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Sensory Evaluation of Bonylip Barb Fish Meat Cream Soup

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ABSTRACT

Bonylip barb is an Indonesian endemic fish that has not been widely used. One potential application is the addition of bonylip barb fish meat to cream soup products. Cream soup is a thick soup that has a cloudy color due to the addition of milk and holds the prominent aroma and taste of milk. This study aims to determine the amount of bonylip barb fish meat that can be added in to produce the most preferred cream soup. Research on bonylip barb fish cream soup creation was carried out at the Fisheries Technology Laboratory of the Faculty of Fisheries and Marine Sciences, Padjadjaran University. The study was conducted in May-June 2019. The method used was experimental with 4 treatments of bonylip barb fish addition, namely 0%, 10%, 20%, and 30% of dry weight. Organoleptic tests were carried out by 20 semi-trained panellists. The variables observed were organoleptic color, aroma, taste and texture. The results showed that 30% addition of bonylip barb fish produced the most preferred cream soup product. This had a color hedonic mean value of 6.7; aroma 6.5; taste 7.3; and texture 6.8.

Keywords: bonylip barb meat, cream soup, preference level, *Osteochilus hasselti*

1. INTRODUCTION

Indonesia is a maritime country with diverse natural resources. One comes from its waters. Bonylip barb fish (*Osteochilus hasselti*) or Nilem fish is an Indonesian native fish whose potential has not been fully used. Indeed, bonylip barb fish production is far less compared to the value of other freshwater fish production. In Indonesia, the harvest of freshwater fish (262,266 tons) is dominated by catfish at 205,489 tons, while nickel fish

production (which includes bonylip barb fish) is far below at 18,328 tons. The low value of bonylip barb fish production might be due to the lack of development of food-based products.



Figure 1. Bonylip Barb Fish
(Source: Personal Documentation)

Innovations in the development of food products with fish-based nutritional enrichment have, however, begun to be carried out. One such food product in which nutritional enrichment can be applied is cream soup. Soup is a liquid prepared from vegetables, fish or meat that uses water, juice or stock and thickening agents. It falls under the heterogeneous categories of food. There are two kinds of soup: thick soup and clear soup. Thick soups are classified depending upon the type of thickening agent used: *purées* are vegetable soups thickened with starch; *bisques* are made from puréed shellfish or vegetables and thickened with *cream*; cream soups may be thickened with béchamel sauce; and *veloutés* are thickened with eggs, butter and cream. Other ingredients commonly used to thicken soups and broths include rice, lentils, flour and grains. Many popular soups also include carrots and potatoes.

Over the last decade, consumer demand for food products has leaned towards foods that contribute to health or provide nutrition, aid in the prevention of disease and improve physical and mental health. In attaining these goals, the ease and practicality of preparation cannot be ignored. Many studies have already done on instant soup, but only a few studies have been done on instant fish soup. One study that used fish as additional ingredients is that of enriching mushroom cream soup with catfish oil microcapsules.

While fast food instant fish soup can be a great source of protein, research on protein enrichment from fish meat is hard to find. What is known is that, beyond enhanced nutrition, nutritional enrichment of cream soup through the addition of bonylip barb fish meat can produce changes in in terms of taste, texture and aroma in the cream soup product itself.

The affect can, therefore, add to the appreciation of the product, but only if the additive is in the appropriate amount. Herein, too much can change the aroma to slightly stingy/fishy due to the high protein content of fish. Based on some of the problems and attribute outlined above, it is necessary to conduct research on the amount of bonylip barb fish that can be added to produce the most preferred processed soup products, by testing the level of preference.

2. MATERIALS AND METHODS

2. 1. Materials and Tools

This research was conducted at the Technology of Fishery Products Laboratory of the Faculty of Fisheries and Marine Science, Padjadajaran University. The tools used in this research, are the common preparatory tools in processing food. Assessment of effect came about by means of a trained sensory (hedonic) test panel. The materials used in this research are bonylip barb meat, mocaf flour, maizena flour, skim milk powder, corn oil, salt, sugar, white pepper powder, garlic powder, MSG, and water.

2. 2. Research Methods

The method used in this research is the experimental method. The treatments differ in the extent of bonylip barb fish meat addition to the base cream soup (based on dry materials). These are as follows:

- 1) Treatment A (control): without the addition of bonylip barb fish meat - 0%
- 2) Treatment B: bonylip barb fish meat addition - as much as 10%
- 3) Treatment C: bonylip barb fish meat addition – as much as 20%
- 4) Treatment D: bonylip barb fish meat addition – as much as 30%.

