

socialization activities. To help increase fish consumption in the community, it can also be done by adding fish protein to foods that are popular and much liked by the community. Fish protein can be added in the form of wet protein concentrate or better known as surimi.

One type of fish that can be used as raw material for making surimi is tilapia (*Oreochromis niloticus*). Tilapia (*Oreochromis niloticus*) is a fish that is in great demand by the public as a source of protein. It has a protein content of 43.76%, fat 7.01%, ash content of 6.80% per 100 grams of fish weight [3]. The advantages of tilapia are that it has thick flesh, glossy white, there are no fine spines in the flesh and is easy to obtain because it is spread in almost all regions in Indonesia.

Surimi can be added to various food products as an effort to increase protein consumption. Several studies have been conducted on the addition of protein to food products including those added to brownies [4], deserts [5], donuts [6], and seaweed jelly candy [7]. Surimi is a colorless, odorless and tasteless fishery product, so it can be modified into various food products [8].

Strawberry dodol is one of the most popular food products by various age groups in Indonesia. Strawberry dodol contains high vitamin C, but has the disadvantage that it contains high sugar and carbohydrates. To increase the nutritional value of strawberry dodol, protein was added from tilapia surimi. The addition of surimi to strawberry dodol will also indirectly help in efforts to increase people's consumption of fish protein.

The addition of tilapia surimi to strawberry dodol can affect its organoleptic characteristics which include appearance, aroma, taste and texture. Given the importance of the level of consumer acceptance of the product, it is necessary to conduct research on the level of preference for strawberry dodol added with tilapia surimi. The purpose of this study was to determine the concentration of addition of tilapia surimi in strawberry dodol which is the most preferred by the panelists.

2. MATERIAL AND METHOD

2.1 Materials and Tools

The materials used in this study were tilapia surimi, white glutinous rice flour, strawberry, sugar, coconut milk, margarine, vanilla and ice.

The tools used in the study included the equipment used for making surimi, namely a meat grinder, plastic bowl, filter cloth, scales, stirrer, thermometer, knife and cutting board. The tools for making dodol strawberry includes a blender, measuring cup, frying pan, wooden stirrer, tray and spoon.

2.2 Research Method

The method used in this study is an experimental method with 5 treatments of 20 semi-trained panelists as replicates. The treatment of adding tilapia surimi was based on the weight of the strawberry, the treatment consisted of without the addition of tilapia surimi (0%), addition of 10%, 20%, 30% and 40% tilapia surimi

2.3 Research Procedure

The procedure carried out in this study consisted of several stages which included making surimi from tilapia, pulverizing strawberries, making dodol strawberries and observing.

2.3.1 Preparation of Tilapia Surimi

The method of making surimi from tilapia meat used is a modification of [9] research. The filleted fish meat was ground using a meat grinder. After that, the fish meat was washed twice using cold water (15 ± 1) °C and 0.3% (w/w) salt solution. Soaking in cold water (ratio of water: meat is 3:1) is done for 10 minutes. Then squeezed using a filter cloth to remove the water. The second immersion with 0.3% (w/w) salt solution (comparison of the volume of salt solution: meat is 3:1) for 10 minutes, then filtered again using a filter cloth while squeezing. The resulting surimi is then used as an additional ingredient in the manufacture of strawberry dodol.

2.3.2 Strawberry mash

The strawberry mashing procedure is as follows:

1. Strawberry washed clean
2. Steamed using a pan at a temperature of 100°C for 10 minutes
3. Strawberry that has been steamed cut into pieces and blended until smooth
4. Filtering so that you get a smooth and clean mashed strawberry from other impurities

2.3.3 Preparation of Strawberry Dodol

The formulation of the ingredients for making strawberry dodol is presented in Table 1. The making of strawberry dodol is as follows:

1. Glutinous rice flour is roasted until it turns yellowish
2. Surimi, crushed strawberries, glutinous rice flour, coconut milk, vanilla, and margarine are mixed and then heated
3. After the dough thickens slightly, the sugar is put into the pan using medium heat
4. Stir evenly until the dough does not stick to the pan.

