Research Article

Increased Value-Added of Tuna Flakes (By-Product) from Steak Processing through Development of Halal Commercial Food Products (Tuna Topping Spaghetti)

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Abstract: Yellowfin tuna is one of Indonesia's main export commodities, its meat contains high protein and can be processed into a variety of commercial food products. In the processing of loin, fillet and tuna steak, ±10% of flaked meat is produced which can be used for processing commercial products. Spaghetti is one of the commercial products that is easily processed with raw materials and additives that are cheap and easy to obtain as well as halal and thoyib. The raw materials used are tuna flakes, spaghetti noodles and seasonings. The research objective was to analyse the chemical composition of tuna flakes and tuna topping spaghetti as well as the added value and level of consumer preference. This research useds laboratory methods, the percentage of additional selling value and consumer preferences. Proximate chemical composition of tuna flakes was observed, namely: water content (74.80 - 75.25%); protein (16.35 - 17.00%); fat (1.43 - 1.50%); minerals (5.38 - 5.45%); carbohydrates (0.65 - 0.80%). Chemical composition of tuna topping spaghetti was determined, namely: water content (62.73 - 69.13%); protein (7.08 - 8.34%); fat (0.42 - 0.76%); minerals/ash (0.93 - 1.16%) and carbohydrates (24.41 - 25.54%). The added value of tuna flakes in the processing of tuna topping spaghetti for two packages of spaghetti noodles (18 portions) is Rp. 147,355 (80.79%). The level of consumer preference (25 panelists) towards the visual value of tuna topping spaghetti is "very like" (76.0%) and "like" (24%); smell values, namely "really like" (72.0%) and "like" (28%); the value of taste, namely "really like" (80.0%) and "like" (20%); Texture values are "really like" (80.0%) and "like" (20%) and taste values are "really like" (76.0%) and "like" (24%).

Keywords: flake tuna, crushed meat, spaghetti, tuna topping, quality, value-added, preference

1. INTRODUCTION

Food is material originating from biological sources of agriculture, fishery, plantation, forestry, fishery, animal husbandry and water in the form of processed or unprocessed form, which is intended as food or beverage for human consumption, including additives, raw materials and other food materials used. In the process of preparing and processing food or beverages [1]. Every producer/halal food industry must have an understanding and awareness to ensure the halalness of products distributed to consumers by implementing the Halal Assurance System (SJH) as an implementation of the sharia conception of halal and haram principles in food and beverages [2].

Food is the main food ingredient which is important and urgent and has strategic meaning in human life. In choosing food, most consumers prioritize taste, regardless of its halalness. In line with the teachings of Islamic Sharia, Muslim consumers worldwide want the food products they consume to be guaranteed their halalness and sanctity. Indonesia is a very potential Muslim consumer market. The government has a big responsibility to protect society as a whole against the halal food products that are marketed. Likewise, producers, legally, ethically and morally doing business are required to have responsibility (product liability) for products circulated if there are defects, endanger or do not meet quality standards and laws and regulations.

Food from fisheries biological resources is found in very large and varied types and quantities, such as fish, shrimp, shellfish, cuttlefish, squid, sea cucumbers, seaweed (macroalgae) and other types that contain important macro and micronutrients (water, protein, fat, minerals, carbohydrates and active compounds) for human growth and health. Fishery food is classified as a type of food that is very easy and quickly decomposes (high perisable food) so it is absolutely necessary to be treated with preservation and processing after being harvested so that it has a large use value/benefit. In the fishery product processing industry, by-products are always formed in the form of offal, gills, bones, skin and meat flakes in large enough quantities, but have not been used properly for commercial food product processing. In order to increase the value of benefits and added value optimally, flaked meat must be processed and developed (diversified) into ready-to-eat food in meeting the nutritional and health needs of the community [3]. Food diversification is one of the government's programs to increase the availability and consumption of food that is diverse, nutritionally balanced and based on the potential of local resources [1].

