



## Analysis of Preference Marinated *Osteochilus hasselti* on Soaking Fermentation Cabbage Media.

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### ABSTRAK

This study aims to determine the level of panelists' preference for marinated *Osteochilus hasselti* for five differences in immersion duration. This research has been conducted at the Laboratory of Fisheries Product Processing at the Faculty of Fisheries and Marine Sciences, Padjadjaran University which began in July 2019 until completion. The research method was carried out experimentally consisting of 5 long immersion treatments, namely for 10 minutes, 20 minutes, 30 minutes, 40 minutes, and 50 minutes with 20 semi-trained panelists as repeitions. The parameters observed were organoleptic characteristics including appearance, aroma, texture, taste, and pH value testing. Analysis of preference tests used the Friedman Test and to determine the most important characteristics used the Bayes Test. The hedonic test and the pH test were analyzed descriptively. The panelist's most preferred product was a marinated *Osteochilus hasselti* with a soaking time of 40 minutes which has a brilliant white appearance with a sarvonry taste and has a pH value of 6.3.

**Keywords:** *Osteochilus hasselti*, Soaking Time, Marinated, Levels of Favonte

### 1. INRODUCTION

*Osteochilus hasselti* are Indonesian endemic freshwater fish that live mostly in rivers and swamps. Her form tends to resemble a fish carp because *Osteochilus hasselti* enterednfamily Cyprinidae. *Osteochilus hasselti* meat is said to have a specific taste and is more savory compared to other freshwater becausemeat contains glutamic acid. The content is formed naturally due to the habit of eating natural food, namely phytoplankton and zooplankton [28]. Efforts should be made to increase the shelf life of post-harvest fishery products through processing and preserving [1].

One method of meat processing is marination. Marination is the process of soaking the meat in the ingredients marinate before further processing. Meat processing with the marinating method initially functions as a spice, but in further development it also functions to reduce the bacterial content in the meat. Based on the ingredients marinated Broks are grouped into three parts, namely based on phosphate salts, acids, and seasonings. One that is based on acid is using lactic acid . Cabbage fermentation is one that produces lactic acid. The

addition of lactic acid in the marinated *Osteochilus hasselti* the acid fermented foods and also provide certain properties which dap a t into consumer appeal [7].

The quality of fish meat is generally assessed using sensory methods on organoleptic characteristics. The assessment will affect consumer decision making related to the level of preference [24].

## 2. MATERIALS AND METHODS

The equipment used in this in marinated *Osteochilus hasselti* making process, namely: basin , knife , cutting boards , scales , jars, strainers, frying pan , and stove . The tools used in organoleptic testing are plates as a place to present samples, assessment sheets and stationery. Tools for pH testing, namely measuring cups, scales, pestle and mortar, spatula , and pH meter. The raw material used is fresh nilem fish obtained from Cianjur.

The following procedure for making fermented cabbage s [27 ] is as follows: cabbage is washed and cut into small pieces, cabbage is put into a jar which already contains 0.25 grams of salt solution with cabbage concentration of 100g / L, then coated with plastic wrap and closed, cabbage fermented during 6 days, and filtering to get the fermentation solution cabage. The procedure of making modified marinate *Osteochilus hasselti* according to Rahmadina 2018 as follows [15 ] : The *Osteochilus hasselti* already weeded cut into three parts later n washed using running water to clean fish washed nilem and drained soaked in cabbage fermentation solution . Ratio fish meat with water used 1: 1, with 1 kg of fish compared with 1 L solution, nilem put in jars that had contained a solution of cabbage , the jar is closed and stored in a refrigerator at 5 °- 10 °C for 10 minutes, 20 minutes, 30 minutes, 40 minutes and 50 minutes. Marinated *Osteochilus hasselti* ditirisk then fried for 2-3 minutes.

This research was conducted on July 2019 at the Laboratory of fishery product processing an Faculty of Fisheries and Marine Sciences, Padjadjaran University with the experimental method consists of 5 treatments with 20 semi-trained panelists as replication. The preference test results were statistically analyzed using the Friedman Test and the Bayes Test and the pH test and marinate fish appearance after soaking were analyzed descriptively.

