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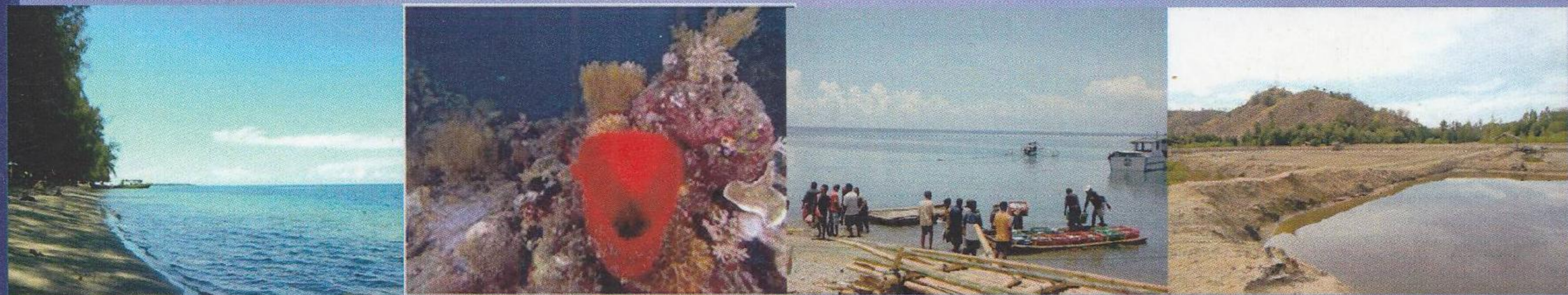
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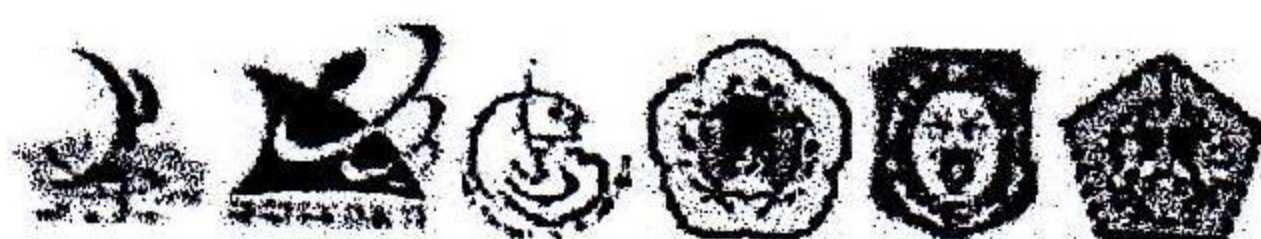


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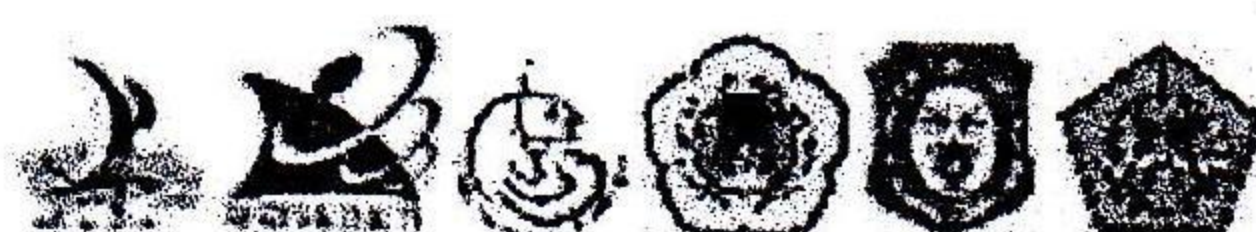
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- Assessment Of Coral Reefs Condition In Molotabu Waters Bone Bolango District**
Femy M Sahami, Sri Nuryatin Hamzah, Sitti Nursinar..... 1-11
- Effectiveness And Productivity Hand Lines With Different Branch Line Around Portable Fish Aggregating Device**
Roza Yusfiandayani, Diniyah dan Wawan Dedi Ariawan..... 12-21
- The Impact Of Moratorium To The Catch Of Fishermen With Boat Size Under 30 Gt (Case Study: Bitung, Manado Cities And Minahasa Utara, Minahasa Tenggara Regencies)**
Samuel Hamel, Hetty M.P. Ondang Daniel H. Ndahawali, Khairul Jamil, Lexy Hosang, Karyanto..... 21-29
- Prospective Capture Fisheries In Northem Gorontalo Distric**
Lis Melissa Yapanto, Syamsuddin 30-36
- Vegetation Structure Of Seagrass In Saronde Island, Ponelo Archipelago Subdistrict, North Gorontalo District, Gorontalo Province**
Siti Rahmi A.R. Nusi, Abdul Hafidz Olli, Syamsuddin 37-48
- Chemical Characteristics Of Fishbones Gelatin That Was Extracted From Tuna (*Thunnus Sp*) By Using Of Palm Vinegar Acid**
Asri Silvana Naiu, Nikmawatusanti Yusuf, Mohammad Zulkifly..... 48-59
- The Seedling Of Flying Fish (*Hirundichtys Oxycephalus*) High Economic Value Of Aquatic Biota As An Effort Of Germplasm Preservation In Indonesian Eastern Water Areas**
Sugeng Raharjo, Dasep Hasbullah, Endah Soetanti, Sadat, Harnita Agusanty, Muhammad Amri Tiro..... 60-75
- Lawi-Lawi Cultivation (*Caulerpa, Sp*) Innovative Technology Of Fishery Agriculture Sector Enviromental Friendly And High Profitability**
Dasep Hasbullah, Sugeng Raharjo, Endah Soetanti, Jumriadi, Imran Lapong , Harnita Agusanty Mike Rimmer..... 76-90
- Isolation And Identification Of Bioactive Compound Of Kopasanda (*Chromolaena Odorata*) Leaf To Fight *Vibrio Harveyi* On Post-Larval Tiger Prawn (*Penaeus Monodon Fabricius*)**
Harlina, Syahrul, Jayadi, Rustam Zaenal Abidin 91-101
- The Design And Specification Of Deep Sea Trawl (Midwater Trawl) Operated In Okhotsk Sea – Russia**
Aris Widagdo, Nyoman Suyasa, Danu Sudrajat, Eko Rahmanto, Rachmat Juanda..... 102-112
- Wangurer Fishermen's Socio-economic After Moratorium Enforcement. (Case Study : Under 30 GT Fishermen in Wangurer District, Bitung City)**
Novie Wijaya, Khairul Jamil 113-118
- Organoleptic Hedonic Quality And Chemical Analysis On Sticks Seaweed *Kappaphycus Alvarezii* With Fortification Flour Rebon Shrimp (*Mysis Sp.*)**



