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Utilization of hampal surimi flour on the preference level of rangginang

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Abstract
The Increased protein in snack rangginang can be done by addition of surimi flour. This research to determine addition surimi hampal flour to manufacture rangginang the organoleptic and chemical content are most preferred treatment of panelists. The research was using an experimental method with five level addition hampal surimi flour were 0; 2, 5; 5; 7, 5; and 10%. Sensory evaluation was conducted using 20 semi-trained panelists. The observed parameters consisted of yield of surimi and surimi flour, volume, sensory test (appearance, aroma, texture and taste) and chemical tests (content of water ash, fat, protein and carbohydrate). The conclusion of research showed surimi flour doesn't affect the aroma and texture but seems to improve appearance, taste, texture and volume of rangginang. Rangginang formulated with 5% surimi flour is most preferred with result of nutrient content are 2,62% water content, 2,06% ash content, 28,99% fat content, 12,07% protein content and 52,47% carbohydrate content.

Keywords: Surimi flour, hampal, rangginang, level preferences

1. Introduction
Fish is a useful and relatively inexpensive source of food and protein for the community, fish also contain unsaturated fatty acids, vitamins and minerals that are needed by the body. Optimizing fish protein is very necessary for the human body because fish contain the same amino acid pattern as human amino acid patterns and are easily digested by the body (Afrianto and Liviawaty 1989) [1]. Fish consumption figures increased in 2015 according to the 2015 Ministry of Forestry and Fisheries (KKP) data, which can be seen from the increase in fish supply in 2015 of 41.11 kg / capita / year).
Hampala fish (*Hampala macrolepidota*) is one of the dominant types of freshwater fish found on the Cimanuk River which is very potential to be used as consumption fish, because the fish has almost delicious taste of meat. The community usually processes fish which are empty by frying or pressing. In Indonesia, fish are also known as hampala (Sundanese), palung (Java) and sasau (Sumatra). The potential for reproductive fish is also quite high because the fish can spawn more than once in a year [11]. Fish are almost not optimally utilized by the community, because fish have almost the same character as carp and nilem which has many thorns.
Processing of fishery products, especially fish, has not been optimally implemented. The lack of public understanding of nutrition and the benefits of fish protein for health and the lack of technological advances in fish processing as a form of product diversity to meet consumer tastes is one of the factors causing low consumption of fish in Indonesia. One method of processing that can be an alternative in utilizing fish is empty, that is by making surimi flour. Surimi (or fish paste) is odorless, tasteless and colorless therefore surimi can be modified with various fishery products (Irianto 1990) [3]. They are widely used because their cooking is simple and inexpensive. In addition, surimi products can easily change the shape, taste, and texture of the final product according to consumer demand [6]. Surimi flour is the result of surimi drying. Surimi flour is the process of bone removal, and some of the components are water soluble and fat through washing with cold water, so that it is called a wet concentrate of myofibril protein from fish meat [10]. The advantages of surimi flour are whiter, cleaner, distinctive smell that does not dominate and has the characteristics of fish meal rather more likely to be neutral or better than usual fish flour. In addition, surimi flour can be preserved as an additive for processed fishery products such as crackers, opaque and rangginang.
Rangginang is one of the typical Indonesian foods that are often found in Java. In general, Rangginang is circular, tastes savory and has a crunchy texture.

Rangginang has high carbohydrate nutrition but low protein content. The nutritional content of rangginang 50 g is 27,05% fat, 60,34% carbohydrate, 6,62% protein. Low protein levels in the rangginang can result in these snacks becoming less nutritious. So it is necessary to add a protein source to rangginang that comes from surimi flour. This research to find result addition of surimi flour. Surimi is a fish meat paste that has undergone a out the percentage of surimi flour additives which produce the most preferred level by panelists.

2. Materials and Methods

This research was conducted at the Fisheries Product Process Laboratory of the Faculty of Fisheries and Marine Sciences, Padjadjaran University for hedonic test, Food Technology Laboratory, Faculty of Engineering, University of Pasundan for proximate analysis (water content, ash content, fat content, protein content, carbohydrate content). The materials used in this research are 4.4 kg of hampal fish, salt, garlic, water and cooking oil, while the tools used in this research are, knives, cutting boards, scales, basins, meat grinders, calico cloths, wood stirrers, baking pan, oven blower, hemernil, 100 mesh tyler sieve, steamer, pan and stove.