### 2.1 Hedonic Test (Preferred Test)

Hedonic test is a test that aims to determine the level of consumer preferences for a product. There were 20 panelists in the hedonic test. Tests on the level of preference include appearance, aroma, taste and texture. Consumer favorite values, namely: 9 (really like); 7 (likes); 5 (neutral / ordinary); 3 (don't like it); and 1 (very dislike) [25 ].

### 2.2 PH Test

PH test procedure modifications marinated *Osteochilus hasselti* Liviawaty 1999 as follows [13 ]: pH is measured by way of the flesh of fish taken as much as 10 grams and added 20 ml of distilled water and then crushed until homogeneous. The suspension is put into the *beaker glass* , the pH is then measured with a pH meter. Before measuring the pH meter is standardized first using a standard buffer solution of pH 7 and pH 4. Measurement of pH is done by inserting the electrode, which has been rinsed in distilled water and dried with a tissue, into suspension until the pH meter reading is constant. Measurement of fish meat pH was repeated three times in each test sample.

### 2.3 Data

Analysis of organoleptic testing using two-way analysis of variance test *Friedman test Chi-squared*. If the price of  $H_c < x^2 \alpha (K-1)$ , then accept  $H_0$  and reject  $H_1$ , and if the price of  $H_c > x^2 \alpha (K-1)$ , then  $H_0$  is rejected and  $H_1$  is accepted. If  $H_1$  is accepted, the treatment gives a real difference and the test continued to determine the median value are not the same and to know the difference between treatments with the test of comparison of multiple [26] .

The test method used to determine the selected product is the *Bayes* method. The *Bayes* Method is one technique that can be used to conduct analysis in the best decision-making of a number of alternatives with the aim of producing gains that consider various criteria [16]. The results obtained are then discussed descriptively.

### 3 RESULTS AND DISCUSSION

#### 3.1 Hedonic Test (Preferred Test)

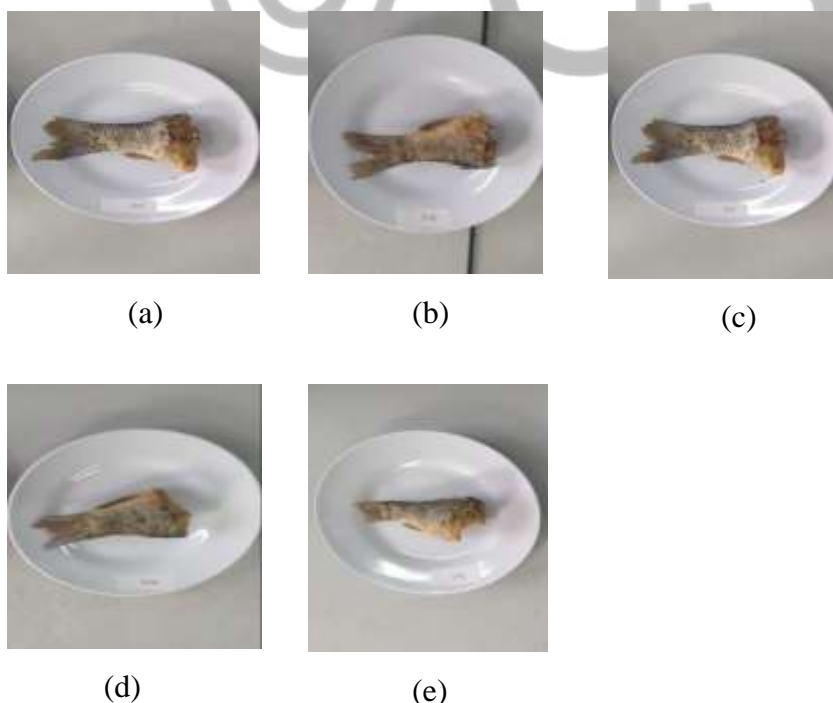
##### A. Appearance

Appearance is the first parameter seen in a product [25]. The results of observing the appearance of marinate *Osteochilus hasselti* are presented in Table 1 and Figure 1.

