treatment of dumpling skins with the addition of *nilem* fish flour was due to the protein content in *nilem* fish meat which was exposed to high temperatures in the frying process and the length of frying.

The average color of dumpling skins with the addition of *nilem* fish flour showed that in all treatments (0%, 2.5%, 5%, and 7.5%) it was not significantly different so that it was at the level of the panelists' preference for all treatments. The treatment of adding 5% *nilem* fish flour is the best treatment for texture parameters because it has the highest average value.

3.1.2 Aroma

The aroma is one of the parameters in determining the good taste of a food product by using a sense of smell because it can quickly provide an assessment of the product preferred or not. Test results for the level of dumpling skins preference are listed in Table 3.

Table 3. Aroma Favorite Level Test Result

Addition *Nilem* Fish Flour (%)	Median Value	Average Aroma
0	7	7,5 a
2,5	7	7,1 a
5	7	7,3 a
7,5	7	6,9 a

Information: Values followed by the same letters vertically show no significant difference based on the Friedman test at the level of 5%.

The results of the statistical analysis showed that the addition of *nilem* fish flour to dumpling skins did not affect the level of aroma preference. The results of the observations in Table 3 the scent of dumpling skins with the addition of *nilem* fish flour obtained a median value of 7 which is included in the preferred category. The average scent of dumpling skins ranges from 6.9 to 7.5.

The 0% treatment which is a treatment without the addition of *nilem* fish flour has the highest average value that is equal to 7.5 compared to the others. Whereas with the addition of *nilem* fish flour, it will reduce the level of dumpling skins aroma preference. This can be caused by the distinctive aroma of dumpling skins rather reduced due to the addition of *nilem* fish flour that has a fishy aroma. This is evidenced by the dumpling skins with 7.5% treatment which has the lowest favorite value. The dumpling skins has a distinctive aroma of dumpling skins and the scent of fish meat is less smelled by the panelists because the percentage of fish meal is not too much.

This is following Khalisi (2011) statement, which states that the higher addition of *tembang* fish flour will reduce the level of aroma preference in *rangginang* caused by fishy odor produced from fish flour.

The average aroma of dumpling skins with the addition of *nilem* fish flour showed that in all treatments (0%, 2.5%, 5%, and 7.5%) it was not significantly different so that it was at the level of the panelist's preference for

all treatments. Treatment without the addition of *nilem* fish flour (control) is the best treatment for aroma parameters because it has the highest average value.

3.1.3 Texture

The texture is a food quality factor to determine the level of crispness that can affect the reception of food products. Texture can affect the image of food and is important in soft and crispy foods. The test results for the level of preference for dumpling skins texture are shown in Table 4.

Table 4. Texture Favorite Level Test Results

Addition *Nilem* Fish Flour (%)	Median Value	Average Texture
0	7	7,2 ab
2,5	7	7,3 ab
5	8	7,5 b
7,5	5	6,0 a

Information: Values followed by the same letters vertically show no significant difference in the *Multiple Comparison* test at the level of 5%.

The result of statistical analysis showed that the addition of *nilem* fish flour the dumpling skins influenced the level texture preference so that *multiple comparisons* were conducted. Based on multiple comparison tests showed that the treatment was 0%, 2.5% did not significantly affect the treatment of 5% and 7.5%, however, the 5% treatment was significantly different from the treatment of 7.5%. Because the dumpling skins texture at 5% treatment is crisper compared to 7.5% treatment. The 5% treatment is most preferred by panelists with a crisp and easily bitten texture, while the treatment of fortification of *nilem* fish flour is 7.5%, resulting in a less crispy texture.

Based on the texture parameters of dumpling skins, all treatments were still accepted by panelists with a median range of between 5 and 8, which meant that they were included in the normal category to be preferred. The highest average value is found in the treatment of 5% which is equal to 7.5, while the lowest average value is found at 7.5%, which is equal to 6.0.

