Nutrient Content and Sensory Characteristics of Tuna Fish Dimsum (Yellowfin)

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Abstract. Yellowfin tuna contains glutamic acid which creates a savory taste. Tuna trimming is a by-product of the trimming process in the formation of tuna loin. Utilization of tuna trimming to produce food products that are nutritious and acceptable to the community. The objective of this research is to determine the nutritional content and preference level of tuna fish in the production of dimsum. Determination of product acceptability using hedonic tests and statistical tests. The nutritional content uses parameters of protein content, fat content, ash content and water content. Assessment of the level of preference (hedonic test) using the parameters of appearance, aroma, taste, texture and overall acceptability. Data were analyzed using the statistical software SPSS Statistic 24. The results showed that the nutritional content of steamed tuna dimsum without MSG was protein content of 14.50%wb, fat content of 1.24%wb, ash content of 1.62%wb, moisture content of 51.73%. The nutritional content of this tuna dimsum complies with the SNI for fish dimsum products. The panelists liked the hedonic test results on tuna dimsum using the steaming and frying method with hedonic test scores above 7. The statistical test results on taste parameters using the frying and steaming method affected the panelist's preference level.

1 Introduction

Thunnus albacares is a species of tuna that has a high protein content of 23.52% and a low-fat content of 1.93%. Yellowfin tuna contains eighteen amino acids with a total amino acid content of 84.49% and the most predominant glutamic acid content is 12.45%. Yellowfin tuna has a higher concentration of DHA (20.22%, % of total fatty acids) [1]. The high nutritional content of yellowfin can be beneficial for health. The production process of tuna loin in a single tuna consists of a 39.7% yield of loin and a 60.3% yield of waste. Tuna fish waste includes tuna swallow, head, bones and fins, skin, stomach/stomach contents, blood and heart. Tuna trimming (tuna eggs, heads, bones, stomach/stomach contents) has potential raw materials as a source of carbohydrates, fats and proteins [2]. Tuna trimming has the potential as a diversified product of processed fishery products including kamaboko [3], flavorings [4], canned tuna, sushi, sashimi [5], nuggets, meatballs, crackers, surimi [6], and dimsum [7].

Dimsum is a processed product consumed by the public as a snack. In general, dimsum uses chicken, shrimp, beef, mackerel and squid [8]. In this study, the processing,
2 Research Method

This research was conducted at the Fisheries Product Processing Laboratory, Politeknik Kelautan dan Perikanan Bitung. Proximate analysis testing was carried out at Food Technology and Agricultural Products, Universitas Gadjah Mada. The tools used to make dimsum tuna include scales, dimsum skin grinding machines, food processors, basins, pans, knives, cutting boards, and stoves. Equipment for organoleptic tests, namely scoring sheets, plates, and glasses. The raw materials used to process tuna dimsum are tuna trimming, and dumpling skins specifically for dim sum types of salt, sugar, pepper, garlic, shallots, tapioca flour, eggs, sesame oil and water.

The method used in this research is an experimental method. This study consisted of 4 treatments and 30 semi-trained panelists. The panelists in this study were cadets/I of the Fishery Product Processing Engineering Study Program, Politeknik Kelautan dan Perikanan Bitung who already know and have experience in organoleptic assessment. The treatment carried out is the method of processing steamed and fried dim sum using synthetic MSG and without MSG.

This study uses parameters, namely proximate analysis testing, and organoleptic testing with the hedonic level test for dimsum products. Organoleptic testing of dimsum tuna fish covers appearance, taste, aroma, and texture. This organoleptic testing method is based on SNI 01-2346-2006 and then analyzed by ANOVA using SPSS with Duncan's method. While the proximate analysis test included water content (AOAC 934.01 method), ash content (AOAC 923.03 method), fat content (AOAC 928.22 method), total protein content (AOAC 981.10 method).

Tuna Fish Dimsum Processing

The processing methods for dimsum tuna in this study are steaming and frying. The stages in processing dimsum tuna include receiving raw materials, washing, mixing seasoning with and without MSG, weighing the dimsum dough, forming, steaming/frying, cooling, packaging and weighing, labeling, frozen and non-frozen storage, organoleptic testing. The raw material for tuna fish is obtained from the remaining results of the tuna loin trimming process from companies that already have HACCP certificates. Make the dimsum dough by mixing ground tuna, tapioca flour, high and low protein flour, salt, ground pepper, synthetic MSG and no MSG, carrots, sesame oil until smooth. Fill the dimsum skin with the dimsum dough then steam for 15 minutes and fry for 5 minutes. Dimsum that has been cooked is packaged and labeled.