The quantities of materials used in the soup formulation can be found in Table 1.

Table 1. Formulation of Making Cream Soup.

Materials	A (control)	B	C	D
	(gram)			
Mocaf flour	10,00	10,00	10,00	10,00
Maizena flour	18,00	18,00	18,00	18,00
Skim Milk	25,00	25,00	25,00	25,00
Corn Oil	3,00	3,00	3,00	3,00
Sugar	6,00	6,00	6,00	6,00
Salt	2,00	2,00	2,00	2,00
Pepper powder	1,00	1,00	1,00	1,00
Garlic powder	1,00	1,00	1,00	1,00
MSG	2,00	2,00	2,00	2,00
Water	500,00	500,00	500,00	500,00
Bonylip barb fish meat	0	6,8	13,6	20,4

Source: Abdurrasyid 2018 (modified)

The procedure for the cream soup formulation is that found in Abdurrasyid (2018) with some modifications:

- Nilem fish fillets are steamed for 10 minutes then ground up using a meat grinder.
- The ground meat is blended into a pot of 400 ml of cold water that is then slowly brought to a temperature of 60 – 70 °C.
- 25 g of skim milk and 6 g of sugar is dissolved in 50 g of hot water and then added to the water/fish combination. Stirring is continuous.
- 3 g corn oil, 2 g salt, 1 g pepper, 1 g garlic, and 2 g of flavoring is added to the water/fish combination and stirred continuously until homogenized.
- 18 g of cornstarch and 10 g of mocaf flour is dissolved with 50 g of water and gradually added into the mixture while stirring continuously.

4 batches are to be made up - but in quantities enough for 20 testers. The ground bonylip barb fish meat is added to each batch in accordance with the amounts designated in Table 1. Each batch is labeled as either A, B, C or D.

2. 3. Parameters Observed

The organoleptic characteristics were tested using the hedonic test to measure the preference level towards several organoleptic characteristics, such as color, aroma, taste, and texture of the cream soup. The panelists used in the hedonic test were semi-trained panelists consisting of students of the Fisheries, Faculty of Fisheries and Marine Science, Padjadjaran University who have experience in hedonic testing and have been given advanced explanations about fresh fish products. The number of semi-trained panelists is 20.

2. 4. Data Analysis

Data obtained from hedonic tests (preferences) on appearance, aroma, texture and taste was analyzed utilizing statistical non-parametrics. The tests applied are two-way analysis and Multiple Comparison. Friedman's two-way variance analysis was also resorted to so as to find the effect of squid ink addition treatment on the level of aroma preference, appearance, texture and taste. Two-way analysis using Friedman is defined by the following formula:

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

Description:

- X^2 = Friedman Test Statistics
- B = Repeat
- K = Treatment
- R_j = Total rank for each treatment

To determine the best treatment, the Bayes method was used. Bayes method is one technique that can be applied to perform so as to ascertain the best decision from a number of alternatives with regard to various criteria. The criteria in question are parameters of color, aroma, texture and taste.

The Bayes equation is as follows:

$$X_G = \sqrt[n]{\prod, X_i}$$

Description:

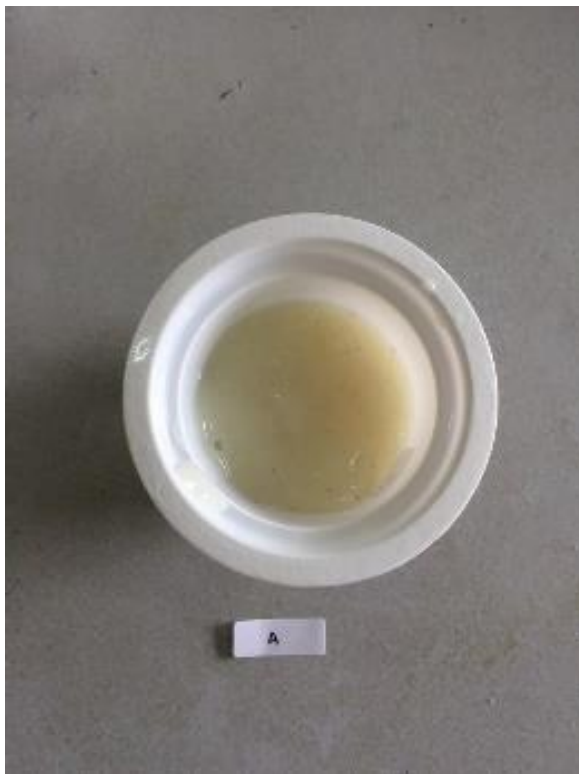
- X_G = geometric average
- \prod = permutation
- n = number of panellists
- X_i = rating from the 1st panellist

Hence, the priority value of each criterion is obtained from the data from the geometrical average of each criterion.

