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UTILIZING OF DARK MEAT TUNA FISH (*Thunnus sp.*) AND TRASH FISH SURIMI IN THE PROCESSING OF FISH BURGER

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ABSTRACT

Trash fish as by-catch includes a wide variety of species caught in shrimp fishing and usually is under utilizied while produced in a great number. Weakness of trash fish are small in measure with bone system, big husk and scale which resulting amount of yield flesh to be utilized relative small. So that, in processing a product require addition of order fish flesh. The objectives of this research were to study the amount of yield of minced fish that can utilizied for fish burger, quality and calory value of the product, and the level of panelists acceptance. Fish burger made from trash fish, used 2 (two) species as gulamah / Silver Pennah Croaker *(Argyrosomus amoyensis),* senangin / Fourfinger Threadfin *(Elentheroma tetradactylum),* and dark meat of Tuna *(Thunnus sp)*. Minced fish of these two species was mixed with tuna flesh by ratio 1:1 (gulamah tuna) (A1), 1:2 (senangin tuna) (A2), 1:3 (gulamah tuna) (A3), 1:4 (senangin tuna) (A4), trash minced fish (gulamah senangin) (A5) and dark meat tuna minced fish (A6) as control. Research design applied was Complete Randomized Design with 4 replications. The result showed that amount of yield of minced fish are 47.8 % gulamah), 33.9 % (senangin) and 4.4 % (dark meat of tuna). The quality of fish burger products water content 46.00-53.93 %, protein content 12.78- 20.84%, fat content 12.83-19.52%, ash content 2.32-3.33%, and carbohydrate content 11.61-17.36% (by-difference). Calory value 253.8-286.9 kcal. Sensory/orgaoleptic test value of this product is 7,04. – 7,93 (aspire). Treatment of minced of gulamah mixed with tuna 1:3 (A3), the fish burger with the best quality as it was by indicated by the water content 50.22%, protein content 20.84% and fat content 12.83%.

Key words : Dark meat tuna, trash fish, minced fish, amount of yield, fish burger

INTRODUCTION

According to Suparno and Dwiponggo (1993) by-catch in shrimp fishing consist of small pelagis and other species which is under utilizied. Source of fish under utilized which have the biggest potency were trash fish, which consist of various type of demersal and some of small pelagis. Weakness of trash fish are small in measure with bone system, big husk and scale which resulting amount of yield flesh to be utilized relative small. So that, in processing a product require addition of order fish flesh.

Trash fish is the mix of varions types of fish resulted from trawler and has a chemical composition which is equal to other fish, but fat and ash content is lower than 2 % (Nasran and Tambunan, 1974). Setiabudi *et al*, (1984) showed that fish raw material of trash fish before getting any treatment contain 76.12 % water, 12.14 % protein and 1.39 % fat content. Trash fish which one has white meat and it is good for making fish jelly products like fish ball, and sausage of surimi (Tan *et al.,* 1987).

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In Indonesia exploiting of trash fish as raw material for making commercial food products is still less.Commonly, those of trash fish sold cheaply while others my be aried. The aim of the research was to know the fish flesh that can be exploited to become fish burger, the percentage of product of raw material weight, quality and calculation of the return of processing of burger.

MATERIALS AND METHODS

Materials

Fish flesh trash fish, used 2 (two) species as gulamah / Silver Pennah Croaker *(Argyrosomus amoyensis),* senangin / Fourfinger Threadfin *(Elentheroma tetradactylum),* and dark meat of Tuna *(Thunnus sp)*, Smooth salt, butter, chiken egg flour of tapioka 8%,sugar 2%, shallot 1.5%, garlic 0.3%, ginger 0.1%, merica 0.8%, flavour (mono sodium glutamate) 0.25%, bayleaf sufficiently. Knife, talenan cooking board, bowl, balance, tablespoon, blender, mixer, tray, cling wrap, burger aluminium mould size 28.

Preparation of ingredient and materials

Shallot, ginger and garlic with comparison 15 : 3 : 1, blended until smooth (condiment). Bay leave into small pieces. Flour of tapioka, butter, salt, sugar, and peppercorn of condiment weight ed and processed.

Preparation of flesh or minced fish

Various of fresh fish type with the best quality washed, cleaned and removed scales. Filleted and Chilling. Remaining off flesh on the bone tuhen out by sloon and attach to the fillet. Fish Fillet and fish flesh cleaned and pressed 2 times. The minced fish ready to be processed become fish burger, and at the same time await to next step.