In the production process of loin, fillet and steak for tuna and other types of large pelagic fish, the production process produces flaky meat (±10%) which has economic potential to be used as raw material for commercial food processing as an alternative to increasing added value. According to [1], the main food is food designated as daily staple food in accordance with potential resources and local wisdom. This study aimed to utilize and increase the added value of tuna flakes at KUB Fresh Fish, Bantul Yogyakarta as a micro-small industry for processing tuna and marlin steaks as well as commercial fish processed products.

2.   MATERIALS AND METHODS

2.1. Equipment and Materials

The equipment used for the preparation and processing of crushed tuna flakes includes: stainless steel table (length: 180 cm, width: 70 cm, height: 60 cm), stainless steel knife, cutting board, digital scale (Idialife IL 500P), food processor (Boar QSJ-A03D2), stainless steel basin, rod thermometer (GEA), pH meter (BNQ PH-777), measuring cup (Iwaki), measuring pipette, stopwatch, meat press machine (CV. Tunas Karya), filter cloth, gas stove (Rinnai RI602BGX), pot, spoon and freezer (MODENA power duo). Equipment for proximate analysis of crushed tuna flakes and tuna topping spaghetti, including: analytical scales (Deriver Instrument Company AA-200), pH meter (BNQ PH-777 Pen Type pH Meter), Erlenmeyer (Iwaki), beaker glass (Iwaki) , filter paper, desiccator (Buchi), condenser (Sibata Coolman C-506), Kjeldahl flask, fat flask, thimble, soxhlet (Buchi Extraction System B-811), porcelain exchange rate, solvent cup (Buchi), oven (Eyela WFO- 601SD), Furnace (Muffle), chromameter (Conica Minolta CR-400), score sheet [4] and stationery.

The research materials consisted of the main raw material (flaky tuna meat) and additional ingredients such as vegetables (fruit tomatoes, onions) and seasonings (garlic, black pepper, sugar, oregano, table salt, sunflower oil, tomato sauce, bolognese, rayco and water and bulk ice) for the manufacture of products (tuna topping spaghetti) as well as chemicals for the analysis of the quality of the main raw materials and processed products. Tuna flakes are purchased from KUB. Fresh Fish, Sonopakis, Kasihan Bantul Yogyakarta (owner: Ir. H. Achmad Widjiantoro). Product processing and panelist/organoleptic preference level testing using 25 panelists held at the Jambon Food Products Processing House, Jl. District, Trihanggo, Sleman Yogyakarta and proximate/chemical analysis was carried out at the Chem-Mix Pratama Laboratory, Bantul Yogyakarta.

2.2. Research Methods

2.2.1. Preparation and processing of crushed fish meat and products (tuna topping spaghetti) from tuna flakes

The stages of preparation and processing of crushed fish meat are as follows: frozen tuna meat is thawed and washed under running water in a stainless steel basin until the ice has completely melted, pressed (stage 1) with a filter cloth (t-shirt) to remove the water (for 5 minutes), mashed in a blender until it becomes pulverized (for 5 minutes), pressed (stage 2) with a filter cloth (t-shirt) to remove the remaining water, mucus and blood (for 5 minutes), stored in the refrigerator (temperature ±3°C) and ready to use for the processing of tuna topping spaghetti and other products, proximate analysis (water content, protein, fat, minerals, carbohydrates) (see Figure 1).
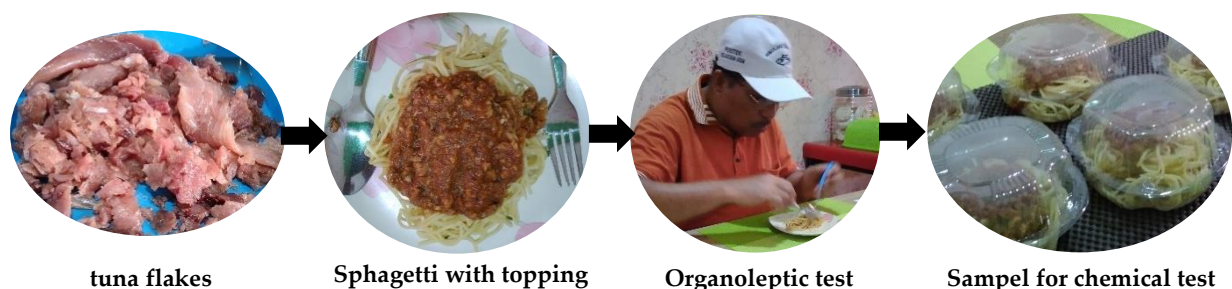