**Table 1.** Average Value of Marinated *Osteochilus hasselti* Appearance

| Soaking (Minutes) | Median | Average Appearance Value |
|-------------------|--------|--------------------------|
| 10                | 5      | 5,80 a                   |
| 20                | 7      | 6,10 a                   |
| 30                | 7      | 7,10 a                   |
| 40                | 7      | 6,30 a                   |
| 50                | 7      | 6,60 a                   |

Note: The average number of treatments followed by the same letter shows no significant difference according to a multiple comparison test of 5% level.



**Figure 1.** Appearance of Marinated *Osteochilus hasselti*

(a) soaking 10 minutes (b) soaking 20 minutes (c) soaking 30 minutes (d) soaking 40 minutes (e) soaking 50 minutes

*Friedman's* statistical test results show that there is no real difference in appearance. The results of the analysis explained that all treatments had almost uniform values, meaning that the appearance of the Nile tilapia did not have a significant effect on the appearance of the marinated *Osteochilus hasselti*. Sensory test results on the parameters of the appearance of marinated *Osteochilus hasselti* with cabbage fermentation immersion have an average value of between 5.80 to 7.10.

The brownish color of cooked meat is caused by the oxidation of fat found in the body of the fish, the oxidation of fat in the body of the fish produces discoloration [2] and the change in the color of the flesh to brown is also caused by the content of hemoprotein and fat in the flesh of the fish which height [6]. The longer the immersion, the higher the oxidation level which causes the color of the meat to darken after undergoing the cooking process [18]. This oxidation process is closely related to the browning reaction at the time of cooking. The higher level of oxidation, it will be the darker color of the meat produced during frying.

## B. Aroma

Aroma is one of the factors that influences the panelists' acceptance of a product. The results of observing the appearance of marinate *Osteochilus hasselti* are presented in Table 2.

**Table 2.** Average Value of Marinated *Osteochilus hasselti* Aroma

| Soaking (Minutes) | Median | Average Aroma |
|-------------------|--------|---------------|
| 10                | 5      | 5,70 ab       |
| 20                | 5      | 4,90 a        |
| 30                | 5      | 6,00 ab       |
| 40                | 7      | 6,30 ab       |
| 50                | 7      | 6,50 b        |

Note: The average number of treatments followed by the same letter shows in significant difference according to a multiple comparison test of 5% level.

*Friedman's* statistical test results show that there are significant differences, meaning that with different immersion treatments can have different effects on the scent of marinated *Osteochilus hasselti*. In soaking for 20 minutes the average value of the aroma drops to 4.90 with a specific characteristic odor that is not smelled (Neutral), this is because cabbage fermentation can disguise the distinctive odor in fish. The loss of the distinctive aroma of the marinate product decreases the level of panelists' likeness to the product's aroma. Then in the immersion of 30 minutes, 40 minutes and 50 minutes, the panelists' assessment increased. This is due to the nature of peroxides which can form the distinctive aroma of marinate products due to re-oxidation of fat that occurs during soaking [12].

Aroma is one of the factors that influences the panelists' acceptance of a product. Changes in aroma can come from the body of the fish itself or because of the influence of the surroundings [8]. Changes in protein and fat of fish meat affect the aroma and taste. The aroma that arises in fishery products comes from volatile and non volatile compounds. The high and low volatile and non volatile compounds are determined by the way and processing techniques performed on the chemical products [19]. Immersion on the marinated *Osteochilus hasselti* gives a significantly different aroma to the product. Process fermented cabbage producing bacteria *Lactobacillus* can inhibit the growth of spoilage bacteria and leave a scent change in fishery products.

## C. Texture

Texture assessment aims to determine the level of panelist acceptance of the texture of marinated *Osteochilus hasselti*. The results of observing the scent of marinated *Osteochilus hasselti* are presented in Table 3 .