3. RESULT

3. 1. Colour

Colour is one indicator that can decide and influence consumer choice. In our study, color was judged subjectively by panellists based on their sense of sight. The results of the hedonic test analysis using the Friedman test on the color of bonylip barb fish cream soup showed that the addition of bonylip barb fish did not significantly affect the colour of the cream soup.



(A)



(B)

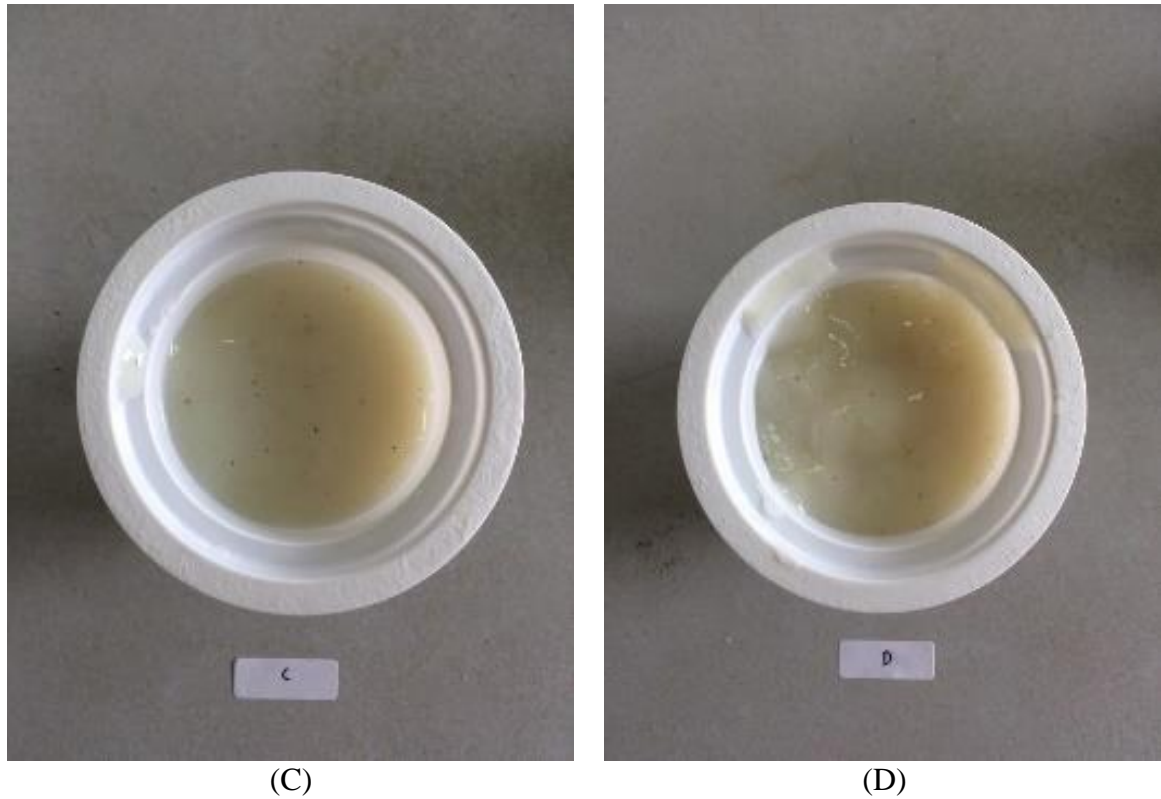


Figure 2. Colour of Bonylip Barb Cream Soup (A) 0%; (B) 10%; (C) 20%; (D) 30%

The color of the cream soup tended to be a uniform pale white. This came about because the composition and process of each treatment with or without the addition of bonylip barb fish is the same. Moreover, bonylip barb fish are categorized as fish that have bright or white colored flesh.