| tuna flakes | Sphagetti with topping | Organoleptic test | Sampel for chemical test |

Figure 1. Tuna flake preparation & tuna topping spaghetti processing

2.2.2. Preparation and processing of products (tuna topping spaghetti)

The stages of preparation and processing of tuna topping spaghetti are as follows: (1) prepare the main raw materials (275 minced meat from yellowfin tuna for one pack of spaghetti noodles (450 grams), the mashed meat is boiled until cooked (±20 minutes) and aerated , the ground beef is ready to be added & mixed with spices; (2) prepare 1 pack of spaghetti noodles (450 grams) of the LaFonte Spaghetti-10 brand and seasonings (5 cloves of garlic, 2 teaspoons of black pepper, 2 teaspoons of granulated sugar, 2 tablespoons Oregano tea, 2 teaspoons of salt, 3 tablespoons of sunflower oil, 2 tablespoons of tomato sauce, 5 tablespoons of Bolognese sauce, 1 teaspoon of royco, enough water (± 2 L); (3) prepare fruit vegetables (1 onion & 5 red tomatoes); (4) boil/saute the spices until cooked (give off a spicy aroma); (5) add and mix the ground tuna meat in the stir fry and stir evenly, while adding water until cooked (tuna topping); (6) taste the taste of the tuna topping (add sugar, sugar, ga ram if needed); (7) prepare the cooked spaghetti noodles in a bowl/plate and pour the tuna topping on top evenly (the product is ready to be served); (8) organoleptic quality testing (appearance, aroma, taste, texture, taste) as well as chemical/proximate tests (moisture, protein, fat, mineral, carbohydrate

content) as well as consumer preference/organoleptic tests; (9) stored in the refrigerator for further observation (see Figure 1).

2.2.3. Proximate analysis of mashed meat from tuna flakes and tuna topping spaghetti

a) Water Content [5]

The water content test was carried out by placing the exchange rate in the oven and heating it at 105 °C for 1 hour. The exchange is removed from the oven and put in a desiccator for 30 minutes. Exchange rate is weighed and recorded weight (A) and a sample of 2 grams is weighed. The sample is put into an ovenized and weighed exchange rate (B). Exchange containing the sample, put in the oven at 105°C for 24 hours or until it reaches constant. The exchange containing the sample was removed from the oven and put in a desiccator for 30 minutes. Weigh the weight of the exchange rate containing the sample (C) and calculate the moisture content with the following formula.

$$\text{Water content (\%)} = \frac{crude\ sample\ weight\ (grams) - dry\ sample\ weight\ (grams)}{Crude\ sample\ weight\ (grams)} \times 100\%$$

b) Crude Protein Content [6]