3 Results and Discussion

Nutritional Content of Tuna Fish Dimsum

In this study chemical analysis of tuna dimsum without MSG included total protein content, fat content, ash content and water content. Proteins are formed by amino acids linked by peptide bonds. All amino acids have the same basic structure and contain a central carbon atom surrounded by four groups: a hydrogen atom, an amine group (NH$_2$), an acidic group (COOH), and a characteristic side group. The protein content in the food consumed by humans is processed in the intestine in the form of amino acids. Table 1 shows that the total protein content of tuna dim sum is 14.50%. The results of testing the protein content of tuna dimsum have met the quality standard for protein content of fish dimsum products set.
by SNI 7756:2020, which is a minimum of 5%

Protein is an important component and a potential source of protein in food that is needed to meet the number of amino acids needed in humans. The content of animal protein is generally higher so that it can meet the needs of the human body.

Table 1. Nutrient Content of Tuna Fish Dimsum

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Steamed Tuna Dimsum</th>
<th>SNI Fish Dimsum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein Content (% wb)</td>
<td>14.50</td>
<td>Minimum 5</td>
</tr>
<tr>
<td>Fat Content (% wb)</td>
<td>1.24</td>
<td>Maximum 12</td>
</tr>
<tr>
<td>Ash Content (% wb)</td>
<td>1.62</td>
<td>Maximum 2.5</td>
</tr>
<tr>
<td>Moisture Content (%)</td>
<td>51.73</td>
<td>Maximum 60</td>
</tr>
</tbody>
</table>

The fat content in food ingredients has functional properties that affect aspects of color, flavor, texture, softness, and emulsification. Fat has an important role in the human body and is a more effective source of energy than protein. The fat content of steamed tuna dimsum is 1.24%wb. According to [24] that the SNI for fat content for fish dimsum products is a maximum of 12%wb. Thus, the results of testing the fat content of steamed tuna dimsum have met the SNI standard.

Ash is obtained from the residue of burning organic material. Ash content in food indicates inorganic mineral components. The ash content of steamed tuna dimsum was 1.62%wb. According to [11] that boiled/steamed foods produce lower ash content than fried foodstuffs. This is due to the salt-mineral content that dissolves in water when boiling. According to [24] regarding fish dimsum products, the maximum ash content in fish dimsum is a maximum of 2.5%wb. Therefore, the ash content of steamed tuna dimsum meets SNI standards.

The water content parameter has an important role as an indicator of the shelf life of fish dimsum products. Moisture content is an important factor affecting product shelf life, stability, and quality of food products. The water content of steamed tuna dimsum is 51.73% while the SNI water content for fish dimsum products is a maximum of 60%. Thus, the water content of steamed tuna dimsum meets SNI standards.

Table 1 showed that the nutritional content of steamed tuna dimsum. Proximate test parameters on steamed tuna dimsum include protein content, fat content, ash content, and water content. The results of the proximate test for steamed tuna dimsum meet human nutritional needs because they have met the threshold value set by SNI.

Yield

The yield value is obtained from the ratio of the weight of the cooked dough to the initial weight of the dough multiplied by 100 [13]. The yield value of steamed and fried dimsum is shown in Table 2. The yield value of fried and steamed dimsum varies because it is influenced by the length of time of steaming and frying. This is to research [13] that a long baking process reduces the water content in the dough resulting in a decrease in yield.

Table 2. Yield Value of Fried and Steamed Dimsum

<table>
<thead>
<tr>
<th>Component</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fried Dimsum</td>
<td>62.5 - 75%</td>
</tr>
<tr>
<td>Steamed Dimsum</td>
<td>81.25 - 100%</td>
</tr>
</tbody>
</table>
Table 2 shows that the yield of fried dimsum is smaller than steamed dimsum. This is due to the frying process in the dimsum resulting in a decrease in water content. This research is by [13] that the roasting process results in loss of water content due to evaporation. Steamed dimsum produces a greater yield than fried dimsum because of the high-water content in steamed dimsum.

Organoleptic Test

Organoleptic testing is a test using the five human senses to a stimulus to determine the response or impression of a product [14]. The results of this organoleptic test are based on the Indonesian National Standard (SNI) number 01-2346-2006. The organoleptic test parameters in this study were appearance, aroma, taste, and texture. Appearance parameters were assessed from color intensity, odor parameters were assessed from the aroma of tuna without MSG and using synthetic MSG, texture parameters were assessed from the softness of the contents and dim sum skin, and taste parameters were assessed from the savory taste. The dimsum organoleptic test results are shown in Table 3.