Dough Preparation

Addition of salt 2.5 % into minced, stired untill wel mixed. Addition of butter into minced fish, stir untill wel mixed. Addition of egg (1) to every 1 kg minced fish. Addition of flour of tapioka bit by bit as much as 8 %. Sequentially add sugar, condiment, peppercorn and other ingredient into that mixture.

Forming and Freezing

Preparation of sheet of thin plastic 40 x 25 cm, then invested by a few/little butter. This plastic was used as a barrier between dough and packaging. so that dough do not come into contact with can. Put dough into forming mould which have been arised with butter, each can 400 g. Folding sheet of plastic to wrap the dough into printing mould. Removing dough which have been prepacked into other printing mould with shares of plastic folded underside at that printing mould. Freeze the dough temperature -25 ◦C for 8 – 10 hours

Presentation

Freeze Fish Burger cutted to pieces with 1.5 cm according to the wide of printing mould, divided into two according to printing mould cutting length, of 9 x 2 x 1.5 cm. Fish burger cut deep into egg yolk agitation, and then applied flour of dry bread powder. Frying in oil with moderate flame. Fried Burger to be served and assessed by acceptance level of panelist. Scheme of Processing of Fish Burger was described Figure 1.

In each processing of fish burger conducted

Measuring the weight of fish used. Measuring the weight of minced fish that could be used as fish burger. Measuring the weight of minced fish of each species according to the treatment applied. Measuring the weight of the fish burger resulted from each treatment.

Parameter Analysed

Quality Analysis consist of objective parameter i.e.: water content, protein content, fat content, ash content, carbohydrate and calory / energy value and subjective parameter: acceptance, smell, flavor and texture by using Hedonic scale of 1 to 9.

Treatments

Fish burger made from trash fish, used 2 (two) species as gulamah / Silver Pennah Croaker *(Argyrosomus amoyensis),* senangin / Fourfinger Threadfin *(Elentheroma tetradactylum),* and dark meat of Tuna *(Thunnus sp)*. Based on the availability of fish, hence treatment the designed as follows: Comparison of dark meat of tuna with fish flesh of gulamah 1 : 1 (A1), Comparison of dark meat of tuna with fish flesh of senangin 2 : 1 (A2), Comparison of dark meat of tuna with fish flesh of gulamah 3 : 1 (A3), Comparison of dark meat of tuna with fish flesh of senangin 4 : 1 (A4), Flesh Fish of gulamah and senangin (1 : !) as control (A5), Dark meat of tuna as control (A6).