The addition of *nilem* fish flour to 5% can increase the level of preference for dumpling skin. However, with further additions as in the 7.5% treatment, it will reduce the level of preference for dumpling skin. This is under the Iman (2017) statement, which states that the average value of sensory tests on texture decreases with increasing concentration of tilapia flour, small crispness can be influenced by thickness in thickness, moisture content and protein content contained in the material.

The good crispy dumpling skin is obtained because the dough is made as thin as possible and not too thick because if it is too thick it will affect the crispness of the dumpling skins which is closely related to the water content to the level of protein. Protein has a hydrophilic nature that has high water absorption. The absorption of water is caused by the presence of carboxyl groups in proteins, so that the higher the protein content in a product, the texture tends to be harder or less crisp. The treatment of adding 5% *nilem* fish flour is the best treatment for texture parameters because it has the highest average value.

3.1.4 Taste

Taste is a very decisive factor in the final decision of consumers to accept or reject a food, because even though the other parameters are good but if they have an unwelcome taste, the product will be rejected. The results of testing the level of preference for the taste of dumpling skins are shown in Table 5.

Table 5. Taste Level Test Results

Addition of *Nilem* Fish Flour (%)	Median Value	Average Taste
0	7	7,3 b
2,5	7	7,4 b
5	7	7,7 b
7,5	5	5,7 a

Information: Values followed by the same letters vertically show no significant difference in the *Multiple Comparison* test at the level of 5%.

Analysis result statistics to show that the addition *nilem* fish flour on the dumpling skins gives away influence to level a flavor, so conducted a comparison test *(Multiple Comparison).* Based on multiple comparison tests show that the treatment of 0%, 2.5%, 5% does not have a real difference between treatments. However, the treatment of 7.5% had a significant difference in other treatments. Because the taste of the treated 7.5% dumpling skin has a more dominant taste of *nilem* fish flour, thus eliminating the savory taste of the typical dumpling skins compared to other treatments.

Based on the taste parameters of dumpling skin*,* all over treatments still accepted by panelists with range median value between 5 and 7, means including in category normal to like. The highest average value present in 5% of treatment that is equal to 7.7, whereas the lowest average value is found in 7.5% treatment, namely amounting to 5.7.

The 5% treatment is the most preferred treatment by the panelists for the treatment of the taste of fish flour enough fish strong however permanent maintaining a savory taste typical dumpling skin. Whereas on the dumpling skin with 7.5% treatment, experienced a strengthening of flour flavor *nilem* fish and savory taste from typical dumpling skins reduced, so get value lowest.

This corresponding with Khalisi (2011) statement, which states that addition *tembang* fish flour 5% in *rangginang* more liked by panelists compared with addition *tembang* fish flour other because of additions *tembang* fish flour 5% more give away the right taste. The provision of *nilem* fish flour which is more and more causes the level of taste of the panelists to decline because in the *nilem* fish flour there are amino acids that cause a bitter taste. This is per the opinion of Pratama et al. (2018) that amino acids play a role in the basic taste of a product because of the presence of glycine, alanine, valine, leucine, tyrosine, and phenylalanine in a peptide will give a bitter taste.

Use *nilem* fish flour increasingly high will make sense more no liked by the panelist. This evidenced in the treatment 7.5% can bring down level goodness dumpling skin because the taste is produced less liked by panelists. However, in a manner overall, a taste of addition *nilem* fish flour to dumpling skins still could be accepted by the panelists because of the average value on the whole treatments still above the limit rejection that is above value 3. Treatment additions *nilem* fish flour 5% is treatment best on taste parameters because it has the highest average value.

3.1.5   Bayes Method

Bayes method aims to determine the best treatment based on the characteristics of color, aroma, texture, and taste. This method is one of the best decision-making techniques that aim to produce the most appropriate decisions. Taking the best decision for the dumpling skins using the Bayes method. The results of the calculation of the weight criteria for dumpling skin are presented in Table 6.