<table>
<thead>
<tr>
<th>Component</th>
<th>Appearance Value</th>
<th>Aroma Value</th>
<th>Taste Value</th>
<th>Texture Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steamed Dimsum without MSG</td>
<td>8.47</td>
<td>8.14</td>
<td>7.31</td>
<td>7.34</td>
</tr>
<tr>
<td>Steamed Dimsum with MSG</td>
<td>8.52</td>
<td>8.09</td>
<td>7.73</td>
<td>7.62</td>
</tr>
<tr>
<td>Fried Dimsum without MSG</td>
<td>8.59</td>
<td>8.64</td>
<td>8.18</td>
<td>7.14</td>
</tr>
<tr>
<td>Fried Dimsum with MSG</td>
<td>8.21</td>
<td>8.53</td>
<td>8.30</td>
<td>7.22</td>
</tr>
</tbody>
</table>

Where: Value 9 = absolutely very like, 8 = very like, 7 = like, 6 = less like, 5 = neutral, 4 = less dislike, 3 = dislike, 2 = really dislike, 1 = absolutely really dislike.
without MSG was highly favored by the panelists. The aroma value that the panelists liked the most was fried dimsum without MSG with a value of 8.64 because fried dimsum with out MSG gave a very distinctive aroma of tuna. The aroma of this dimsum is influenced by the presence of supporting ingredients, namely the allicin content in garlic, amino acids from tuna fish, quercetin-4-glucoside dari bawang merah. This is to research conducted by that the marinade of soy sauce prawns contains supporting spices, namely the content of salt, amino acids, sugar, and other flavoring substances.

Taste
Taste is an important parameter in determining the panelist's decision to accept or reject a food product. Taste assessment can be in the form of whether a food product is tasty or not. Based on the results of the panelists' assessment of the taste of dimsum shown in Table 3, the average range of taste values is 7.31 to 8.30. The highest taste parameter value for fried dimsum with synthetic MSG is 8.30. MSG is a sodium salt that binds to amino acids in the form of glutamic acid which is used as a flavor enhancer in food. Fried dimsum with MSG produces a savory taste because of the glutamic acid content in the tuna fish and the synthetic flavoring of the chicken flavor. Glutamic acid is one of the main sources of umami taste which can be found naturally in food and food products. Glutamic acid is one of the main components of the amino acid compound which creates a savory taste in flavoring products. Glutamic acid in tuna is 12.45% (dry basis). Synthetic MSG contains glutamic acid so the addition of MSG to dim sum tuna fish gives a savorier taste. The use of cooking oil when frying the dimsum produces a savory taste in the fried dimsum. The savory taste of fat can cause the fishy smell to disappear when the frying process is at high temperatures. In addition, garlic plays a role in providing a savory taste because there are 33 sulfur components, 17 amino acids, many minerals, vitamins, and lipids.

Texture
The texture is an important parameter in determining the quality of food using the sense of touch. The texture is an important parameter in knowing the type of soft food and crunchy food. Texture assessment is a parameter to identify the density, hardness, water content, and cohesiveness of the product.

Table 3 shows the results of organoleptic testing of dimsum tuna fillets with different cooking methods yielding the highest score for steamed dimsum with MSG. Panelists liked steamed dimsum with MSG with a score of 7.62 and the lowest score was fried dimsum with MSG of 7.10. The use of MSG in fried dimsum affects the quality of the texture. The texture using MSG is softer than without using MSG.

Statistical Analysis
Statistical analysis was used to determine the effect of the steaming and frying methods on tuna dimsum using SPSS software. The statistical test results presented in Table 4 show that the differences are in appearance, aroma, taste, and texture. The results of statistical data processing showed that the p-value of the appearance aspect was 0.496; the aroma aspect of 0.064; the taste aspect of 0.011; texture aspect of 0.250. Based on the results of statistical tests, the results were not significantly different (p>0.05) in terms of appearance, aroma, and texture. Meanwhile, on the taste aspect, the results were significantly different (p<0.05). This shows that the method of steaming and frying the tuna dimsum did not affect the panelists' preference for appearance, aroma, and texture. Meanwhile, the taste aspect showed that the tuna dimsum using the steaming and frying method affected the panelists' preference level.
### Table 4

<table>
<thead>
<tr>
<th>Component</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>0.496</td>
</tr>
<tr>
<td>Aroma</td>
<td>0.064</td>
</tr>
<tr>
<td>Texture</td>
<td>0.250</td>
</tr>
<tr>
<td>Taste</td>
<td>0.011</td>
</tr>
</tbody>
</table>

### 4 Conclusion

Dimsum tuna with steaming and frying method using MSG and without MSG was still accepted and liked by the panelists. Based on statistical tests, it showed that the taste aspect had a significant difference \((p < 0.05)\) so it affected the panelists' preference level. The organoleptic characteristics with the most preferred taste of the panelists were fried dimsum without MSG with a value of 8.18 (highly preferred) and fried dimsum with MSG of 8.30.

The nutritional content of steamed tuna dim sum is a protein content of 14.50% wb, fat content of 1.24% wb, ash content of 1.62% wb, and water content of 51.73%. This tuna dimsum product complies with the SNI for fish dimsum products.

### References


