Review of Ikan Tuna Kering Kayu Processing, Canning Systems and Proximate Analysis Results in PPUPIK Program of Rumah Ikan Faculty Agriculture, Muhammadiyah Maluku Utara University

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Abstract
Ikan kering kayu is a diversified product of processed fish that looks and tastes almost the same as rendang but has a difference in raw materials used ie fish. The people of North Maluku generally make ikan tuna kering kayu as one of the business activities to improve the welfare, where this product has a low shelf life or less than two days so it can also affect the wide scope of marketing. To be able to increase shelf life and wide scope of marketing hence need to utilize correct processing technology, handling and canning and based on result of research so that ikan tuna kering kayu product that produced can have wide storey and wide scope of marketing. Fish canning is a handling and packing treatment technique by heating fish in closed, tin containers to deactivate enzymes, kill microorganisms, and turn fish in raw form into ready-to-eat products. Furthermore, the proximate test results show that the nutritional content of ikan tuna kering kayu is water content 65.2%, crude protein 23.3 g / 100g, total fat 3.93 g / 100g, total carbohydrate 6.13 g / 100g, total ash 1.43 g / 100g, dietary fiber 1.49 g / 100g, total sugar 2.02 g / 100g, sodium (Na) 290 mg, potassium (K) 360 mg, iron (Fe) 8.12 mg / kg and total energy 150 kcal.

Keywords: Processing, Canning, Proximate, PPUPIK Rumah Ikan, Ikan kering Kayu

1. Introduction
Yellowfin tuna and skip jack tuna or better known as madidihang and skipjack is one of the big pelagic fish and superior commodities in North Maluku, with production value reaching 50% of total fish production in North Maluku Province. As a commodity of high economic value and has a large market share, the exploitation of madidihang and skipjack fish has a role in the economic development of Indonesia, especially in North Maluku Province, therefore, it is reasonable to use the resources of the fish and the skipjack is increasing (Tangke and Deni, 2014; Tangke et al, 2018).

Maluku Province is mostly used in the form of fresh and processed exports in the form of diversified products such as fish shredded fish, dried wood, fish meatballs and other processed species. Diversification of processed fish products is a diversification of fishery products made from raw fish, which have not or have been utilized with attention to quality and nutrition factors, in order to increase fish consumption both in quality and quantity and increase in selling value (Radjiloen, 2015). Ikan tuna kering kayu is a diversified product of processed fish that looks and tastes almost the same as rendang but has a difference in raw materials used ie fish.

The people of North Maluku generally make ikan tuna kering kayu as one of the business activities to improve the welfare, where this product has a low shelf life or less than two days so it can also affect the wide scope of marketing. To be able to increase shelf life and wide scope of marketing hence need to utilize correct processing technology, handling and canning and based on result of research so that ikan tuna kering kayu product that produced can have wide storey and wide scope of marketing. Fish canning is a handling and packing treatment technique by heating fish in closed, tin containers to deactivate enzymes, kill microorganisms, and turn fish in raw form into ready to eat products.

Another problem in the traditional manufacturing process of ikan tuna kering kayu is that there is no information on the nutritional content of the product so that it will affect the product's selling value. Given the importance of processing, handling and canning systems as well as information on the nutritional value of ikan tuna kering products, this paper is to examine and discuss processing and canning systems as well as analyzing the nutritional content of ikan tuna kering kayu at the PPUPIK activity of Rumah Ikan Faculty of Agriculture Muhammadiyah University of North Maluku.

2. Methodology

This research was conducted for 2 months in the fishery product processing laboratory, Muhammadiyah Maluku Utara University and the laboratory of PT. Angler BioChem Lab Surabaya. The research procedure was carried out by processing and canning ikan tuna kering kayu products and testing the nutritional content as shown in Figure 1.

2.1. Processing and Canning

Processing and canning of wood dried tuna can be seen in the flow chart in Figure 1.

2.2. Nutrient Content Analysis

Nutritional content analysis includes:

Water Content, Water content testing was carried out using the oven method which refers to SNI 01-2891-1992 and Legowo and Nurwantoro (2004), after the sample preparation process, the water content is calculated using the formula:

$$\%\, Wc = \frac{W_2 - W_3}{W_2 - W_{21}}\, x\, 100\%$$

Where : W_1 = container and sample weights (gr), W_2 = the weight of the container (gr), W_3 = the weight of the container and sample after drying

