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Nutritional Contents of Lawar *Perinereis cf. cultrifera* (Grube 1840) from Wearlilir Waters Southeast Maluku District Indonesia

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Abstract: ***One marine food sources of economic value is Lawar Perinereis cultrifera that by coastal communities of Wearlilir village, known as the "S'u", a traditional food. Local food has the potential to be expanded in a variety of diversified the fishery products. Therefore analysis of Lawar nutrient content needs to be done. The research objective was to determine the nutrient content of Lawar in Wearlilir waters as raw material for fish pellets. Proximate analysis of Lawar used 1995 OAC method and composition of fatty acids by GC-MS. The Results proximate analysis obtained includes Lawar proximate when blooming in September that consisted of moisture, 13.06%, ash 12.45%, fat 10.55%, and 61.94% protein, and carbohydrates 2.0%, and Lawar proximate when not blooming consists of 20.01% moisture, 12.67% ash content, the fat content of 10.16%, 55.06% protein, 2.1% carbohydrates. Results of analysis of fatty acid composition consist of saturated fatty acids 0.62% strearat acid (C18: 0), 0.22% palmitic acid (C16: 0), cyclopentadecanone 0.14%, 0.06% 3-carboxamide and fatty acids unsaturated 0.23% arachidonic acid (C20: 4, n-6). 6-oktadekanoid 0.08% acid, 9-oktadekanoid acid 0.06%. There were 17 kinds of amino acids, the amino acid is the highest hydroxyprolin 22, 015 mg.***

Keywords: Lawar, nutrition, fish pellet, proximate

1. Introduction

The high biodiversity of Indonesian coastal and marine offers many opportunities to diversify the utilization of biological resources, both in terms of types of biota and kinds of usage. Fishery products that have become their own source of food and income sources in the country and exports, in the form of various types of fish and non-fish continuously sought in a massive scale. To avoid the immense pressure on the usage, we need to look and introduced the kinds of marine biota such as the types of marine worms from Polychaeta class and other invertebrate that has the potential as fishery commodity with high market potential value. One of the aquatic biological resources of Wearlilir is "Lawar" Perinereis cultrifera.

Lawar from Wearlilir waters experienced blooming in April, May, September to December, the highest biomass of Lawar (blooming) were in September with an average of 5921 g / 2dm3. No blooming period start from January to March and June to August [7].

One potential alternative material as feed additives is the earthworms because it contains high protein and complete amino acids. The chemical composition of earthworms Lumbricus rubellus flour was 65.63% protein content [2] as well as the amino acid proline approximately 15% of the total 62 amino acids [1], whereas the earthworm species L. Terestris containing 32.60% crude protein [4], earthworm flour Perionyx excavatus containing 57.2% crude protein and contains complete essential amino acids [17], with the provision of earthworm flour (TCT) as poultry feed proved to accelerate the growth of live weight, increase muscle tissue formation, and increase feed efficiency [3]. Antimicrobial activity was also reported there in earthworms. Earthworm *Eisenia foetida* has glikolipoprotein mixture of G-90 and having inhibition against Staphylococcus sp. higher than the antibiotic Gentamicin 10 mg and 20 mg Enrofloxacin.

P. cultrifera worm is used by the Langgur community as one of the popular traditional food for generations [10]. Until now this marine worm is used as the nutritious side dishes with a fairly complete composition of nutrients (Table I).

The worms are also sold to supplement the family income with an average price IDR 50,000/kg [6]. With the advantages, *P. cultrifera* worm has opportunities to be exploited and developed in order to meet the needs of human beings. For instance, it is used as a raw material for food and pharmaceutical industries such as supplement foods or fortified ingredients in food products [12].

Table 1: Nutritional Contents of P. Cultrifera Worm

Content		*Composition*
	Protein	13.5%
	Fat	0.11%
	Ash	2.40%
	Water	76.71%
	Ca	1814.45 ppm
	Fe	21.65 ppm
Essential amino acids	Histidine	0.34%
	Threonine	0.57%
	Tyrosine	0.34%
	Methionine	0.23%
	Valine	0.68%
	Phenylalanine	0.53%
	Isoleucine	0.62%
	Leucine	0.81%
	Lysine	0.77%
Unsaturated fatty acids	palmitoleate acid (C16: 1, n-7)	16 mg
	oleic acid (C18: 1 n-9)	56 mg
	linoleic acid (C18: 2, n-6)	15 mg

	alpha-linolenic acid (C18: 3, n-3)	14 mg
	11-eichosanoat acid (C20: 1, n-9)	14 mg
	arachidonic acid (C20: 4, n-6)	164 mg
	EPA (C20:5, n-3)	58 mg
	DHA (C22:6, n-3)	21 mg

