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Abstract. *Telebralia palutris*, *Cheritidea obtusa, Siliqua winteriana,* and *Polymesoda bengalensis* are the types of mollusks consumed by the local community in Merauke. The purpose of this study was to investigate water content, ash content, protein content, and fat content in mollusks from the coastal of Lampu Satu, Merauke. Chemical composition was analyzed in an organic chemistry laboratory, Department of Chemical Engineering, Politeknik Negeri Ujung Pandang, Makassar. Analysis of protein content used semi micro-Kjeldahl method, while analysis fat contents use soxhletase. The result of the study revealed that the highest content of water, 78.66% was *Telebralia palutris*, the highest content of ash, 28.13% was *Telebralia palutris*, and the highest content of fat, 14.53% was *Polymesoda bengalensis* and the high content of protein 42.01 was *Polymesoda bengalensis*. Based on the result, *Polymesoda bengalensis* could be a good animal protein and fat resource to complete protein necessity and fat beside meat and fish. These *Bivalvia* and *Gastropoda* from Mollusca phylum are potential and have economic value to be developed as a protein and fat resources in completing of needs for Indonesia society in general and Merauke in particular.

1. Introduction

Indonesia is a country that has vast territorial waters compared to the mainland, so it allows to have a very abundant fishery product as well. Marine biological resource diversity includes genetic diversity sometimes become an argument to describe how great marine wealth of Indonesia. Marine biological diversity will be used, based on a marine role as one of society livelihood resource.

Fish and shellfish are one of the primary animal protein resources and its existence is essential because of protein amount they provide with a high level of biological value [1]. Shellfish protein is considered to protein complete because it has a high level of amino acid. Besides that, shellfish is one source of fat-soluble and water-soluble vitamins which and the main source of minerals needed by the body.

The nutrient profiles of most animals, including fish and shellfish, vary both with and within species, location of harvest/source whether or wild or cultured, the season, environmental condition, age or sexual maturity, sex, feed (especially in aquacultured species, genetic makeup, mode of preparation/analysis, and other factors [2]. Generally, shellfish are rich in succinic acid, citric acid and glycolic acid that closely related to taste and gives calorie. Various kinds of biota are living in

mangrove ecosystems such as Lampu Satu and Payumb Coastal Merauke, that are fish, shrimp, mollusks, crab, and worm.

Various types of mollusks found along the coast of Lampu Satu and Payumb Coastal indicated that the species of the gastropod class are more numerous than the species of the bivalve class, as listed in table 1 [3].

Table 1. Species of Mollusks from The Coastal of Merauke

Class	Family	Species
Bivalve	Corbiculidae	*Polymesoda bengalensis*
		Polymesoda expansa
	Arcidae	*Anadara granosa*
	Solenidae	*Siliqua winteriana*
		Solen grandis
	Veneridae	*Meretrix lusoria*
Gastropod	Littorinidae	*Littorina scabra*
		Littorina undulata
	Muricidae	*Thais kieneri*
	Potamididae	*Cerithidea obtuse*
		Terebralia sulcata
		Terebralia palutris
		Cerithidea cingulate
		Telescopium telescopium
	Neritidae	*Nerita costata*
		Nerita veolacea
	Nassariidae	*Nassarius reeveanus*
		Nassarius semiculcatus
		Nassarius albus
		Nassarius venustus
		Nassarius siquijorensis
	Melampidae	*Cassidula angulifera*
	Fasciolariidae	*Pleuroploca trapezium*
	Pisaniidae	*Canthanus melanostomus*
	Costellarridae	*Vexillum plicarium*

Consumption of shellfish has been increasing until now. Among the popular ones and has been analyzed for the proximate content are *Anadara inflata, Meretri meretri* [4], *Anadara granosa* [5], *Mytilus viridis* [4],[6], *Solen spp* [7], *Anodanta woodiana* Lea. [8], *Pilsbryoconcha exilis* [9], and *Batissa violacea celebensis* Marten. [10].

Mollusks are found in mangrove ecosystem living on a substrate surface or in substrate and patch on mangrove *trees*, most mollusks living in the mangrove ecosystem are gastropods and bivalves species. Mangrove as a living habitat, shelter, spawn and food supplier that can support mollusks' living. The food resource comes from leaves, twigs of mangroves that fallen and rotting.

This preliminary research aimed to investigate water content, ash content, protein content, and fat content in *mollusks* from the coastal of Lampu Satu and Payumb Merauke as the protein source for the local community.

2. Methods

2.1. The Research Location
The sampling was collected in Lampu Satu and Payumb Coastal of Merauke. Analysis of the chemical *composition* was conducted in Chemical Engineering Laboratory of Politeknik Ujung Pandang, Makassar.

2.2. Tools and Materials
Tools used in this research were glass equipment commonly used in the laboratory, porcelain cup, petri dish, desiccator, exicator, soxhlet extraction tube in timble, and Kjeldahl flask. Material used are mollusks meat (gastropods and bivalves) sulfuric acid (H_2SO_4), hydrochloric acid (HCl) 0.1N, potassium sulfate (KSO_4), copper (II) sulfate pentahydrate ($CuSO_4.5H_2O$), sodium sulfate (Na_2SO_4) oxalic acid $(COOH)_2$, sodium hydroxide (NaOH), boric acid (H_3BO_3).

