PROCEEDING

The 2nd International Seminar of Basic Science

Natural Science For Exploration The Sea-Island Resources

Ambon, May 31st 2016

Organized by

Faculty of Mathematics and Natural Science

Pattimura University

PROCEEDINGS

The 2nd International Seminar of Basic Science

"Natural Science for Exploration The Sea-Island Resources"

Poka-Ambon, 31st May 2016

Mathematic and Natural Science Faculty
Universitas Pattimura
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2nd edition

Welcoming Address By The Organizing Committee

Today, We have to thank the The Almighty Allah SWT for the implementation of this international seminar. This is the second seminar about Basic Science in The Faculty of MIPA Pattimura University. The seminar under the title “Natural Sciences for Exploration the Sea-Island Resources” will be carried out on May 31st 2016 at Rectorate Building, Pattimura University. There are 200 participants from lecturers, research institute, students, and also there are 34 papers will be presented.

My special thanks refer to the rector of Pattimura University and the Dean of MIPA Faculty, Prof. Dr. Pieter Kakissina, S.Pd., M.Si. I also would like to express my deepest gratitude to Prof. Amanda Reichelt-Brushett, M.Sc., Ph.D. ; Kazuhiko Ishikawa, Ph.D. ; Nicolas Hubert, Ph.D. ; Prof. Dr. Kirbani Sri Brotopuspito ; Prof. Dr. Marjono, M.Phil. ; Gino V. Limon, M.Sc., Ph.D. as the keynote speakers.

The last, We hope this international seminar usefull for all of us, especially Mollucas People and very sorry if any mistake. Thank you very much.

Dr. La Eddy, M.Si.
Chairman of Organizing Committee

Opening Remarks
By Dean of Mathematic and Natural Sciences Faculty

I express my deepest gratitude to The Almighty God for every single blessing He provides us especially in the process of holding the seminar until publishing the proceeding of International Seminar in celebrating the 18th anniversary of MIPA Faculty, Pattimura University. The theme of the anniversary is under the title "Natural Sciences for Exploration the Sea-Island Resources". The reason of choosing this theme is that Maluku is one of five areas in Techno Park Marine in Indonesia. Furthermore, it is expected that this development can be means where the process of innovation, it is the conversion of science and technology into economic value can be worthwhile for public welfare especially coastal communities.

Having the second big variety of biological resources in the world, Indonesia is rich of its marine flora and fauna. These potential resources can be treated as high value products that demand by international market. Basic science of MIPA plays important role in developing the management of sustainable marine biological resources.

The scientific articles in this proceeding are the results of research and they are analyzed scientifically. It is expected that this proceeding can be valuable information in terms of developing science and technology for public welfare, especially people in Maluku.

My special thanks refer to all researchers and reviewers for your brilliant ideas in completing and publishing this proceeding. I also would like to express my gratefulness to the dies committee-anniversary of MIPA Faculty for your creativity and hard working in finishing this proceeding, God Bless you all.

Prof. Dr. Pieter Kakisina, S.Pd., M.Si.
Dean of Mathematic and Natural Sciences Faculty

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Hotel Mutiara Ambon

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QUALITY CHARACTERISTICS OF REDTAIL SCAD (*Decapterus kurroides*) SMOKE PRESSURE USING DIFFERENT LIQUID SMOKE AND MECHANICAL MIXING

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ABSTRACT

Redtail scad (*Decapterus kurroides*) by the people of Maluku known as fish "red momar" is a fish that is less favored people of Moluccas because they have less meat, many barbed and perishable foods. Though the price is very affordable, continuity is always available and as a source of protein and fat. Judging from the physical properties as well as the barriers are so diversified that works best on these fish is to process them with liquid smoke presto techniques that fumigation of products using liquid smoke, and through a process of heating and pressure to produce smoked fish products are durable, safe and spiny soft. This study aimed to determine the effect of the type of liquid smoke and different mixing techniques on the quality and nutritional value of the final product. The best products on the addition of liquid smoke from the bark of sago 4% and 5% with the immersion technique. Nutritional Values obtained are: protein 25.75% and 26.95%; Amino acids 21.37% and 26.17%; fat 3.02% and 4.4%; Omega-3 (EPA 4.37% and 5.08%; DHA 12.18% and 11.25%; ARA 2% and 1.79%); the water content of 60.77% and 57.08% is relatively high so that the preserved foods only 10 days; salt content of 1.18%–2.14%. Product is safe for consumption because it was not found policyclic aromatic hydrocarbons (PAH) compounds and meet the quality standards of smoked fish according to SNI 01-2725-2013.