Table 6. Weight Criteria Score Dumpling skin

Criteria	Weight Criteria
Color	0,14
Aroma	0,10
Texture	0,22
Taste	0,55

Based on result calculation of the parameters of the color, aroma, texture, and taste of the dumpling skin, obtained total weight highest is the taste parameter of 0.55, followed texture 0.22, color 0.14, and aroma 0.10. This shows the taste parameter is judgment most important or as consideration main according to panelists in choose product dumpling skin *nilem* fish flour.

Table 7. Bayes Method Assessment Decision Matrix

Treatment (%)	Criteria				Alternative Value	Priority Value
	Color	Aroma	Texture	Taste		
0	7	7	7	7	7,07	0,26
2,5	7	7	7	7	7,07	0,26
5	7	7	8	7	**7,29**	**0,27**
7,5	7	7	5	5	5,53	0,21
Criteria Value	0,14	0,10	0,22	**0,55**	26,96	1,00

Based on the calculation method Bayes obtained results that dumpling skins with treatment fortification *nilem* fish flour 5% is the most preferred treatment by panelists based on hedonic tests because they have value alternatives and values priority highest that is at 7.29 and 0.27. In order second that is fortification *nilem* fish flour 0% and 2.5% are the same have value alternative amounting to 7.07 with value priority of 0.26, then followed with treatment 7.5%, with value alternative 5.53 and value priority 0.21.

3.2 Proximate Test

The test results of proximate among them levels of protein, ash, water, and fat. The test result of proximate *nilem* fish flour, dumpling skin in the treatment without additions *nilem* fish flour (0%) and on treatment 5% addition *nilem* fish flour, can be seen in Table 7.

Table 7. Proximate Test Results

Chemical Content	Treatment		
	Nilem Fish Flour	0%	5%
Protein	40.48	7.88	17.45
Ash	5.63	2.09	3.21
Water	7.51	3.22	2.29
Fat	6.35	22.71	23.84

Source: Animal Husbandry Nutrition Laboratory and Animal Husbandry Chemistry Faculty of Animal Husbandry,
Padjadjaran University.

3.2.1 Protein Content

Protein is a food substance that is important for the body. Aside from being a fuel, protein also functions as forming new tissues that always occur in the body and replace damaged body tissues. So that the main function of proteins is to form new tissue and maintain existing tissue. The value of protein content from the proximate test results of dumpling skin without the most preferred addiction and treatment can be seen in Table 7.

The protein content of dumpling skin without the addition of *nilem* fish flour has a protein content of 7.88, while dumpling skin with the most preferred *nilem* fish flour has a protein content of 17.45. Based on the results of measurements of protein levels in dumpling skin showed that with the addition of *nilem* fish flour, the protein content increased.

Increased protein content in dumpling skin is influenced by the ingredients used. The biggest source of protein for dumpling skin is obtained from *nilem* fish flour. *Nilem* fish flour has a protein content of 40.48%. The higher content of *nilem* fish flour can increase protein content in a product. The protein from *nilem* fish flour contributes the most to affect the protein content of dumpling skin, so the higher the concentration of addition of *nilem* fish flour the higher the protein content of dumpling skin.

3.2.2 Ash Content

Ash is an inorganic substance leftover from the combustion of organic material. The value of ash content from the proximate test results of dumpling skin without the most preferred addiction and treatment can be seen in Table 7.

Levels of dumpling skins ash without the addition of *nilem* fishmeal by 2.09%, while the dumpling skins with the addition of *nilem* fish flour is the most preferred which is 3.21%. Based on the results of measurements of ash content in dumpling skin showed that with the addition of *nilem* fish flour, the ash content increased.

The dumpling skin produced in the addition of the most preferred *nilem* fish flour treatment has a higher ash content than the control treatment, obtained from the ingredients of *nilem* fish flour which has an ash content of 5.63%. The ash content of *nilem* fish flour can increase the ash content of dumpling skin. High ash values indicate high levels of minerals that are very important in terms of nutrition.

3.2.3 Fat Content

Fat is a source of energy for the body that can provide greater energy value than carbohydrates and proteins. The value of fat content from the proximate test results of dumpling skin without the most preferred addiction and treatment can be seen in Table 7.

