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Analysis of the Proximate Composition of Bamboo Lobster (*Panulirus versicolor*) in Olilit Timur Village, South Tanimbar District, Tanimbar Islands Regency, Indonesia

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ABSTRACT

Bamboo lobster (*Panulirus versicolor*) is one of the crustacean species widely consumed by coastal communities in Olilit Timur Village, South Tanimbar District, Tanimbar Islands Regency, Indonesia. However, information regarding its nutritional composition remains limited among local communities. This study aimed to determine the proximate composition of bamboo lobster, including moisture, protein, ash, lipid, and carbohydrate contents. A descriptive research method was employed through laboratory analysis following the Association of Official Analytical Chemists (AOAC) procedures. The sample consisted of one bamboo lobster collected from the coastal waters of Olilit Timur Village and subsequently analyzed at the Basic Chemistry Laboratory, Universitas Pattimura. The results revealed that bamboo lobster contained 75.04463% moisture, 22.3515% protein, 1.5598% ash, 0.6739% lipid, and 0.7485% carbohydrates. These findings indicate that bamboo lobster has a relatively high protein content and low lipid content, suggesting its potential as a nutritious seafood source. Furthermore, its nutritional composition highlights the importance of bamboo lobster as a locally available marine food resource that may contribute to dietary protein intake among coastal communities. This study provides preliminary information on the nutritional characteristics of *P. versicolor* and may serve as a reference for further research on its nutritional value and potential food applications.

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INTRODUCTION

Indonesia stands as a leading global exporter of raw spices, a position that cements its importance in worldwide culinary and pharmaceutical networks. In South Sulawesi, specifically within the East Luwu Regency, Indonesia is an archipelagic country with abundant marine resources, including lobster fisheries, which represent an important commodity with high economic value. Lobsters belong to the crustacean group and are widely consumed due to their desirable meat characteristics and nutritional composition. Crustaceans are generally recognized as valuable sources of animal protein, with protein content ranging from approximately 10.8% to 23.5% and relatively low fat content of 0.3%–4.4% (Pires & Batista, 2023). In addition to protein, crustaceans contain essential minerals, including copper (Cu), zinc (Zn), and selenium (Se), which contribute to various physiological processes in the human body. These nutritional characteristics make lobster an important seafood resource for supporting food security and meeting dietary nutritional requirements. One of the lobster species distributed throughout tropical Indo-Pacific waters is the bamboo lobster (*Panulirus versicolor*), commonly known as the painted spiny lobster. This species is characterized by its distinctive body coloration and typically inhabits coral reef ecosystems, particularly crevices and rocky substrates in shallow marine waters. Bamboo lobster is an economically important species that is harvested for local consumption and commercial trade. Its distribution in Indonesian waters, including the Aru Islands and West Papua, demonstrates its potential as a valuable marine fisheries resource (Pane et al., 2021; Tirtadanu et al., 2022). Consequently, this species contributes not only to local food consumption but also to the livelihoods and economic activities of coastal communities.

Maluku Province is one of Indonesia's archipelagic regions with considerable marine fisheries potential, including various lobster species. Research conducted by Pane et al. (2021) in the Aru Islands waters identified *P. versicolor* as one of the lobster species harvested by local fishers. Their findings also indicated that the exploitation status of bamboo lobster had reached the fully exploited level, highlighting the importance of sustainable fisheries management. In addition to resource management, information regarding the nutritional quality of bamboo lobster is also essential to understanding its potential as a valuable seafood product and supporting its utilization as a local food resource. Nutritionally, lobster is considered a valuable source of animal protein that contributes to human dietary requirements. Protein plays an essential role in tissue growth and repair, enzyme and hormone production, and the maintenance of physiological functions. A study by Lalopua et al. (2022) on the amino acid profile and protein quality of fresh bamboo lobster reported a protein content of 15.8% and identified 15 amino acids, consisting of nine essential amino acids and six non-essential amino acids. These findings demonstrate that *P. versicolor* has considerable nutritional potential as a source of high-quality dietary protein. However, the nutritional composition of marine organisms may vary depending on several factors, including species, body size, physiological condition, habitat characteristics, food availability, and environmental conditions.