***Keywords*:** Redtail scad (*Decapterus kurroides*), liquid smoke, pressure

INTRODUCTION

Redtail scad (*Decapterus kurroides*) or by the people of Moluccas known as fish "red momar" classified material perishables (perishable foods) and tend to be favored by the people of Moluccas since it has the composition of meat are few and tend to be a lot of thorns. This is an obstacle for the people of Moluccas in utilizing these types of fish, so that the processed results of this fish is very limited, for example: fried or steamed extent only. Whereas “momar fish” is very potential to be developed into products processed in Moluccas because these types of fish, including fish that continuity is abundant and always available; the price is relatively cheap compared to other types of fish; distribution scattered across the territorial waters of Indonesia (Indonesian Fishing Statistics, 2008); and most importantly, serve as a source of protein and fat that is high enough. According Chairita (2008) in Hadinoto, S (2015), the chemical composition of fish Scad (Decapterus spp) in general is the water content of 78.58%; ash content of 1.03%; fat 1.90%; 18.13% protein; TVB 9.79 MGN /

100% and a pH of 5.98. Redtail scad (Decapterus kurroides (Bleeker, 1855 in Wikipedia, 2016) has a size of 20-45 cm and weight ranged between 80 to 500 g) are shown in Figure 1 below:

Figure 1. Redtail scad (*Decapterus kurroides*)

Judging from the nutritional composition, potency, physical properties of this Scad fish and constraints already mentioned above efforts are needed to process them into products that are more durable, safer and more demanding public. One way of preserving fish are safest to modern curing technique using liquid smoke, because the modern curing technique can overcome the weaknesses in traditional fumigation is less assured in terms of both food safety and nutritional value. Fumigation with the liquid smoke has many advantages such as saving costs required for timber and equipment maker smoke, can set the desired flavor of the product, easily be applied to the general public, and reduce air pollution; can be applied to various types of food, can eliminate carcinogenic compounds formed (Leha, M.A., 2010); application concentration of liquid smoke in foodstuffs can be controlled and produce products that vary (Swastawati F, et al (2012); can obtain uniform products, reduce environmental pollution, flavor, and taste almost the same as smoked fish traditionally, do not need a special place for fumigation and made more simply (Yanti and Rochima (2009). Added again by Himawati E, (2010) in the various sources mentioned other advantages of liquid smoke that is: has antioxidant activity and antibacterial; the potential for the formation of brown color and the ease and variety of use in the form of a liquid solvent in the oil phase and form of powder so as to allow the wider use and easy for various products.

The use of liquid smoke should consider the potential of the raw material producing the liquid smoke. According Leha, M.A., (2010), the raw material liquid smoke potential in the Moluccas are coconut and sago cortex for both types of raw materials are numerous in the Moluccas. Thus considered suitable for the application of liquid smoke of both the raw materials to the diversification of food products in Moluccas. Judging from the nutritional composition, physical properties and potential Scad fish (Decapterus kurroides), potential raw material liquid smoke, as well as the constraints that have been mentioned above, the diversification of products processed from fish Layang or fish momar red suitable to be applied is the process by engineering liquid smoke presto thus producing smoked fish products spiny soft.Mechanical liquid smoke presto ie processing with salt and pickling with fumigation using liquid smoke, and through a process of heating and pressure (presto). As for the principle of processing by presto namely the use of a temperature of 115 to 120^0 C and a pressure of 1 to 2 atmosphere. Temperature and high pressure is achieved by using a steam pressure (autoclave) or in household scale using "pressure cooker" (Arifudin, 1993 in Tapotubun, AM, et al (2008). Products presto fish also known as fish soft spines for all parts including bones can eat. thus presto fish reliable as a source of protein and minerals for children and the elderly due to fish spines and bones are often the main obstacle in consuming the fish can be eaten safely.Science and technology for society processors on technology curing Scad fish (Decapterus kurroides) with the technique of liquid smoke presto

raw materials for producing liquid smoke potential in Moluccas to be applied to the diversification of food products namely coconut shell and bark sago need to be introduced so as to produce a product that is durable, safe, meet the standards of quality and food safety, more marketable, and most importantly the public interest.