Based on SNI the maximum total fat content with the treatment of frying on dumpling skin which refers to the quality requirements of snacks is 38%. The fat content of dumpling skins without the addition of *nilem* fish flour by 22.71%, while the dumpling skin with the addition of the most preferred *nilem* fish flour is 23.84%, has increased but is still below the maximum limit of the quality requirements set.

This increase is due to the fat content in the ingredients. The fat content contained in *nilem* fish flour is 6.35% so that the higher the concentration of *nilem* fish flour the higher the fat content in dumpling skins.

3.2.4 Moisture Content

Levels of moisture in a food ingredient also determine the durability of the food and as a catalyst media, the reaction that occurs in the natural mixture will later affect the texture. Therefore, this dumpling skin product can be said to have a good shelf life because the water content it contains is low. The water content values obtained from the proximate test of dumpling skin without the most preferred addiction and treatment can be seen in Table 7.

The quality standards of dumpling skin for water content refer to SNI 01-2886-2000 SNI for snacks, which is a maximum of 4%. The water content of dumpling skin without the addition of *nilem* fish flour by 3.22%, while the dumpling skin with the addition of *nilem* fish flour is 2.29%, still under the quality standards of snacks. Based on the results of measurements of water content in dumpling skin shows that with the addition of *nilem* fish flour, the water content will decrease.

Decreasing water content in dumpling skin can be caused due to the cooking process. According to Sundari (2015), cooking is a processing process that can reduce the water content of the food. According to Zilfasani (2017) which states the addition of fish flour, causes the ability of starch granules to bind water to be reduced, because protein will react with sugar and reduce starch gelatinization.

3.3 Recapitulation of Observation Results

Table 8. Research Recapitulation Results

Observation	Average Treatment Addition *Nilem* Fish Flour				*Nilem* Fish Flour
	0%	2,5%	5%	7,5%	
Organoleptic					
Color	7,2 a	7,2 a	7,5 a	6,8 a	-
Aroma	7,5 a	7,1 a	7,3 a	6,9 a	-
Texture	7,2 ab	7,3 ab	7,5 b	6,0 a	-
Taste	7,3 b	7,4 b	7,7 b	5,7 a	-
Bayes Method					
Alternative Value	7,07	7,07	**7,29***	5,53	-
Proximate Test					
Protein Content	7,88	-	17,45	-	40.48
Ash Content	2,09	-	3,21	-	5,63
Fat Content	22,71	-	23,84	-	6,35
Moisture Content	3,22	-	2,29	-	7,51

Based on the aim research you want to be achieved, the level of preference is the main consideration. Addition *nilem* fish flour up to 7.5% still could be accepted by panelists, however, 5% treatment is the most preferred treatment by panelists. This too shows that the additions *nilem* fish flour as much as 5% is organoleptic characteristic most liked by panelists with color values, the highest color, aroma, texture, and taste compared to other treatments. This result is following the hypothesis. Criteria for color, aroma, texture, and taste play a role in determining the best treatment based on the Bayes method.

Based on the proximate test results carried out on the control and treatment treatments the most preferred panelists obtained that the control treatment of the content possessed was protein 7.88%, water 3.22%, fat 22.71%, ash 2.09%, whereas in the most preferred treatment panelist is the treatment of 5% of the content that is owned, namely protein 17.45%, water 2.29%, fat 23.84%, and ash 3.21%

4. CONCLUSION

Based on the results of the research, it can be obtained that the percentage of the addition of *nilem* fish flour to the most preferred dumplings skin product organoleptically is at 5% treatment with having a protein content of 17.45%, ash content of 3.21%, 23.84% fat and water content of 3.22%.

Reference

[1]   Andarwulan, Nuri and Kusnandar, Feri and Herawati, Dian. *Data Management Food Analysis.* Open University, Jakarta (2014).

[2]   Anugrahati, Nuri and Natania, Natania and Andrew, Andrew. Sensory and Physical Characteristics of Fried Dumpling Skin with Different Flour Substitutions on Cold and Frozen Storage. *Journal of Agrotechnology,* (2017) 11 (2): 156-163.

