The Amino Acid of Sandfish Sea Cucumber (Holothuria scabra): Dry Method with Various Feeding Enzyme

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Abstract. Sand sea cucumber processing stages require the release of calcium on the surface of the skin, it is necessary for the addition of the enzyme papain from papaya latex to facilitate the process. The purpose of this study is to determine the type and composition of amino acids in dried sea cucumber due to the effect of the enzyme papain from papaya leaves with different methods. The results showed that dried sea cucumbers from the two methods approaches produced the same amino acid profile, even with different composition values. Where for sea cucumber type A obtained 9 essential amino acids and type B, obtained 8 non-essential amino acids. Thus, in order to maintain the amino acid content in dried sea cucumbers, it is better that when boiling sea cucumbers, the water temperature and the slices of papaya leaves to be controlled at a temperature of 50 °C ± 5°C in order to minimize damage to amino acids.

1. Introduction

Sea cucumbers are economically valuable commodity that the potential is quite high in Indonesia. According to data from fisheries in 2001, production reached 3,517 tons of sea cucumbers. In the world there are 1,250 species of sea cucumbers that have been described, while in Indonesia there are 25 species that have commercial value derived from water corals in Indonesia [1]. Sandfish sea cucumbers (Holothuria scabra) is an economically valuable species of sea cucumber and is one of the leading commodities in Southeast Maluku. Sea cucumbers is included in the Holothuridae class. Elongated rounded body shape like an elongated cylindrical or slightly flattened with a mouth and anus located on the opposite corners. The outer skin of the sea cucumber consists of a layer of sand attached to strong and rough with needle-shaped frame or small pieces of lime spread in body tissues [2].

In general, processing raw sea cucumber is not fully utilized due to production of dried sea cucumber is only temporary and fluctuate only of there is demand from customer for sea cucumber. One characteristic of this sea cucumber that is on the surface of the body covered with lime so it tends to require special treatment to remove the lime substance. The release of calcium usually has to use a certain material to soften it and using the enzyme papain is a way to do so. The enzyme papain in papaya...
latex is widely available in the region. This enzyme is classified as protolithic enzyme that can hydrolyze the protein. Enzymes are biocatalyst that can speed up a reaction without co-react with the material.

Although in terms of aesthetics, these species are unattractive but fairly complete in nutritional value. Proximate analysis of the results obtained by the protein composition of sea cucumber meat 43%, 2% fat, 17% water content, mineral ash content of 21% and 7% [3]. Nutrient content can be altered by the treatment process. Protein is one nutrient component which are crucial for the human body. These types of nutrients is essential for the growth and replacement of human body cells that are damaged also supporting the body's metabolism. Sea cucumber protein content in wet conditions is 44-55% [4]. According [5], protein dry conditions was 82%, 1.7% fat, 8.9% moisture content, ash content of 8.6% and 4.8% carbohydrate.

Amino acids are the monomeric building blocks of protein, plays an important role in the metabolism of living cells. Acids of amino acids can be classified based on the ability of the synthesis of human and animal bodies [6]. Essential amino acids are amino acids that cannot be made in the body and must be obtained from food which also called exogenous amino acids. Amino acids are often called and known as a builder substance which is the end product of protein metabolism [7]. Non-essential amino acid is an amino acid that can be made in the body is also called endogenous amino acids [8]. These amino acids function of repairing damaged tissue after injury, protect the liver from toxic substances, lowering blood pressure, regulate cholesterol metabolism, promote the secretion of growth hormone, and reducing ammonia levels in the blood [9]. The existence of the essential amino acids is often associated with the quality of the protein. This study aims to determine the type and content of amino acids in dried sandfish sea cucumber due to the effect of the enzyme papain from papaya leaves with different methods.

2. Material and Method

2.1. Material
Materials used in this research was sandfish sea cucumber obtained from the cultivation farm owned by our partners in Langgur Village, Southeast Maluku, Indonesia.