Rita Marsuci Harmain, Faiza Dali, Winawanti Amrulla.....	119-130
The Physics And Chemical Characteristics Of Sausage Catfish Subtitution By Algae (<i>Kappaphycus Alvarezii</i>) Rieny Sulistijowati, Rita Harmain, Nur Hidayat Rauf.....	131-140
Propeller Shaft Bearing of Fishing Vessel Kaminton Tambunan	141-148
Development of Grouper Aquaculture with Community-Based Partnership - Fachrudin Zain Olilingo.....	149-153
Resistance Of The Three Species Of Seaweed (<i>Kappaphycus Alvarezii</i>, <i>Eucheuma Striatum</i>, And - <i>Eucheuma Denticulatum</i>) To The Extreme Salinity In Waters Of Tomini Bay Petrus Rani Pong Masak, Wiwin Kusuma Perdana Sari, and Nova F. Simatupang.....	154-159
Diversity And Density Of Macroinvertebrates (Order: Diptera) In Umbulrejo River, District Dampit Malang Miftahul Khair Kadim.....	160-166
Demersal Fish Caught In Lembeh Strait (Case Study : Vertical Hand Line) Heru Santoso, Khairul Jamil, Yuli Purwanto.....	167-172
Valuasi Nilai Ekonomi Perikanan Danau Limboto Provinsi Gorontalo Hasim.....	168-178
Analisis Ramah Lingkungan (<i>Environment Friendly</i>) Perikanan Cakalang (<i>Katsuwonuspelamislinneus</i>) Berkelanjutan Di Perairan Teluk Tomini Propinsi Gorontalo Syamsuddin, Achmar Mallawa, Yuniarti Koniyo.....	179-194
Partisipasi Masyarakat Pesisir Dalam Pengelolaan Danau Limboto Provinsi Gorontalo Beby S.D. Banteng	195-203
Adaptation and Mitigation against Rob Flood Based Socio-Economic Assessment in Coastal Communities Sriwulan Village, Sayung, Demak Nur Indah Septriani*, Suparjo Rasazli Carong, Falmuriati, Fitriawan Umar, Gigih Girriastowo.....	204-217
Studi Peran Perempuan Pesisir Dalam Menunjang Aktivitas Perikanan Di Desa Torosiaje Laut Kecamatan Popayato Kabupaten Pohuwato Sumrin, Abd. Hafidz Olli, Alfi Sahri Remi Baruadi.....	218-229
The analysis of production factors of catching yellowfin tuna (<i>thunnus albacares</i>) the small-scale in seram sea waters Haruna Dewi Shinta Achmad.....	230-236
The Use Of Plant Tembelekan (<i>Lantana Camara</i> Linn) Extract To Prevent Ice-Ice Disease And Trigger Growth Rate Of Seaweed <i>Kappaphycus Alvarezii</i> Rahmat Sofyan Patadjai , Indriyani Nur and Syamsul Kamri.....	237-250



Onboard Observation Of Deep Sea Trawl (Midwater Trawl) Operated In Okhotsk Sea-Russia <i>Aris Widagdo, Nyoman Suyasa, Danu Sudrajat, Eko Rahmanto, Rachmat Juanda</i>	251-258
Rendement and chemical composition alteration During processing of dried abalone <i>haliotis asinina</i> Maharani.....	259-269
Analysis Of Suitability And Carrying Capacity Of Marine Tourism At Bandengan Waters In Jepara District Citra Panigoro, Juliana.....	270-276
Biodiversity of Coral Fish in Bontang Waters, East Kalimantan Ristiana Eryati, Muchlis Efendi dan Irwan Ramadhan R	278-287
Heavy Metals Concentrations In Fish Cultivated In Floating Cage In Kutai Kartanegara <i>Ghitarina, Sulistyawati, Henny Pagoray, Abdunnur, Ahmad Rafii</i>	288-294



ORGANOLEPTIC HEDONIC QUALITY AND CHEMICAL ANALYSIS ON STICKS SEAWEED *Kappaphycus Alvarezii* WITH FORTIFICATION FLOUR REBON SHRIMP (*Mysis* sp.)

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ABSTRACT

Rebon shrimp (*Mysis* sp.) is one of the potential of fisheries in Gorontalo province which is on a lake Limboto. Rebon shrimp in the form of flour can be utilized through the fortification of processed products such as seaweed sticks *Kappaphycus alvarezii*. The research aimed to produce seaweed sticks with fortification rebon shrimp flour was selected based on the test organoleptic quality hedonic include texture, colour, aroma and flavor and chemical. This research was carried out in several stages that is the preparation stage and making flour shrimp and analysis. The organoleptic hedonic quality test using semi panelist and chemical using Indonesian National Standard (2006). The data organoleptic hedonic quality that was received will be analyzed used non-parametric statistical method if significantly different *Kruskal Wallis* tes followed by *multiple comparison*. The results showed that with the fortification of rebon shrimp flour 7.5% in the organoleptic quality of the panelists preferred hedonic value criteria organoleptic appearance intact, neat, clean, somewhat pale yellowish color value of 7.12, rebon shrimp and seaweed scent less value 7,40 , rebon shrimp and seaweed flavor less strong value of 8.40, and dried shrimp and crunchy texture of 8.32. Results of the chemical quality of the product seaweed sticks has a water content of 1.26%, ash content of 19.84%, 18.33% protein content, fat content of 36.40%, and 24.17% carbohydrate content.