2.1 Research method

The method used in research was an experimental method consisting of 5 treatments and 20 semi-trained panelists as replications, while the percentage of surimi flour addition was empty, namely, 0%, 2.5%; 5%; 7.5%; and 10%. Consisting of five treatments with 20 semi-trained panelists. The parameters observed were physical tests (surimi yields, surimi flour, and blooming volume), chemical tests ((water content, ash content, fat content, protein content, carbohydrate content) were low for the control treatment and most preferred), hedonic test (test preference) based on organoleptic characteristics which include appearance, aroma, texture, and taste.

2.2 Proximate Composit

The macronutrient of rangginang was determined according to AOAC methods [2]. Protein content was determined using the Kjeldahl method, fat content was determined by the Soxhlet method. Ash content was determined by ashing the samples overnight at 550-600 ^{o}C. Watre content was determined by drying the samples overnight at 105-110 ^{o}C. Carbohydrate content was calculated by difference method.

2.3 Data Analysis

Analysis of the data in this researh for water content, fat content, ash content, protein content, carbohydrate content and volume of blooming using a comparative descriptive method. Sensory test were analysis used non-parametric statistics, analysis of two-way variance friedman test with Chi-square test, followed by using multiple comparison tests (to determine differences in treatment. Pairwise comparison tests were conducted to take panelist decisions on the criteria of the preferred product, followed by the Bayes method for the best decision making from several alternatives taking into account the weight of the criteria (Marimin 2004) [9].

3. Results and Discussion

3.1 The yield of Surimi Flour Hampal

The yield of hampal surimi flour is calculated by compared the weight of fish meat produced with the weight of whole fish then multiplied by 100 pencent. 4400 gram fish meat produced 910 grams of surimi and from 910 gram of surimi produced 148 grams of surimi flour, from the data, the surimi yield value was 20.86% and surimi flour yield was 16.26%. the yield of surimi flour obtained is lower than the results of Kurniawati's research (2018), which is 18.9%. The low yield values are caused by washed frequency which caused water-soluble meat components such as blood, lipids and sarcoplasmic proteins to dissolved in water resulted in a decrease of the yield.

3.2 Organoleptic Test

3.2.1 Appearance

Appearance is the first characteristic assessed by consumers. Appraisal of appearance can determine consumer acceptance of wholeness, surface appearance and product color. Based on the results of the statistical analysis of the appearance of rangginang, the hampal surimi flour addition to the rangginang has a significant effect on rangginang (Tabel 1). Average values of appearance ranged from 5.0-7.4 which means that the appearance of the rangginang ranges from normal to favored by panelists. The highest average value in treatment 5% with the acquisition of 7.4 (liked) with the appearance of a brownish yellow color, intact shape and uneven surface, while the lowest average value in the treatment 10% added hampal surimi flour with the acquisition of a value of 5.0 (neutral) with brown and an uneven surface. The brownish yellow color of the rangginang is caused by a maillard reaction. Maillard reaction is a reaction of protein and carbohydrate, which is a non-enzymatic brown reaction, so that the more addition of bone flour is a source of protein, the more brown color of the crackers (Wiriano 1992) [14].

3.2.2 Aroma

Aroma is one of the parameters in determinated the good taste of a food product by using a sense of aroma because they can provide a rapid assessment of the product that is liked or not (Winarno 2002) [14]. The results of the statistical analysis showed the aroma had an influence on the level of preferenced of the panelists. The average aroma of rangginang with the addition of hampal surimi flour is almost as can be seen in Table 2. Average value of the aroma values ranged from 5.8 to 7.1 which indicated the aroma of rangginang ranged from normal or is still accepted by panelists. The highest average value of smell was found in the addition of surimi flour with 5% treatment of 7.1 and a median value of 7.0 (preferred) which produced a distinctive aroma of sticky rice and smelled specifically of fish are balanced. The lowest average value of aroma in the addition of surmi flour is almost 10%, which is 5.8 and the median value is 5.0 which produced only a distinctive smell of fish. The more addition of surimi flour to the rangginang, the lower the level of preference of the panelists for aroma parameters. The addition of surimi flour to a treatment of 5% then experienced a decrease in the addition of surimi flour as much as 7.5% and 10%. The addition of surimi flour almost produced the smell of glutinous rice rather specific to the 2.5% treatment, the smell of fish glutinous rice specific to the 5% treatment and the smell of glutinous rice is slightly with specific fish at 10% treatment. The average value decreased in the 7.5 and 10% treatments because the smell of surimi flour produced at the grass was too strong.