Measurement of crude protein content using the total nitrogen method, with the following procedure: weigh 2 grams of the sample and put it in a Kjeldahl flask (size 50 ml), add 15 ml concentrated H_2SO_4, 3 ml H_2O_3 and Kjeldahl tablets and let stand for 10 minutes in the acid chamber. , the sample is digested for 1 hour until the liquid is clear green, add 50 ml of distilled water then distilled, the Kjeldahl flask is attached to the distillation device and add 50 ml of concentrated NaOH until 150 ml of distillate is collected in Erlenmeyer which contains 25 ml of 4% boric acid and 2 drops from the pH indicator. The result of the distillation was titrated with 0.2 N HCl until it turned pink. Crude protein content can be calculated using the formula:

$$\text{Crude protein content (\%, wb)} = \frac{(ml\ HCl\ sampel - ml\ HCl\ blank)\ N\ HCl\ x\ 14,007\ x\ 6,25}{Cruid\ sample\ weight\ (grams)\ x\ 1000} \times 100\%$$

$$\text{Crude protein content (\%, db)} = \frac{\%\ cruid\ protein\ content\ (wet\ basis)}{(100 - \%\ water\ content)} \times 100\%$$

c) Fat/Oil Content [7]

Fat content testing was carried out by placing a solvent cup in the oven and heated at 105°C for 1 hour, cooled in a desiccator for 30 minutes and weighed, weighing 2 grams of sample and oven at 105°C for 1 hour, chilling the sample in a desiccator for 30 minutes, place the sample in a thimble and attach it to the Soxhlet extractor. The condenser was turned on and the solvent cup was installed on the Soxhlet, add petroleum ether to the extraction and extraction equipment for 2 hours, rinsing for 1 minute and drying for 5 minutes. Remove the solvent cup from the appliance, dry in the oven at 105°C for 1 hour, cool in a desiccator for 30 minutes and weigh (record the weight). Fat content can be calculated using the following formula.

$$\text{Fat/oil content (\%, wb)} = \frac{fat/oil\ weight\ (grams)}{crude\ sample\ weight\ (grams)} \times 100\%$$

$$\text{Fat/oil content (\%, db)} \quad = \quad \frac{\%\ of\ fat/oil\ content\ (wet\ basis)}{(100 - \%\ of\ water\ content)}\ x\ 100\%$$

d) Ash Content [7]

The ash content test was carried out with the following procedure: the exchange rate was put into the furnace and heated at 600°C for 2 hours, the exchange rate was removed and put in the oven at 105°C for 30 minutes, the exchange rate was put into a desiccator for 30 minutes and weighed/note the weight, weigh 2 grams of the sample and put it in the exchange rate and weigh it, add 1 ml of HNO_3 to the exchange and heat it in an electric stove, the exchange containing the sample is charred in a furnace at a temperature of 600°C for 3 hours, the exchange is put in an oven and heated again at a temperature of 105°C for 30 minutes, put the rate in the desiccator for 30 minutes, weigh and calculate the ash content using the following formula.

$$\text{Ash content (\%, wb)} = \quad \frac{Ash\ content\ (grams)}{Cruid\ sample\ weight\ (grams)}\ x\ 100\%$$

$$\text{Ash content (\%, db)} = \quad \frac{\%\ of\ ash\ content\ (wet\ basis)}{(100 - \%\ of\ water\ content)}\ x\ 100\%$$

e) pH Value [7]

Testing the pH value of the product, namely by dissolving 1 gram of product sample in 9 ml of distilled water, testing the pH value of the sample using a pH meter that has been standardized in a buffer solution. The pH value is read after the number shown on the instrument has stabilized.

2.2.4. Analysis of preferences/organoleptic (appearance, aroma, taste, texture, taste) (score sheet method)

Testing the level of consumer preference for tuna topping spaghetti using the score sheet method (scale 1 - 5) with each level of preference: very dislike (1), dislike (2), quite like (3), like (4) and very like (5).

2.2.5. Added value analysis of product (tuna topping spaghetti)

The value-added product analysis uses the percentage increase in selling price method in each market segment (the price of raw materials and/or semi-finished materials) in the production process with or without calculating production costs [8-9].