**Table 3.** Average Value of Marinated *Osteochilus hasselti* Texture

| Soaking (Minutes) | Median | Average Texture |
|-------------------|--------|-----------------|
| 10                | 5      | 5,50 a          |
| 20                | 7      | 6,40 ab         |
| 30                | 7      | 6,70 ab         |
| 40                | 7      | 7,10 b          |
| 50                | 5      | 6,10 ab         |

Note: The average number of treatments followed by the same letter shows in significant difference according to a multiple comparison test of 5% level.

*Friedman's* statistical test results show that there are significant differences, meaning that with different immersion treatments can have different effects on the texture of the marinated *Osteochilus hasselti*. The results of the analysis explained that immersion for 40 minutes had the highest average value with a value of 7 , 10 with a denser texture and not harder than other treatments. Immersion in the 10th minute has a lower value compared to other treatments with an average value of 5 , 50 with a slightly dense and rather hard texture. Adding a little salt to the fermentation process can reduce the holding capacity of the water in the fish so that the meat of the fish turns into solid. Soaking in the 50th minute decreased because the resulting texture was not too dense and caused the panelists to dislike the product. The longer soaking marinated *Osteochilus hasselti* in cabbage fermentation solution will cause the solution to be increasingly absorbed into the fish meat so that the fish meat becomes less dense [17].

Texture on fish meat can also be influenced by several things, one of which is the soaking time on fish meat. Texture fish meat will change exponentially with time because of changes in biochemical fermentation due to the addition of salt and fermentation processes [20]. Fish texture is also influenced by bacteria and chemicals present in fish. Fish meat will become soft because of the bacteria present in fish meat that produces enzymes. These enzymes degrade complex molecules into simple molecules so that the meat becomes soft [23]. A sam lactate produced from lactic acid bacteria in the fermentation process the fish lead to the disintegration of fish protein into peptides and free amino acids that can affect product texture is soft. Texture of the fish in the frying process will change color to brown and the texture will be more hardened [3].

#### D. Taste

Rate sense is done by way of direct tasting marinate the soaking time difference treatment. The results of observing the taste of marinate *Osteochilus hasselti* are presented in Table 4 .

**Tabel 4.** Average Value of Marinated *Osteochilus hasselti* Taste

| Soaking (Minutes) | Median | Average Taste |
|-------------------|--------|---------------|
| 10                | 5      | 5,50 ab       |
| 20                | 5      | 5,10 a        |
| 30                | 7      | 6,30 ab       |
| 40                | 7      | 6,70 b        |
| 50                | 7      | 6,40 ab       |

Note: The average number of treatments followed by the same letter shows in significant

difference according to a multiple comparison test of 5% level.

Based on the results of the study, the treatment of soaking Nilem in cabbage fermentation solution gives a real difference to the flavor produced. The taste of marinated *Osteochilus hasselti* in the soaking time for 40 minutes has the highest average value of 6,70 with a slightly acidic and savory taste because of the breakdown of fish protein into peptides which can produce a savory taste. Whereas the 20 minute immersion treatment has the lowest average value of 5,10 with a taste that is not too tasty and not too preferred by panelists. Soaking in the 50th minute decreased with a value of 6,40 with a sour and savory taste. The longer the marinated *Osteochilus hasselti* is immersed in the cabbage fermentation solution, the more lactic acid bacteria enter the fish meat, so that the sour taste in the fish appears. Lactic acid bacteria will contribute to the aroma and flavor of fermented products. This bacterium acts to acidify food, which results in a sharp taste of lactic acid [4]. Flavor is produced from lipids through the activity of lactic acid bacteria, yeast and mold. A semi-volatile fatty acids may be derived from fats or amino acids through oxidation of fish protein, one with a pinch of salt as salt stimulates the oxidation of lipids in meat products [9].

### 3.2 Value of pH

pH value of marinated *Osteochilus hasselti* was presented in Table 5.