Crude Protein, testing of protein levels was carried out using the Kjeldhal Micro method (Legowo et al, 2005), the testing stage for protein content through the digestion stage, the distillation stage and the titration stage, then calculate the value of% N and% Protein with the formula:

$$\%\, N = \frac{1.4007\, x\, NHCl\, x\, (Vol\ Sample\ Titration - Vol\ blanco\ Titration)}{Weight\ Sample}$$

$$\%\, Protein = \%\, N\, x\, Convertion\ Factor$$

Total Fat, fat content testing was carried out using the Soxhlet extraction method (Legowo et al, 2005), the preparation results were then analyzed with the formula:

$$\%Fat = \frac{W_1 - W_2}{W} \; x \; 100\%$$

Where : W = sample weight (gr), W_1 = weight of fat after extraction (gr), W_2 = weight of fat before extraction (gr)

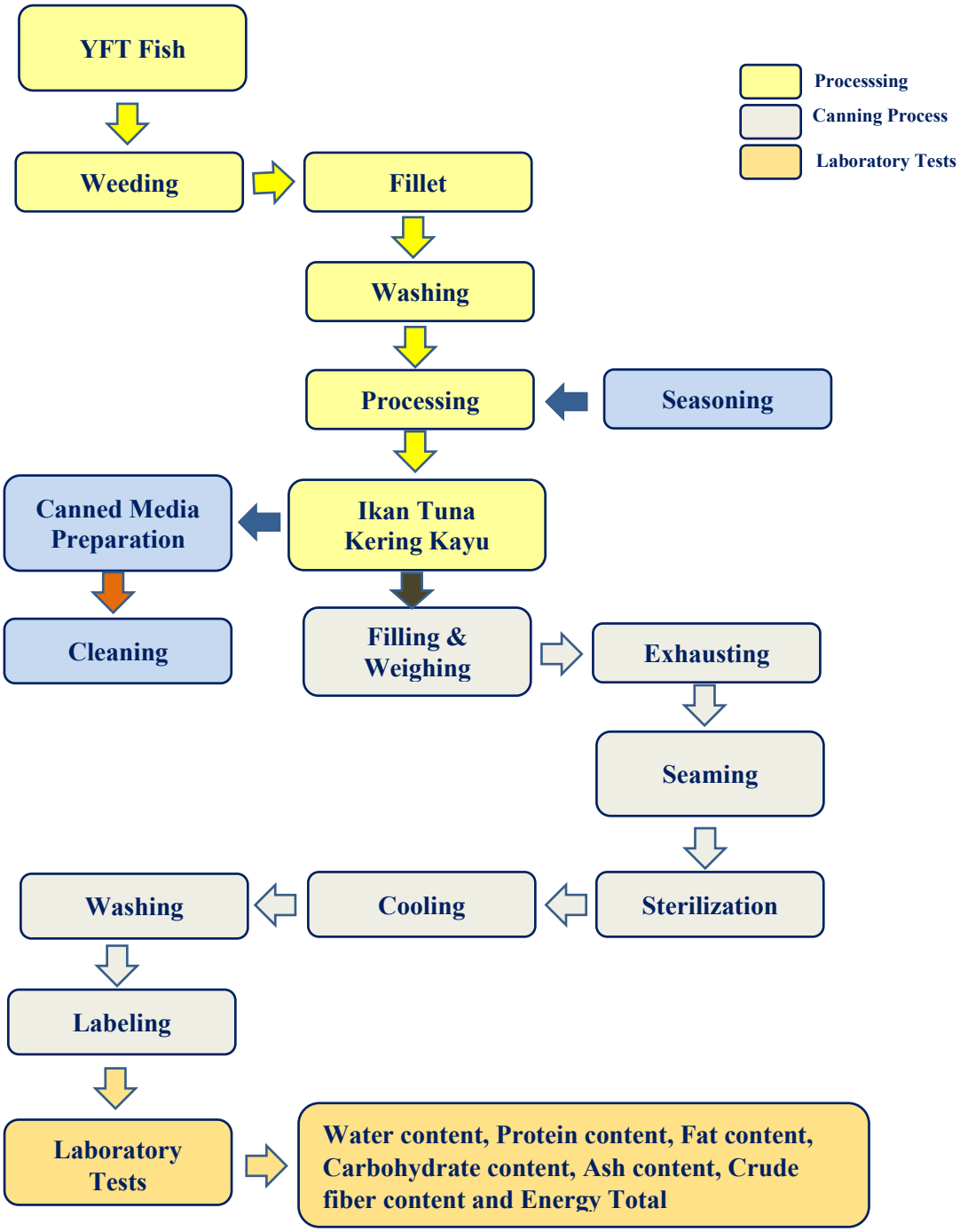

Figure 1. Flowchart of Processing and Canning Laboratory test of Ikan Tuna Kering Kayu

Total Carbohydrat, tested using the method by difference (Apriyantono et al., 1989). To find out the carbohydrate content, the protein, fat, water and ash content are first tested. then the carbohydrate content is calculated by the formula:

$$\%CH = 100\% - \%(Protein + Fat + Water + Ash)$$

Total Ash, Ash content testing was carried out using the total ash analysis method (SNI 01-2891-1992), where after sample preparation, the ash content was calculated using the formula:

$$\%Ash = \frac{W_3 - W_1}{W_2 - W_1} x\ 100\%$$

Where : W_1 = container and sample weights (gr), W_2 = the weight of the container (gr), W_3 = the weight of the container and sample after drying