3. RESULTS AND DISCUSSIONS

3.1. Chemical Composition of Tuna Flakes

Based on the results of laboratory analysis (Table 1), it can be seen that of the five chemical components of yellowfin tuna flakes, it is known that water and protein content are in large amounts, minerals, and fats are in small amounts and carbohydrates are in very small amounts (<1.0. %). The average chemical composition of yellowfin tuna flakes was water content (74.80 - 75.25%); protein (16.35 - 17.00%); fat (1.43 - 1.50%); carbohydrates (0.65 - 0.80%) and minerals (5.38 - 5.45%). In general, carbohydrates are found in very small amounts in white meat (fish) and red meat (beef, buffalo, goat,

and the like) in the form of glycogen as a source of energy in muscles, therefore fish and meat are classified as a group of foodstuffs with protein content. high and poor in carbohydrates.

According to [10], the nutritional composition of fresh frozen tuna meat per 100 grams was water content (75.65%), protein (23.38%), fat (0.95%), calories (108 cal), while carbohydrates were not detected (0%). According to [11], the chemical composition of fresh frozen bluefin tuna meat is water content (73.5%), protein (22.6%), fat (2.7%), minerals (1 ,2%) and energy (121.0 cal.); yellowfin tuna (yellowfin tuna) which contains water (74.6%), protein (24.1%), fat (0.1%), minerals (1.2%) and energy (105.0 cal.); as well as fresh skipjack, namely water content (70.0%), protein (26.2%), fat (2.1%), minerals (1.3%) and energy (121.0 cal.) According to [12], the chemical composition of mashed meat from fresh African catfish is water content (73.72%), crude protein (16.79%), fat (5.63%), minerals (1.49), while the chemical composition of African catfish surimi which was treated with multilevel washing (3 times) was water content (71.79%), protein (14.46%), fat (4.83%) and minerals (3.24%).

Protein and fats in food have the advantage of being good nutritional intake for human health because they contain amino acids and essential fatty acids (especially omega 3). Tuna contains higher omega-3 fatty acids than fresh fish (up to 28 times). Tuna contains protein (22.6 - 26.2 grams/100 grams of meat), fat (0.2 - 2.7 grams, as well as minerals calcium, phosphorus, iron and sodium, vitamin A (retinol) and B vitamins (thiamin, riboflavin and niacin) (Department of Health Education and Walfare 1972 cit [13]. Consumption of tuna 30 grams per day can reduce the risk of heart disease by 50%. A study at Harvard in 2004, states that fish consumption tuna 1 - 4 times per week can increase intake of omega-3 fatty acids in the body and prevent heart arrhythmias by 28%. The publication of Cancer Epidemology Biomakers and Prevention in 2004, states that consumption of tuna which is rich in omega-3 fatty acids can reduce disease leukemia. The content of omega-3 fatty acids in tuna can inhibit a proinflammatory enzyme called cyclooxygenase 2 (an enzyme that supports breast cancer). Omega-3 fatty acids can also activate receptors in cell membranes (proliferator-actived receptors) that can at shutting down the activity of cancer-causing cells [14].

The nutritional composition of fresh tuna meat is higher than other types of sea water and freshwater fish. Differences in the chemical composition of fish meat are influenced by species, sex, age, habitat, and type of food. According to [15], the chemical composition (especially protein) of sea water fish (tuna, skipjack, tuna) is relatively higher than that of freshwater fish (catfish, white pomfret and wader), whereas catfish has a special nutritional composition because it contains fat, carbohydrates and calories which are higher than other types of fish (see Table 2).

