Food Composition in the Hull of Sand Cucumber (*Holothuriascabra*) Kept at Floating Net Cages

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Abstract. Food is one of the factors which is important in determine organism viability in nature. Studying various kind of food which is consumed by an organism can be made as basic data in keeping that organism until the decline of waters resource at nature because environment degradation as well as catching can be constraint with cultivation. As such as other waters organism which cultivated, sea cucumber also need to verified what type of food in its side of, until accuracy of woof type which given become important factor in develop cultivated effort of sea cucumber which is one of fishery commodity that is more economic valuable, because possess a number of nutrients which can be used as medicines basic materials. As well as said by Farouk *et al* (2007) that nutrient of sea cucumber can cure injury, used as anticoagulant agent and trombotic, lower cholesterol degree and bloody fat, anticancer and antitumor, antibacterial, immune stimulant, antifungal, antivirus, antimalaria and antirematic.

Key word: sea cucumber, food composition, and float net cages

1. Introduction
Food is one of the factors which is important in determining organism viability in nature. Organism can grow and proliferate because energy coming from food (Nikolsky, 1963 *et al* Effendi, 2002). Studying various kind of food which is consumed from an organism can be made as basic data in keeping that organism until the decline of waters resource at nature because environment degradation as well as catching can be constraint with cultivation. As such as other waters organism which cultivated, sea cucumber also need to verified what type of food in its side of, until accuracy of woof type which given become important factor in develop cultivated effort of sea cucumber which is one of fishery commodity that is more economic valuable, because possess a number of nutrients which can be used as medicines basic materials. As well as said by Farouk *et al* (2007) that nutrient of sea cucumber can cure injury, used as anticoagulant agent and trombotic, lower cholesterol degree and bloody fat, anticancer and antitumor, antibacterial, immune stimulant, antifungal, antivirus, antimalaria and antirematic.

In cultivating woof, it is important substance which must be seen except type, quality of woof and woof expense. However in cultivating sea cucumber woof expense isn’t necessary big because sea...
Cucumber can exploit the available natural provision that is plankton. As well as research of Padang et al (2014a; 2014b) discover food composition in the hull of sea cucumber which collected nature consist of Diatom or Bacillariophyceae (56%), Cyanophyceae (4%), Dynophyceae (1%) and Zooplankton (39%).

In spur on growth of diatom as sea cucumber food, nutrient availability is needed. Necessary nutrient for fitoplankton diatom growth are phosphate, nitrate and silicate. Nutrient requirement in spur on growth of fitoplankton procerable at nature by decomposition process by bacteria is used for decomposing from biogeochemical cycle. Nutrient requirement (phosphate and nitrate) at nature procureable is from sago palm waste and chicken manure. Sago palm waste can supply nutrient like N, P, S, Ca, K and Mg (Hadiisuwito, 2007; Stevenson, 1982; Latuponoet al, 2014), whereas chicken manure contains a number of nutrient like N, P, K, Ca and other substances (Lingga, 1991). Where substances mentioned from sago palm waste and chicken manure was needed for diatom bentic growth. Cultivating of sea cucumber which made all this time was kept at embed cage or penculture like research of Serang et al (2014), Padang et al (2016), meanwhile cultivate method at float net cage never been done. Cultivating of sea cucumber at float net cage based on the utilization of cultivate means with purpose of policulture cultivate that is raise of sea cucumber together with biota of waters like fish.

With knowledge of natural food of sea cucumber at nature, it’s easy to cultivating as what been said by Effendie (2002) that to find out food provide in nature and used by fish, can be done with food sample procure from it side. The same process can be used or sea cucumber to analyse it in side. Thereby the purpose of this research is to know what type of food in the hull of sea cucumber which keeps at float net cages with sago palm waste and chicken manure treatment.

2. Research Method
Research was done in August-October 2016, started with procuring sample of sea cucumber which keep at float net cage at Hunut village waters with coordinate of float net cage 3º38”6,0036”LS and 128º12’52.164”BT. Treatment used is by add sago palm waste (A), chicken manure (B) and mixture of both waste (C) in to keeping container which had been gave sediment and leaves Enhalusacroides.