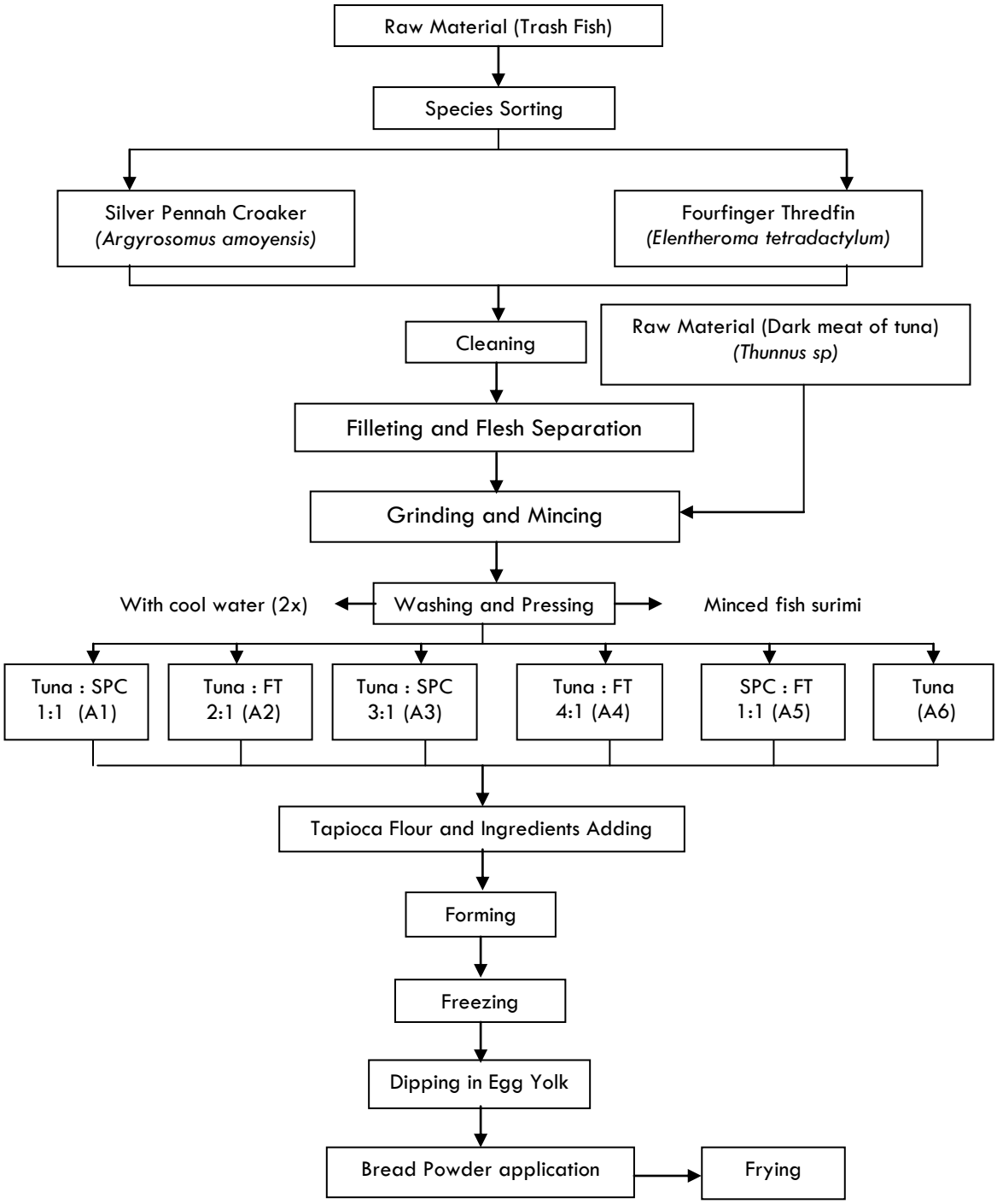

Figure 1. Scheme of Processing of Fish Burger

Data Analysis

The objective parameters were analyzed by Complete Randomized Design with four replications and followed by Honest Significant Difference (HSD) (Gaspersz, 1994). While the subjective parameters were analyzed by Friedman test and followed by Multiple Comparison (Wayne, 1989).

RESULTS AND DISCUSSION

Yield

The amount of minced fish that could be used as fish burger after passing wash process and press (minced fish) can be seen at Table 1.

Table 1. The Yield of minced Flesh used as Fish Burger.

Species	Fish Weight (g)	Minced Fish Weight (g)	Yield (%)
Silver Pennah Croaker	4,520	2,180	48.2
	4,340	2,060	47.5
	4,440	2,140	47.8
Average	4,430	2,120	47.8
Fourfinger Threadfin	2,560	850	33.2
	2,700	940	34.8
	2,620	880	33.6
Average	2,630	890	33.9
Tuna	6.500 (700)	290	4.5
	8.800 (900)	370	4.2
	11,200 (1,200)	490	4.4
Average	8,830 (933.3)	383.3	4.4

Amount of minced fish resulted from each of fish type was as follow silver pennah croaker is more than 4 kg equal to 47.8 % (average 192 g / tail); fourfinger threadfin more than 2.5 kg equal to 33.9 % (average 105 g / tail); tuna in more or less 10 kg equal to 4.4 % (average 8,830.3 g / tail). Thereby yield flesh fish amount was in line with ever greater of fish weight and measure. Silver pennah croaker in form of ellipse, wide and long; fourfinger threadfin in the form of ellipse, not wide, not length and big head. Suzuki (1981) expressed that yield of flesh fish vary depend on fish type, fish measure, body form, of old age and arrest season. Generally yield of flesh fish between 45 - 50 %. The yield of flesh fish in the form of ellipse about 60 %, and fish which big head 35 - 45 %. Pattipeilohy (2004) reported that yield of flesh fish of silver pennah croaker equal to 46.7 % (heavy rate 175 g / tail) and fourfinger threadfin 33.0 % (heavy rate 90 g / tail), which is dissociation of flesh with flesh separator used of form of filet so that do not remain flesh at husk followed isn't it flesh of bone. Huda (1994) reported yield flesh fish fourfenger threadfin equal to 32 % (heavy rate 45 g / tail) which is dissociation of flesh.