Table 1. The proximate chemical composition of flake (yellowfin tuna)

No	Proximate Chemical Composition	Materials/Product	
		Tuna flakes	**Tuna topping spaghetti**
1	Water content (%)	74.80 – 75.25	62.73 – 69.13
2	Protein content (%)	16.35 – 17.00	7.08 – 8.34
3	Fat content (%)	1.43 –1.50	0.42 – 0.76
4	Carbohydrate content (%)	0.65 – 0.80	24.41 – 25.54
5	Mineral/ash content (%)	5.38 – 5.45	0.93 – 1.16

Table 2. Chemical composition of tuna meat and other types of fish

No	Chemical Composition (per 100 grams of ingredients)	Kind of Fish					
		Tuna*	Skipjack*	Mackarel*	Bawal**	Catfish**	Wader**
1	Protein (grams)	23.38	28.21	23.87	17.21	14.93	14.88
2	Fat (grams)	0.95	1.29	0.92	1.22	12.35	2.27
3	Carbohydrate (grams)	0.00	0.00	0.00	0.00	7.26	0.00
4	Calori (kal)	108.00	132.00	110.00	84.00	204.00	84.00

Information *: types of sea water fish, **: types of freshwater fish (Source [15]

3.2. Chemical Composition of Tuna Topping Spaghetti

Based on the results of laboratory analysis (Table 1), it can be seen that water, carbohydrate, and protein contents are the largest part (± 98%) of the chemical composition of tuna topping spaghetti, followed by minerals and fat (±2.0%). The average chemical composition of flake tuna topping spaghetti are water content (62.73 - 69.13%); protein (7.08 - 8.34%); fat (0.42 - 0.76%); carbohydrates (24.41 - 25.54%) and minerals (0.93 - 1.16%). Tuna topping spaghetti is classified as a nutrient-rich food ingredient because it contains large amounts of carbohydrates (the second largest after water) so it is classified as a very healthy food ingredient. According to [16], the nutritional composition of tuna topping sauce spaghetti per 100 parts, namely: 51% carbohydrates, 26% fat and 23% protein, with total calories reaching 431 cal. According to [15], spaghetti is a type of pasta with an elongated shape like a stick, made from flour and water, with a nutritional composition (per 100 grams) as follows: water (66.1 grams), protein (7.4 grams), fat (2.1 grams), carbohydrates (22.6 grams), minerals (2.1 grams) and energy (139 Cal.). Based on the spaghetti food composition data, it is confirmed that there is an additional protein source of ± 1.0% from yellowfin tuna meat and spices and a carbohydrate source of ±3.0% from the flour and cooking spices used in the processing of tuna topping spaghetti, in addition to which is sourced from spaghetti noodles.

The body should get a supply of 45 - 65% of calories from carbohydrates, 20 - 35% from fat and 10 - 35% from protein. The carbohydrates contained in spaghetti are a substitute for carbohydrates from rice so that they become very healthy food for the human body. According to the Ministry of Health of the Republic of Indonesia, food with a balanced chemical composition of water, protein, carbohydrates, and fat is nutritious foods and very good for human health. Rice is the staple food of most Indonesians, although it does not mean that carbohydrate sources rely solely on rice, moreover white rice can increase the risk of health problems, so it is necessary to find healthy alternative sources of carbohydrates.

According to [17], there are eight very healthy food sources of carbohydrates to replace rice, namely: cassava *(Manihot utilissima)*, sweet potato (*Ipomoea batatas*), taro (*Dioscorea esculenta* L.), gembili (*Dioscorea esculenta* L.), ganyong (*Canna discolor* L), breadfruit (*Artocarpus altilis* (Parkinson ex F.A.Zorn) Fosberg), potatoes (*Solanum tuberosum* L.) and corn (*Zea mays* L.). Food sources that are classified as healthy carbohydrates are foods that are slowly absorbed by the body and contain lots of fibers because they can reduce the risk of heart disease, control body weight, as well as prevent

colon cancer. Types of bad (unhealthy) carbohydrates, which can increase the risk of various diseases, are carbohydrates from processed foods and do not contain fiber (especially white rice and white bread).

