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Characterize Fatty Acid of *Babylonia spirata*, *Meretrix meretrix*, *Pholas dactylus*

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Abstract

Babylonia spirata, Meretrix meretrix, and Pholas dactylus are consumed shellfish that has not been optimally utilized, due the lack of information about nutritional content. This research was aimed to characterize the fatty acid in samples. Chemical compositions of samples were tested by thermogravimetric method, soxhlet method and kjeldahl method. The composition of fatty acid were tested by Gas Cromatography method. Moisture content, ash, fat, protein and carbohydrates consequtively B. spirata 78.44%, 1.20%, 0.33%, 17.38% and 2.65%; M. meretrix 79.98%, 1.37%, 0.11%, 9.39% and 9.02%; P. dactylus 83.78%, 1.19%, 0.11%, 11.37% and 3.55%. B. spirata, M. meretrix, and P. dactylus contains saturated fatty acid i.e lauric, myristic, palmitic and stearic. Monounsaturated fatty acid were oleic and palmitoleic, and polyunsaturated fatty acids were linoleic, linolenic, arachidonic, EPA and DHA. The highest content of lauric acid in the B. spirata was 0.55%. The highest content of myristic acid in P. dactylus was 1.05%, the highest of palmitic and stearic acid in P. dactylus were to 11.22% and 3.45% respectively. The highest content of oleic in P. dactylus was 3.81% and the highest palmitoleat acid found in M. meretrix i.e 2.5%. B. spirata has the highest linoleic acid i.e 0.95%. The highest content of linolenic acid found in P. dactylus i.e 0.16% and the highest arachidonic acid in B. spirata, was i.e 5.17%. The highest content of EPA and DHA found in M. meretrix were to 2.03% and 6.06% respectively.

Keywords

Babylonia Spirata, Chemical Compositions, Fatty Acids, *Meretrix meretrix*, *Pholas Dactylus*

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1. Introduction

Indonesian Fishery Resources has excellent potential to contribute to the fulfillment of public nutrition, both fisheries resources and aquaculture. The one commodity whose nutritional value is the oyster. Shellfish is a food that has a distinctive taste and delicious and much in demand by the public. Typical nutrient content in the shells one of which is an unsaturated fatty acid compound that Omega-3 EPA and DHA.

The potential for sustainable shellfish has not been much exploited, but the region is spreading widely because nearly all the marine waters of Indonesia overgrown coral reefs have various types of shellfish. Examples of shells are widely available in Indonesia is a tiger snail (*Babylonia spirata*), *Meretrix meretrix* and *Pholas dactylus* (The high potential for mussel group in Indonesia has not been matched with the optimum utilization due to lack of information on the nutrient content in the shells. Some groups still as catches shells aside. One of the results of research conducted by Kamiya *et al*. (2002) mentions that the tiger snails and shells out including the side catches landed in PPI Mundu Coastal.

Oyster allegedly contains fatty acids omega-3 and omega-6 are beneficial for brain development and for preventing heart disease. There are two types of omega-3 fatty acid is docosahexaenoic acid (DHA) and eiocosapentatonoic acid (EPA). Comparison of fatty acids omega-3 and omega-6 on snails are generally the same with the fish, which is 2: 1. Sea shells can be an alternative source of omega-3, omega-6 and

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omega-9 as well as a source of vitamin A, vitamin D, and minerals (Ozyurt et al. 2006). This study aims to determine the type and amount of fatty acids contained in tiger snails, clams and mussels out of snow.

2. Methods

2.1. Materials and Tools

The materials used in this study include *Babylonia spirata Babylonia spirata*, *Meretrix meretrix* and *Pholas dactylus*, solution of internal standard fatty acids, water, distilled water, methanol, n-hexane, NaCl, BF_3, K_2SO_4, H_2SO_4, NaOH, H_3BO_3, and HCl.

Tools used include electric stove, furnace ashing, pipettes, knives, plastic, analytical balance and digital scales, the cup porcelain, oven, desiccator, test tubes, glass erlenmeyer, tube kjeldahl, tube sokhlet, heating, distillation, burette, mortar, labels, filter paper and gas chromatography (gas chromatography) Hitachi GC 263-50.

2.2. Scope of Research

This research was conducted in two stages, the research phase 1 begins with a survey (sampling) raw material to the field to obtain information about the origin of the sample and how to arrest, followed by the determination of the size (length and weight) and yield *Babylonia spirata*, *Meretrix meretrix* and *Pholas dactylus*. Phase 2 study conducted proximate analysis, and analysis of fatty acids. Fatty acid analysis methods used have changed the principles of fatty acids into turunanya, namely methyl esters that can be detected by means of chromatography. Gas chromatography (GC) has a working principle of separation between gas and liquid a thin layer based on the different types of materials. Results of the analysis are recorded in a sheet that is connected to the recorder and shown through several peaks in the retention time specified in accorandce with the character of each fatty acid. Prior to injection of methyl ester, first fat is extracted from the material carried methylation to form methyl esters of fatty acids respectively obtained.