3.2.3 Texture

Texture is a quality factor that is related to crispness. The

assessment of rangginang texture is related to the level of rangginang crispness. The results of the statistical analysis show that the texture has an influence on the level of preference of the panelists. The average rating of rangginang with the addition of surimi flour (Table 3). Average values of texture ranged from 7.0 - 8.1, which means that the rangginang texture is still accepted by panelists. The highest average score was found in the addition of surimi flour at 5.0% with a value of 8.1 and a median value of 9.0 with a very crunchy texture. The lowest average value in the addition of surimi flour is almost 10% with a value of 6.7 and a median value of 7.0 with a crisp texture. The addition of surimi flour has an effect on the rangginang texture because the addition of fish flour will cause the ability of starch granules to bind the water to be reduced so that the water decreases and when the water reaches its boiling point the water will evaporate left the surface of the crackers to dry and hard (Siaw *et al* 1985) [12].

3.2.4 Taste

The results of the statistical analysis show that taste has an influence on the level of preference of the panelists. The average rangginang smell with the addition of surimi flour is shown in Table 4. Average value of taste ranged from 5.3 to 8.0, which means that the taste is ordinary to the liked of panelists. The highest average value was found in the 5% treatment with a value of 8.0 and a median value of 8.0 with balanced taste of glutious rice and fish. The lowest average value of the treatment is 10% with a value of 5.3 and a median value of 5.0 with the dominant fish taste. The addition of hampal surimi flour at 2.5% treatment resulted in the product had a tasted of glutinous rice which is still dominant, treatment of 5% produced rangginang with a taste in which glutinous rice and fish taste are balanced, so that the treatments 7.5% and 10% addition of hampal surimi flour produced rangginang with fish flavor more dominant. Specific savory flavors of fish are produced from differences in the proportion of surimi flour which is almost in rangginang, so the protein content found in the product is different.

3.3 Descision Making with Bayes Method

The best rangginang decision is made by the Bayes method. The Bayes method is one technique that can be used to analysis the best decision making from a number of alternatives that aim to obtain optimal results. The results of the weight calculation of the appearance criteria are 0.17; aroma 0.19; texture 0.22 and taste is 0.42. Based on the weight gain of appearance criteria, aroma, texture and taste, it was found that taste assessment was the most important criterion that would determine the final decision of the panelist. The decision matrix for the rangginang assessment using the Bayes method is presented in Table 5. Based on the Bayes method, it was found that rangginang with the addition of surimi flour was almost 5% which was the most preferred treatment for panelists with an alternative value of 7.86. While the lowest alternative value is 10% with a value of 5.44.

3.4 Expansion Volume

The volume of bloom is one of the important factors in making rangginang. Rangginang is considered good when in the fried process. The larger volume of bloom the more crisp the texture so that the quality is getting better (Mahdar in Pinasthika 2015) [11]. The results of the analysis showed that the average value of bloom in the control treatment was 17.14% and the addition of surimi flour was as much as 5% at 15.95%. Reduce the volume of blooming that occurs with an increase of surimi flour caused by the ranginang air cavity produced smaller because the density of the air cavity is filled by other ingredients that are not amylopectin. The low volume of bloomf is also related to the air content which showed the higher the water content, the lower the volume of bloom. The ratio of fish and starch will affect the volume of bloom and crispness of fish crackers (King 2002) [7].

3.5 Proximate Composition

3.5.1 Water content

Water content contained in a product can affect the texture of the product. The water content test results found on 50 gram of rangginang in the addition of surimi flour as much as 5.0% at 2.62%, when compared with rangginang without the addition of surimi flour the water content was 2.54%. The water content in Rangginang is increased because of the addition of surimi flour to the rangginang.

3.5.2 Ash content

The ash content in a product can illustrate the large amount of minerals contained in the product (Khalisi 2011) [4]. The proximate test results of Rangginang ash content at the treatment of 0% were 1.66% while in the treatment 5.0% was 2.06% (Table 5). Increased ash content occurs when the addition of surimi flour is almost due to the addition of ash found in the previous rangginang, and the addition of ash content that has been found in surimi flour is empty. Increasing the ash content occurs because of the addition of surimi flour to the barrier. The ash content contained in surimi flour is almost 5.45% (Kurniawati 2018) [7]. The increase in ash content is influenced by the release of water from the product and the concentration of minerals, as well as the added protein Winarno (1985) [14].