Table -1: Formulation of Strawberry Dodol with the Addition of Tilapia Surimi

Material	Addition of Tilapia Surimi Treatment				
	A (0%)	B (10%)	C (20%)	D (30%)	E (40%)
Strawberry (g)	100	100	100	100	100
Tilapia surimi (g)	0	10	20	30	40
Glutinous rice flour (g)	5	5	5	5	5
Sugar (g)	40	40	40	40	40
Coconut cream (g)	10	10	10	10	10
Margarine (g)	5	5	5	5	5

2.4 Observation

Organoleptic test observations using hedonic test, organoleptic characteristics observed include appearance, aroma, taste and texture [10].

2.5 Data Analysis

The results of the hedonic test were analyzed using Friedman's two-way analysis of variance [11] to determine the effect of adding tilapia surimi to the level of preference for strawberry dodol.

3. RESULT AND DISCUSSION

Organoleptic characteristics in the hedonic test are parameters assessed by panelists in determining the level of preference for a product. The organoleptic characteristics observed in this study were appearance, aroma, taste and texture.

3.1 Strawberry Dodol Appearance

Appearance is an important organoleptic parameter, because it is a sensory property that is first seen by consumers. If the impression of the appearance of the product is good or liked, then new consumers will see other sensory properties (aroma, taste, texture). Appearance does not determine the absolute level of consumer preference, but appearance also affects consumer acceptance. Generally, consumers choose and accept foods that have an attractive appearance [12]. The results of observations of the appearance of strawberry dodol with the addition of tilapia surimi are presented in Table 2.

Table -2: The Average of Strawberry Dodol Appearance with the Addition of Tilapia Fish Surimi

Tilapia Surimi Addition (%)	Median	The Average of Appearance
0	7	6.7a
10	7	6.3a
20	7	6.7a
30	7	6.9a
40	7	6.5a

Note: The average value followed by the same letter shows that it is not significantly different according to the multiple comparison test at the 5% level.

The average value range of the appearance of strawberry dodol with the addition of tilapia surimi was 6.5 to 6.9. The lowest value was in strawberry dodol with the addition of 40% tilapia surimi, while the highest was found in strawberry dodol with the addition of tilapia surimi. Based on the median value of all treatments, the panelists liked the addition of tilapia surimi to strawberry dodol. Based on the Friedman test results, it was shown that all treatments with the addition of tilapia surimi did not have a significant effect on the appearance of strawberry dodol.

The average value of the highest appearance of strawberry dodol was in the treatment with the addition of 30% tilapia surimi. This treatment produces an attractive strawberry dodol and a brownish red color. According to [13] the factors that cause food to change color are due to the influence of heat on added sugar or naturally present in the fruit itself which causes a non-enzymatic browning reaction.

3.2 Strawberry Dodol Aroma

Taste or not a food product is determined by aroma, even aroma is more complex than taste or taste, and the sensitivity of the sense of smell is higher than the sense of taste. The food industry considers it very important to conduct a odor test because it can provide an assessment of whether its production is favorable or unfavorable [12]. The results of observing the aroma of strawberry dodol with the addition of tilapia surimi are presented in Table 3.

Table -3: The Average of Strawberry Dodol Aroma with the Addition of Tilapia Fish Surimi

Tilapia Surimi Addition (%)	Median	The Average Aroma
0	5	5.9a
10	7	6.4a
20	7	6.6a
30	7	7.0a
40	5	6.1a

Note: The average value followed by the same letter shows that it is not significantly different according to the multiple comparison test at the 5% level.

The average value range of strawberry dodol aroma with the addition of tilapia surimi was 5.9 to 7. The lowest value was in strawberry dodol without the addition of tilapia fish surimi (0)%, while the highest was found in strawberry dodol with the addition of 30% tilapia surimi. Based on the median value of all treatments, the panelists liked the addition of tilapia surimi to strawberry dodol. Based on the Friedman test results, it was shown that all treatments with the addition of tilapia surimi did not have a significant effect on the aroma of strawberry dodol. This happens because surimi has a neutral aroma, so that when applied to strawberry dodol it does not cause an aroma that deviates from the dodol aroma. This is in accordance with [8] statement that surimi is a colorless, odorless and tasteless fishery product so that surimi can be modified into various food products.