**Table 5.** pH Value of Marinated *Osteochilus hasselti*

| Treatment  | Repetition |     |     | Average |
|------------|------------|-----|-----|---------|
|            | I          | II  | III |         |
| 10 minutes | 6,5        | 6,4 | 6,4 | 6,4     |
| 20 minutes | 6,4        | 6,4 | 6,4 | 6,4     |
| 30 minutes | 6,3        | 6,3 | 6,2 | 6,3     |
| 40 minutes | 6,2        | 6,3 | 6,2 | 6,2     |
| 50 minutes | 6,2        | 6,2 | 6,3 | 6,2     |

The pH value of Marinated *Osteochilus hasselti* has results that are not significantly different in that it has an average value ranging from 6,3 to 6.4. Marinated *Osteochilus hasselti* soaked in cabbage solution for 10 and 20 minutes has the highest value of 6.4, Marinated *Osteochilus hasselti* soaked in cabbage solution for 30 has a pH value of 6.3 while 40, and 50 minutes have the same pH value which is 6.2. The longer soaking done on jerky pH testing showed a decreased pH value. [6]. The pH of the fish after death will decrease until it reaches a value of 6. The change in pH value decreases in proportion to the formation of lactic acid produced from the glycolysis process [13].

### 3.3 Decision Making Using the Bayes Method

Decision making on alternative weight values from the criteria of appearance, aroma, texture, and taste of Marinated *Osteochilus hasselti* is done by multiple comparison tests (*Pairwise Comparison*). Paired comparison test data results on the appearance, aroma, texture, and taste criteria of 20 panelists. The completion of the pairwise comparison results is done by manipulating the matrix to determine the criteria weights. The results of calculations on the weight criteria for appearance, aroma, texture, and taste of Marinated *Osteochilus hasselti* are presented in Table 6.

**Table 6.** Value of Marinated *Osteochilus hasselti* Weight Criteria

| Criteria (s) | Weight Criteria Value |
|--------------|-----------------------|
| Appearance   | 0,14                  |
| Aroma        | 0,17                  |
| Texture      | 0,10                  |
| <b>Taste</b> | <b>0,58</b>           |

Based on the calculation of the weight criteria, appearance, aroma, texture, and taste of marinated *Osteochilus hasselti* the result that the taste criteria has the highest value with a criteria weight value of 0,58 . Then followed by the aroma parameter that is the value of the criteria weight is 0,17 and the value of the appearance and texture criteria is 0,14 and 0,10 . This shows that the taste criteria have the most influence on the assessment of marinated *Osteochilus hasselti*. This shows that although other judgments are good, if the taste of marinate is not liked by the panelists, the product will be rejected by the panelists. criteria for appearance, aroma, texture, and taste of marinate nilem are presented in Table 7.

**Table 7.** Rate Decision Matrix of Marinated *Osteochilus hasselti* Using Bayes Method

| Treatment (Minutes) | Criteria   |       |         |             | Alternative value | Values of Priority |
|---------------------|------------|-------|---------|-------------|-------------------|--------------------|
|                     | Appearance | Aroma | Texture | Taste       |                   |                    |
| 10                  | 5          | 5     | 5       | 5           | 5,00              | 0,162              |
| 20                  | 7          | 5     | 7       | 5           | 5,49              | 0,177              |
| 30                  | 7          | 5     | 7       | 7           | 6,66              | 0,215              |
| 40                  | 7          | 7     | 7       | 7           | <b>7,00</b>       | <b>0,226</b>       |
| 50                  | 5          | 7     | 5       | 7           | 6,80              | 0,220              |
| Weight              | 0,14       | 0,17  | 0,10    | <b>0,58</b> | 30,94             | 1,00               |

Based on the calculation using the *Bayes* method , the results show that marinated *Osteochilus hasselti* on immersion for 4 minutes gets the highest alternative value of 7,00, and marinated *Osteochilus hasselti* on immersion for 50 minutes is 6.80, followed by marinated *Osteochilus hasselti* on soaking for 10 minutes for 10 minutes. 5.00, followed by marinated *Osteochilus hasselti* on soaking for 20 minutes at 5.49 , then followed by marinated *Osteochilus hasselti* on soaking for 30 minutes at 6.66. Marinated *Osteochilus hasselti* soaked in cabbage fermentation solution for 40 minutes is the most preferred marinate by panelists.