The color of white bonylip barb fish tends to resemble the raw materials for the cream soup recipe, hence, when added in relatively small amounts, it did not generate a visual difference in the product. The colour ratio of each treatment can be seen in Fig. 2.

Table 2. Colour Test Results for Bonylip Barb Fish Meat Cream Soup.

Treatment	Average	Median
0%	6,7a	7,0
10%	6,8a	7,0
20%	6,5a	7,0
30%	6,7a	7,0

Description: The 'a' letter indicates that there is no significant difference as based on a Friedman Test with the level of 5%.

The average value of the hedonic test for colour characteristics can be seen in Table 1. The highest average value obtained by the bonylip barb fish curry soup with the treatment of 10% fish meat is 6.8 and the smallest is for 20%, which is 6.5. This closely grouped large average indicates the results of organoleptic assessment of color characteristics are not too different. The median value obtained is uniform at 7.0.

3. 2. Aroma

Aroma is the nasal attraction that generates consumer interest in and positive feelings about a certain material or a food product. It is the result of a Millard reaction between reducing sugar and primary amine groups. Fish has an aroma originated from several volatile compounds. The average aroma as assessed by the panellists can be seen in Table 3.

Table 3. Aroma Test Results for Bonylip Barb Fish Meat Cream Soup

Treatment	Average	Median
0%	5,4a	5,0
10%	6,1a	5,0
20%	6,5a	7,0
30%	6,5a	7,0

Description: The 'a' letter indicates that there is no significant difference as based on a Friedman Test with the level of 5%.

The average value of the hedonic test for aroma characteristics shows that the aroma of cream soup is neutral to like. The lowest value is indicated by cream soup with 0% treatment (5.4 - neutral) and the highest averages for treatment cream soup are 20% and 30%, which is 6.5 (preferred) (Table 8). The results indicate that the addition of fish meat increased the panellists' preference value due to aroma.

The increase in the value of aroma characteristics due to bonylip barb fish meat addition indicates that the fish meat has a significant influence on the level of preference. However, the Friedman test results show that while the addition of bonylip barb fish has a significant influence on the aroma of cream soup, comparisons between treatments did not produce a significant difference in the test level of 5%.

Although fish meat has a distinctive fishy aroma, in this experiment, fish meat addition enhanced preference value. This could have occurred because in this study the fish meat had undergone a steaming process. One source of the fishy odor from fish meat is its contained fatty acids. Fat content decreases after boiling because the fat volatilizes and combines with other components adding to aroma and flavor. The treatment of 20% and 30% had the aroma of cream soup that was most preferred by the panellists because the aroma of the fish added to, but did not overpower the distinctive aroma of the basic cream soup.

3. 3. Taste

Taste helps in identification, acceptance and appreciation of food. It is perceived by the taste buds on the tongue. There are four types of taste perception: sweet, salty, sour and bitter. According to the panel, the lowest value of taste preference was ascribed to cream soup with 0% treatment at 5.8 (neutral), the highest average for treatment cream soup was 30%, which is 7.3 (preferred) (Table 4). Thus, the addition of fish meat increased the panellists' perceptions of preference based on taste characteristics. The smallest median value is indicated by cream soup with 0% treatment at 5.0, while cream soups of 10%, 20%, and 30% fish meat addition had a median value of 7.0.

Table 4. Taste Test Results for Bonylip Barb Fish Meat Cream Soup.

Treatment	Average	Median
0%	5,7a	5,0
10%	6,6ab	7,0
20%	7,1ab	7,0
30%	7,3b	7,0

Description: The ‘a’ and ‘b’ letters indicate real difference as based on a Friedman Test with the level of 5%.

The Friedman test results show that the addition of bonylip barb fish has a significant influence on the taste of the base cream soup. The addition of bonylip barb fish increases the panellists' preference value, along with the increase in amount. This could have come about because the addition of fish meat increased the savory taste of the base cream soup.

Savory flavors are produced from the glutamic acid compounds that naturally reside in fish meat. Indeed, glutamate acid is found in protein-based foods such as meat, seafood, meat stew (broth) and soy sauce. In addition, in the process of cooking (ripening with heat) bonylip barb fish meat, the glutamate compounds are released into the surrounding liquid. When glutamate is bound to protein molecules, glutamate does not give a savory taste (umami) to food, but protein hydrolysis during fermentation, ripening, and heating processes free it. Hence, the addition of bonylip barb fish during the processing stage produced a savory taste of a type favored by panellists.