3.5.3 Fat content

The proximate test results of Rangginang fat levels at 0.0% and 5.0% treatment showed an increase in fat content. At 0% treatment amounted to 27.05% while in treatment 5.0% was 28.99% (Table 5) per 50 gram rangginang. Increased fat levels occur because of the addition of fat from surimi flour which is almost added. The fat content of surimi flour is almost 15.06% (Kurniawati 2018) [8].

3.5.4 Protein content

Protein is an important nutrient parameter for the body. Protein functions to form new tissues that always occur in the body and replace damaged body tissues other than as fuel. The proximate test results of the levels of protein contained in rangginang with a treatment of 0.0% surimi flour were almost 6.62% and 12.07% surimi flour was almost 5.0% per 50 grams of ingredients. Based on the proximate test results of protein content, there was an increase in protein content in the treatment range of 5.0% compared to the treatment of 0.0% (Table 6). Increased protein content in mangoes occurs because of the addition of proteins derived from surimi flour. The protein content of surimi flour is almost 55.17% (Kurniawati 2018) [8].

3.5.5 Carbohydrate content

Carbohydrate levels found in 50 grams of rangginang in the addition of surimi flour as much as 5.0% were 52.47%, when compared to rangginang without the addition of surimi flour the carbohydrate content was 60.34% (Table 5).

4. Conclusion

The results addition of hampal surimi flour as much 5% the most preferred treatment by the panelist. Hampal surimi flour doesn't affect the aroma and texture but seems to improve the color, taste, texture and volume of bloom rangginang with a favorite value for appearance, aroma, texture, and taste 7(liked); 7(liked); 9(very liked); and 8(very liked). The result proximate composition of rangginang water content 2.62%, ash content 2.06%, fat content 28.99%, protein content 12.07% and carbohydrate content 52.47%. This research showed that is rangginang with the addition of hampal surimi flour incrase the nutrient and that are accepted by society.

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Table 1: Average Rengginang Appearance Various Treatment of Surimi Hampala Flour Addition

Addition of Surimi Hampal Flour (%)	Median Value	Average Appearance
0,0	7,0	6,7 b
2,5	7,0	7,0 b
5,0	7,0	7,4 b
7,5	7,0	6,1 ab
10	5,0	5,0 a

Tabel 2 : Average Rengginang Smell Various Treatment of Surimi Hampala Flour Addition

Addition of Surimi Hampal Flour (%)	Median Value	Smell Average
0,0	7,0	6,6 a
2,5	6,0	5,9 a
5,0	7,0	7,1 a
7,5	5,0	6,0 a
10	5,0	5,8 a

Table 3: Average Rengginang Texture Various Treatment of Surimi Hampala Flour Addition

Addition of Surimi Hampal Flour (%)	Median Value	Average Texture
0,0	7,0	7,2 a
2,5	7,0	6,9 a
5,0	9,0	8,1 a
7,5	7,0	6,8 a
10	7,0	6,7 a

Table 4: Average Rangginang Taste Various Treatment of Surimi Hampala Flour Addition

Addition of Surimi Hampal Flour (%)	Median Value	Average Taste
0,0	6,0	6,4 ab
2,5	7,0	6,0 a
5,0	8,0	8,0 b
7,5	5,0	5,8 a
10	5,0	5,3 a

Description: Values followed by the same letter show no significant difference in the multiple comparison test at the level of 5%

Table 5: Decision matrix for the rangginang assessment using the Bayes method

Addition of Surimi Hampal Flour (%)	Kriteria				Value Alternative	Value Priority
	Appearance	Aroma	Texture	Taste		
0,0	7	7	7	6	6,58	0,20
2,5	7	6	7	7	6,81	0,21
5,0	7	7	9	8	7,86	0,24
7,5	7	5	7	5	5,77	0,18
10	5	5	7	5	5,44	0,17
Bobot Kriteria	0,17	0,19	0,22	0, 42	32,46	1,00

Table 6: Proximate composition of rangginang

Compotition	Treatment	
	0,0%	5,0%
Water (%)	2,54	2,62
Ash (%)	1,66	2,06
Fat (%)	27,05	28,99
Protein (%)	6,62	12,07
Carbohydrate (%)	60,34	52,47

Source: Laboratory of Engineering Food, University of Pasundan

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