2.3. Procedures

2.3.1. Sampling. Samples were collected from Lampu Satu and Payumb Coastal, preserved with ice and added into coolbox before sent to Makassar

2.3.2. Sample preparation (analysis of fat content and protein content). Mollusks (gastropods and bivalves) are removed from its shell and washed. They were then dried under the sun. The Mollusks' meat was mashed with a blender.

2.3.3. Determining water content by heating method. The procedure started by weighing 10 g of wet sample or 2 g dry sample into a petri dish, which has known the weight. Heat in the oven with temperature 100°C-105°C for 3-5 hours. The sample was then removed and put it in exicator, and then weighed to obtain a constant weight. The amount water in the material is represented by the weight reduction. Thus, calculating weight reduction resulted in the water content.

2.3.4. Determining ash content. The procedure is weighing 2.0 g of sample in porcelain cup. The sample was then heated in the oven with temperature 700°C until it turns to white. The sample was removed and put it in exicator. With similar procedure it is possible to weigh and calculate the ash content.

2.3.5. The determination of fat content by Soxhlet Method. Weigh carefully 2.0 gr of fine dry sample (recommended passing 40 mesh). They were then put into soxhlet extraction tube in a thimble. Then, circulate cooling water through a water condenser. Install a soxhlet extraction tube with enough hexane for four hours. After the residue in the extraction tube was stirred, extraction continues for 2 hours more with the same solvent. Move the hexane solution which already contains fat extract and oil has into a clean weighing bottle and vapor the solvent using water bath until thick extract was produced. Dry the extract in the oven 100°C to get the constant weight. Residue weight in the bottle expressed as weight of fats and oil.

2.3.6. Determination of protein content (Semi-micro-Kjeldahl Method). Weigh 1.0 g dry sample and put into Kjeldahl 500 ml and add 20 ml H_2SO_4 (93-98% free N) and 5.0 gram the mixture of Na_2SO_4-$CuSO_4.5H_2O$ (9:1) as a catalyst. Boil it until getting a clear solution and continue boiling 30 minutes again. Add 140 ml distilled water to the cold solution, 100 ml NaOH 30% and some boiling stones. Do distillation for the solution, then put 100 ml of distillate in Erlenmeyer that contain 100 ml boric acid 20% and a few drops of mixed indicator. Titration was performed for the distillate with HCl 0,1 N solution. A blank solution was then made. Calculate the total of N or % protein in the sample. The equation to calculate the percentage of protein, as in equation (1).

$$P \quad C \quad = \frac{(m\ H\ \ S\ell \quad -D \quad)NH \quad x1\ .0 \quad x6.2}{m\ \ S\ell} x\ 100\% \qquad (1)$$

3. Results

The research was done by collecting the sample of mollusks phylum in Lampu Satu, and Payumb Costal Merauke, four type of mollusks are *Cerithidea obtusa, Terebralia palustris* from gastropod class *and Siliqua winteriane and Polymesoda bengalensis* from bivalve class. These four types of mollusks are included to organisms that can live in the muddy substrate. The four types of these mollusks are consumed by the local society, so presumably, there are nutrients content that useful for humans such as protein and fat. Figure1 shows the picture of the four types of mollusks.

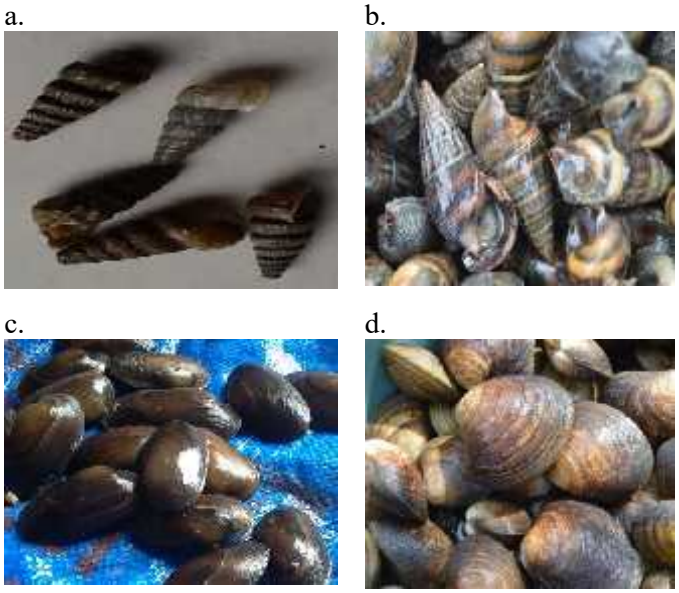

Figure 1. Species of mollusks; a. *Cerithidea obstusa,* b. *Terebralia palustris,* c. *Siliqua winteriana,* d. *Polymesoda bengalensis*

Nutrients content or chemical composition analyzed of the four type of mollusks which is obtained from Lampu Satu Coastal of Merauke include the content of water, the content of protein, and content of fat. Chemical composition the four mollusks analyzed is listed in table 2.