Good (healthy) carbohydrate sources include corn, potatoes, sweet potatoes, peas, kidney beans, cereals, quinoa, and bananas. Fresh corn is rich in fiber, antioxidants, vitamin C, lutein, and zeaxanthin, whereas boiled or roasted corn will get a higher benefit. Potatoes contain vitamin C, potassium and fiber when consumed with the skin and in other forms (mashed potatoes & small squares greased with olive oil and baked until cooked). One slice of cooked sweet potato contains 18-21% carbohydrates consisting of fiber, sugar and flour, vitamins A, C, K and antioxidants. Peas are a great source of fiber, antioxidants and anti-inflammatory properties and contain coumestrol which protects the body from stomach cancer. Red beans are rich in protein, also contain carbohydrates (22%), minerals and vitamins. Choice of cereals with whole grains, containing 3 grams of fiber and ±10 grams of sugar in each serving. Quinoa is a high nutritious grain, after cooking it contains carbohydrates (21.3%) which is very healthy for the body, is also a source of fiber and protein which makes it often chosen for consumption by people with celiac disease. Bananas are very rich in potassium, fiber, vitamin B6 and manganese nutrients, they can be consumed directly, processed into smoothies, or combined with ice cream or into cakes [17].

3.3. Value Added of Product

The concept of added value in the fisheries industry according to [18] is an innovation in the use and processing of fishery by-products into raw materials, semi-finished materials, and final products in the form of food and non-food/feed with important and nutritious econochemical value for human consumption and aquaculture biota (fish and shrimp). According to [8], [9], the determination of the added value of a product from the utilization of fishery by-products is based on an increase in the selling price of a product (raw materials to semi-finished materials to finished materials) in each market segment, without and or taking into account production process costs. Based on the results of product processing and financial analysis, 18 servings of tuna topping spaghetti were produced from 550 grams of flaky tuna meat and two packages of spaghetti noodles (900 grams) at a price of Rp. 17,500 per portion. The added value generated is IDR 147,355 (80.79%) with a production process cost of IDR 167,645 and a total sales income of IDR 315,000.

In the UPI (fish processing unit) tuna that processes tuna meat into various derivative products (loins, fillets, steaks), it turns out that there are still 10 side products in the form of flake meat (loose meat in the preparation process of loin and filet as well as those left on the bone) reaching 10 - 15%, so it is necessary to use innovation based on commercial products. The government has issued Government Regulation Number 57 of 2015 concerning Quality Assurance System, Safety of Fishery Products, and Increasing Value Added of Fishery Products as mandate of implementing Article 22 and Article 24 paragraph (3) of Law Number 45 of 2009. Article 25 PP. 57/2015 states that increasing the added value of fishery products can be done by handling raw materials starting from catching and harvesting, processing, distribution, and marketing of fishery products through the cold chain system towards zero wastes. The issuance of this government regulation has a strong reason because the UPI of micro, small, medium, and large-scale enterprises still have problems in handling

and utilization of by-products (head, offal, bones, and skin) in the production process which have not been utilized properly so that they have the potential to pollute the environment.

According to [19], the development of value-added UPIs towards zero waste is expected to be able to improve the community's economy through optimizing the use of by-products based on the concept of developing micro, small, medium, and large-scale industries towards certification or other zero waste management systems. Value-added UPI operations towards zero waste are required to apply feasibility standards for processing such as Good Handling Practices (GHP), Good Manufacturing Practices (GMP) and Sanitation Standard Operating Procedure (SSOP).

The concept of zero waste is the hope of all fishery product processing industries to increase the value-added of by-products because they can process all by-products into commercial derivative products maximally. According to [18], zero waste in the fishing industry has the meaning of "utilization, processing and development of fishery products with important economic value (food and feed) based on processing by-products by applying the concept of reduces, reuses, recycles, recovery and revalued. Zero waste is an experimental process to reduce by-products of the production process which ultimately reduces all unwanted materials through verification and development of value-added products [20].

