THE CORRELATION BETWEEN WET AND DRY WEIGHT OF INTESTINE AND BODY WITHOUT INTESTINE OF SEA CUCUMBER (*Holothuria scabra*)

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ABSTRACT

Holothuria scabra is a commercial tropical sea cucumber species, which has been exploited severely in recent years. This study was conducted at the Mataram Marine Bio Industry Technical Implementation Unit for 20 days aiming to determine the relationship between wet and dry weight of sea cucumbers with and without colon. Results of regression analysis between wet and dry weight show a significant positive correlation. The relationship between wet and dry weight without the colon is $y = 0.1685x - 0.2319$ ($R^2 = 0.9236$) whereas the wet and dry wet of the intestine is $y = 0.075x + 0033$ ($R^2 = 0.791$).

KEYWORDS: Lombok, Indonesia, colon weight, water content, food conversion, 'beche-de-mer', trepang, sandfish

INTRODUCTION

Sea cucumbers (Echinodermata: Holothuroidea) are widely consumed in Asia. This marine invertebrate is usually called "beche-de-mer" or "trepang" (Hu *et al*., 2010). There are 52 species commercially used as a source of food, most of them are tropical and sub-tropical species of the family Holothuriidae and Stichopodidae, including the genera *Holothuria*, *Actinopyga*, *Bohadschia*, and *Stichopus* (Choo, 2008).

Holothuria scabra is a tropical deposit-feeding sea cucumber found in the Indo-Pacific (Mercier *et al*., 1999) and is often called sandfish. It is a species with high commercial value (Conand, 1990). It is also the most popular among fisherman (Purwati, 2006) and one of the most widely distributed tropical sea cucumbers (Ramofafia *et al*., 2003). Sandfish is also cultured and has been bred extensively (Purcell *et al*., 2012).

Since *H. scabra* has a commercial value, these cucumbers are studied extensively in both aquaculture and other fishery research. Some variables known about the sea cucumber include spatial distribution, daily activities of juveniles, and the reproductive cycle in the laboratory like spawning and larvae (Mercier *et al*., 1999); juvenile growth (Ramofafia *et al*., 1997); reproductive patterns and temporal changes (Muthiga *et al*., 2009); sediment patch selectivity (Uthicke & Karez, 1999); growth and production (Paltzat *et al*., 2008). Further specific research requires initial and final dry body weight to obtain the specific growth rate (SGR), ingestion rate (IR), fecal production rate (FPR), food conversion efficiency (FCE) (Yuan *et al*.,

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2006), and feed efficiency (FE) (Liu *et al*., 2010). In order to get the dry weight we had to put the animal to death, therefore it is extremely helpful to know the relationship between the dry and wet weight.

OBJECTIVE

To establish the correlation between wet weight and dry weight in sea cucumber *H. scabra* for a wide size range, in order to prevent killing of individuals.

MATERIAL AND METHODS

The experiment was carried out from 5 to 24 November 2012. Twenty five sea cucumbers used in this study were collected from the coast of North Lombok, Indonesia. After 24 hours of fasting each sea cucumber was placed individually in a tank. Fifty percent water was exchanged everyday and aeration was provided continuously. Wet weight of each individual was taken daily. At the end of 20 days experiment, wet weight of intestine and wet weight of the body without intestine were taken and then dried in the oven at 60°C for 2 days. Then dry body and dry intestine were weighed. Water temperature, pH, and salinity were monitored every 3 days. Finally a regression analysis was applied in order to establish the relationship of wet weight to dry weight.

RESULTS AND DISCUSSION

Weight Change Over Time

The average weight of sea cucumbers decreased during the 20 days (-15.6656 g ± 3.31 g). The largest individual weight gain of one sea cucumber was 9.2 g, the greatest loss -56.93 g (Figure 1). It is assumed that the sea cucumber is not able to digest the food properly and the individuals studied obviously had developed stress. In nature, this type of sea cucumbers lives in muddy or sandy substrate in the seagrass meadow. Most of the commercial sea cucumbers are deposit feeders eating detritus, bacteria, and diatoms in the sediment at the seabed (Conand, 2006). However, this assumption requires further research. In holothurians, it is not easy to determine weight or length intervals and monitor how these factors develop over time. There are several factors, e.g. a variable water content and on a population level the unpredictability of recruitment and the scarcity of juveniles (Conand, 1990).

Water quality in this experiment was excellent and very close to ambient conditions, with an average temperature of 28.66°C± 0.14°C, pH 7.56±0.02, and salinity 34.29± 0.29.

Correlation Between Wet Weight and Dry Weight

Dry weight and wet weight of the sand sea cucumbers (both without the intestine) are connected in a linear equation. The equation obtained was $y = 0.168x - 0.231$ with a correlation coefficient $R^2 = 0.923$ (Figure 2).