Proximate analysis is one of the most commonly used approaches for determining the chemical composition and nutritional characteristics of food products. This analysis generally includes five major components: moisture, protein, lipid, ash, and carbohydrates. Moisture content is an important parameter associated with food stability, quality, and susceptibility to deterioration during storage. Protein content indicates the availability of essential nutrients required for tissue development and repair. Lipids serve as an important energy source and contribute to various metabolic processes. Ash content represents the total mineral residue remaining after the combustion of organic matter, while carbohydrate content indicates the proportion of carbohydrates in the food material. In conventional proximate analysis, carbohydrate content is commonly determined by difference (*by difference*), calculated by subtracting the other measured components from 100% (AOAC INTERNATIONAL, 2019). The proximate composition of marine organisms is an important indicator for evaluating their nutritional quality and potential utilization as food resources. Differences in chemical composition among crustacean species indicate that nutritional characteristics may vary considerably depending on species-specific biological and environmental factors. Previous studies have reported variations in protein, lipid, moisture, and mineral contents among different crustacean species (Pires & Batista, 2023). Therefore, conducting proximate analysis on bamboo lobster collected from specific geographical locations is necessary to obtain baseline information regarding its nutritional composition and potential as a local marine food resource.

Olilit Timur Village, South Tanimbar District, Tanimbar Islands Regency, is a coastal area with considerable marine resource potential and fishing activities. Bamboo lobster (*P. versicolor*) is among the marine products harvested by local fishers and utilized both for household consumption and commercial

purposes. Despite its economic and nutritional importance, scientific information regarding the proximate composition of bamboo lobster from the waters of Olilit Timur Village remains limited. Previous studies on bamboo lobster in the Maluku region have primarily focused on biological characteristics, population parameters, exploitation status, and protein quality and amino acid profiles (Lalopua et al., 2022; Pane et al., 2021). Consequently, further investigation into its complete proximate composition is necessary to provide additional scientific information regarding the nutritional characteristics of this species, particularly in the Tanimbar Islands region. Based on this background, this study aimed to analyze the proximate composition of bamboo lobster (*Panulirus versicolor*) collected from the waters of Olilit Timur Village, South Tanimbar District, Tanimbar Islands Regency, Indonesia. The analysis included moisture, protein, ash, lipid, and carbohydrate contents. The findings are expected to provide preliminary scientific information regarding the nutritional characteristics of bamboo lobster and contribute to the understanding and development of locally available marine food resources in the Tanimbar Islands.

MATERIALS AND METHOD

This study employed a descriptive research design to determine the proximate composition of bamboo lobster (*Panulirus versicolor*). The research was conducted from November to December 2025. Sample collection was carried out in the coastal waters of Olilit Timur Village, South Tanimbar District, Tanimbar Islands Regency, Maluku Province, Indonesia, while laboratory analyses were performed at the Basic Chemistry Laboratory, Universitas Pattimura, Ambon, Indonesia. The research sample consisted of one bamboo lobster collected using a purposive sampling technique based on predetermined criteria, including commercial size, freshness, apparent health, and the absence of morphological abnormalities or physical damage. Following collection, the sample was carefully handled and transported to the laboratory to maintain its freshness and minimize changes in its chemical composition. The lobster was subsequently cleaned, and the edible meat was separated from the exoskeleton and other inedible parts. The edible portion was then prepared and homogenized before analysis.