3. Results and Discussion

Characteristics conch *Babylonia spirata*, *Meretrix meretrix*, and *Pholas dactylus* The size and weight of the tiger snails, mussels and *Meretrix meretrix* the snow is presented in Table 1. Based on the results of measurements, obtained data on the size and weight of the tiger snails, clams and mussels snow out of several parameters: length, width, height and total weight. Tiger snails have an average length of 4.27 cm, average width of 2.87 cm, the average height of 1.94 cm and a total weight of an average of 16.65 g. Shellfish know have an average length of 4.26 cm, an average width of 3.60 cm, the average height of 1.89 cm and an average weight of 20.85 cm. Snow shells have an average length of 6.66 cm, an average width of 2.88 cm, the average height of 2.10 cm and an average weight of 17.95 g. According to Gluck et al. (1996) have shells of various weights, which is between 20-40 g. Also varies the length of 83-100 mm, 15-20 mm height, total width ranges from 33-47 mm shells.

Tabel 1. Size and weight Meretix meretrix, Pholac Dactylus, and Babylonia spirata.

Parameter	*Meretrix meretrix*	*Pholac Dactylus*	*Babylonia spirata*
Long(cm)	4.26±0.27	10.58±0.85	4.16±0.27
width (cm)	3.60±0.31	3.32±0.27	2.87±0.17
High (cm)	1.87±0.17	3.04±0.34	1.94±0.19
weight (g)	20.9±4.21	58.1±11.51	16.6±2.43

Yield is a most important parameter to determine the economic value and effectiveness of a product or material. The yield obtained from the three samples of shells, meat and offal are shown in Table 2. The scallops fresh tofu has the highest yield in the shell value that is equal to 67.44%, the yield of 14.38% meat and offal yield of 18.18%, Shellfish fresh snow has a high yield value at a shell that is equal to 60.64%, the yield of 15.48% meat and offal yield of 23.88%. Fresh tiger snail has the highest yield in the shell value that is equal to 67.03%, the yield of 21.81% meat and offal yield of 11.16%. According Haliloglu *et al*. (2004), mollusc shells generally yield 53-65%, 19-28% meat and liquid inside by 9-25%. The high value of the yield of the shell indicate the efficiency of a production process to produce a final product. According Okuzumi and Fujii (2000), there are some researchers who make flour from waste shell because the shell contains important minerals are calcium and phosphorus. The types of oyster, shrimp, oyster, squid insects and fungi are a source of chitin-chitosan.

Tabel 2. Rendement *Meretrx meretrix, Pholac Dactylus, and Babylonis spirata*.

Rendemen	*Meretrix meretrix* (%)	*Pholac dactylus* (%)	*Babylonia spirata* (%)
Meat	14.38	15.48	21.81
Offal	18.18	23.88	11.16
Shell	67.44	60.64	67.03

The chemical composition of mussel meat out, clams and snails snow leopard can be seen in Table 3. Water is an important component in food ingredients, since water can influence the appearance, texture and taste, even in very dry food, water contained in a number of certain. The percentage of water content of the snow clam meat that is 83.79% higher than the tiger snail shells out and that is 79.98% and 78.44%. According to Orban *et a*l. (2002), the water content in mussels (*Mytilus galloprovincialis*) ranged from 82.0% - 87.0%. The water content of the snow clam shells greater because the snow has a size and weight that is greater than to know and snail shells tiger.

Ash is inorganic substances waste products of combustion of an organic material. The percentage of ash content in shellfish flesh out, clams and snails snow leopard was 1.37%, 1.19% and 1.20%. According Karakoltsidis et al. (1995), ash content *Mytilus qalloprovinciallis* some molluscs are approximately 0.7 to 2.0% and about 1.0 to 1.6% *Ostra edulis*.

Tabel 3. Chemical compotion Meretrix meretrix, Pholac dactylus, and Babylonia spirata.

Jenis Gizi	*Meretrix meretrix* (%)	*Pholac dactylus* (%)	*Babylonia spirata* (%)
			78.44
Ash	1.37	1.19	120
Fat	0.24	0.11	0.33
Protein	9.39	11.37	17.38
Carbohydrate	9.02	3.55	2.65

Fat is a substance that is important and is a more effective source of energy for the body than carbohydrates and proteins. The analysis showed that the percentage of fat content in meat tiger snails, mussels and *Meretrix meretrix* the snow is 0.33%, 0.24% and 0.11%. This value is not much different from the test results clams fat content carried by Nurjanah *et al*. (1996) and Kamil et al. (1998), which is between 0.40% to 0.91%.