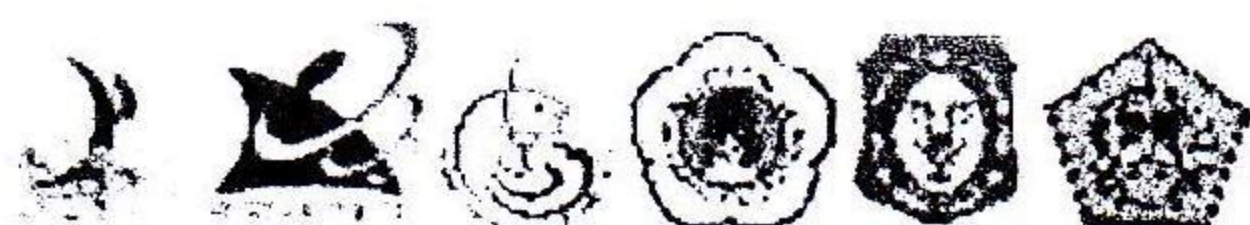
Keyword: seaweed sticks *K.alvarezii*, flour rebon shrimp *Mysis* sp, hedonic organoleptic quality, chemical quality

PRELIMINARY

Diversification of food that originates in the potential of marine fisheries is in addition to exploiting the potential of marine fisheries as well as the fulfillment of the consumption of animal protein. One of fishery potentials that need to be developed is a type of seaweed *Kappaphycus alvarezii* be one result of the diversification of food products fortified with fish non rebon (*Mysis* sp.) In the form of seaweed sticks *K.alvarezii*.

Utilization rebon on seaweed sticks *K.alvarezii* because rebon always available throughout the season, but is still lacking in diversification of non-processed fish products are generally confined as a flavor enhancer. Rebon generally marketed already experiencing the drying process. In addition to the availability of rebon throughout the season also supported by the availability of seaweed *K.alvarezii* which is one of the excellent potential non-fish fishery resources very rapidly cultivated in the area, especially in Gorontalo Province.

Seaweed *K.alvarezii* and flour rebon on the product stick can add nutritional value especially protein, fiber and minerals besides it can add a distinctive flavor to enhance the value of consumption on the stick product. Due



to the growing stick products is still dominated by raw materials are lacking in nutrients, especially animal protein, minerals and fiber are generally the most widely made extra flour or has a relatively high carbohydrate content.

Another alternative to further enrich the nutritional content of the product that sticks with the addition of seaweed and flour rebon so the need for nutrients, especially animal protein, minerals and fiber, especially during the growth and health care can be met.

According PERSAGI (2009) in Fitriyani et al (2013), the protein content owned rebon very high. At rebon fresh protein 16.2 g and in dried form, namely 59.4 g. In addition to the calcium content of 100 g dry rebon is 2,306 mg (16 times the calcium in cow's milk 100 g), phosphorus content is 625 g and the iron content is 21.4 g (8 times the iron content of 100 g beef), In addition Fitriyani et al (2013) suggested that rebon susceptible to decay if not handled properly and quickly processed. Therefore the use of rebon that has been processed through the drying process in powder form so it is easy to add to processed products and the products can last long. So based on that, the purpose of this study is to analyze the organoleptic quality of hedonic based on appearance, aroma, flavor, texture and chemical seaweed sticks *K. alvarezii* fortified flour rebon.

MATERIAL AND METHODS

The tools used for the manufacture of seaweed sticks *K. alvarezii* fortified flour rebon consisting of scales, pans, knives, cutting boards, mixers, sieve, mixer, blender, display devices, and stove. Material to be used is seaweed *K. alvarezii* in a dry form, rebon dry, sticky rice flour, eggs, butter, garlic, onion, flavorings, salt, coconut milk, vanilla, and cooking oil. Organoleptic test equipment that hedonic quality score sheet. Testing tools chemical that is oven, saucer porcelain, desiccator, thermometer, digital scales, forceps, furnaces, timer, hot plate, pipette, distilled water, filter paper, pumpkin destruction, stone boiling, hood, erlenmeyer, distillation steam, pipettes, glass measuring, concentrated H₂SO₄, HgO, H₂SO₄, NaOH, Na₂S₂O₃, H₂BO₃, indicator (a mixture of methyl red and methylene blue), and HCl. flask, soxhlet, measuring cups, petroleum ether.

Research procedure

Research procedure includes the stages of research and data analysis.

Research stages consist of:

1. Preparation of flour rebon (*Mysis sp.*)

Materials used are rebon fresh from the fish auction place (TPI) Gorontalo. Before the manufacture of products stick, first performed the manufacture of flour rebon based Suarnaya (2012). Drying was conducted at the Laboratory BPPMHP Gorontalo province. Flow rebon manufacture of flour can be seen in Figure 1.