Proximate composition analysis was conducted following the standard procedures of the Association of Official Analytical Chemists (AOAC INTERNATIONAL, 2019), including the determination of moisture, protein, lipid, ash, and carbohydrate contents. Moisture content was determined using the oven-drying method by drying a known weight of the sample at a specified temperature until a constant weight was achieved. Protein content was analyzed using the Kjeldahl method, which involved digestion, distillation, and titration to determine total nitrogen, followed by conversion into crude protein using an appropriate nitrogen-to-protein conversion factor. Lipid content was determined using the Soxhlet extraction method with an appropriate organic solvent to extract fat from the sample. Ash content was measured using the gravimetric method through dry ashing in a muffle furnace until a constant weight was obtained. Carbohydrate content was determined using the difference method (*by difference*), calculated by subtracting the percentages of moisture, protein, lipid, and ash from 100%. The carbohydrate content was calculated using the following equation: Carbohydrate (%) = 100 − [Moisture (%) + Protein (%) + Lipid (%) + Ash (%)]. All analytical results were expressed as percentages (%). The data obtained were analyzed descriptively to characterize the proximate composition and nutritional potential of bamboo lobster (*P. versicolor*) as a marine food resource.

RESULTS AND DISCUSSION

Proximate Composition of Bamboo Lobster (*Panulirus versicolor*)

The results of the proximate analysis of bamboo lobster (*Panulirus versicolor*) revealed variations in the nutritional composition of the analyzed sample. Moisture content was the highest component, accounting for 75.04463%, followed by protein at 22.3515%, ash at 1.5598%, carbohydrates at 0.7485%, and lipid at 0.6739%. These findings indicate that the analyzed bamboo lobster sample was characterized by a high moisture content, relatively high protein content, and low lipid and carbohydrate contents. The proximate composition is presented in **Table 1**.

Table 1. Proximate composition of bamboo lobster (*Panulirus versicolor*)

Proximate components	Content (%)
Moisture	75.04463
Protein	22.3515
Ash	1.5598
Carbohydrate	0.7485
Lipid	0.6739

Moisture was the predominant component of bamboo lobster, accounting for 75.04463% of the total sample weight. This finding is consistent with the general characteristics of marine crustaceans, which typically contain relatively high moisture levels in their edible muscle tissues. Pires and Batista (2023) reported that the nutritional composition of crustaceans varies among species, with muscle moisture and other proximate components contributing substantially to their overall nutritional characteristics. Similarly, Kommuri et al. (2021) reported a moisture content of approximately 76.2% in *P. versicolor* collected from the Visakhapatnam coast of India. This value is relatively close to the moisture content obtained in the present study. The relatively high moisture content is associated with the water composition of fresh marine animal tissues and contributes to the characteristic texture of lobster meat. However, high moisture content may also increase susceptibility to microbial deterioration and biochemical changes during storage, potentially reducing product shelf life. Therefore, proper post-harvest handling, refrigeration, and preservation techniques are essential to maintaining the freshness and quality of bamboo lobster (Kampouris et al., 2021).

Protein was the second most abundant component, with a concentration of 22.3515%. This relatively high protein content indicates that bamboo lobster has considerable potential as a source of animal protein. Protein plays essential roles in tissue growth and repair, enzyme synthesis, hormone production, and the maintenance of various physiological functions. Pires and Batista (2023) reported that crustacean muscle generally contains approximately 10.8–23.5% protein, indicating that the protein content obtained in this study falls within the reported range for crustaceans. Furthermore, Lalopua et al. (2022) reported a protein content of 15.8% in fresh *P. versicolor* meat and identified 15 amino acids, consisting of nine essential and six non-essential amino acids. The protein concentration observed in the present study was higher than that reported by Lalopua et al. (2022). Such differences may be associated with variations in sampling conditions, biological characteristics, sample preparation, and analytical procedures. Nevertheless, the findings support the nutritional potential of bamboo lobster as a protein-rich marine food resource.