The few studies that have been done relating to this technology, including by Hadinoto (2015) to Scad fish (Decapterus ruselli) an increase in protein levels of amino acids and fatty acids after dipresto; Tapotubun, A.M., et al (2008), the three (3) types of fish from fish species Selar pressure, Scad and Cob with heating time for 120 minutes to produce good quality parameters; Leha (2010) showed that the application of liquid smoke coconut shell can extend the 5% lasting power tuna smoked during 4 days of storage at room temperature; while research E.E Nanlohy (2014), showed that the liquid smoke bark sago 5% are able to maintain the quality of smoked tuna fish microbiologically during 10 days of storage at room temperature; Haras (2004) mentions that the tuna marinated in coconut shell liquid smoke 2% for 15 minutes and stored at room temperature started to decline in the quality of day-to-4; Febriani (2006) reported that fish marinated eel liquid smoke coconut shell 30% for 15 minutes can be preserved at room temperature until day 9. Gumanti (2006) reported that wet noodles mixed with liquid smoke coconut shell 0.09% in the dough can be preserved up to 2 days at room temperature. Liquid smoke is mixed in the water used for boiling or steaming fish products. The advantages of this method, the components are distributed more smoke into the product and also coats the outside of the product (Siskos et al. 2007). Quality smoked fish must comply with quality requirements according to ISO No.01-2725-2013 smoked fish as shown in Table 1 below:

Table 1. Quality Requirements of Smoke Fish

Type Test	Unit	Quality requirements
A. Appearance		
- Minimum Value	(number 1 – 9)	Min 7
B. Microbial contamination		
- ALT, maks	CFU/gram	5×10^5
- Escherichia coli	APM/gram	Negative
- Vibrio cholera	Per 25 gram	Negative
- Staphilococcus aureus	Per 25 gram	Maks 1×10^3
C. Chemical contamination		
- Water, maks	% w/w	60
- Histamin	mg/Kg	100
- Salt, maks	% w/w	4

Source: BSN (2013) in Swastawati, et al (2013)

Hopefully, by the technology Scad fish processing liquid smoke presto can meet the nutritional needs of the community ikani proteins are safe for consumption while utilizing the potential of the fish were abundant, but less favored communities into products more attractive and marketable. This study aims to aims to determine the effect of the type of liquid smoke and different mixing techniques on the quality and nutritional value of fish products Scad liquid smoke pressure.

MATERIALS AND METHODS

Material

Two food grade liquid smokes from coconut and sago cortex, ice cubes, salt and plastic packaging.

Smoking procedure

Scad fresh fish weeded out and do the washing. Then soaked in a 5% salt solution for 15 minutes. Then do the cooking presto drained for 40 minutes and treated liquid smoke. Liquid smoke treatment variations administration is shown in Table 2 below:

Table 2. Variation Treatment Award liquid smoke

Type of liquid smoke	Concentration Liquid smoke (%)	*Direct Addition*	*Dipping*
Coconut shell	4	A	C
	5	B	D
The Sago Bark	4	E	G
	5	F	H

Note :
A = direct addition with liquid smoke coconut shell 4%
B = direct addition with liquid smoke coconut shell 5%
C = Dipping with liquid smoke coconut shell 4%
D = Dipping with liquid smoke coconut shell with 5%
E = direct addition with liquid smoke sago bark 4%
F = direct addition with liquid smoke sago bark 5%
G = Dipping with liquid smoke sago bark 4%
H = Dipping with liquid smoke sago bark 5%
I = Blank (without the addition with liquid smoke)

Once it is done fumigation using an electric oven for 6 hours at a temperature of 80 ^{0}C. Furthermore, the cooling at room temperature and vacuum packed before analysis. Flow process of making liquid smoke fish pressure illustrated in Figure 2 below :