### 3.4 Recapitulation of Observation

The overall results of marinated *Osteochilus hasselti* are presented in Table 8.

**Table 8.** Recapitulation of Observation Result of the Marinated *Osteochilus hasselti*

| Parameter(s)        | Duration of soaking |            |            |            |            |
|---------------------|---------------------|------------|------------|------------|------------|
|                     | 10 Minutes          | 20 Minutes | 30 Minutes | 40 Minutes | 50 Minutes |
| <b>Hedonic Test</b> |                     |            |            |            |            |
| Appearance          | 5,80a               | 6,10a      | 7,10a      | 6,30a      | 6,60a      |
| Aroma               | 5,70ab              | 4,90a      | 6,00ab     | 6,30ab     | 6,50b      |
| Texture             | 5,50a               | 6,40ab     | 6,70ab     | 7,10b      | 6,10ab     |
| Taste               | 5,50ab              | 5,10a      | 6,30ab     | 6,70b      | 6,40ab     |
| <b>Bayes Method</b> |                     |            |            |            |            |
| Alternative value   | 5,00                | 5,49       | 6,66       | 7,00       | 6,80       |
| <b>pH Test</b>      |                     |            |            |            |            |
| Average pH          | 6,4                 | 6,4        | 6,3        | 6,3        | 6,2        |

Based on the overall observations of marinated *Osteochilus hasselti* with the treatment of soaking time for 40 minutes is the selected product that is preferred by panelists. Bayes test results showed the treatment of marinated *Osteochilus hasselti* with soaking time for 40 minutes had the highest alternative value compared to other treatments, which was 7.00 with the most influential taste criteria for the assessment of marinated *Osteochilus hasselti*.

Organoleptic test results that have been done show that marinated *Osteochilus hasselti* with soaking time treatment for 40 minutes has the highest average value on each characteristic compared to other treatments. The average value of marinated *Osteochilus hasselti* with soaking time for 40 minutes of each characteristic is the appearance value of 6.30, aroma 6.30, texture 7.10, and taste 6.70.

### 4. Conclusion

Based on the results of research that has been carried out the product of marinated *Osteochilus hasselti* most preferred by panelists is marinated *Osteochilus hasselti* which is soaked in cabbage fermentation solution for 40 minutes with the characteristics of a brilliant white appearance, dense and chewy texture, distinctive aroma and no fishy smell, savory taste with a median appearance, aroma, texture, taste of 7 each (liked) and a pH of 6.3.

### References

- [1] Afrianto, E and E. Liviawaty. 1989. Fish preservation and processing. Kanisius, Yogyakarta.
- [2] Adawyah, R. 2007. *Fish processing and preservation*. Bumi Aksara Publisher, Jakarta.
- [3] Astriani, L. 2011. *Application of Yogurt as a Source of Lactic Acid Bacteria in Fermented Carp (Cyprinus carpio)*. Thesis. IPB Faculty of Fisheries and Marine Sciences, Bogor.