The ash content of bamboo lobster was 1.5598%, indicating the presence of inorganic mineral components in the analyzed sample. Ash represents the total inorganic residue remaining after the organic components of a food material have been incinerated under controlled conditions. In marine organisms, this mineral fraction may contain calcium, phosphorus, magnesium, potassium, sodium, iron, and other essential elements. These minerals contribute to various physiological processes, including bone formation, electrolyte regulation, muscle contraction, and metabolic activities. Kommuri et al. (2021) also reported measurable ash content in *P. versicolor* and other commercially important spiny lobster species, supporting the presence of mineral components in lobster muscle tissue. Pires and Batista (2023) further emphasized that crustaceans can serve as valuable dietary sources of essential minerals, particularly copper, zinc, and selenium. However, total ash content alone cannot identify the concentrations of individual minerals. Therefore, further mineral-specific analysis is required to determine the detailed mineral composition of bamboo lobster.

Carbohydrate content was reported at 0.7485%, representing a relatively small proportion of the proximate composition. This finding is consistent with the general nutritional characteristics of animal-derived foods, particularly marine crustaceans, in which protein and lipid are the major organic macronutrients, whereas carbohydrates generally occur in smaller proportions. Kampouris et al. (2021) demonstrated that the proximate composition of marine crustaceans varies among species, reflecting differences in their biological and nutritional characteristics. In crustaceans, carbohydrates may occur as glycogen and other carbohydrate-containing compounds that contribute to energy metabolism and physiological functions. The relatively low carbohydrate content observed in the present sample suggests that carbohydrates are not a major component of the edible tissue of bamboo lobster. Nevertheless, the interpretation of this result should consider the

analytical method used, particularly when carbohydrate content is estimated using the difference method (*by difference*).

Lipid content was the lowest among the analyzed proximate components, accounting for 0.6739%. This finding indicates that the analyzed bamboo lobster sample contained a relatively low proportion of total lipids. Pires and Batista (2023) reported that crustacean muscle generally contains approximately 0.3–4.4% fat, suggesting that the lipid content obtained in this study falls within the reported range. A similar nutritional characteristic has also been described in other marine crustaceans, where lipid concentrations are generally lower than protein and moisture contents (Kampouris et al., 2021). Although the total lipid content was relatively low, lipids remain important components of marine animal tissues because they function as energy reserves, contribute to cellular membrane structure, and facilitate the absorption of fat-soluble vitamins. Furthermore, crustacean lipids may contain essential fatty acids, including omega-3 and omega-6 fatty acids, which are important for human health. Therefore, additional fatty acid profiling would be necessary to provide a more comprehensive assessment of the nutritional quality of bamboo lobster lipids.

Overall, the proximate composition of bamboo lobster (*P. versicolor*) indicates that the analyzed sample is characterized by high moisture content, relatively high protein content, and low lipid and carbohydrate contents. The protein concentration of 22.3515% highlights its potential as a valuable source of animal protein, while its relatively low lipid content suggests that it may be considered a low-fat seafood option. These findings provide preliminary information regarding the nutritional characteristics of bamboo lobster harvested from the waters of Olilit Timur Village, Tanimbar Islands Regency. However, because this study was based on a single specimen, the results should be interpreted as the proximate composition of the analyzed sample rather than a representative nutritional profile of the entire bamboo lobster population in the region.

CONCLUSION

Based on the results of the proximate analysis, bamboo lobster (*Panulirus versicolor*) collected from the waters of Olilit Timur Village, South Tanimbar District, Tanimbar Islands Regency, Indonesia, exhibited variations in nutritional composition. Moisture was the predominant component, accounting for 75.0446%, followed by protein (22.3515%), ash (1.5598%), carbohydrates (0.7485%), and lipid (0.6739%). The relatively high moisture content indicates that bamboo lobster is a fresh seafood product with a substantial water fraction, while its protein content demonstrates its potential as a valuable source of animal protein. The ash content reflects the presence of inorganic mineral components, whereas the relatively low carbohydrate and lipid contents indicate that these components constitute only a small proportion of the analyzed sample. In particular, the low lipid content suggests that bamboo lobster has potential as a low-fat seafood source. Overall, the findings provide preliminary information on the nutritional characteristics of *P. versicolor* and highlight its potential as a nutritious marine food resource for coastal communities. Further studies involving a larger number of specimens, biological replicates, and detailed mineral and fatty acid analyses are recommended to obtain a more comprehensive understanding of its nutritional quality.