Dietary fiber, Crude fiber content, testing for food fiber content was carried out by the Gravimetric method, where fiber content is the crude fiber content analyzed in units of% (Apriyantono et al., 1989; Setyowati et al (2008). Crude fiber content is calculated by the formula:

$$\%\ Crude\ fiber\ \ conten = \frac{Residual\ Weight}{Sample\ Weight}\ x\ 100\%$$

Total Sugar, the analysis of total sugar was carried out using the refractophotometry method (Yenrina, 2015).

Sodium and Potasium, carried out by the Spectrophotometric UV method (Ramadhani et al, 2018).

Iron (Fe), carried out by the method with spectrophotometry UV-VIS (Yenrina, 2015)

Total Energy, analysis of the total energy content is carried out using the calculation of the results of proximate analysis which refers to Prawiranegara (1991) and Almatsier (2004), using the formula:

Energy Total (kkal) = (4 x CH) + (4 x CP) + (9 x FL) (1)

Where : CP = Protein Level (g); CH = Carbohydrat Level (g); FL = Fat Level (g)

3. Discussion

The process of making ikan tuna kering kayu cans at the PPUPIK Rumah Ikan Faculty of Agriculture, Muhammadiyah University of North Maluku is divided into two major processes namely processing and canning process.

3.1. Processing

Processing begins with sorting or selection of the type and quality of the best fish as raw materials for manufacturing of ikan tuna kering kayu. The process of sorting is done by organ oleptic testing of yellow fin tuna fish raw material which will be used as ikan tuna kering kayu product, if the organoleptic quality does not meet the requirement to eat the raw material is rejected. The standard of organoleptic value for raw material of fresh tuna yellowfin is > 7 (from scale 1-9), with the criteria of good fish meat is bright color, on and chewy and when pressed texture will return to its original condition.

Weeding is the second process after the raw materials are accepted to serve as the material for the manufacture of ikan tuna kering kayu. Weeding process is done by removing the parts on the fish body such as the disposal of fins, gills, scales, stomach contents. After weeding raw materials in the wash and fillets in accordance with the size of the manufacture of ikan tuna kering kayu it is products with the thickness of fish meat at least 2 cm. The next step after the fillet process is the washing process. Washing is done by using clean water with a quality value such as water so as not to occur microbial contamination from which can degrade the quality and can rot the fish. According to Larousse and Brown (1997), fish wash with cold water can reduce contamination of microbes in fish body significantly.

Processing is the last step on the processing or manufacturing of ikan tuna kering kayu products. Processing done with spice preparation first before the fish meat cooked with spices. In the process of processing fish meat in cooking along with spices for about 3 hours with the aim that the spices can seep perfectly into the pores of fish meat, after cooking ikan tuna kering kayu products then in the lift and cooled for the next process of the canning process.

3.2. Canning Process

The steps in the canning process are done with the preparation of the container cans before being used in the process of canning. The container is then washed in order to remove dust and other contaminant materials attached to the inside and outside of the can. After the cans are washed the next step is the process of filling and weighing the product. Charging is done by arranging the fish meat to match the product type and the number of products on the can with the diameter of 75 mm and the height of the can of 75 mm. In the process of filling and weighing things to note is the uniform weight of the product and the provision of head space on the container cans with the aim that there is reserve space for the development of the product during the heating process so as not to press the container because it can cause cans become kembun (Redhitasari, 2015). According to Adawiyah (2007), the head space is the remaining empty space between the cap and the product.

Exhausting is the second step in the ikan tuna kering kayu canning process, exhausting is the process of vacuum, where in the small-scale factory exhausting is done by way of preheating the product at 90-95 oC for 15 minutes, when the product is inserted into the can in hot and direct container closed in a hot masih state. The purpose of exhausting is to remove air so that the pressure inside the cans after heat and cooling treatment becomes lower than atmospheric pressure. The vacuum condition maintains the lid of the can, thereby reducing the oxygen level and the oxidation chances of the material in the head space. It will also extend the shelf life of the product and prevent canning bubbles in the high areas of Larousse and Brown (1997).

Seaming or tin closing process is done after exhausting process. This seaming process is done as soon as possible in order to achieve a vacuum condition inside the can. This vacuum condition is intended to extend the shelf life of the product due to the absence of oxygen and other gases and to reduce the growth of microorganisms that can damage the product. Seaming process is the condition of the second critical control point because if penutpancan not be perfect then it can merudsak product and can occur contamination of E. coli and Salmonella bacteria. The process of closing the cans is done with a portable machine can seaming seamer type TDFJ-160 with seaming speed 7 cans / minute. The can seam can seam can seam can combine the can body and the can cover in two folds between the body and the can cover aims to prevent leakage and form barrier to gas, liquid and microorganism (Adawiyah, 2007).