Protein is an essential nutrient for the body. Tiger snail meat has the highest protein value of 17.38% compared with the mussel meat out and *Pholas dactylus* by 9.39% and 11.37%. High levels of protein in the *Babylonia spirata* showed odds utilization as a source of animal protein. Both on the protein content of the tiger snails, clams and mussels know the snow is greater than the results of the study Nurjanah *et al*. (1999) regarding the protein content of blood clam that is equal to 7.96%. Differences in protein value is thought to be caused by age, food intake, metabolic rate and rate of movement.

Results of calculation by difference showed levels of carbohydrate found in shellfish flesh out 9.02%, the value is greater than carbohydrates clams and snails snow leopard sebasar 3.55% and 2.65%. Carbohydrates contained in fishery products do not contain fiber, mostly in the form of glycogen. Glycogen content contained in fisheries products amounted to 1% for fish, crustaceans and 1% to 1-8% for shellfish (Okuzumi and Fujii 2000).

4. Fatty Acid Composition of *Babylonia spirata, Meretrix meretrix*, and *Pholas dactylus*

The results showed that the fatty acids contained in *Babylonia spirata*, *Meretrix meretrix*, and *Pholas dactylus* consists of saturated fatty acids, namely lauric, myristic, palmitic and stearic acids monounsaturated fat, namely oleic and palmitoleic and unsaturated fatty acid compound, namely linoleic, linolenic, arachidonic, EPA and DHA.

The content of saturated fatty acids on the three samples can be seen in Figure 1. Saturated fatty acids are the most dominating in all three shells are palmitic and stearic. Palmitic and stearic the highest found in the shells of snow is equal to 11.22% and 3.45%. Research Supriyantini et al. (2007) show the results of the analysis of palmitic acid in shellfish blooded (Polymesoda Erosa) amounted to 13.89%. According to Osman et al. (2007), palmitic are saturated fatty acids most commonly found in food that is 15-50% of the total fatty acids are present.

The content of monounsaturated fatty acids is presented in Figure 2. Monounsaturated fatty acids in tiger snails, clams and mussels know the snow is dominated by oleic acid (C18: 1), which amounted to 3.81% on snow clams, 2.27% in *Meretrix meretrix* and 1.42% at *Babylonia spirata*. Research Supriyantini et al. (2007) showed that the results of the analysis of oleic acid in shellfish blooded (Polymesoda Erosa) is 5.42%. The average content of oleic at various shellfish is 25 mg / 100 g or 0,025%. Differences in the content of unsaturated fatty acids thought to be caused by differences in the composition of the type of fat consumed from the environment (Leblanc *et al*. 2008).

The content of polyunsaturated fatty acids are presented in Figure 3. conch tiger has the highest content of linoleic acid, which amounted to 0.95% compared with mussels and *Meretrix meretrix* the snow, the results of the analysis of both linoleic acid on tiger snails, clams and mussels out of snow, more small compared with the results Mursydin *et al*. (2007) regarding the content of linoleic acid sand crab (Emerita spp.) That is equal to 9.90%. Differences linoleic acid content can be caused by food availability, habitat and water temperature (Guderley et al. 2007). The content of linolenic acid (omega-3) is the highest found in the shells of snow, which amounted to 0.16%, the result is less than the research Supriyantini et al. (2007) regarding the content of linoleic acid blooded shells (Polymesoda Erosa) is 1.70%. Differences shells linolenic acid content suspected to be caused by the source of the food they consume. Phytoplankton are a food source shellfish and even phytoplankton itself a major biota in marine productivity processes relating to the nets and the pyramid in the sea (Supriyantini et al. 2007).

The highest content of EPA and DHA found in shellfish know that is equal to 2.03% and 6.06%. EPA and DHA content of mussel meat out, clams and snails snow leopard is still lower when compared to some species of fish and mollusks other groups. The content of EPA and DHA contained in the blade shells 7.35%, 8.67% Short necked clam and Oyster 10.89% (Okuzumi and Fujii 2000). EPA and DHA difference in value is due to the change of species, food availability, age and size of the shellfish. EPA is very important in the reproductive system, immune and nervous. EPA primary function is the production of prostaglandins to regulate the body's metabolism of heart rate, blood pressure, blood clotting, fertility, conception, improve immune function in the regulation of inflammation and encouraging the body to fight infection (Muchtadi *et al.* 1993).