![Map Research](image1a.png)

**Figure 1a.** Map Research

![Float net cage](image1b.png)

**Figure 1b.** Float net cage

Information O = location of float net cage
Research continues with analyzing of in the hull of sea cucumber at biology laboratory of University of Darussalam Ambon. This analysis of in a side of sea cucumber starting with cutting its stomach star from its anterior to its posterior to take it side. Furthermore it in side was taken out and put in container which had been gave formalin 4%. The contents of it side which had been gave formalin as preservative was take with pipette 1 ml and put at haemocytometer to observe using Olympus microscope with magnification 400 times. Identification of sea cucumber side contents based on book by Yamaji (1996), Newel and Newel (1977), Tomas (1977) and Van Heurck (1962). Furthermore to calculate the food composition in the hull of sea cucumber with using formula according to Fachrul (2007):

\[
\text{Composition (\%)} = \frac{\sum \text{individual of one kind}}{\sum \text{individual of all kinds}}
\]

3. Result and Discussion

3.1. Food Composition in the hull of Sea Cucumber

Analysis result of food composition in the hull of sea cucumber which keep at float net cage with three treatment, they are: A. Sago palm waste; B. Chicken manure and C. Mixture of Sago palm waste and chicken manure. Food composition in the hull of sea cucumber can be seen at table underneath.

| No | Type of Food | Treatment | Sago palm waste | Chicken manure | Sago palm waste + chicken manure |
|----|--------------|-----------|----------------|----------------|---------------------------------|
|    |              | A1 | A2 | A3 | B1 | B2 | B3 | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | Total |
| 1  | Diatom/Bacillariophyceae | 98.128 | 97.858 | 99.048 | 99.379 | 97.478 | 97.161 | 95.087719 | 97.72475 | 98.670213 | 0.3295 | 0.1905 | 0.3408 | 0.7017544 | 0 | 0 | 0 | 100 |
| 2  | Chlorophyceae | 0 | 0.1647 | 0.1905 | 0 | 0 | 0 | 0 | 0 | 0.0886525 | 0.4751 | 1.1588 | 0.9564 | 0.3508772 | 0.7214206 | 0.3546099 | 0 | 0 | 0 | 100 |
| 3  | Cyanophyceae | 1.3369 | 1.318 | 0.1905 | 0.1086 | 0.9543 | 0.0568 | 0 | 0 | 0.0886525 | 0 | 0 | 0 | 0.7017544 | 0 | 0 | 0 | 100 |
| 4  | Dinoflagellate | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 |
| 5  | Zooplankton | 0 | 0.3295 | 0.1905 | 0.4751 | 1.1588 | 0.9564 | 0.3508772 | 0.7214206 | 0.3546099 | 0 | 0 | 0 | 0 | 0 | 0 | 100 |
| 6  | Zooplankton Holozoa | 0 | 0.1647 | 0 | 0.0365 | 0.3408 | 1.59 | 1.754386 | 0.7769145 | 0.3102837 | 0 | 0 | 0 | 0 | 0 | 0 | 100 |
| 7  | Polychaeta | 0 | 0 | 0 | 0 | 0.0082 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 |
| 8  | Paramecium | 0.2674 | 0.1647 | 0.381 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 |
| 9  | The leaves of seagrass | 0.2674 | 0 | 0 | 0 | 0 | 0 | 0.2274 | 2.1052632 | 0.7769145 | 0.4875887 | 0 | 0 | 0 | 0 | 0 | 0 | 100 |

Food composition in sea cucumber which keep at float net cage with three treatment woof turn out to be dominate by class Diatom fitoplankton or Bacillariophyceae (113 species) in addition of class Chlorophyceae (Halosphaerasp, Chlorellasp), Cyanophyceae (Oscillatoriasp, Annabaenaspa and Spirulinaspa) and Dinophyceae (PeridiniumspadGymnodinimum sp).
Figure 2. Food composition in the hull of Sea Cucumber with Sago Palm Waste Treatment (source: Primary data, 2016)

Figure 3. Food composition in the hull of Sea Cucumber with Chicken Manure Treatment (source: Primary data, 2016)

Figure 4. Food composition in the hull of Sea Cucumber with Sago Palm Waste + Chicken Manure Treatment (source: Primary data, 2016)