AUTHORS CONTRIBUTION

Fenyapwain, R.N., Tuaputty, H., Lamerkaber, J.S.A & Wael, S. conceptualized the study, performed the experiments, analyzed the data, and drafted the manuscript, revised the manuscript.

CONFLICT OF INTEREST

The authors definitively declare that there are no financial, personal, or professional conflicts of interest associated with this research.

REFERENCES

Anshar, Rakfid, A., Mosriula, Samsibar, Karyawati, & Sabara, A. (2023). The enlargement of painted spiny lobster (*Panulirus versicolor*) uses different feed ingredients. *Akuatikisle: Jurnal Akuakultur, Pesisir dan Pulau-Pulau Kecil, 7*(2), 145–149. https://doi.org/10.29239/j.akuatikisle.7.2.145-149

Arumugam, A., Dineshkumar, R., Rasheeq, A. A., Prabakaran, G., Sampathkumar, P., & Murugan, S. (2020). Biochemical profile of spiny lobsters *P. homarus* and *P. ornatus*. *Agricultural Science Digest, 40*(4), 411–417. https://doi.org/10.18805/ag.D-5091

Barrento, S., Marques, A., Teixeira, B., Vaz-Pires, P., & Nunes, M. L. (2009). Nutritional quality of the edible tissues of European lobster *Homarus gammarus* and American lobster *Homarus americanus*. *Journal of Agricultural and Food Chemistry, 57*(9), 3645–3652. https://doi.org/10.1021/jf900237g

Francis, D. S., Salmon, M. L., Kenway, M. J., & Hall, M. R. (2014). Palinurid lobster aquaculture: Nutritional progress and considerations for successful larval rearing. *Reviews in Aquaculture, 6*(3), 180–203. https://doi.org/10.1111/raq.12040

Haryono, F. E. D., Hutabarat, S., Hutabarat, J., & Ambariyanto. (2015). Nutritional value of spiny lobsters (*Panulirus* sp.) from Southern Coast of Java. In F. Iskandar, Hadiyanto, A. Budiman, H. Nur, & S. Ismadji (Eds.), *International Conference of Chemical and Material Engineering, ICCME 2015: Green Technology for Sustainable Chemical Products and Processes* (AIP Conference Proceedings, Vol. 1699, Article 030016). American Institute of Physics. https://doi.org/10.1063/1.4938301

Jacoeb, A. M., Nurjanah, & Lingga, L. A. B. (2012). Karakteristik protein dan asam amino daging rajungan (*Portunus pelagicus*) akibat pengukusan. *Jurnal Pengolahan Hasil Perikanan Indonesia, 15*(2). https://doi.org/10.17844/jphpi.v15i2.6207

Kampouris, T. E., Asimaki, A., Klaoudatos, D., Exadactylos, A., Karapanagiotidis, I. T., & Batjakas, I. E. (2021). Nutritional quality of the European spiny lobster *Palinurus elephas* (J.C. Fabricius, 1787) (Achelata, Palinuridae) and the non-indigenous northern brown shrimp *Penaeus aztecus* Ives, 1891 (Dendrobranchiata, Penaeidae). *Foods, 10*(10), 2480. https://doi.org/10.3390/foods10102480

Kommuri, P. K., Mugada, N., & Kondamudi, R. B. (2021). Proximate analysis and mineral composition of commercially important spiny lobsters from Visakhapatnam coast, Andhra Pradesh, India. *Asian Journal of Fisheries and Aquatic Research, 14*(2), 39–47. https://doi.org/10.9734/ajfar/2021/v14i230294