Source: [12]

Marine worms Lawar Perinereis cultrifera also had high chemical composition especially protein 62%, this may allow for a complete amino acid composition that can be used as a source of fish feed. Amino acids are proteins, so the influence of heating process is expected to give effect to Lawar worm's amino acids quality as protein constituent of protein. Referring to the potential of Lawar, it is necessary to test the nutrient content of Lawar as a local food source that has an advantage in the field of fisheries so that it becomes a source of food that has high nutritional value. The purpose of this study was to determine the nutrient content of Lawar from Wearlilir waters as raw material of fish pellets.

2. Research Methods

2.1 The time and place of study

The study lasted from May to December 2014. The proximate analysis and Lawar sample preparation was done in the Basic Laboratory of Tual State Fisheries Polytechnic. Analysis of fats composition and amino acids was done in Bogor's Chemical Analysis Laboratory and the Center for Research Development and Fisheries Biotechnology, Jakarta.

2.2 Research materials and data

Materials used were Lawar, n-heksane, proximate analysis material and amino acids.

2.2.1 Data analysis

Data were analyzed descriptively in the form of tables and histograms

3. Results and Discussion

3.1 Lawar proximate

A large number of organisms require the provision of materials and energy derived from organic molecules that they consumed. Lawar (*Perinereis cultrifera*) as a typical local aquatic organisms in Wearlilir are consumed by humans, so it need to be tested to determine the chemical composition of nutrients or nutrients in the form of organic molecules that have been previously formed in the body Lawar. Therefore Lawar proximate analysis was done and the results as shown in Table 2 below:

Table 2. Lawar nutrient content based on the time of catchment

Nutritional Content (%)	PERIOD OF CATCHMENT						
	May*	July	August	September*	October*	November*	December*
Water	14,15	11,43	20,01	13,06	12,47	14,47	19,54
Ash	17,75	25,16	12,67	12,45	13,85	14,85	7,11
Fat	11,62	8,43	10,16	10,55	10,69	10,93	13,16
Protein	54,48	52,68	55,06	61,94	60,05	57,58	55,13
Carbohydrate	2,0	2,3	2,1	2,0	2,94	2,17	5,06

* Lawar *blooming* time [9]

Lawar the nutritional content varied, depending on food and environmental factors in which the worms live and regenerate. Based on the study of nutritional content of Lawar processed as food by [12], suggesting that 13.85% protein, 0.11% fat, 2.40% ash, water 76.71. These results when compared to the unprocessed (raw lawar) from Wearlilir dried by the sun showed that crude Lawar had lower water content, higher ash content, higher fat content and protein content was very high. The difference in nutritional content was due to loss of particular amino acid content during heating at 60^0C [13] so Lawar processed by heating at high temperatures resulted in low protein content. The high nutritional content of raw Lawar dried by the sun indicates that this type of local food in Wearlilir area has the potential to be developed as one of diversified food product with economic value. Lawar nutritional content in the period of blooming season was higher compared to the not-blooming period. This was presumably because at the period of blooming season, all individuals of Lawar who were on the surface of the waters bring mature gametes while on the not-blooming period, each individuals Lawar captured in June until August made up of young and mature individuals. This was as a result of upwelling where most marine fish and invertebrates produce microscopic larvae floating in the water column for several weeks or months depending on the species. Moreover, another effect of the upwelling process that lift nutrients utilized by perifiton to water surface, triggered the movement of young individuals into water surface. The *Geryonia Proboscidalis* species of Coelenterata phylum, class hydrozoans also suspected as a triggering factor of Lawar explosion in water surface in September [8]. Other trigering factors such as the physical and chemical of waters covering optimal temperature of 31 ° C, salinity 25 ‰, pH 8.3 [10]. In addition, the aquatic environment during blooming season supports reproductive activity also triggered the developments occurred in the egg and increase the quality of the eggs and have an impact on the nutritional content of Lawar.

3.2 Fatty acid composition

The fatty acid composition based on GC-MS obtaining the saturated fatty acids that include palmitic acid, stearic acid, unsaturated fatty and acids arachidonic acid (Figure 1 and Table 2). The results of analysis on fatty acid composition obtained were different to the results of research by [12]. This happened because Lawar used in previous studies was Lawar that has been processed, while in this study the Lawar used was the raw Lawar flour dried naturally in the sun. Table 2 shows the omega -3 acids, omega -6 and omega - 9

contained in Lawar dominated palmitic acid and fatty acid composition in Lawar by 62%.