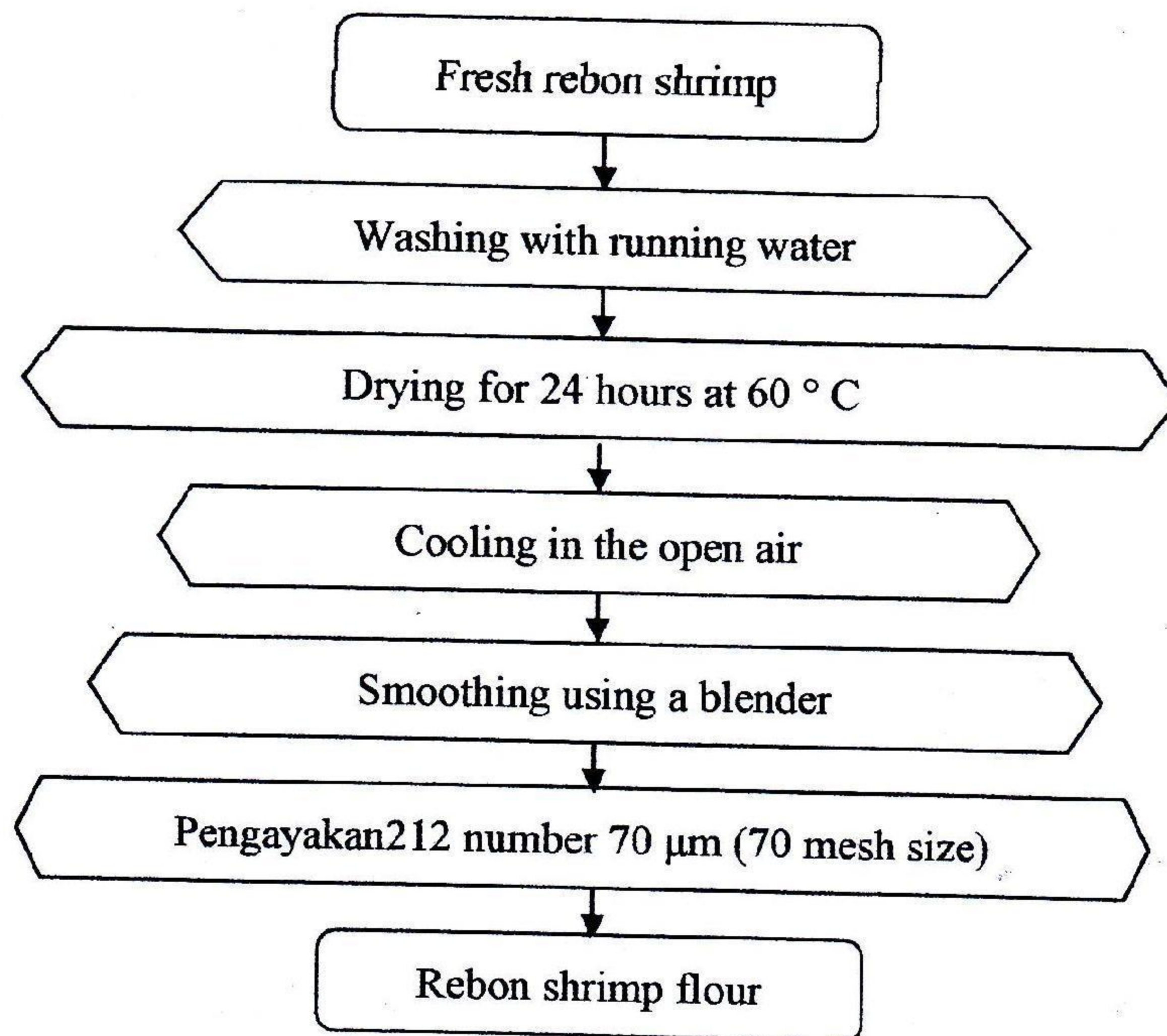


Figure 1. Flow diagram of the manufacture of flour rebon (Suarnaya (2012), which has been modified

2. Preparation of seaweed sticks with the addition of flour rebon (*Mysis sp.*) Is based on trial and error Formulation use of the material composition in the manufacture of flour rebon seaweed sticks *K.alvarezii* done by trial and error. Material composition *K.alvarezii* seaweed and spices used can be seen in Table 1.

1. The composition of seaweed and spices

Table Material Composition	Composition	Percentage
Seaweed <i>K.alvarezii</i>	19 g	10 %
Glutinous rice flour	100 g	47,84 %
Sugar	60 g	28,70 %
Egg	27 g	12,92 %
Coconut milk	0,87 g	0,42 %
Margarine	0,32 g	0,15 %
Garlic	0,77 g	0,37 %
Red Onion	0,77 g	0,37 %
Vanilla	0,32 g	0,15 %

Description: % concentration = Total material x number% concentration

Source: Dangkoa (2013), which has been modified



The procedure of making sticks for seaweed concentration *K.alvarezii* based on the best research conducted by Dangkoa (2013), while the concentration rebon flour were added in the manufacture of sticks is 5%, 7.5% and 10%. Grass pulping flow diagram is shown in Figure 2.