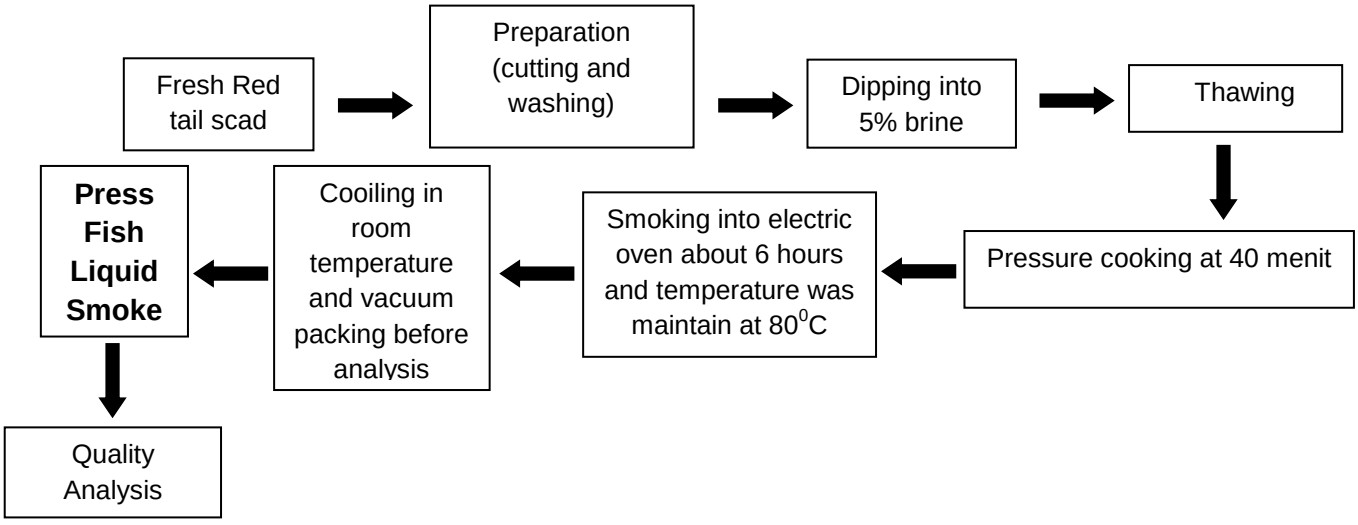


Figure 2. Flow process of making liquid smoke Scad fish smoke pressure

RESULTS AND DISCUSSION

The results of protein content and Amino Acid composition of Redtail scad and Blanko Pressure Liquid Smoke can be seen in Table 3.

Table 3. Results of Assays Protein and Amino Acid Composition of Liquid Smoke Scad fish Pressure and Blanko

No	PARAMETER	UNIT	CODE								
			A	B	C	D	E	F	G	H	I
	Protein	%w/w	27.96	28.31	26.84	26.81	21.7	30.73	25.75	26.95	29.36
	Amino Acid Total	%w/w	27.4	26.22	23.71	22.36	20.39	20.72	21.37	26.17	24.7
	Amino Acid Esensial (AAE)	%w/w	14.55	13.8	12.55	11.76	10.74	11.14	11.32	14.13	13.20
1	Histidine	%w/w	1.09	0.99	0.75	0.72	1.03	1.04	1.04	1.27	1.27
2	Threonine	%w/w	1.28	1.21	1.08	0.96	0.94	0.92	1.02	1.27	1.21
3	Arginine	%w/w	1.81	1.74	1.59	1.40	1.30	1.28	1.4	1.68	1.62
4	Methionine	%w/w	1.04	1.02	0.92	0.87	0.77	0.63	0.62	0.86	0.81
5	Valine `	%w/w	1.65	1.56	1.42	1.4	1.25	1.26	1.32	1.62	1.48
6	Phenylalanine	%w/w	1.35	1.28	1.29	1.29	0.98	0.98	1.01	1.23	1.15
7	Isoleucine	%w/w	1.48	1.40	1.28	1.26	1.14	1.14	1.20	1.47	1.32
8	Leucine	%w/w	2.36	2.23	2.05	2.03	1.79	1.8	1.87	2.25	2.08
9	Lysine	%w/w	2.49	2.37	2.17	1.83	1.54	2.09	1.84	2.48	2.26
	Amino Acid Non Esensial (AANE)	%w/w	12.85	12.42	11.16	10.6	9.65	9.58	10.05	12.04	11.5
10	Aspartic acid	%w/w	3.00	2.86	2.58	2.55	2.31	2.23	2.35	2.84	2.69
11	Glutamic acid	%w/w	4.46	4.32	3.89	3.81	3.42	3.35	3.50	4.24	3.92
12	Serine	%w/w	1.17	1.12	1.00	0.89	0.84	0.83	0.89	1.06	1.04
13	Glycine	%w/w	1.36	1.41	1.23	0.99	0.94	1.06	1.08	1.20	1.30
14	Alanine	%w/w	1.80	1.71	1.54	1.46	1.34	1.33	1.40	1.67	1.61
15	Tyrosine	%w/w	1.06	1.00	0.92	0.90	0.80	0.78	0.83	1.03	0.94

The protein content of the product tends to increase after processing presto case of smokeless liquid protein levels by administering liquid smoke by 29.36% to 30.73% higher than the protein content of fresh Scad fish is 26.31%. Elevated levels of this protein are the result of processing with the use of salt as well as the use of high temperatures due to the expenditure of water from fish meat causes more concentrated protein that causes viscous solution in the flesh of fish. Based on Table 4, it is known that both the total amino acids as well as the composition of the amino acid lysine is highest tend to the treatment of the addition of liquid smoke coconut shell 4% (A) and 5% (B) is directly followed by the addition of liquid smoke bark sago 5% with the technique immersion (H) are respectively 27.4% w/w; 26.22% w/w; and 26.17% w/w total amino acids and 2.49% w/w; 2.37% w/w; and 2.48% w/w lysine. Lysine are essential for people with average requirement is 1.0-1.5 g per day. Lysine to the framework in the formation of niacin (vitamin B3), the basic ingredients of blood antibodies, strengthens circulatory system and maintains normal growth of cells. Lysine