Sterilization, at this stage the product of the canned ikan tuna kering kayu is heated to a temperature of 120 °C. and a pressure of 0.55 kg/cm^2, for 15 minutes. The purpose of sterilization is to kill all microorganisms that can cause damage to the product, where with the death of all microorganisms the product will have a long shelf life. This stage is the third critical control point because if temperature, time and pressure are not suitable it can cause potential danger of growth of Clostridium botulinum bacteria. According to Adawiyah (2007), there are two types of sterilization namely biological sterilization to kill all microorganisms and commercial sterilization that does not cause all microorganisms to die, but only kill pathogenic bacteria and forming toxins which under normal conditions will not damage the food. In the activity of PPUPIK Rumah Ikan, the sterilization process used is biological sterilization.

The cooling stage is carried out after the sterilization stage, the cooling must be done so that the fish meat in the product does not overheat, so it can damage the texture and taste of the product and can provide shock teraphy on heat-resistant bacterial spores and can grow at a temperature between room temperature and process temperature. Cooling is done by inserting sterilized cans into a water-filled container for 20-25 minutes. Post sterilization cooling is important because of the considerable pressure difference that can cause the recontamination of cooling water into the product. It should be ensured that the cooling water used also meets the standard microbiological requirements. According to Adawiyah (2007), after the sterilization process of the container should be immediately cooled to obtain uniformity of time and temperature of the process and to maintain the quality of the final product better.

The washing stage is performed with the aim of removing dirt attached to the tin surface during the process of filling. If the dirt is not cleaned, it is feared that microbes can grow and become the main contaminant of the product

after it is opened. Dirt is usually attached to the outer cans surface causing rusty cans and difficult at the time of labeling. Washing is done by using soap water this is in accordance with the opinion of Adawiyah (2007), on good process cans washed with warm water tube then rinsed with clean water.

The last stage of canning porses is labeling. Labeling is intended to know the product used and to know when the production time so that it can determine the expiration period, and of course with the labeling of products will be more easily recognized by the public.

3.3. Nutrient Content

Tuna is the scombriade family, where this type of marine fish is one of the most consumed fish in the world in the form of diversified and fresh products. Tuna fish can be processed into various kinds of processed products (Haryanto and Rauf, 2017; Tangke et al, 2020; Tangke, 2020), one of which is ikan tuna kering kayu which is a typical product of the people of North Maluku. As a commercially processed product, of course, ikan tuna kering kayu must have good nutritional value to maintain body functions. Based on the results of laboratory tests, it can be seen that the nutritional content of wood dried tuna is shown in Table 1.

Table 1. Nutritional Content of 100 Gram Ikan Tuna Kering Kayu

Measurend	Unit	Result
Water content	%	65.2
Crude protein	g/100g	23.3
Total Fat	g/100g	3.93
Total Carbohydrat	g/100g	6.13
Total Ash	g/100g	1.43
Dietary fiber	g/100g	1.49
Total Sugar	g/100g	2.02
Sodium (Na)	mg	290
Potasium (K)	mg	360
Iron (Fe)	mg/kg	8.12
Total energy	kkal	150

In Table 1, it can be seen that the content number of ikan tuna kering kayu is very good from its nutritional value components, which in turn is useful information for consideration by consumers and also the information listed is very useful for someone with certain medical conditions or someone who is limiting the amount of calorie intake.

4. Conclusion

Ikan tuna kering kayu is a processed product typical of the people of north maluku that has a very short storing capacity at room temperature so that it affects the wide scope of the marketing area, by utilizing the results of research, technology and processing methods and a good canning then ikan tuna kering kayu products can have an intersection very well that can reach 1.8 years and will certainly greatly affect the wide scope of marketing area. Furthermore, the proximate test results show that the nutritional content of ikan tuna kering kayu is water content 65.2%, crude protein 23.3 g / 100g, total fat 3.93 g / 100g, total carbohydrate 6.13 g / 100g, total ash 1.43 g / 100g, dietary fiber 1.49 g / 100g, total sugar 2.02 g / 100g, sodium (Na) 290 mg, potassium (K) 360 mg, iron (Fe) 8.12 mg / kg and total energy 150 kcal.

Acknowledgement

We sincerely thank you for your cooperation from various parties. Especially the Ministry of RISTEK-DIKTI, the Rector of Muhammadiyah University of North Maluku and the Dean of the Faculty of Agriculture UMMU-Ternate who has provided suggestions for the development of PPUPIK Rumah Ikan activities.

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