3. 4. Texture

Texture is perceived by a combination of senses *i.e.* touch, mouth-feel, sight and hearing. It is one of the most imperative features of a food. The texture of a food is very closely related to its water content, and the texture characteristics of a cream soup can be seen from its thickness. Viscosity is a texture attribute that is a sensory characteristic assessable by touch – whether hands, lips, oral cavity, tongue or teeth, and plays a role in the level of consumer acceptance. A thick texture is a characteristic of cream soup products. A thickening agent is a

texture modifier that increases the viscosity of the emulsion’s continuous phase. Thus, increasing the thickening agent concentration will lead to an increasing of the viscosity as well.

The results of the hedonic test analysis showed that the average results of the panel’s assessment ranged from 6.1 to 6.8 (Table 5). This indicates that the texture of cream soup with or without the addition of fish meat is still appreciated. However, the median value of the four treatments is 7.0 (preferred). The small difference in the average value of bonylip barb fish cream soup may be due only to the objective assessment of the panellists.

Table 5. Texture Test Results for Bonylip Barb Fish Meat Cream Soup.

Treatment	Average	Median
0%	6,1a	7,0
10%	6,8a	7,0
20%	6,2a	7,0
30%	6,8a	7,0

Description: The ‘a’ indicates that there is no significant difference according to a Friedman Test with the level of 5%.

The Friedman test on the texture of bonylip barb fish cream soup showed that the treatment of adding bonylip barb fish did not have a significant effect on the texture of cream soup, even though the average value differed between treatments. This comes about because viscosity can be influenced by the type and concentration of starch or the types of thickening agents [3]. The starch used in making bonylip barb fish cream soup comes from corn flour (cornstarch). The amount of cornstarch used in the bonylip barb fish cream soup has the same ratio in each formula. Hence, as the amount and manufacturing process is kept the same, the texture (thickness) in bonylip barb fish cream soup in each batch is not significantly different. The addition of bonylip barb fish meat does not have a significant effect on the thickness of cream soup. Corn flour is a good thickening agent [2], thus the thickness of the cream soup is caused by the use of corn flour alone.

3. 5. Bayes Test

Table 6. Criteria Value of Bonylip Barb Meat Fish Cream Soup

Criteria	Criteria Quality
Color	0,07
Aroma	0,33
Taste	0,47
Texture	0,13

Determination of the most important criteria in the hedonic test can be done using Bayes method. The result of criteria calculations can be seen in Table 6.

Based on the calculation of the weight criteria for the color, aroma, taste and texture of the bonylip barb cream soup, it was found that the lowest criterion weight was owned by the color criteria of 7%, while the highest criterion weight was the taste characteristic of 47%. This shows that taste characteristics are the most influential criteria for the assessment of bonylip barb fish meat cream soup. This is in accordance with [19], who concluded that flavor (taste) is the main property that determines consumer's acceptance of a product.

Decision-making on the relative weight values of the criteria for color, aroma, taste and texture of the cream soup batches was done by pairwise comparisons (Pairwise Comparison). Data from pairwise comparisons of the criteria for color, aroma, taste, and texture of cream soup from the 20 panellists on the preference of the experimental cream soup product are presented in Table 7.

Table 7. Assessment Decision Matrix via Bayes Method.

Treatment	Criteria				Alternative Value	Priority Value
	Color	Aroma	Taste	Texture		
0%	6.7	5.4	5.7	6.1	5.72	16.14
10%	6.8	6.1	6.6	6.8	6.48	18.27
20%	6.5	6.5	7.1	6.2	6.75	19.03
30%	6.7	6.5	7.3	6.8	6.93	19.56
Total	0.07	0.33	0.47	0.13	0.35	1.00

The value of the obtained criteria is multiplied by the average value of the preference test results for each treatment and then summarized, so that an alternative value is obtained. The highest alternative value of 19.56 is found in the treatment of 30% with the weight value of the taste criteria of 0.47. Data from the Bayes method shows that taste is the most important criterion in the panellist's final decision on product preference in this experiment. The second important criterion is aroma. This has a weight value of 0.33. In descending preference value, texture and aroma follow at 0.13 and 0.07 respectively.

4. CONCLUSIONS

The item of greatest preference is a bonylip barb fish meat cream soup of 30% bonylip barb fish meat supplement. This has a hedonic mean value of 6.7 (color), 6.5 (aroma), 7.3 (taste), and 6, 8 (texture).

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