deficiency can cause fatigue, difficulty concentrating, hair loss, anemia, stunted growth and reproductive disorders (Harli 2008 in Hadinoto, 2015). The quality proteins, especially essential amino acids such as lysine can be decreased due to the heating process at high temperature pressure i.e temperatures above 100^0C and roasting at a temperature of 80^0C and the use of liquid smoke. As well, most of arginine and histidine can be lost or damaged in the reaction between the proteins in the fish with the liquid smoke composition carbonyl. It is as proposed by Darmanto (2009), that fogging at high temperatures can increase the decomposition of smoke, but also can of cause damage to the essential amino acids such as lysine. As well, most of arginine and histidine can be lost or damaged in the reaction between the proteins in the fish with the liquid smoke composition carbonyl. Test Results Fat Content and Fatty Acid Composition of Liquid Smoke Scad fish pressure and blanks are shown in Table 4.

Table 4. Test Results Fat Content and Fatty Acid Composition of Liquid Smoke Redtail scad Presto and Blanko

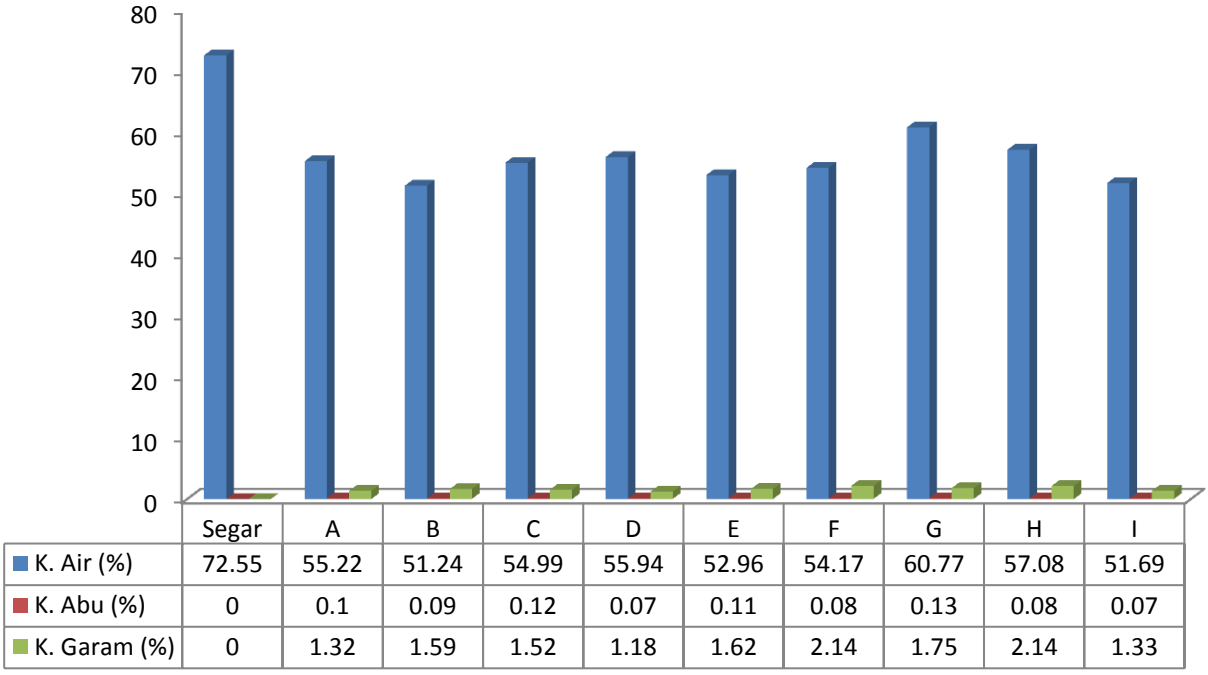
No	PARAMETER	UNIT	CODE								
			A	B	C	D	E	F	G	H	I
	Fat	%w/w	6.79	9.40	5.25	5.17	7.14	7.31	3.02	4.40	7.23
	Total Fatty Acid	%w/w	64.94	62.67	63.37	61.80	65.13	63.40	62.45	62.63	67.96
	Saturated fatty acid (SFA)	%w/w	27.19	27.71	25.4	26.24	26.03	26.13	25.50	25.01	26.26
1	Lauric acid, C12:0	%w/w	0.07	0.05	0.06	0.05	0.05	0.05	0.06	0.06	0.06
2	Myristic acid, C14:0	%w/w	3.20	2.81	2.93	2.73	2.71	3.02	3.03	3.27	3.12
3	Pentadecanoic acid, C15:0	%w/w	0.34	0.32	0.37	0.32	0.3	0.35	0.35	0.38	0.35
4	Palmitic acid, C16:0	%w/w	17.78	19.01	16.60	17.22	17.49	17.11	16.00	16.07	17.15
5	Heptadecanoic acid, C17:0	%w/w	0.52	0.43	0.53	0.44	0.46	0.52	0.51	0.58	0.68
6	Stearic acid, C18:0	%w/w	4.95	4.76	4.64	5.17	4.72	4.78	5.23	4.39	4.68
7	Arachidic acid, C20:0	%w/w	0.28	0.28	0.22	0.27	0.25	0.25	0.27	0.21	0.18
8	Heneicosanoic acid, C21:0	%w/w	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.04
	Monounsaturated fatty acids (MUFA)	%w/w	**19.79**	**19.65**	**17.76**	**17.8**	**19.6**	**19.27**	**17.21**	**18.22**	**21.21**
9	Myristoleic Acid, C14:1	%w/w	0.03	0.02	0.03	0.00	0.02	0.03	0.02	0.03	0.03
10	Palmitoleic Acid, C16:1	%w/w	4.90	5.09	4.01	4.02	4.55	4.28	3.68	3.91	4.35
11	Cis-10-Heptadecanoic Acid, C17:1	%w/w	0.26	0.20	0.29	0.18	0.23	0.27	0.25	0.29	0.34
12	Elaidic Acid, C18:1n9t	%w/w	0.09	0.07	0.06	0.07	0.08	0.08	0.09	0.1	0.11
13	Oleic Acid, C18:1n9c	%w/w	13.79	13.73	12.56	12.93	14.11	13.79	12.5	13.1	15.62
14	Cis-11-Eicosenoic Acid, C20:1	%w/w	0.72	0.54	0.81	0.60	0.61	0.82	0.67	0.79	0.76
	Polyunsaturated fatty acids (PUFA)	%w/w	**17.96**	**15.31**	**20.21**	**17.76**	**19.5**	**18.00**	**19.74**	**19.4**	**20.49**
15	Linoleic acid, C18:2n6c	%w/w	0.75	0.59	0.83	0.62	0.70	0.76	0.83	0.93	0.92
16	□-Linolenic Acid, C18:3n6	%w/w	0.08	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.07
17	Cis-11,14-Eicosedienoic	%w/w	0.15	0.10	0.16	0.1	0.12	0.13	0.15	0.16	0.16