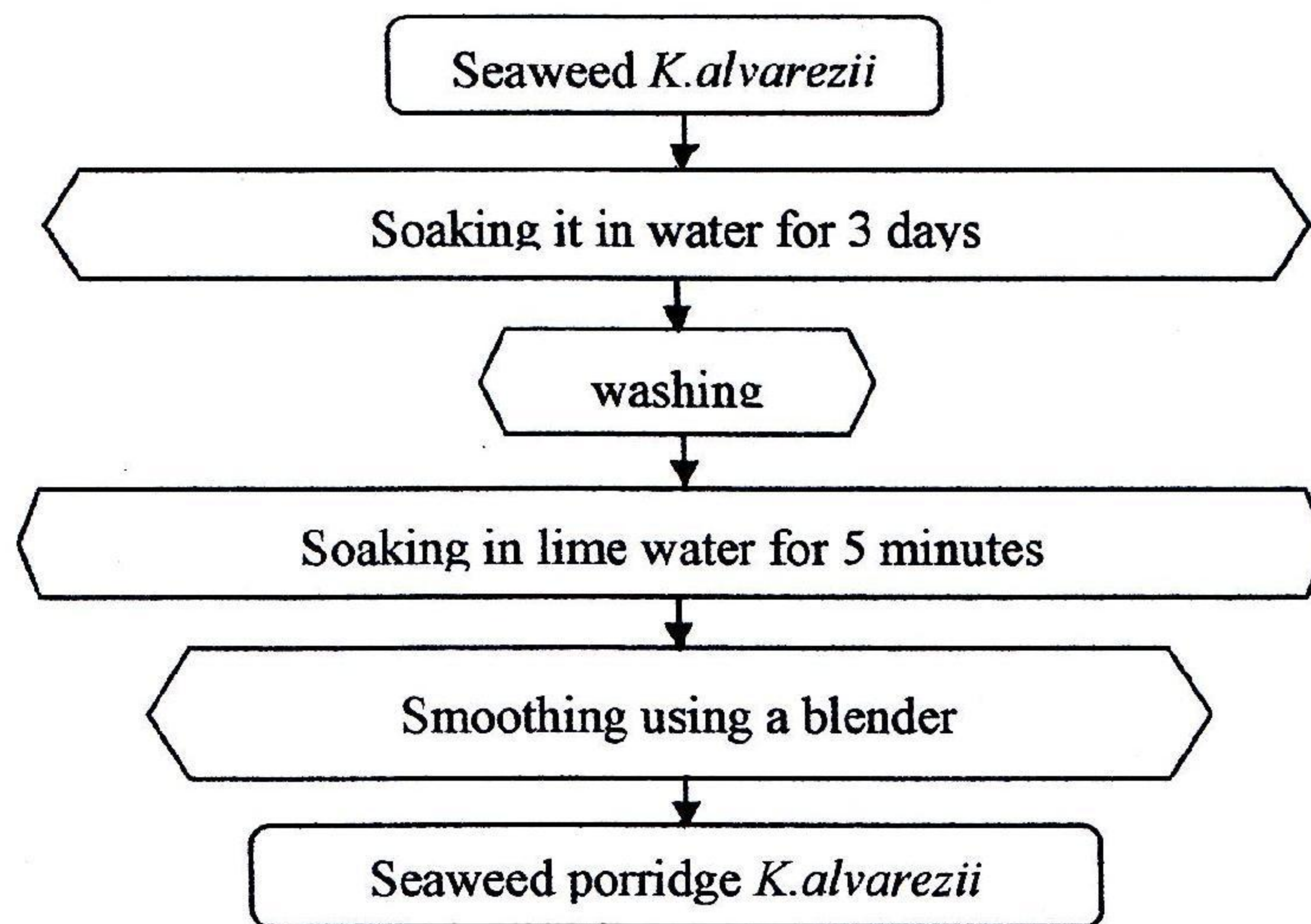
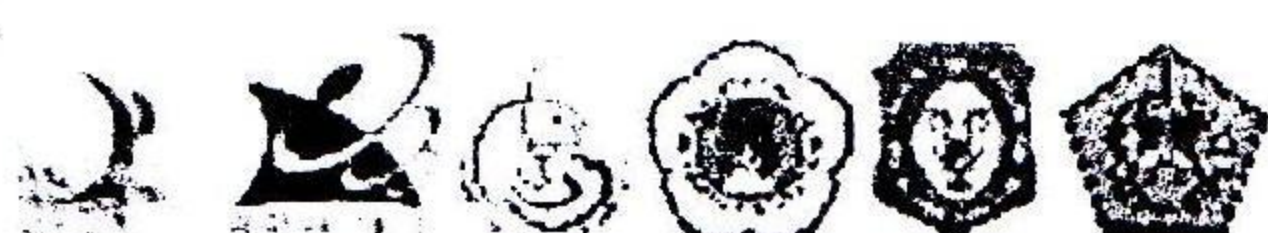
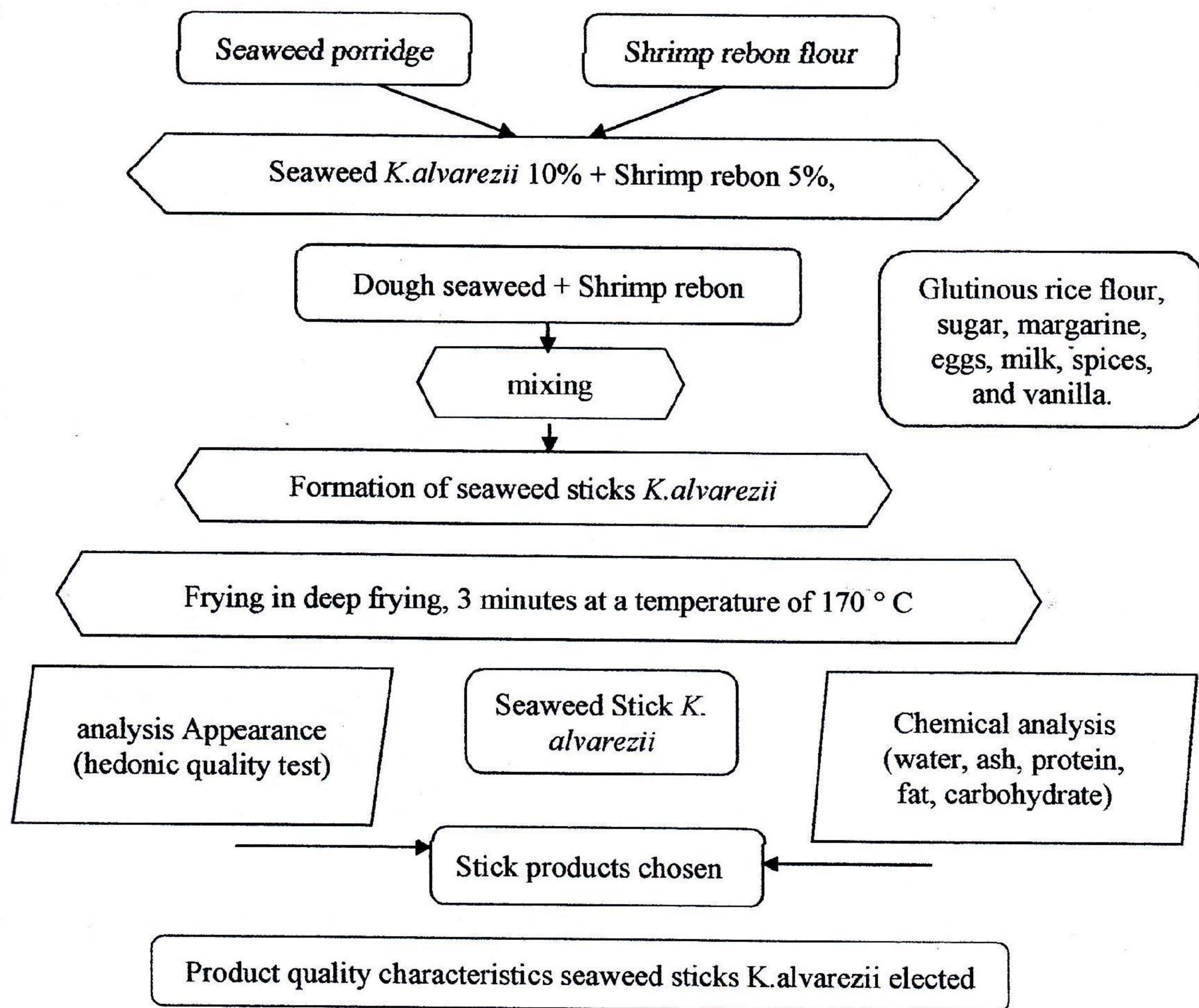


Figure 2. Flowchart of making porridge seaweed *K. alvarezii* (Dangkua, (2013))

Stick made consists of 3 formulations rebon concentration of 5%, 7.5%, and 10% and the concentration of seaweed used fixed at 10%. Seasoning mashed, whipped eggs and sugar using a mixer. Once mixed evenly with seasoning, put glutinous rice flour, vanilla, coconut milk, margarine and salt to taste and stir until blended. Once the dough is evenly mixed, then molded by using a printer, and fried at a temperature of 170o C for 3 minutes. Then analyzed organoleptic stick products, and products will be analyzed chemically. Chronology of the research process can be seen in Figure 3.