Quality of Fish Burger

Objective parameter of quality of fish burger perceived cover: water, protein, fat, ash, carbohydrate content analysis and calory value, while subjective parameter is sensory test as follows: acceptance, smell/aroma, flavor and texture level.

Objective Parameter

Recapitultion of varians analysis and Honest Significant Difference (HSD) showed at Table 2.

Table 2. Recapitulation Varians Analysis and Honest Significant Difference (HSD) Objective Parameters Fish Burger

Treatment	Water (%)	Protein (%)	Fat (%)	Ash (%)	Carbohydrate (%)	Calory Value (kcal)
A1	49.88^{b}	16.19^{c}	**19.52$_{a}$**	2.80^{ab}	**11.61**	**286.9**
A2	**46.00^{c}**	17.24^{bc}	16.07^{b}	**3.33^{a}**	**17.36**	283.0
A3	50.21^{b}	**20.84^{a}**	**12.83^{c}**	2.63^{b}	13.49	**253.8**
A4	48.15^{bc}	18.72^{b}	14.93^{bc}	2.38^{b}	11.82	256.5
A5	**53.93^{a}**	**12.78^{d}**	16.08^{b}	2.39^{b}	14.92	255.5
A6	48.50^{bc}	16.40^{c}	15.67^{b}	**2.32^{b}**	17.11	275.0
F Value	12.88	62.35	68.00	8,33		
F Table	2.77	2,77	2,77	2,77		
HSD	3.32	1.53	2.47	0.60		

NB. Number followed by is same letter real on same column do not differ at level of 0.05 significant.

Water Content

The average of water content of fish burger was ranged from 46.00 - 53.93% (seeing Table 2). The highest was 53.93% on the treatment trash fish (gulamah and senangin) as control (A5), while the lowest was 46.00% on the treatment comparison of dark meat of tuna with fish flesh of senangin 2 : 1 (A2). The difference on fish species is known as the manner on the difference in the water content of the fish burger. Nasran and Tambunan (1974), report that fish chemical composition of silver pennah croaker is: water 79.27%, protein 17.82%, fat 1.73% and ash 0.01%; fourfinger threadfin is: water 84.29%, protein 15.43 %, fat 0.46 % and ash content 0.77 %. Gaspersz and Pattipeilohy (2011), report that fish chemical of dark meat tuna is: water 79.50%, protein 17.62%, fat 1,41% and ash content 1.41%.

The water content of the fish burger is lower than of the previous research by Arifudin (1993), from his research found the water content of fish burger was 58.2%. Fish burger made from comparison of ikan kakap : tenggiri : cumi (squid) is 1 : 5 : 2. The resource of the differentiation between this two results was predicated because of the different in fish species used in the two research and also because of the pressing treatment applied.

The difference was predicated because water content surimi after washing as reported by Ilyas, *at al.,* (1988) water content fluctuation of pari (*Trygon sephen*) surimi after washing was 75,05–82,79%. Before Grantham (1981) showed that difficult on water content minced fish control although with effective machine for pressing the water.

Protein Content

As a whole the quality of food product of fish was determined by content irrigate and prtein is two especial component. Rate irrigate product of fish very determine by rate irrigate early raw material. The average of protein content of fish burger was ranged from 12.78-20.84% (seeing Table 2). The highest was 20.84% on the treatment comparison of dark meat of tuna with fish flesh of gulamah 3 : 1 (A3), while the lowest was 12.78% on the treatment flesh fish of gulamah and senangin (1 : 1) as control (A5). The difference of protein content was caused by difference of protein content of raw materials. Nasran and Tambunan (1974),

report that fish chemical composition of silver pennah croaker is: water 79.27%, protein 17.82%, fat 1.73% and ash 0.01%; fourfinger threadfin is: water 84.29%, protein 15.43 %, fat 0.46 % and ash content 0.77 %. Gaspersz and Pattipeilohy (2011), report that fish chemical of dark meat tuna is: water 79.50%, protein 17.62%, fat 1,41% and ash content 1.41%. Winarno (1980), expressed that progressively lower rate water content product, hence protein content, fat, ash will be more excelsior. The protein content of the fish burger is consist than of the previous research by Arifudin (1993), from his research found the protein content of fish burger was 19.2%.