	Acid, C20:2										
18	Cis-8,11,14-Eicosetrienoic Acid, C20:3n6	%w/w	0	0.09	0.09	0.09	0.10	0.09	0.13	0.11	0.12
19	Arachidonic Acid, C20:4n6 (ARA)	%w/w	1.77	1.29	1.60	1.49	1.58	1.49	2.00	1.79	2.00
20	Cis-5,8,11,14,17-Eicosapentaenoic Acid, C20:5n3 (EPA)	%w/w	4.88	4.12	5.12	4.23	4.97	4.56	4.37	5.08	5.56
21	Cis-4,7,10,13,16,19-Docosahexaenoic Acid, C22:6n3 (DHA)	%w/w	10.33	9.06	12.35	11.16	11.96	10.9	12.18	11.25	11.66

Based on Table 4 shows that the fat content of the Redtail scad (Decapterus kurroides) after being processed liquid smoke presto tends to increase ranged between 3.02 to 9.40% when compared to fresh fish before it is processed only by 1.9%. Increased levels of fat presto smoked fish is due to the heating process that causes the water content of the fish is reduced. This is consistent with the statement Darmanto (2009) stated that the increase in fat composition, followed by decreasing water levels in smoked fish. Fish drying process using high temperatures can also cause fat oxidation. However the effect of salt, hemo protein from fish meat and liquid smoke that has the effect of antioxidants can protect fats from oxidation in a while. Fatty acid analysis by GC-MS showed that the Redtail Scad (Decapterus kurroides) Pressure and Without Liquid Smoke Liquid Smoke has a monounsaturated fatty acid (MUFA) with the highest value is oleic acid ranged from 12.5 to 15.62% w/w, while polyunsaturated fatty acids (PUFA), which has the highest value is Dacosa Hexaenoic acid (DHA) ranges between 9.06 -12.35%w/w followed Eicosa Pentaenoic acid (EPA) ranged between 4.12 to 5, 56% w/w. For the composition of omega-3 fatty acids (EPA and DHA) are the best products with the soaking treatment with liquid smoke bark sago 4% (G) and 5% (H) are respectively 4.37 and 5.08% w/w (EPA) and 12.18 and 11.25% w/w (DHA). According to Frankel (1998) in Swastawati (2003) the value of the EPA in fish is usually between 5 -12% depending on the fat content of the fish. Omega 3 fatty acids EPA and DHA that is needed by the body as it serves to prevent atherosclerosis (especially EPA). Both can significantly lower the levels of triglycerides in the blood and lowering cholesterol levels in the liver and heart. The test results of water content, ash content and salinity Scad fish Liquid Smoke pressure is shown in Figure 3.