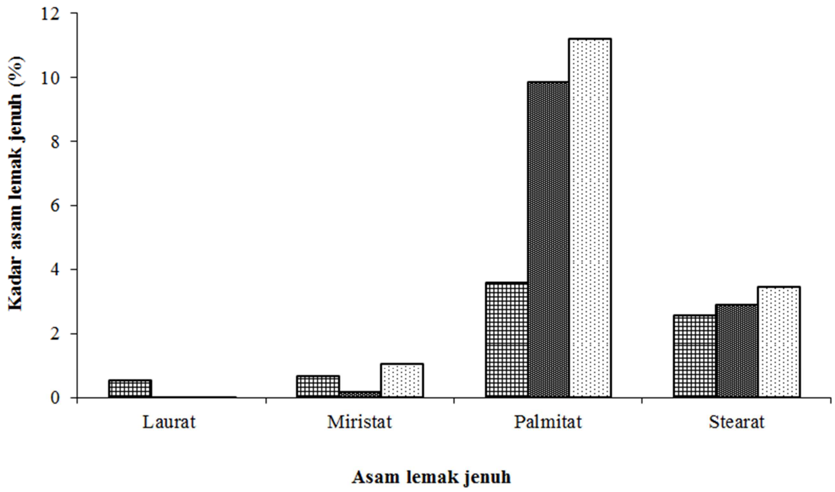

Figure 1. Result analysis saturated fatty acid (*Babylonia spirata*, *Meretirx meretrix*, and *Pholac dactylus*)

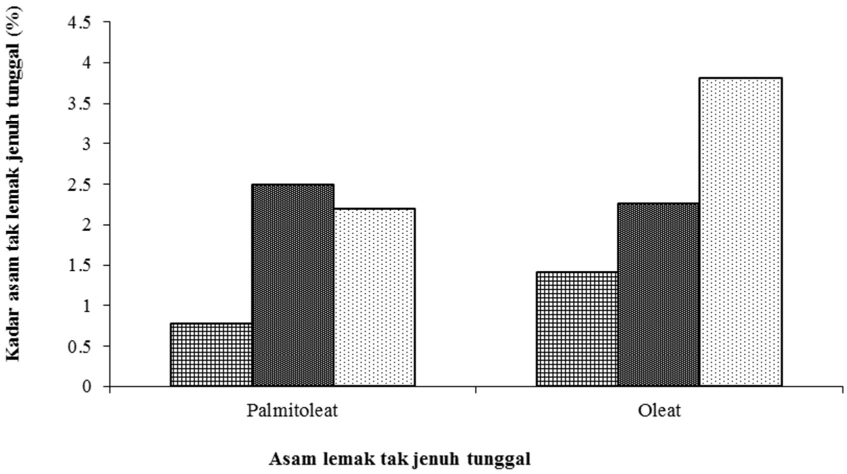

Figure 2. Result analysis Monounsaturated fatty acid babylonia spirata, meretrix meretrix and pholac dactylus)

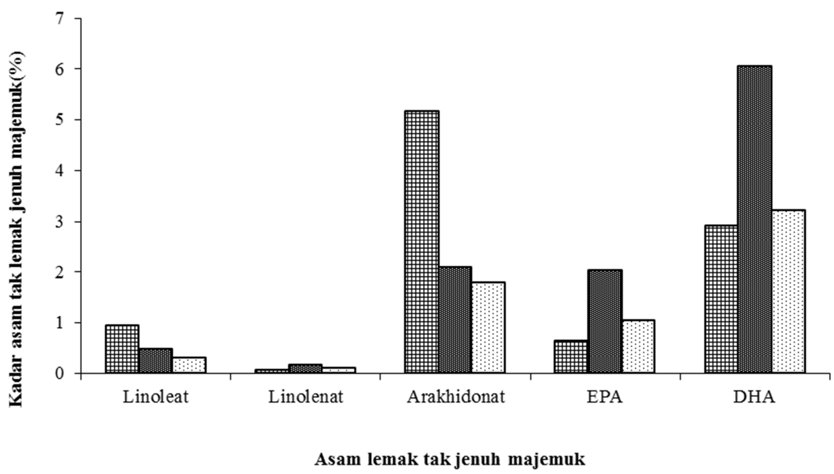

Figure 3. Result analysis Polyunsaturated fatty acid (*Babylonia spirata*, *Meretrix meretrix*, *Pholas dactylus*).

5. Conclusion

Fatty acids contained in *Babylonia spirata*, *Meretrix meretrix*, and *Pholas dactylus* consists of saturated fatty acids, namely lauric, myristic, palmitic and stearic acids monounsaturated fat, namely oleic and palmitoleic and unsaturated fatty acid compound, namely linoleic, linolenic, arachidonic, EPA and DHA. The composition of palmitic and oleic highest shells found in the snow, and the composition of the highest DHA found in shellfish know.

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