2.2. Equipment
Cool box, knives, pots boiling, conventional curing tool, agitator. The tools used to analyse the amino acid analytical balance, oven, syringe filter paper and High-Performance Liquid Chromatography (HPLC).

2.3. Work Procedure
Cucumbers harvested from pen-culture put cool box and transported to mills. Sea cucumbers are weighed to determine the initial weight. Furthermore, the sea cucumber entrails removed (eviscerate) by piercing from the anus to the head using parts of the bamboo skewers and sharpen like a jab. Sea cucumbers pressed to exit the entire contents of the stomach. Furthermore, the boiling, the boiling is used two methods. Method A is based on study by [10], where started with boiling the sea cucumbers mixed with sliced papaya on the water temperature of 60 0 C ± 50 °C for 30 minutes, while the second method (B) by using traditional methods used by the Southeast Maluku, where sea cucumber processing boiled with water for ± 30 minutes until it was chewy and then proceed with stirring along with slices of papaya leaves. Afterwards, added with brushing with a soft brush and wash cucumbers, then braised sea cucumbers being wash twice. So, the first method, proceed by boiling the slices of papaya leaf and sandfish sea cucumber, whereas the second method uses only boiling water. Subsequently cooled, and waited for 24 hours of curing process by using a conventional dryer with coconut shell fuel. Initially using cold fogging subsequently using heat curing. Furthermore, sandfish sea cucumbers dried using the sunlight for 3 days. Sandfish sea cucumbers are being further analysed the content of amino acids in the Environmental Biotechnology Laboratory PT. Biotechnology biodiversity of Indonesia, Bogor. The results were tested by descriptive (Fig 1).
3. Result and Discussion
The results of the analysis of amino acids in dried sea cucumber is based on two methods that can be seen in Table 1 below:

**Table 1. Amino Acid Profile Dried Sea Cucumber**

| No | Amino Acid Type    | Unit | A     | Sample Code | B     |
|----|-------------------|------|-------|-------------|-------|
| 1  | Aspartic acid     | %    | 4.22  | 3.72        |       |
| 2  | Acid glutamate    | %    | 8.00  | 7.11        |       |
| 3  | Serine            | %    | 2.52  | 2.05        |       |
| 4  | Glycine           | %    | 7.90  | 8.04        |       |
| 5  | Histidine         | %    | 1.41  | 0.96        |       |
| 6  | Arginine          | %    | 1.25  | 1.19        |       |
| 7  | Threonine         | %    | 1.72  | 1.75        |       |
| 8  | Alanine           | %    | 1.51  | 1.41        |       |
| 9  | Proline           | %    | 0.63  | 0.62        |       |
| 10 | Tyrosine          | %    | 1.37  | 1.39        |       |
| 11 | Valine            | %    | 3.10  | 3.37        |       |
| 12 | Methionine        | %    | 1.14  | 1.96        |       |
| 13 | Cysteine          | %    | 1.07  | 0.96        |       |
| 14 | Isoleucine        | %    | 2.16  | 1.72        |       |
| 15 | Leucine           | %    | 6.02  | 5.75        |       |
| 16 | Phenylalanine     | %    | 1.38  | 1.23        |       |
| 17 | Lysine            | %    | 3.81  | 4.34        |       |
|    | **Total**         |      | 49.21 | 47.57       |       |

**Figure 1. Work Procedure**
Based on the analysis of amino acids in above shows that there are about 17 types of amino acids contained in the dried sea cucumber produced both a sea cucumber A and cucumbers B, consisting of nine essential amino acids are: histidine, arginine, threonine, valine, methionine, isoleucine, leucine, phenylalanine, and lysine and 8 non-essential amino acids are: aspartic acid, glutamic acid, serine, glycine, cysteine, alanine, proline, and tyrosine. The results of this study are not much different from the results of the study of [11] and [12] who argued that the sand sea cucumbers (Holothuria scabra) contains almost all the essential amino acids except tryptophan. The difference lies in the composition of each amino acid. Total amino acid produced by the treatment A is 49.21% higher than treatment B, namely 47.57 in accordance with the results of this research study [13] states that the average amount of amino acids contained in the sea cucumber ranges from 33.32 - 54.13 g / 100 g bk with the highest amino acid is glycine, glutamate, aspartic, alanine and arginine. The high amino acid composition of trepang B were related to the method used. [10] method using controlled temperature is 500C ± 5 0C at boiling 1 so as not to damage the amino acid composition contained in it besides the temperature is the optimal temperature for the enzyme papain work.