The water content of the fresh fish tends to decrease after processing and curing presto from 72.55% to a range between 51.24 to 60.77% (Figure 3). Reduction of water content is due to the process of salting and heating, thereby reducing the water content in the body of the fish. In general, the water content of smoked fish float presto all treatments is still at the threshold value of the water content of smoked fish according to SNI is a maximum of 60%, except in the treated product immersion liquid smoke coconut shell 4% (G) has passed the threshold of the SNI is 60.77 %. Still high levels of water is caused by the process of draining while soaking in a solution of liquid smoke that is less than the maximum, so that the water content in the body of the fish is still high, in addition to the use of the technique of curing the heat that is using temperature curing 80^0C for ± 6 hours, so it is generally the water content of the final product the resulting relatively high and shorter preserved foods only 10 days, compared by evaporation cooler with a temperature of 40-50^0C and up to 2 weeks old fumigation has a lasting 2-3 weeks or even months. To extend the lasting power of the final product should be conducted additional drying time or use by evaporation cooler in addition

to the need to pay attention to the process of draining the water when the fish were completed soaked with liquid smoke for example, the position of the fish when drained by hanging for the process-water discharge from the fish better and maximal. Salinity presto smoked fish still meet the ISO standard. In the process of salting wet salt penetration into the fish's body and discharge in the body of the fish because of differences in concentration. This fluid will quickly dissolve the salt crystals. The salt can draw water out of the fish's body in conjunction with the release of water from the fish, salt seeping into the fish flesh tissue besides that at certain concentrations of salt can inhibit the growth of bacteria that cause decay fish (Adawiyah 2007 in Titik, 2012). The results of the microbiological test and PAH fish float liquid smoke presto on observation for 10 days are shown in Table 5 below.



	Segar	A	B	C	D	E	F	G	H	I
K. Air (%)	72.55	55.22	51.24	54.99	55.94	52.96	54.17	60.77	57.08	51.69
K. Abu (%)	0	0.1	0.09	0.12	0.07	0.11	0.08	0.13	0.08	0.07
K. Garam (%)	0	1.32	1.59	1.52	1.18	1.62	2.14	1.75	2.14	1.33

Figure 3. Test Results Water Content, Dust content and Salt Content of Scad fish Liquid Smoke pressure.

Table 5. Microbiological Test Results and PAH Redtail scad Liquid Smoke Pressure

PARAMETER	Fresh fish	A	B	C	D	E	F	G	H	I
TPC (colony/g)	$3{,}45 \times 10^{1}$	$1{,}15 \times 10^{1}$	$3{,}00 \times 10^{0}$	$1{,}50 \times 10^{1}$	$8{,}00 \times 10^{0}$	$5{,}00 \times 10^{0}$	$6{,}00 \times 10^{0}$	$3{,}00 \times 10^{0}$	$11{,}50 \times 10^{0}$	$11{,}50 \times 10^{0}$
E. coli (ALT/g)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Salmonella (colony/g)	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
Benzoantracene (mg/kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene (mg/kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

TPC value pressure fish smoked all treatments at room temperature storage still below the threshold requirements for quality smoked fish according to SNI 01-2725-1992 (5 x 10^5). Table 5 shows that the value of TPC fish float presto after the addition of liquid smoke decreased, ie ranging from 3.00 x 100 to 1.50 x 101 compared to TPC Scad fish before processing that is 3.45 x 101. The addition of liquid smoke tend to generate value TPC lower than without the addition of liquid smoke. Overall the sample does not contain harmful bacteria such as E.coli and Salmonella. The content of phenol and formaldehyde in the added liquid smoke can inhibit the growth of bacteria. The combination of the two compounds also are fungicides that can kill molds (Himawati, 2010). Besides, the treatment of wet before salting smoked fish can inhibit the growth of bacteria in which the salt content of the fish meat absorbs water and chemical compounds penetrate into the body of the fish, causing bacterial activity becomes inhibited (Darmanto, et al., 2009). This shows that the use of liquid smoke either coconut or sago cortex 4 and 5% have a real ability to inhibit the growth of microbes. So that the fish products Scad fish liquid smoke had already qualified for the microbiological quality of the TPC value, E.coli and Salmonella.