[3]   Iman, M. Fortification of Tilapia Meat Against Characteristics of Small Organoleptics and Nutritional Content. *Journal of Marine Fisheries,* (2017) 8 (2) 161-167.

[4]   Ministry of Marine Fisheries. *Performance Report of the Ministry of Maritime Affairs and Fisheries 2018*. Department of Marine Fisheries, Jakarta (2018).

[5]   Khalisi, Z. *Characterization and Formulation of Rangginang with Flour Fish (Sardinella Fimbriata)*. Department of Aquatic Product Technology. Faculty of Fisheries and Marine Sciences, Bogor Agricultural Institute, Bogor (2011).

[6]   Kolanus M, Radiena M. Analysis of Nutritional Value of Snack Puff Fortification of Surimi Flour Fish. Faculty of Mathematics & Natural Sciences, Pattimura University, Maluku (2014).

[7]   Latief, F. *Characteristics of Physical Properties of Fish Flour and Meat and Bone Flour*. Faculty of Fisheries and Marine Science. Bogor Agricultural Institute. Bogor (2006).

[8]   Marimin, M. *Technique and Application of Compound Criteria Decision Making*. Grasindo. Jakarta (2004).

[9]   Putri, E. The Effect of Adding Teri Jengki Flour to Stick Making to Consumer Favorite Levels. Faculty of Fisheries and Marine Science. Padjadjaran University. Jatinangor (2015).

[10]   Saanin, H. *Taxonomy, and Identification Key Fish* Vol 1.Bandung: Binatjipta. (1984).

[11]   Soekarto, T and Suwarno. *Organoleptic Assessment for the Food and Agricultural Products Industry*. Jakarta: Bharata Karya Aksara (1985).

[12]   Sudradjat, M. *Non-Parametric Statistics*. Faculty of Agriculture. Padjadjaran University. Jatinangor (1999).

[13]   Utami, D. *Changes in the Characteristics of Nilem Fish at Various High-Temperature Processing.* Faculty of Fisheries and Marine Science. Padjadjaran University. Jatinangor (2018).

[14]   Winarno, F.G. Food, and Nutrition Sciences. Gramedia Pustaka Utama, Jakarta (2002).

[15] Subagja, J., R. Gustiano and L. Winarlin. Preservation of *Nilem* Fish (*Osteochilus hasselti* CV) Through Hatchery Technology. In: *National Workshop on Management and Protection of Genetic Resources in Indonesia: Economic Benefits for Realizing National Resilience* (2006).

[16] Pratiwi, F. Utilization of Fly Fish Meat Flour for Making Fish Sticks. Semarang State University, Semarang (2013).

[17] Yulianti. Effect of Addition of Cakalang Fish Flour on Dry Noodles Substituted with Sweet Potato Flour. *Agriculture Technology Journal,* (2018) 1 (2) 8-15.

[18] Clark, S., Costello M, Drake MA, and Bodyfelt F. The Sensory Evaluation of Product Diary. (Second Edition). *Springer Science + Business Media*, LCC. New York (2009).

[19] Kyaw, ZY, Yu, SY, Cheow, CS, Dzulkifly, MH and Howell, NK Effect of fish to star ratio on viscoelastic properties and microstructure of fish crackers ('*keropok*' dough). *International Journal of Food Science and Technology*, (2001) 36: 741-747.

[20] Handayani, R. Addition of Dumbo Catfish Protein Hydrolysate to the Preferences Level of Cassava Opacies. Faculty of Fisheries and Marine Sciences. Padjadjaran University. Jatinangor (2018).

[21] Cahyadi, W. 2nd Edition Food Additives. Bumi Aksara, Jakarta (2012).

[22] Deman, John M. *Food Chemistry*. Bandung Institute of Technology, Bandung (1997).

[23] M. Z.M. Nor, R.A. Talib, M. A. Noranizan, N. L. Chin and K. Hashim, Increasing Resistant Starch Content in Fish Crackers Through Repetitive Cooking-Chilling Cycles, *International Journal of Food Properties*, (2004), 17(5) 966-977.