Table 2. Chemical Content of Mollusks from Coastal of Merauke.

No	Class	Species	Repetition	Water content of wet sample (%)	Water content of dry sample (%)	Ash content (%)	Fat Content (%)	Protein content (%)
1	Gastropod	*Cerithidea obtusa*	1	65.10	1.92	9.16	7.91	29.15
			2	65.21	1.97	9.29	7.89	29.08
			Mean	65.15	1.94	9.23	7.90	29.12
		Terebralia palustris	1	78.68	1.67	28.17	3.33	28.66
			2	78.63	1.59	28.08	3.29	28.69
			Mean	78.66	1.63	28.13	3.31	28.68
2	Bivalve	*Siliqua winteriana*	1	64.97	1.72	23.36	3.45	25.75
			2	64.95	1.79	23.40	3.41	27.80
			Mean	64.96	1.76	23,38	3.43	26.78
		Polimesoda bengalensis	1	76.58	11.16	8.16	14.55	41.99
			2	76.14	11.27	8.09	14.50	42.03
			Mean	76.36	11.22	8.13	14.53	42.01

3.1. Water content

The result of the wet sample showed the different water content of each species. For the gastropod class, the water content of *Terebralia palustris* is 78.66%, higher than water content of *Cheritidea obtusa* which is 65.15%, while in bivalve class the water content of *Polymesoda bengalensis* 76.36% was higher than the water content of *Siliqua winteriana.* Water content in mollusks tends to increase by increasing the size of its shell. When the size of the shell increases, the water content in the visceral mass of mollusks will increase too. It is estimated because of the eating habit of mollusks which is filter feeder. The food goes through the water circulation into the mantle cavity. It is suspected that the increase of the shell size will increase the mantle cavity so that water capacity will be increased accordingly [11].

3.2. Ash content

The result of ash content analyzing for the four types of the sample showed the difference of ash content for each species. For the gastropod class, the ash content of *Terebralia palustris* is 28.13% higher than *Cheritidea obtusa* 9.23%, while in bivalve class the ash content of *Siliqua winteriana* is 23.38%, higher than *Polymesoda bengalensis* is 8.13%. Ash content showed mineral content so it can be suspected that *Terebralia palustris* contained the highest mineral. Minerals have an important role in maintaining body function, both of the level of cells, tissues, organs, and body function at all [10].

3.3. Fat Content

The result of fat content analyzing showed the difference of fat content both of these mollusks class. In gastropod class, the fat level of *Cheritidea obtusa* is 7.90% higher than *Terebralia palustris* 3.31%. In bivalve class, the fat content of *Polymesoda bengalensis* 14.53% is higher than *Siliqua winteriana* 3.43%. This result showed that the species of *Polymesoda bengalensis* was enough good to be a source of animal protein. It indicates that local society consumes more this type of mollusk.

3.4. Protein Content

The result of protein content analyzing of sample mollusks showed that ash content in three type mollusks *Critidea obtusa, Terebralia palustris,* and *Siliqua winteriana* almost the same, namely 29.12%, 28.68%, and 26.78%. The highest protein content is *Polymesoda bengalensis* species 42.01%. This result showed that among the four species of these mollusks which is good for protein resource due to the highest protein content is *Polymesoda bengalensis* species. The protein content of this *P. bengalensis* from Coastal of Merauke is higher than others bivalve, i.e. marine clam *Gafrarium divaricatum* from Mumbai, West Coast of India (26.32%), *Donax cuneatus* from Cuddalore Coastal Waters, Southeast Coast of India (23.93%) [11-12].

Protein content in bivalve tends to increase by increasing of the size of its shell [13]. Gabbot (1983) in [14] and [15] revealed that the protein content in most bivalves is stored in gonad and the adductor muscle for the needs of gametogenesis. It can be suspected that the increasing shell size will increase the size of the adductor muscle, so the needs of protein will also be increased.

The protein content of *Polymesoda bengalensis* mollusks was potential as an alternative animal protein source. Animal protein has biological value are higher than vegetable protein because animal protein has a more complete amino acid. Protein from shellfish can be categorized as a complete protein, which has high essential amino acids. The amino acid can be classified into two main groups: essential and non-essential ones. The human body cannot produce essential amino acid, it should be obtained from food protein resource. Non-essential amino acid is one human body can produce.

Polymesoda bengalensis is one of shellfish which is often consumed by local society of Merauke. Its existence is quite abundant in Merauke especially in Lampu Satu Coastal making it as one of animal protein resource and good sources of fat to complete protein needs other than meat and fish.

4. Conclusion

The highest of the water content of the mollusks were *Terebralia palustris* (78.66%), the highest of ash content was *Terebralia palustris* (28.13%), the highest content of fat was *found in Polymesoda bengalensis* (14. 53%), and the highest protein content was *Polymesoda bengalensis* (42.01%). Overall, *Polymesoda bengalensis* is the most appropriate source of animal protein and good fat content to complete protein and fat needs other than meat and fish.

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