Fat Content

The average of fat content of fish burger was ranged from 12.83-19.52% (seeing Table 2). The highest was 19.52% on the treatment comparison of dark meat of tuna with fish flesh of gulamah 1 : 1 (A1), while the lowest was 12.83% on the treatment comparison of dark meat of tuna with fish flesh of gulamah 3 : 1 (A3), The difference of fat content was caused by difference of fat content of raw materials. Winarno (1980), expressed that progressively lower rate water content product, hence protein content, fat, ash will be more excelsior. The fat content of the fish burger is higher than of the previous research by Arifudin (1993), from his research found the fat content of fish burger was 10.8%.

Ash Content

The average of ash content of fish burger was ranged from 2.32-3.33% (seeing Table 2). The highest was 3.33% on the treatment comparison of dark meat of tuna with fish flesh of senangin 2 : 1 (A2), while the lowest was 2.32% on the treatment dark meat of tuna as control (A6), The difference of fat content was caused by difference of fat content of raw materials. Winarno (1980), expressed that progressively lower rate water content product, hence protein content, fat, ash will be more excelsior. The ash content of the fish burger is consist than of the previous research by Arifudin (1993), from his research found the ash content of fish burger was 2,9%.

Carbohydrate Content

The average of carbohydrate content (by-difference) of fish burger was ranged from 11.61-17.36% (seeing Table 2). The highest was 17.36% on the treatment comparison of dark meat of tuna with fish flesh of senangin 2 : 1 (A2), while the lowest was 11.61% on the treatment comparison of dark meat of tuna with fish flesh of gulamah 1 : 1 (A1), Winarno (1980), expressed that progressively lower rate water content product, hence protein content, fat, ash will be more excelsior. The carbohydrate content of the fish burger is higher than of the previous research by Arifudin (1993), from his research found the water conrent of fish burger was 8.3%.

Calory Value

The average of calory value of fish burger was ranged from 253.8-286.9 kcal. (seeing Table 2). The highest was 286.9 kcal on the treatment comparison of dark meat of tuna with fish flesh of gulamah 1 : 1 (A1), while the lowest was 253.8 kcal on the treatment comparison

of dark meat of tuna with fish flesh of gulamah 3 : 1 (A3). The difference of calory value was caused by difference of protein, fat and carbohydrate content of the products. According to Auliana (2001), calory or energy value of the food substance can be determined by using Atwater factor, in which each gram of lipid/fat, carbohydrate and protein equel to 9 cal, 4 cal and 4 cal, respectively.

Subjective Parameter

Recapitulation of Friedmen test and Multiple Comparision of sensory test value can be seen at Table 3.

Table 3. Recapitulation of Friedman test and Multiple Comparsion of Sensory Test Value

Treament	Average of AV	Total Ranking	Average of SV	Total Ranking	Average of FV	Total Ranking	Average of TV	Total Ranking
A1	7.85	15.0^{ab}	**7.69**	**21.5^{a}**	**7.38**	**6.0^{c}**	7.36	12.5 ^{c}
A2	**7.93**	**20.5^{a}**	7.44	13.5^{abc}	7.49	13.5^{abc}	7.43	17.0^{ab}
A3	**7.39**	**5.0^{b}**	7.35	9.0 ^{bc}	7.64	16.0^{abc}	**7.04**	**5.0^{c}**
A4	7.91	16.0^{a}	**7.22**	**5.0^{c}**	7.71	16.5^{ab}	**7.93**	**22.0^{a}**
A5	7.63	13.5^{ab}	7.59	19.5^{a}	7.44	9.5^{bc}	7.57	16.0^{ab}
A6	7.66	14.0^{ab}	7.66	15.5^{ab}	**7.83**	**22.5^{a}**	7.34	11.5^{bc}
Xi2= 11.1	S=11.1	CV=10 .4	S=12.9	CV=10 .4	S=12.6	CV=10 .4	S=13.8	CV=10 .4

NB. Number followed by is same letter real on same column do not differ at level of 0.05 significant.