[24] Olivier Gibert and Sudip Kumar Rakshit, Cassava starch snack formulation using functional shellfish by-products: mechanical, sorption and geometric properties, *Journal of the Science of Food and Agriculture*, (2005) 85(11) 1938-1946.

[25] K. Suknark, K.H. McWatters, and R.D. Philips, Acceptance by American and Asian Consumers of Extruded Fish and Peanut Snack Products, *Journal of Food Science*, (2006) 63(4) 721-725.

[26] Dilip Subba, Acceptability and nutritive value of keropok-like snack containing meat offal, *International Journal of Food Science & Technology*, (2002) 37(6) 681-685.

[27] Hung-chia Chang, Hua-Han Chen. Association between textural profiles and surface electromyographic (sEMG) behaviors of microwavable cassava cuttlefish crackers with various expansion ratios. *Food Research International*, (2013) 53 (1) 334-341.

[28] Huda, N., Boni, I. and Noryati, I. The effect of different ratios of Dory fish to tapioca flour on the linear expansion, oil absorption, color, and hardness of fish crackers. *International Food Research Journal*, (2009) 16: 159–165.

[29] Gisca, Barnadetha and Rahayuni, Arintina. Addition of Gembili to Cork Fish Angled Flakes as an Alternative Food for Children with Poor Nutrition. Journal of Nutrition College, (2013) 2 (4): 505-513.

[30]   Suseno, Sugeng H.dan Suptijah, Pipih and Wahyuni, Darma S. Effect of Addition of *Nilem* Fish Pulverized Meat (*Ostheochilus hasselti*) on Making Simping as a Snack Food. Fisheries Product Technology Bulletin, (2004) 7 (1).

[31]   AOAC. Official Methods of Analysis. Association of Official Analytical Chemists. Benjamin Franklin Station, Washington DC (2007).

[32]   Asni, Y. Study of Biscuit Making with the Addition of Patin Fish Bone Flour. Faculty of Fisheries and Marine Sciences, Bogor Agricultural University. Bogor (2004).

[33]   Yulianti. Effect of Addition of Cakalang Fish Flour on Dry Noodles Substituted with Sweet Potato Flour. Agriculture Technology Journal, (2018) 1 (2) 8-15.

[34]   National Standardization Agency (BSN) 2000. SNI 01-2886-2000. Snack Extrudate (2000).

[35]   Febrianto, A., Basito, and Choirul. Study of Physicochemical and Sensory Characteristics of Corn Chips Tortillas with Alkali Solution Variations in the Nicamamalization Process. Food Teknosains Journal, (2014) 3 (3): 22-34.

[36]   Khan M, Nowsad AKMA. Development of protein enriches shrimp crackers from shrimp shell wastes. J. Bangladesh Agril. Univ, (2012) 10 (2): 367-374.

[37]   Kumalaningsih, S. Design of Corn Tortilla Chips Processing Unit in Small Scale Industry. Journal of Agricultural Technology, (2006) 6 (1): 7-16.

[38]   Sundari, D., Almasyhuri, and Astuti. The Effect of Cooking Process on the Composition of Nutrients for Food Protein Sources. Media Litbangkes, (2015) 25 (4): 235 - 242.

[39]   Zilfasani, E. Fortification of Lalawak Fish Surimi Flour Against the Favorite Level of Sticky Opacies. Fisheries Study Program, Faculty of Fisheries and Marine Sciences, Padjadjaran University, Jatinangor (2017).

[40]   Muchtadi, T. *Food Processing Technology*. Bogor Agricultural Institute Press. Bogor (2006).

[41]   Pratama, R., Rostini, I. and Rochima, E. Profile of Amino Acid, Fatty Acids and Volatile Components of Fresh Gurame Fish *(Osphronemus goramy)* and Steamed. *Journal of Indonesian Fisheries Processing,* (2018) 21 (2): 218-231