Apparently, Cultivating of sea cucumber at float net cage with sago palm and chicken manure treatment, diatom is also main food as well as sea cucumber which live at natural habitat, as found by
Padang et al (2014a; 2014b) in analysis of side content of sea cucumber which collected from Suli beach waters that is Diatom or Bacillariophyceae 56%, Cyanophyceae 4%, Dynopyceae 1% and Zooplankton 39%, while those found by Padang et al (2016) which keep sea cucumber at penculture consist of Diatom class fitoplankton (89%) and Zooplankton (11%). Research of Yulianti (2009) also found Diatom which is the biggest compound in sea cucumber and from Sukmiwati research (2012) get the result of identification of food consist of 10 species of sea cucumber at Sepempang waters and PengadahNatuna from Riau islands founded 19 genus of plankton and detritus which include in two familia: that is Chrysophyta and Cyanophyta. Chrysophyta consist of 17 genus and Cyanophyta consist of two genus that is Oscillatoria, Lyngbia.

According to Bakus (1973) sea cucumber commonly uses organic materials and detritus in its substrate. Lawrence (1987) in Sukmwawati (2012) said that food of sea cucumber commonly consist of organic nutrients from sand and various biota available in sand like Diatom, Protozoa, Policheta, Filament Algae, Copepoda, Foraminifera, Radiolaria, sand particle along with crumbling shellfish and Mollusk Shells. Besides, sea cucumber also feeds on plankton, organic matter on shellfish, little Crustacea and Polychaeta (Macneet al, 1958 in Bakus, 1973). Furthermore Bakus (1973), Nesa and Rahman (1987) in Sukmiwati (2012) said that sea cucumber in addition of had deposit feeder characteristic, also had poliphpagia characteristic which feed on all things at the bottom of waters like detritus, sand particles, crumbling shellfish, benthic diatomic, green algae, blue algae filamentous which dead or alive on the surface of shellfish, red algae, coppeda and gastropoda.

Diatom class as the biggest group in the hull of sea cucumber which keep at float net cage was founded as much as 113 species which include in 35 genus. This genus is more if compare with the research Padang et al (2014b) with just 25 genus and 79 species in sea cucumber which collected from nature and Padang et al (2015) which amount of 23 genus and 53 species in the hull of sea cucumber which keep at penculture. Distribution of diatom species in the hull of sea cucumber which keep at float net cage can be seen at next table (Table 2).

The genus from Diatom class mostly found in the hull of sea cucumber which keep are 23 species for Navicula and 17 species for Nitzschia. Research of Padang et al (2014a) hit upon Naviculagenus for 15 species and Nitzschiagenus for 11 species in the hull of sea cucumber which collected at nature. Furthermore research of Sukmiwati (2012) get most amount of individual food in side come from Chrysophyta that is Cymbella genus, with amount 130 (Sepempeng) and 149 individul (Pengadah). The highest percentage amount of food volume from Chrysophyta are 13.6% (Cymbella) in sea cucumber S.nogtivagus and 13.6% In sea cucumber S.vastus.

From table above can be seen treatment with chicken manure get more amount of diatom than sago palm waste and mixture of both in the hull of sea cucumber. This matter indicates that chicken manure is better in giving stimulation diatom growth as food for sea cucumber. As said as research of Padang et al (2016) which keep sea cucumber at penculture with addition of chicken manure resulting in growth progress which high enough as big as 0.14% and life passing as big as 92%,, because sea cucumber using bentic diatom as it food. Another research of Padang et al (2014a) result in using bentic diatom by sea cucumber by 56% and Padang et al (2016) by 83%.
Table 2. Amount of genus and species of Diatom in the hul of Sea cucumber

| No | Genus             | Number of Species |
|----|-------------------|-------------------|
| 1  | Achnanthes        | 4                 |
| 2  | Amphora           | 5                 |
| 3  | Amphiprora        | 1                 |
| 4  | Asteromphalus     | 1                 |
| 5  | Bacillariopsis    | 1                 |
| 6  | Bidulphia         | 2                 |
| 7  | Chaetoceros       | 5                 |
| 8  | Campylodiscus     | 3                 |
| 9  | Cocconeis         | 4                 |
| 10 | Coscinodiscus     | 1                 |
| 11 | Cymatopleura      | 2                 |
| 12 | Diatomella        | 1                 |
| 13 | Diploneis         | 4                 |
| 14 | Epithemia         | 4                 |
| 15 | Eunotia           | 1                 |
| 16 | Fragilaria        | 5                 |
| 17 | Grammatotheca     | 1                 |
| 18 | Grevillea         | 1                 |
| 19 | Hemiaulus         | 3                 |
| 20 | Hemidiscus        | 1                 |
| 21 | Limnophtea        | 1                 |
| 22 | Melosira          | 6                 |
| 23 | Mastigoplea       | 1                 |
| 24 | Navicula           | 23                |
| 25 | Nitzschia         | 17                |
| 26 | Pseudonitzschia   | 3                 |
| 27 | Rhizosolenia      | 3                 |
| 28 | Staurocentra      | 1                 |
| 29 | Striatella        | 2                 |
| 30 | Surirella         | 1                 |
| 31 | Thalassiosira     | 5                 |
| 32 | Thalassiosirolis  | 1                 |
| 33 | Thalassiosorma    | 1                 |
| 34 | Triceratium       | 1                 |
| 35 | Van Harenia rhomboides | 1               |
| **Total** |                  | **113**           |