Lalopua, V. M. N., Silaban, B. br., Gaspersz, F. F., & Labobar, S. (2022). Profil asam amino dan kualitas protein lobster bambu (*Panulirus versicolor*) segar. *INASUA: Jurnal Teknologi Hasil Perikanan, 2*(1), 22–28. https://doi.org/10.30598/jinasua.2022.2.1.121

Lourenço, H. M., Anacleto, P., Afonso, C., Martins, M. F., Carvalho, M. L., Lino, A. R., & Nunes, M. L. (2010). Chemical characterisation of *Nephrops norvegicus* from Portuguese coast. *Journal of the Science of Food and Agriculture, 90*. https://doi.org/10.1002/jsfa.3754

Moruf, R. O., Afolayan, O. A., Taiwo, M. A., & Ogunbambo, M. M. (2021). Estimation of nutritional energy values, mineral ratio and mineral safety index in the Royal spiny lobster, *Panulirus regius* (De Brito Capello, 1864). *Croatian Journal of Food Science and Technology, 13*(1), 105–110. https://doi.org/10.17508/CJFST.2021.13.1.13

Nankervis, L., & Jones, C. (2022). Recent advances and future directions in practical diet formulation and adoption in tropical Palinurid lobster aquaculture. *Reviews in Aquaculture, 14*(4), 1830–1842. https://doi.org/10.1111/raq.12675

Özden, Ö., & Erkan, N. (2011). A preliminary study of amino acid and mineral profiles of important and estimable 21 seafood species. *British Food Journal, 113*(4), 457–469. https://doi.org/10.1108/00070701111123943

Samiee, K., Rustaiyan, A., & Keshavarz, F. (2017). Omega-3, 6 and 9 fatty acids composition and lipid content from liver and muscle tissues of spiny lobster (*Panulirus homarus*) in the Persian Gulf. *Journal of Food and Nutrition Research, 5*(1), 27–30. https://doi.org/10.12691/jfnr-5-1-5

Singh, A., & Talpade, M. (2024). Comparative nutrient analysis of prawn (*Penaeus indicus*), crab (*Scylla serrata*), and lobster (*Sagmariasus verreauxi*). *Uttar Pradesh Journal of Zoology, 45*(14), 364–371. https://doi.org/10.56557/upjoz/2024/v45i144214

Sriket, P., Benjakul, S., Visessanguan, W., & Kijroongrojana, K. (2007). Comparative studies on chemical composition and thermal properties of black tiger shrimp (*Penaeus monodon*) and white shrimp (*Penaeus vannamei*) meats. *Food Chemistry, 103*(4), 1199–1207. https://doi.org/10.1016/j.foodchem.2006.10.039

Suhaeli Fahmi, A., Agustini, T. W., Jayanto, B. B., & Prihantoko, K. E. (2023). Sensory value, proximate analysis, amino acid and fatty acid profile of steamed and boiled blue swimming crab (*Portunus*

pelagicus). *IOP Conference Series: Earth and Environmental Science, 1224*(1), Article 012034. https://doi.org/10.1088/1755-1315/1224/1/012034

Vigneshwari, S., & Gokula, V. (2018). Proximate composition of cooked meat and exoskeleton of *Portunus pelagicus* (Linnaeus, 1758). *Research Journal of Life Sciences, Bioinformatics, Pharmaceutical and Chemical Sciences, 4*(5). https://doi.org/10.26479/2018.0405.47

Williams, K. C. (2007). Nutritional requirements and feeds development for post-larval spiny lobster: A review. *Aquaculture, 263*(1–4), 1–14. https://doi.org/10.1016/j.aquaculture.2006.10.019

Zlatanos, S., Laskaridis, K., & Sagredos, A. (2009). Determination of proximate composition, fatty acid content and amino acid profile of five lesser-common sea organisms from the Mediterranean Sea. *International Journal of Food Science & Technology, 44*(8), 1590–1594. https://doi.org/10.1111/j.1365-2621.2008.01870.x