The data analysis consists of: Organoleptic analysis Quality hedonic

Hedonic quality organoleptic test parameters is the appearance, colour, texture, aroma and flavor. Hedonic quality scale used is worth 1-9, the number of panelist 30-36 semi-trained panelist and materials presented at random (BSN 2006). Sensory test results were analyzed by non-parametric statistics Kruskal-Wallis method. If the results obtained are significantly different to do further study using Multiple Comparison test or Duncan's test (Meilgaard et.al (1999).

Texture All observational data analysis and organoleptic values are tabulated and statistically processed using SPSS 16 software. Determination of selected products by using an index that interests Bayes methods. Bayes method is one technique used to analyze the decision making the best of a number of alternatives with the aim of producing an optimal acquisition or best results. Optimal decision making will be achieved when considering various criteria (Marimin, 2004).

Before analysis by Bayesian method, performed perangkingan on several parameters observed with interest the referenced index based on previous studies on snack products and according to experts. Based on



these sources, the interests of the selected criteria adapted to the type of research conducted. The characteristics and value of the interests of sticks of seaweed is added to the flour rebon seen in Table 2.

Table 2. Characteristics and value the importance of seaweed sticks *K. alvarezii* added flour rebon

Number	Parameters	Basic Parameters consideration	Value
1	Texture	- a good stick products is having a savory flavor and crunchy texture that is preferred by everyone (Suami, 2009). - Changes in the texture of the material can alter the taste and aroma that arises because it can affect the speed of the onset of stimulation to the cell receptor (Winarno, 1997).	5
2	Taste	Taste is a very important parameter in determining the level of consumer acceptance of food products (Erawaty, 2001). - Pain is one of the factors which determine consumer decisions to accept or reject a food product (Astawan et al., 2004).	5
3	appearance	One organoleptic seen by consumers as a whole, in general, consumers choose foods that have attractive appearance (Jusuf, 2011)	4
4	Color	Color is one of the factors that determine visual acceptance of a product (Winarno, 2008).	3
5	Aroma	Aroma determine the level panelists acceptance of a product. Typical aroma good or very influential on consumer tastes (Joseph, 2011).	2

Chemical analysis include water content, ash content, protein, fat and carbohydrates to follow procedures based on the Indonesian National Standard (BSN 2006).

RESULTS AND DISCUSSION

Determination of Selected Products Stick Flour *alvarezii* K. Seaweed Shrimp Rebon Determination of selected products from the three formulations seaweed sticks fortified flour rebon was analyzed with Bayesian method. Bayes methods used to produce the optimal decision to consider using various criteria (Marimin, 2004). Parameters that are considered important to the product *K. alvarezii* seaweed sticks with the addition rebon is the texture, flavor, appearance, color and aroma last. The analysis with Bayes method can be seen in Table 3.

Table 3. Results perankingan organoleptic value with Bayes method

Parameters	Sample		
	A (5%)	B (7,5%)	C (10%)
Texture	0,530	0,795	0,265
Taste	0,530	0,795	0,265
Color	0,615	0,410	0,205
Appearance	0,318	0,477	0,159
Aroma	0,106	0,318	0,212
Total Value	2,099	2,795	1,106
Ranking	2	1	3



Based on the results perangkingan organoleptic value of the fifth parameter assessment using Bayesian methods in Table 3, the product is chosen according to the results perangkingan formulation B, namely seaweed sticks with the addition of flour rebon 7.5%. Based on the results of the perangkingan can be said that sticks seaweed formulation B is selected products or sticks of seaweed *K. alvarezii* rebon most preferred by the panelists. Appearance Characteristics and Chemical Quality hedonic *Kappaphycus alvarezii* Seaweed Stick Flour Shrimp Rebon Selected The results of chemical analysis and organoleptic quality of seaweed sticks *K. alvarezii* rebon elected flour can be seen in Table 4.

Table 4. Results of chemical analysis and organoleptic quality of seaweed sticks *K. alvarezii* flour rebon

Criteria Testing Terms	Results	Quality Snacks extrudate (BSN, 2000)
organoleptic		
- appearance	intact, neat, clean, color rather pale yellowish	-
- Aroma	Aroma shrimp and grass sea less	normal
- Taste	Taste shrimp and grass less powerful sea	normal
- Texture	Dry, crisp	-
Water content	1.26%	-
ash	19.84%	Max 4%
The protein content	18.33%	-
fat content	36.40%	-
carbohydrate	24.17%	Max 38%

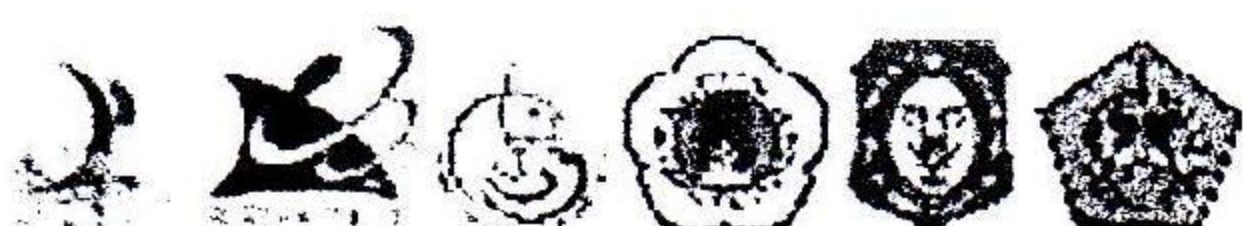
Organoleptic analysis of the results of the hedonic quality seaweed sticks *K. alvarezii* fortified flour rebon elected conducted to determine the quality of seaweed sticks chosen based on the criteria of appearance, aroma, flavor, and texture. The results of the analysis based on assessment of the panelists described as follows:

Appearance

Organoleptic analysis of the results of the hedonic quality seaweed sticks *K. alvarezii* fortified flour rebon obtained value of 7.12 with the criteria intact, neat, clean, somewhat pale yellowish color / somewhat dark. Rather pale yellowish color / somewhat dark due to the addition of flour rebon. Yellowish color due to the frying process. The tendency to form this color is caused by a group of proteins.