(source: Primary data, 2016)

Beside fitoplankton turn out to be zooplankton, it is also discovered in the hull of sea cucumber. Zooplankton as first consumer, which found consist of holoplankton group (true zooplankton/lifetime as plankton) inter-alia Copepoda, Rotifera, Foraminifera, Ciliata and Cladocera along with meroplankton group (half of its lifetime as plankton) that is larva organism bentos and nekton. Especially for bentos larva organism which do settlement activity before become juvenile. Beside that Polychaeta, Paramecium and lamun leaves also found.

### 4. Conclusion

Based on the result of the research, can be concluded that:

1. Food composition in sea cucumber which kept at float net cages with three treatment turn out be dominated by diatom class fitoplankton or Baccilariophyceae.
2. Diatom which found consist of 113 species which falling within 35 genus.

Table 3. Amount of Species Distribute in Sea Cucumber for Each Treatment

| No | Genus     | Sago Palm Waste | Chicken Mature | Sago Palm Waste + Chicken |
|----|-----------|-----------------|----------------|---------------------------|
| 1  | Achnanthes| 3               | 3              | 3                         |
| 2  | Amphora   | 3               | 4              | 5                         |
| 3  | Amphiprora| 1               | 1              | 1                         |
| 4  | Asteromphalus| 0             | 1              | 0                         |
| 5  | Bacillariopsis| 0           | 1              | 1                         |
| 6  | Bacillariopsis| 0           | 0              | 1                         |
| 7  | Chaetoceros| 1               | 5              | 2                         |
| 8  | Campylodiscus| 2             | 2              | 1                         |
| 9  | Cocconeis | 1               | 2              | 3                         |
| 10 | Coscinodiscus| 1             | 1              | 1                         |
| 11 | Cymatopleura| 1             | 2              | 1                         |
| 12 | Diatomella | 1               | 0              | 0                         |
| 13 | Diploneis | 3               | 4              | 4                         |
| 14 | Epithemia | 2               | 3              | 2                         |
| 15 | Eunotia   | 1               | 0              | 0                         |
| 16 | Fragilaria| 2               | 3              | 2                         |
| 17 | Grammatotheca| 0            | 1              | 1                         |
| 18 | Grevillea | 1               | 3              | 1                         |
| 19 | Hemiaulus | 1               | 2              | 2                         |
| 20 | Hemidiscus| 0               | 1              | 0                         |
| 21 | Limnophtea| 1               | 1              | 1                         |
| 22 | Melosira  | 3               | 5              | 5                         |
| 23 | Mastigoplea| 1              | 1              | 1                         |
| 24 | Navicula  | 15              | 14             | 16                        |
| 25 | Nitzschia | 7               | 13             | 9                         |
| 26 | Pseudonitzschia| 2           | 3              | 2                         |
| 27 | Rhizosolenia| 2              | 2              | 1                         |
| 28 | Staurocentra| 0             | 0              | 1                         |
| 29 | Striatella| 1               | 1              | 2                         |
| 30 | Surirella | 1               | 0              | 0                         |
| 31 | Thalassiosira| 2             | 1              | 2                         |
| 32 | Thalassiosirolis| 1           | 1              | 1                         |
| 33 | Thalassiosorma| 1             | 1              | 1                         |
| 34 | Triceratium | 0              | 1              | 0                         |
| 35 | Van Harenia rhomboides| 1       | 1              | 1                         |

**Total** 63 51 74
5. Proposition

Be provided that there is further research about application of sea cucumber side of in direct kept at nature with sago palm waste and chicken manure treatment.

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