3.4. The Level of Consumer Preference for Tuna Topping Spaghetti

The level of preference is the ability of a person/panelist to finish the food served using the organoleptic/sensory test (human senses). Determining the level of consumer preference is very important in realizing consumer satisfaction with the products consumed in measuring the texture, appearance, aroma and flavor of food [21]. Based on the results of the analysis (Table 3), it can be seen that the level of consumer preference (25 panelists) on the attributes of appearance, aroma, taste, texture and taste of the product (tuna topping spaghetti) is at the "like" and "very like" level. At the "like" level, the average level of consumer preference was 23% and at the "very like" level, the average level of consumer preference was 77%, without any panelist's assessment at the "quite like, dislike and dislike" level. In the dumbo catfish surimi topping spaghetti, the level of consumer acceptance was more dominant at the "like" level respectively: 75%, 80%, 75%, 75% and 75% (average: 76%) and "very like" respectively: 25%, 20%, 25%, 25% and 25% (mean: 24%) [12].

Based on the analysis above, it is known that the level of consumer preference for the tuna topping spaghetti is higher than the catfish surimi topping spaghetti. This shows that the tuna topping spaghetti is very popular with consumers because of the excellent flavor of the tuna topping, so that most of the panelists taste and finish the test samples, there are even a number of panelists who order products for family consumption. The most interesting things about the tuna topping spaghetti delivered by the panelists were: (1) the tuna topping spaghetti has the right taste (there are salty, sour, and spicy tastes that are dominant, (2) the texture of the spaghetti noodles is legit and (3) the topping portion of tuna given has a fairly high protein intake value because consumers can consume 1 (one) portion of spaghetti as a whole. In addition, with the panelists' acceptance rate score at the "like and really like" level, it shows that the product (spaghetti topping tuna) is ready for in order to increase the value of consumer preference and acceptance, as well as the convenience of product consumption, it is necessary to add safe product packaging (sanitary and hygiene).

Organoleptic/sensory testing plays an important role in product development by minimizing risk in decision making at a very low cost. Panelists can identify sensory properties that will help them to describe the product. Sensory evaluation can be used to assess the desired changes in product or formulation ingredients, identify development areas, determine optimization, evaluate competitor products, observe changes during the storage process and provide appropriate data for product promotion [22].

Table 3. Penelists' preference for products (tuna topping spaghetti)

Skala	Level of Preference	Atribut / Level										Average
		Likeness		Smell		Taste		Texture		Flavor		
		person	%	person	%	person	%	orang	%	person	%	
1	Very dislike	-	-	-	-	-	-	-	-	-	-	-
2	Don't like	-	-	-	-	-	-	-	-	-	-	-
3	Just like it	-	-	-	-	-	-	-	-	-	-	-
4	Like it	6	**24**	7	**28**	5	**20**	5	**20**	6	**24**	**23**
5	Really like	19	**76**	18	**72**	20	**80**	20	**80**	19	**76**	**77**

4.   CONCLUSION

The average chemical composition of yellowfin tuna flakes was varied water content (74.80 - 75.25%), protein (16.35 - 17.00%), fat (1.43 - 1.50%), carbohydrates (0, 65 - 0.80%) and minerals (5.38 - 5.45%). The average chemical composition of tuna flake topping spaghetti was water content (62.73 - 69.13%), protein (7.08 - 8.34%), fat (0.42 - 0.76%), carbohydrates (24.41 - 25.54%) and minerals (0.93 - 1.16%). Based on the results of product processing and financial analysis, 18 servings of tuna topping spaghetti were produced from 550 grams of flaky tuna meat and two packages of spaghetti noodles (900 grams) at a price of IDR 17,500 per portion and the added value obtained was IDR 147,355 (80.79%).   The level of consumer acceptance of the tuna topping spaghetti was more dominant at the "really like" level with the value of each attribute (appearance, aroma, taste, texture, and taste) being 76%, 72%, 80%, 80% and 76% (average: 76%) and at the "like" level the attribute values are 25%, 20%, 25%, 25% and 25% (mean: 23%).

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