- [4] Desniar, D. Poernomo, and W. Wijatur. 2009. The Effect of Salt Concentration on Fish Marcher ( *Rastrelliger sp* ) with Spontaneous Fermentation. *Journal of Fisheries Product Processing* , 12 (1 ): 72-87.
- [5] Desroisier, NW 1988. *Food Preservation Technology*. University of Indonesia, Jakarta.
- [6] Hidiwiyoto, S. 1993. *Fishery Product Processing Technology*. Liberty, Yogyakarta.
- [7] Hutkins, RW. 2006. *Microbiology and Technology of Fermented Foods*. USA: IFT Press, Blackwell Publishing.
- [8] Ilyas S. 1993. *Refrigeration Technology of Fisheries Product I Volume of Fish Digestion Techniques*. Fisheries Research and Development Center, Jakarta.
- [9] Irianto, HE and Giyatmi, S. 2009. *Fishery Product Processing Technology*. Open University Publisher, Jakarta.
- [10] Irawadi, TT 1979. Effect of salt and glucose on the fermentation of lactic acid from bloating ( *Scomber neglectus* ) . Thesis. Post-graduate IPB, Bogor.
- [11] Jeyasanta K. Immaculate, S. Prakash, J. Patterson. 2016. Wet and dry salting processing of double spotted queen fish *Scomberoides lysan* (Forsskål, 1775). *International Journal of Fisheries and Aquatic Studies*. 4 (3 ): 330-338.
- [12] Kusnandar, F . 2011. *Food Analysis*. Dian Rakyat. Jakarta.
- [13] Liviawaty, Evi. 1999. Effects of Filet Making Time On Some Characteristics of Red Tilapia ( *Oreochromis niloticus* ). Thesis. Padjadjaran University. Bandung.
- [14] Majid, Abdul.,T. W. A gustini and L. R ianingsih. 2014. Effect of Differences in Salt Concentration on Sensory Quality and Volatile Compound Content in Anchovy Terasi ( *Stolephorus sp* ). *Journal of Fisheries Product Processing and Biotechnology*. 3 (3): 17-24 .
- [15] Maktabi, S., M. Zarei and M. Chadorbaf. 2015. Effect of Traditional Marinating on Bacterial and Chemical Characteristics in Frozen Rainbow Trout Fillets. *Journal of Food Quality and Hazards Control*. 2: 128-133.
- [16] Marimin. 2004. *Decision Making Techniques and Applications of Multiple Criteria*. PT Grasindo. Jakarta.
- [17] Nafianti, S. 2016. *Duration of Drying Bloating in Cabbage Fermentation Solution for Preference*. Thesis. Padjadjaran University, Jatinangor.
- [18] Nurilmala, M. 2013. Studied pf the structural Changes on Myoglobin in Tuna Meat Discoloration. *Dissertation*. Tokyo: The Graduate School of Agricultural and Life Sciences, The University of Tokyo, Tokyo.
- [19] Pratama, RI, I. Rostini and MY Awaluddin. 2013. Fresh composition of carp ( *Cyprinus carpio* ) flavored compounds and their steaming. *Journal of Aquatics*. 4 (1 ): 55-67.

- [20] Pramono, YB, Rahayu, ES, Saparno and Utami, T. 2007. *The Microbiological, Physical, and Chemical Changes of Petis Liquid during Dry Spontaneous Fermentation*. [J.Indon.Trop.Anim.Agric. 32 [4] Dec 2007]. Diponegoro University, Semarang.
- [21] Purnomo, H. 1995. *Water Activities and Its Role in Food Preservation*. UI-Press, Jakarta.
- [22] Rahmadina, Ranti. 2018. Analysis of Marinade Salt Preference for Several Types of Fresh Fish. Thesis. Faculty of Fisheries and Marine Sciences, Padjadjaran University, Jatinangor.
- [23] Saraswati, D.2011. The Effect of Long Soaking Tuna in Yogurt on the Number of Spoilage Bacteria at Room Temperature. *Journal of Health & Sport*, 2 (1 ): 45-51.
- [24] Sari, DP 2018. The Quality of Fresh *Fish Nilem* and *Nilem All Female (Osteochilus Hasselti) Hybrids* Based on Organoleptic, Physical and Chemical Characteristics. Thesis. Padjadjaran University. Jatinangor.
- [25] Soekarto. 1985. *Organoleptic Assessment for the Food Industry and Agricultural Products*. Bhatara Aksara. Jakarta.
- [26] Sudrajat, M. 1999. *Non-Parametric Statistics*. Faculty of Agriculture, Padjadjaran University Jatinangor
- [27] Suriawiria, U. 1980. *General Microbiology*. Department of Biology FMIPA, ITB, Bandung.
- [28] Wodi, MIS, Trilaksani W., and Nurilmala M. 2014. Changes in Myoglobin in Big Eye Tuna During *Chilling* Temperature Storage. *Jphpi*. 17 (3) : 215-224.