According to [14] dodol has a distinctive aroma depending on the raw fruit used. In this study, the strawberry dodol produced had a distinctive strawberry aroma.

3.3 Strawberry Dodol Taste

Taste is an important factor that forms the basis for making decisions by consumers on the acceptance of a product. If a product has an unpleasant taste, then the product will not be accepted by consumers even though the color and aroma are good [15]. The results of observations on the taste of strawberry dodol with the addition of tilapia surimi are presented in Table 4.

Table -4: The Average of Strawberry Dodol Taste with the Addition of Tilapia Fish Surimi

Tilapia Surimi Addition (%)	Median	The Average Taste
0	5	6.9a
10	7	7.3a
20	7	7.5a
30	7	7.9a
40	5	6.7a

Note: The average value followed by the same letter shows that it is not significantly different according to the multiple comparison test at the 5% level.

The average value of the strawberry dodol taste with the addition of tilapia surimi was 6.7 to 7.9. The lowest value was in strawberry dodol with the addition of 40% tilapia surimi, while the highest was found in strawberry dodol with the addition of 30% tilapia surimi. Based on the median value of all treatments adding tilapia surimi to strawberry dodol was favored by the panelists, 0%, 10%, 20%, and 40% treatment panelists gave a score of 7 (liked), while in the treatment of adding tilapia surimi 30% the panelists gave a value of 9 (really like). Based on the Friedman test results, it was shown that all treatments with the addition of tilapia surimi did not have a significant effect on the taste of strawberry dodol.

In the addition of 30% tilapia surimi treatment, strawberry dodol was produced with a distinctive taste, no fish aroma and sweet taste. This is in accordance with [7] in the treatment of adding 30% surimi, the taste of surimi in jelly candy has not been felt. And in the research of [16] regarding the addition of tilapia meat meal to red guava dodol, red guava dodol was produced with a distinctive taste and no fish aroma.

The taste produced on strawberry dodol with the addition of tilapia surimi is influenced by the amino acid content contained in surimi protein. According to [17] good taste is caused by the presence of amino acids in protein and fat contained in food. Furthermore, according to [18] glycine contained in fish meat can cause a sweet taste.

3.4 Strawberry Dodol Texture

Texture is one of the parameters that determine the level of consumer preference for a product. Types of texture sensing include juiciness, dryness, hard, smooth, rough and oily [12]. In this study, texture observations were carried out by means of when the strawberry dodol was chewed or bitten in the mouth. Another way is by touching your finger to the strawberry dodol so you know the texture. The results of observations on the texture of strawberry dodol with the addition of tilapia surimi are presented in Table 5.

Table -5: The Average of Strawberry Dodol Texture with the Addition of Tilapia Fish Surimi

Tilapia Surimi Addition (%)	Median	The Average Texture
0	5	6.7a
10	7	6.6a
20	7	7.1a
30	7	8.5b
40	5	6.1a

Note: The average value followed by the same letter shows that it is not significantly different according to the multiple comparison test at the 5% level.

The average value of the dodol strawberry flavor with the addition of tilapia surimi was 6.1 to 8.5. The lowest value was in strawberry dodol without the addition of 40% tilapia surimi, while the highest value was found in strawberry dodol with the addition of 30% tilapia surimi. Based on the median value of all treatments adding tilapia surimi to strawberry dodol was favored by the panelists, 0%, 10%, 20%, and 40% treatment panelists gave a score of 7 (liked), while in the treatment of adding tilapia surimi 30% the panelists gave a value of 9 (really like). Based on the results of Friedman's test, it was shown that the addition of 30% tilapia surimi had a significant effect on the texture of the strawberry dodol.

The texture of strawberry dodol with the addition of 30% tilapia surimi had the highest average value, resulting in a smooth and chewy texture of strawberry dodol which was very liked by the panelists. The addition of surimi can affect the texture of strawberry dodol, this is due to the high protein content of tilapia surimi. The

addition of 40% tilapia surimi had the lowest average value because the texture became denser than the other treatments.

4. CONCLUSIONS

Based on the results of the study, it can be concluded that strawberry dodol with the addition of 30% tilapia surimi resulted in the most preferred treatment by the panelists with a median value of appearance 7, aroma 7, taste 9, and texture 9.

5. REFERENCES

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