Boiling along with slices of papaya leaves at this temperature causes the release of calcium from the surface of the sea cucumber skin but damage to the nutritional components can be minimized. In contrast to the method [10], This method of temperature control is not done because the goal is only to be rubbery meat with a sea cucumber that is inconsistent, causing breakdown of amino acids can occur. [13], stating that all the amino acids in food, especially lysine, threonine and methionine is sensitive to dry heat and radiation. Furthermore [14], states that heating meat at a temperature of 700C would reduce the amount of lysine contained in it to be 90%, while heating at a temperature of 1600C would reduce levels of lysine up to 50%. Differences in amino acid composition of these two methods can be seen in Figure 1.

![Dry Sea Cucumber Amino Acid Composition](image)

**Figure 2. Amino Acid Composition**

From the chart above showed that the highest content of essential amino acids namely leucine of cucumbers A amounted to 6.02%. Leucine works with the amino acid isoleucine and valine in repair muscles, regulate blood sugar, and provide energy reserves. Leucine also serves to increase the production of growth hormone and helps burn visceral fat located in the deepest layers of the body. Essential amino acid histidine lowest for the sea cucumber B of 0.96%. Histidine is an essential amino acid for children and babies. The lowest of the content of histidine so to say as the limiting amino acid. Non-essential amino acid content is highest with glycine of cucumbers B of 8.04%, followed by glutamate acid in the sea cucumber A while the lowest is proline of sandfish sea cucumber B at 0, 62% nevertheless not unlike the sea cucumber A. Glycine is an amino acid that can inhibit processes in the brain that causes stiffness of motion such as in multiple sclerosis [15]. Glycine and glutamic acid is an essential component for the cell to synthesize glutathione, which can stimulate the activation and
proliferation. Arginine can enhance immunity by promoting cell activation and proliferation of T cells [16]. The average content of glutamate acid in both treatments was higher than that generated by the research of sea cucumbers in the islands of Belitung [17] while the lower glycine. Although glutamate acid instead of an amino acid essential but this amino acid is important in the formation of the flavour of the fishery, which can provide the savoury flavour of seafood products. Hydrogen group on glutamic acid can substance with sodium to form monosodium glutamate which has a high intensity savoury flavour so widely used as a flavour enhancer. Proline has a free amino group and form the aromatic structure. These amino acids can be obtained from the hydraulic casein [14]. All amino acids in food, especially lysine, threonine and methionine is sensitive to dry heat and radiation. [18] Differences in the womb These amino acids can also be caused by age, fishing season, and stages in the life cycle of the organism [19]; [20].

4. Conclusion
Based on research by amino acids contained in the dried sea cucumber from both methods have the same kind are 9 essential amino acids and 8 essential amino acids, but different composition. The highest total amino acids contained in the dried sea cucumber with the method of use of the enzyme by [10] is 49.21%. The content of the essential amino acid leucine highest at 6.02%. In the dried sea cucumber with the method of use of the enzyme by [10] while the lowest was 0.96 on a histidine dried sea cucumber with traditional methods of enzymes, non-essential amino acids, glycine as high as 8.02% on the dried sea cucumber with methods of use traditional enzyme [10], while the lowest was 0.62% proline in dried sea cucumber with traditional delivery methods of enzyme. Preferably during the first boiling water temperature and slices of papaya leaves to remain controllable at a temperature of 500 C ± 50 C in order to minimize the breakdown of amino acids.

Acknowledgement
We would like to thank the Directorate of Research and Community Ministry of Research Technology and Higher Education Republic of Indonesia to fund the study.

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