For the wet-dry intestine relationship, there was a significant positive correlation reflected in the equation of $y = 0.075x + 0.033$ with a correlation coefficient $R^2 = 0.791$ (Figure 3).

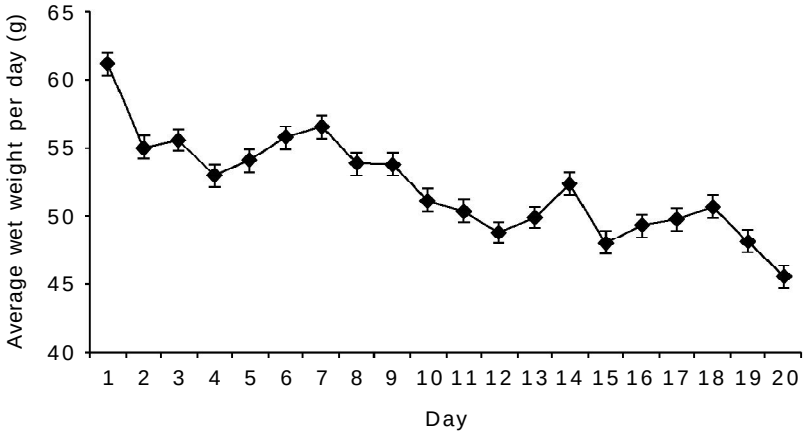

Figure 1. Average wet weight per day (n=25)

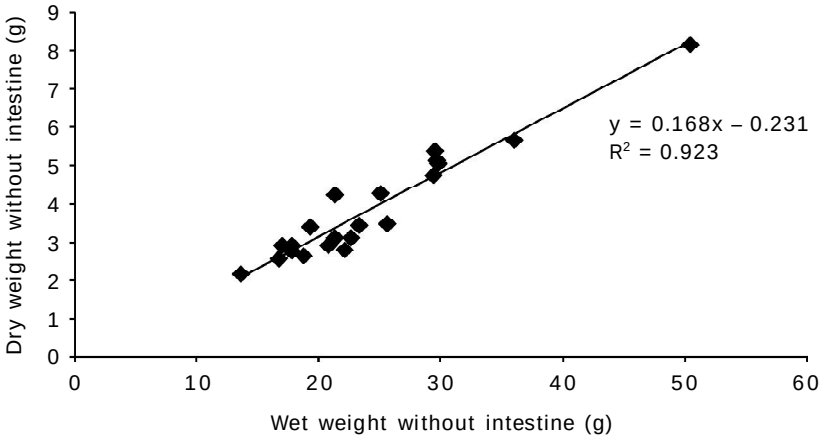

Figure 2. Relationship between dry and wet body weight without intestine in *H. scabra* (n=21)

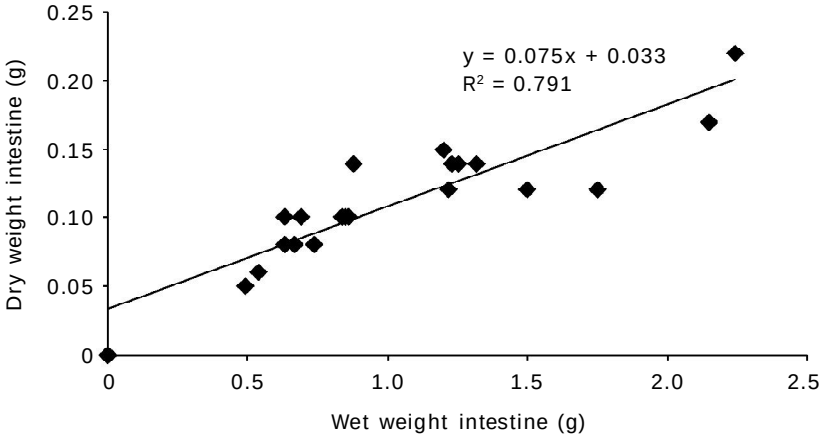

Figure 3. Wet-dry intestine relationship in *H. scabra* (n=22)

This equation can facilitate further research in estimating the dry weight of sea cucumbers without the need to kill the animals; it can also be used to estimate the water content in each individual. For this species it is now possible to just use the records of wet body weight data and with the help of the equations above, the respective dry weight data can be predicted. For future research we suggest to increase the size range for more maximum and minimum values in order to better represent a population so the equations obtained will be more accurate. Some studies are using the dry weight data of sea cucumbers for energy consumption (C), the energy discharged in the feces (F), energy for growth or scope for growth (SFG) (Yuan *et al*., 2010), specific growth rate (SGR) (Dong *et al*., 2006), specific growth rate in terms of energy (SGRe) (Yang *et al*., 2005); and ingestion rate (IR), fecal production rate (FPR) (Liu *et al*., 2009), but for these studies other species were used.

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