Based on Table 5 shows that in all samples of smoked fish presto no compounds detected benzo (α) pyrene and benzo (α) pyrene is a carcinogenic agent indicator, so that the products declared safe for human consumption. This is because the compounds in the liquid smoke is phenol, organic acids and carbonyl instrumental in improving the properties of smoked fish products, antimicrobial and anatioksidan. In addition, liquid smoke can also make the color, flavor, odor, specific taste in the final product (Halim et al., 2005 in Swastawati (2014)

The results of organoleptic test Redtail scad (Decapterus kurroides) liquid smoke presto against the appearance, smell, texture, taste by 25 panelists give average values ranging from 7.67 to 8.2 of grades 6 to 9. The results of organoleptic test Redtail scad (Decapterus kurroides) liquid smoke presto shown in Table 6.

Table 6. Results of organoleptic Redtail scad (*Decapterus kurroides*) liquid smoke pressure

Parameter	A	B	C	D	E	F	G	H	Average
Appearance	7	7	7	7	7	8	6	7	7
Smell	6	7	7	7	8	8	7	6	7
Flavor	7	8	8	7	8	7	8	8	7,62
Texture	8	8	8	8	8	8	8	8	8
Mucus	9	9	9	9	9	9	9	9	9
Mushroom	9	9	9	9	9	9	9	9	9
Total Score	46	48	48	47	49	49	47	47	47,62
Ranking	4	2	2	3	1	1	3	3	
Average	7,67	8	8	7,8	8,2	8,2	7,8	7,8	7,94

Based on Table 6. The value of the highest organoleptic in samples E and F (liquid smoke sago cortex concentration of 4 and 5% with direct added followed by the sample B, C after D, G, H and lastly A. When compared with control (I), the average value of the samples E and F is the highest. This means that the panelists liked the fish products overpass liquid smoke that dipresto and using liquid smoke sago cortex concentration of 4 and 5% by engineering the direct added as components of the smoke more distributed in the product and also coats the outside product or directly absorbed into the fish flesh when done pressure. The effect of salting causes the body surface shiny silver-colored fish or "glosy" on the skin of the fish in addition to the cause of fish meat into tasty. But in general, liquid smoke

presto Scad fish smoked with liquid smoke does not give a noticeable difference compared with the Scad fish pressure without the use of liquid smoke as well as the addition of liquid smoke technique of the organoleptic value because they ranged from 7.67 to 8.2. This means that all of these treatments can be accepted by the panelists and is rated suitable for consumption because it is in compliance with the quality requirements of smoked fish according to SNI 01-2725-2013. Hedonic test results on fish float liquid smoke presto seen that most consumers prefer products with an average value of 8.2 is the addition of direct adding with liquid smoke sago bark 4% and 5%. While the average value of the bottom at 7.67 which is the product with the addition of direct treatment with liquid smoke coconut shell 4%. Sensory characteristics typical of smoked fish affected by the Maillard reaction between the carbonyl liquid smoke with fat from fish meat produces a distinctive aroma and flavor smoked fish. While the reaction with the protein produces a sensory characteristics typical of smoked fish include appearance, texture and color.

CONCLUSION

Addition of liquid smoke with different mixing techniques in the manufacture of Redtail scad (Decapterus kurroides) presto influence on the quality and nutritional value of the final product. Based on the results of the analysis of the nutritional value and organoleptic tests, the addition of liquid smoke treatment of sago bark 4% (G) and 5% (H) with the Dipping technique is the best. The nutritional value is derived row are as follows: protein 25.75% and 26.95%; Amino acids 21.37% and 26.17%; AAE lysine 1.84 and 2.48% w/w; fat 3.02% and 4.4%; Omega-3 (EPA 4.37% and 5.08%; DHA 12.18% and 11.25%; ARA 2% and 1.79%); the water content of 60.77% and 57.08% is relatively high so that the preserved only 10 days; salt content of 1.18% - 2.14%. In general, the product is safe for consumption because it does not reveal any of the compounds policyclic aromatic hydrocarbons (PAH) and has a quality of microbiological meet the standard quality requirements smoked fish according to SNI 01-2725-2013.

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