According Kusnandar (2011), the phenomenon of color change on food caused by compounds containing amine groups (amino acids, proteins, or other compounds that contain amine groups). This is consistent with the findings that protein in shrimp can affect the formation of color on seaweed sticks *K. alvarezii* fortified flour rebon.

Aroma



Organoleptic analysis of the results of the hedonic quality seaweed aroma *K.alvarezii* fortified flour rebon obtained value of 7.40. The appropriate range of values, criteria seaweed *K.alvarezii* fortified flour rebon that is slightly scented shrimp sticks. Shrimp scent is derived from flour rebon raw materials used in the manufacture of kelp seaweed sticks *K.alvarezii*. Aroma shrimp affect the taste of seaweed sticks.

According Astawan et al. (2004) taste very decisive difference in assessment of a food product. This is because the taste response by the senses of taste and flavor is an interaction between the aroma, taste and texture of food. According to Winarno (1997), the texture and consistency of the material will affect the flavor caused. Changes in the texture of the material can alter the taste and aroma that arises because it can affect the speed of the onset of stimulation of the receptor cells.

Flavor

Stick seaweed *K.alvarezii* fortified flour rebon analysis results for the taste value of 8.40 was obtained. The corresponding values can be said that the criteria seaweed sticks have a taste of shrimp and seaweed that is less strong. Results of research conducted by Dangkoa (2013), sticks seaweed without the addition rebon has a savory taste, the taste is influenced by the composition of the constituent ingredients in the formulation seaweed sticks.

Some components in the formulation which is considered as a contributor to the taste of seaweed sticks are margarine, coconut milk, garlic onion. Margarine and milk is a source of food containing vegetable fat, vegetable fat will help improve the taste of the product. Garlic and shallots is a component of the spice, which contains compounds that act alliin provide tasty and savory flavors in food. Winarno such statement (1997) that the taste is influenced by several factors: chemical, temperature, concentration and interaction with other flavor components. The onset of response is not the same for different flavors.

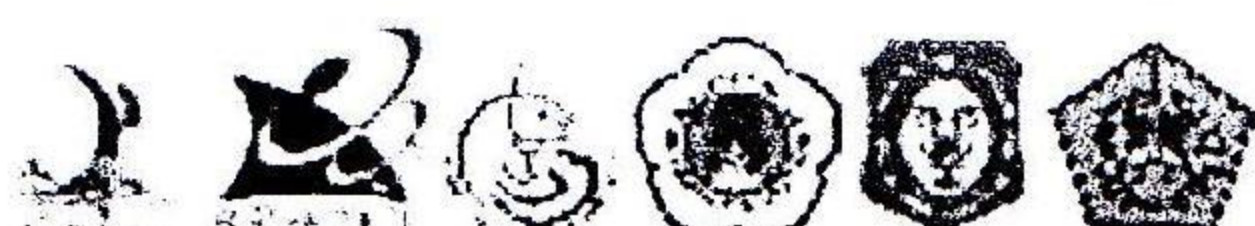
Texture

Results of the analysis of seaweed sticks *K.alvarezii* fortified flour rebon texture value of 8.32 was obtained. The corresponding values can be said that the stick has a dry and crunchy texture.

Texture of the crunchy seaweed sticks due to high carbohydrate content in seaweed sticks and also due to the moisture content slightly. Carbohydrate content is affected by the base material making up the stick and the seaweed and sticky rice flour. The composition of the carbohydrates that make the crispness of a product is amylopectin. Atmaja (2006) suggests that amylopectin role in the process of blooming, crisp and crunchy when frying. According Indriyani (2007), in shaping the texture of seaweed fortified products have the ability to bind high water with no assistance so that the heating will trap other components and form a matrix that makes the structure more compact sticks.

Chemical Characteristics of Seaweed Stick Flour Shrimp *Kappaphycus alvarezii* Rebon Selected

Water content



Results of the analysis of the water content of seaweed sticks *K.alvarezii* fortified flour rebon ie 1.26% while the restrictions set by BSN (2000) imposes limits snacks extrudate moisture content up to 4%. Based on these limits, the water content of seaweed sticks *K.alvarezii* fortified flour rebon meet the quality standards of the water content of snacks extrudate.

According Suprpti (2003), the measurement of water content is very important in the diet. Measurement and determination of moisture content aiming to determine the maximum limit or range of the amount of water content in the material. The water content of the sticks of seaweed derived from seaweed porridge water. After experiencing the process of kneading and frying, partially undergo evaporation of water content.

Fellows in Nendisa (2012) states that the water content of a food is very influenced by the treatment process. High and low water levels seaweed sticks rebon depend on the frying process. When the product stick frying, the water content in the sticks undergo evaporation due to heat frying oil. Adawyah, (2008) state that when frying starts, hot steam flows covering the surface of the material will increase the pressure of water vapor that caused the movement of water diffusion from the material to the surface, eventually after water reduced material water vapor pressure will decrease until there is a balance to surrounding air.

Results of research conducted by Dangkoa (2013) in particular sticks that use seaweed to 10% moisture content of 1.73%. The amount of water content is higher than the water content of seaweed sticks with the addition of flour rebon 7.5%. It is influenced by rebon added flour and stick to water holding capacity.