Table 3: Fatty acid composition of lawar

No Peak	Retention Time (Minute)	Area ratio (%)	Alleged Compounds
1	6,668	98,36	-
2	9,155	0,2	Strearat
3	10,380	0,62	Palmitat
4	10,628	0,2	Arakidonat
9	2,105	0,06	3-carboxamide
10	27,510	0,06	9-oktadekanoid
11	28,254	0,14	cyclopentadecanone
12	29,118	0,08	6-oktadekanoid

Source: [13]

Essential fatty acids omega - 3 and omega - 6 are essential for the normal functioning of the body. Essential fatty acids obtained from outside sources mainly through food, because human body could not synthesize them. Omega-3 fatty acids is one of the nutrients that human body needs. Omega - 3 is a type of polyunsaturated fat, which is a nutrient for preventing disease. There are three types of fatty acids of Omega - 3, namely the ALA (alpha-linolenic acid), EPA (Eicosapentaenoic Acid) and DHA (Docosahexaenoic Acid). DHA and EPA are the main component of the fatty acid Omega - 3. This component is essential for human cell membranes. DHA is also important because it directly affects the function and brain development. DHA is beneficial to adults and children, especially in infancy. Omega fatty acids - 6 known as linolenic acid, is essential for heart health, growth and development of the body. Omega-9 is the unsaturated fat group that is commonly found in vegetable and animal fats. Omega-9 fatty acids produced by the body but also beneficial when found in food [16]. Based on the results obtained, Lawar flour in blooming season can be developed as main raw material in the manufacture of fish pellet.

3.3 Amino acid vomposition

Amino acid composition obtained, consist of essential amino acids and non-essential amino acids. Hydroxyprolin in an amounted of 22.015 mg was the biggest part obtained. L-4-hydroxyproline produced by hydroxylation in the 4-position of the L-proline pyrrolidine ring that was inserted into the polypeptide chain (protein) of the collagen molecules. The skin was rich in human peptidic collagen bound by L-hydroxyproline. Prolyl hydroxylase enzyme catalyzes it, consisting of ascorbic acid (vitamin C). In collagen the L – proline built was hydroxylation by the prolyl 4 - hydroxylase enzyme and with the participation of vitamin C to L - hydroxyproline. The hydroxyproline is required for the mechanical properties as structural protein. Hydroxyproline stabilizes the molecule cohesion of triple helix collagen through the awkward effect [5] .

Table 4: The mapping of *amino acid* of lawar worms

No	Content	Composition (mg/g sampel)
1	Alanine	0,890
2	Alpha Amino Butyric acid	0,746
3	Valine	0,096
4	Beta amino isobutyric acid	2,090
5	Threonine	0,088
6	Aspartic acids	0,913
7	Hydroxyproline	22,015
8	Glutamic acid	16,361
9	Phenylalanine	0,581
10	Alpha-aminoadipic acids	2,254
11	Ornithine	0,868
12	Lysine	0,959
13	Histidine	1,209
14	Tyrosine	0,993
15	Glysine	0,046
16	Serine	0,297
17	Methionine	0,068

Source: [14]

Amino acids needed for children's growth are histidine and arginine. The process of drying in the sun had a histidine content of 1,209 mg / g sample. Some amino acids contained in the Lawar worm were indispensable. Organisms such as phenylalanine was tyrosine beginners and both formed tyrosine and epinephrine, arginine, ornithine, citrulline, and played a role in the synthesis of urea in the liver. Glycine can be fused with toxic substances and produce non-toxic compounds then excreted. Glycine also plays a role in the synthetic porphyrin of hemoglobin and was also a constituent of glycolic acid. Histidine is important for histamine synthetic. Creatine is formed from arginine, glycine and methionine, with phosphate to form creatine phosphate, glutamine and asparagine which is reserve amino groups respectively generated by glutamic acid and aspartic acid [15]. All types of amino acids both essential and non-essential crucial for the growth and development of children was found available in full on Lawar at Wearlilir waters, Southeast Maluku.

4. Conclusion

Lawar nutritional composition consist of the highest content of proximate when blooming, that include water content of 6.72%, 6.87% ash content, the fat content of 14.41%, 61.94% protein, carbohydrates 10.06%. The highest saturated fatty acid composition was strearat acid (C18: 0) 0.62%, and unsaturated fatty acids 0.23% arachidonic acid (C20: 4, n-6). The highest amino acid composition was hydroxyprolin 16.61 mg /g sample. Lawar's high nutrient content, complete enough to make Lawar as a raw material in the manufacture of pellets to feed farmed fish.

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