The average of sensory test level at Table 2 (scale of hedonik 9) hence quality of fish burger 7.63 - 7.93 (appearance); 7.22 - 7.69 (smell); 7.38 - 7.83 (flavor) and 7.04 - 7.93 (texture) or assessed to reside in level rather (7) aspire after (8); with product specification as follows: vision turn yellow chocolate, not muccous, natty surface; compact texture, elastic ; specific smell of fish flesh and feel crispyly, and for flavour fish flesh and also flavour enough flavour.

Result test Friedman indicate that given treatment have an effect on reality to value appearance, smell, flavor and texture of fish burger. Result of Multiple Comparison test prove that value appearance fish burger treatment of better A2, because yielding value of rate and amount of highest ranking that as 7.93 and 20.5 different reality to treatment of A3 (7.39 and 5.0). For the value smell treatment of better A1, with 7.69 and 21.5 different reality to treatment of A3 (7.35 and 9.0) and A4 (7.22 and 5.0). For value flavor treatment of A6 (7.83 and 22.5) differing reality to A5 (7.44 and 9.5) and A1 (7.38 and 6.0), but not differ reality to A2 (7.49 and 13.5), A3 (7.64 and 16.0) and A4 (7.71 and 16.5). For the value of texture treatment of A4 (7.93 and 22.0) differing reality to A1 (7.36 and 12.5) , A6 (7.34 and 11.5), and A3 (7.04 and 5.0), but not differ reality to A2 (7.43 and 17.0), A5 (7.57 and 16.0).

As a whole assess acceptance level of panelist to the product of good enough fish burger (rather - aspire after). This prove that fish burger can use each fish flesh type and or mixture with a purpose to improve production.

Sribhibhadh (1985) suggested that fleshly fish type turn white and fish type of demersal in general is good to made surimi, but fleshly fish squeeze and bream which although fleshly mean turn white is not good to made surimi. Grantham (1981) suggested that surimi is " intermediate processed of fish minced" (fall to pieces fish flesh as product among/between) used for making raw material, of various final product type which want forming gel (elasticity). Miyake *et al.,* (1985) expressed that surimi can be made by various fish type, so long as the fish have ability to form gel, flavor and good vision. Suzuki (1981) expressed that protein content of sarkoplasma of fish of demersal lower than the pelagic. Nature of this protein pursue forming of gel like kamaboko, and sausage of fish ball.

Discoloration on fish and fish product usually influenced by lipid oxidation and enzyme activities. Futhermore, Desrrosier (1977) showed that appearance or color of the product is main key in determining the quality of the product. Some of the discoloration commonly observed in frozen fish can probably be attributed to autolysis action, sugar produced by enzyme action can interact with the amino compuounds already present to produce brownish or yellowish compound (Huss, 1988).

The sources of smell or aroma on the fish and fish products are amino acid and fatty acids which are broken down from polypeptides and lipids respectively. The food aroma of the product caused the good taste of it. Aroma also has correlation of the taste of the product. Aroma is also known as one of quality indicator of the fish products (Clucas and Ward, 1996).

Flavor of the food is taken from the lipid composition in it, beside that addition of ingredient on the right composition will result the good taste. The characteristic sweet, meatly flavor of fresh fish at least partly due to compound called inosinic acid. The break down of of inosinic acid through autolysis results in a loss of this flavor. The present of ginger, garlic, mono sodium glutamate, spices and salt in the fish burger can build the good flavor of it.

Texture of the fish burger is affected by additive of salt to the minced fish while dough is made, so that the myosin in the salt soluble is separated from the fish flesh and to make sol that have adhesive carracteristics. This sol will change to be gel that build the elastics products (Tanikawa, 1971).

According to Fardiaz (1985), ability gel structure has correlation of the water bidding capacity and viscocity of the flour.

CONCLUSION

Amount of yield of minced fish are 47.8 % gulamah), 33.9 % (senangin) and 4.4 % (dark meat of tuna). The quality of fish burger products water content 46.00-53.93 %, protein content 12.78- 20.84%, fat content 12.83-19.52%, ash content 2.32-3.33%, and carbohydrate content 11.61-17.36% (by-difference). Calory value 253.8-286.9 kcal. Sensory/orgaoleptic test value of this product is 7,04. – 7,93 (aspire). Treatment of minced of

gulamah mixed with tuna 1:3 (A3), the fish burger with the best quality as it was by indicated by the water content 50.22%, protein content 20.84% and fat content 12.83%.

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