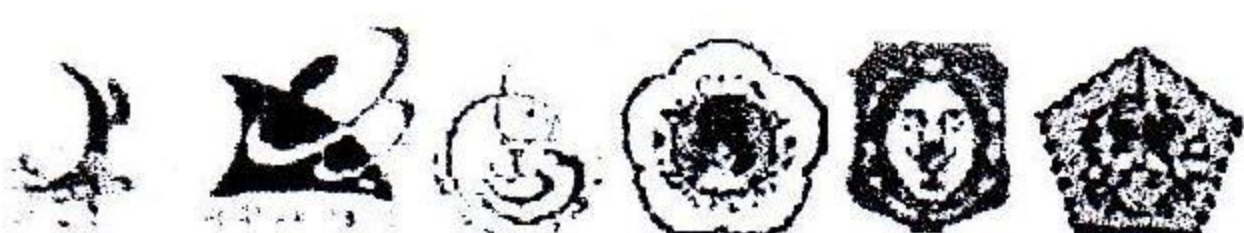
According Sipayung et al. (2014) the higher the use of soybean flour cookies then the water content will increase and the higher use of flour rebon cookies then the water content decreases. According Kusnandar (2011) water in food can be between cells, is trapped in the cell, or bound to a compound contained in the food. The degree of attachment of water will affect the role of water in a chemical reaction. The presence of water in food is expressed in the form of water content.

Abu levels

Results of the analysis show that the ash content of seaweed sticks *K.alvarezii* fortified flour rebon is 19.84%. The high value of the ash content of seaweed sticks *K. alvarezii* rebon derived from fresh seaweed ash content that is 22.25%, and flour rebon added.

Rebon flour drying at 60 °C and seaweed stick frying rebon at a temperature of 17 °C also lead to high value ash content on the stick, this is due to the increasing temperature drying and frying, the water content decreases as more and more residue left in the material. This is consistent statements and Saneto Susanto (1994) in Sipayung et al. (2014) that the water content of dried foodstuffs will decline and lead to a higher concentration of materials left behind one mineral.

Minerals are classified as inorganic nutrients called ash elements in food, because it turns out if food is burned, the organic element will disappear and organic matter (ash) remains consist of mineral Sipayung et al. (2014). Sudarmadji (1997), said that the components of the ash will easily decompose or evaporate even at elevated temperatures.



Protein levels

Results of the analysis showed that the protein content of seaweed sticks *K.alvarezii* fortified flour rebon is 18.33%. The addition of flour rebon in manufacturing seaweed sticks stick causes the protein composition becomes high. High levels of protein derived from wheat flour rebon because it contains protein as much as 59.40%.

Fat Content

Fat or oil is a very important food substances transform and maintain the body's immunity and resistance. Besides fat is a source of energy more effectively than carbohydrates and proteins. The fat content of seaweed sticks *K.alvarezii* fortified flour rebon is 36.40%. The fat content is lower than the quality requirements snacks extrudate is a maximum of 38%, so that the fat content in seaweed sticks *K. alvarezii* flour rebon meet quality standards snacks extrudate.

Research conducted by Dangkoa (2013) that the fat sticks of seaweed without the addition of flour rebon fat by 39.11%. The fat content higher than the fat content of seaweed sticks were added flour rebon. Dhanapal et al. (2012) in Sipayung et al. (2014) stated that the depreciation levels of fat in fish or shrimp that have undergone the process of drying is mainly caused by the loss of tissue fluid during the heating process.

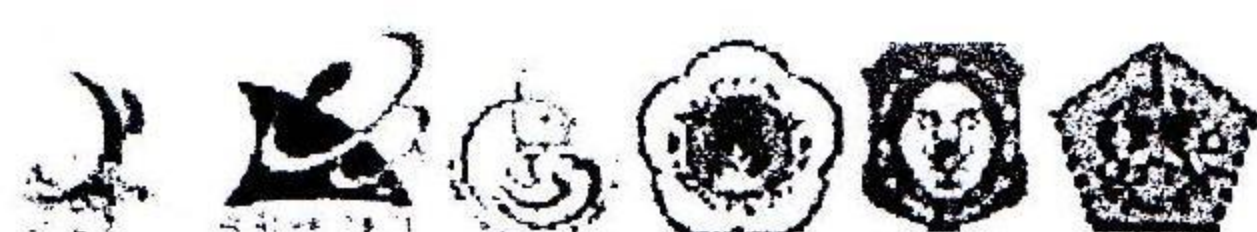
According to Gurr (1992), the heating will accelerate the movements of molecules of fat, so the distance between the fat molecules to be great and will facilitate the process of spending the fat. The process is influenced by the processing temperature and duration of heating.

Besides fat content derived from seaweed sticks *K.alvarezii* fortified flour rebon also derived from used cooking oil when frying. During the frying process, the oil goes into parts of the crust (the outer surface) and the outer layer (outer zone) so that it fills the empty space that was originally filled by water. Fat content also can improve the physical structure such as development, softness, texture, and aroma.

Carbohydrate levels

Results of the analysis of carbohydrate content of seaweed sticks *K.alvarezii* fortified flour rebon is 24.17%. The carbohydrate content is derived from seaweed used. Seaweed carbohydrate content based on research results Cahyani (2011) is as much as 33.30%, while the results Astawan (2009) in Sipayung (2014) reported that rebon flour contains only 3.20%. The use of seaweed in this study can increase the amount of carbohydrates in seaweed sticks *K.alvarezii* fortified flour rebon. The use of seaweed in the manufacture of sticks of seaweed *K. alvarezii* rebon effect on carbohydrate content of sticks.

Results of research conducted by Dangkoa (2013) reported that sticks seaweed without adding flour contains carbohydrates rebon by 56.52%. The higher carbohydrate content than the sticks of seaweed is added flour rebon. The use of flour rebon can reduce the carbohydrate composition of seaweed sticks, in contrast with only sticks made from seaweed. This condition is caused by a growing number of other components such as fat and protein as carbohydrates obtained from the reduction of the nutritional components, this leads to significant differences in carbohydrate.



CONCLUSION

Based on test results Obtained hedonic organoleptic quality of that product sticks seaweed *K.alvarezii* fortified flour rebon of 7.5% is a product of the selected formulations with organoleptic quality hedonic value The results Showed that with the fortification of flour shrimp rebon 7.5 % in the organoleptic quality of the panelists preferred hedonic value appearance intact organoleptic criteria, neat, clean, somewhat pale yellowish color value of 7.12, shrimp and seaweed scent rebon less value 7.40, rebon shrimp and seaweed flavor less strong value of 8:40, and dried shrimp and crunchy texture of 8:32.

Results of the chemical quality of the product of seaweed sticks has a water content of 1.26%, ash content of 19.84%, 18.33% protein content, fat content of 36.40%, and 24.17% carbohydrate content.

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