

**TRACE METAL AND NUTRITIONAL CONTENTS OF COCKLE
Anadara granosa FROM SEVERAL LOCATIONS AT NORTHERN
COAST OF CENTRAL JAVA**

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memberiku bekal untuk hidup dan senantiasa
menyayangiku;

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SUMMARY

Toxic metals are one of the most important pollutants present at the coastal area of northern Central Java. A recent study showed that lead (Pb) and cadmium (Cd) concentrations in estuaries of six Semarang rivers exceeded the permissible levels. So, continuously the living media of seafood species, i.e. detritus and benthos (e.g. cockle *Anadara granosa*), has been endangered by metal pollution since *A. granosa* tend to accumulate pollutants, including metals. In addition to fish, this cockle is one of the most common seafood items in the area. The objectives of this study are to determine zinc (Zn), Cd, copper (Cu), Pb, lipid, protein and glycogen content of *A. granosa* from four locations at northern coast of Central Java (Demak, Kendal, Batang and Semarang). Estimation of consumption level of cockles and correspondingly the intake rates of each heavy metal were conducted as well to accomplish the overall risk estimates. For the purpose of nutrient and metal analyses, 25 cockles were used. Whilst for regulation study, body size parameters, such as length, width, fresh and dry tissue weights of 100 specimens from each location were measured. Trace metals measurement was measured using graphite furnace AAS (Cd, Cu and Pb) and flame AAS (Zn). Protein content was analyzed by means of Bradford method, glycogen content using Dreywood's anthrone reagent and lipid content using the sulphophosphovanillin method. To estimate the daily intake of trace metals of the inhabitants of Semarang who consume *A. granosa*, interviews were carried out at four chicken-soup stalls with 25 participants each stall, were interviewed based on a questionnaire. The level of Cd in *A. granosa* from all locations has indeed exceeded the permissible levels. Glycogen contributes as the largest proportion of tissues nutrients, followed by lipid and protein. Lipid has negative correlation with Cd concentration in cockle ($p < 0.001$). However, there was a positive correlation between Zn and Cu concentration. Large cockle tends to have higher concentrations of Cd and lower concentrations of Pb. Based on the respective metals contents, cockles from all locations studied can be classified as unsafe for consumption although the weekly consumptions of cockles by the inhabitants of Semarang has not yet exceeded from the Maximum Tolerable Weekly Intake.

RINGKASAN

Logam pencemar merupakan salah satu dari pencemar penting yang terdapat di kawasan pantai utara Jawa tengah. Suatu studi menyebutkan bahwa konsentrasi timbal (Pb) dan cadmium (Cd) di enam muara sungai Semarang melampaui ambang batas yang telah ditetapkan. Secara berkelanjutan, media hidup dari *seafood*, seperti detritus dan benthos (contoh: kerang *Anadara granosa*), telah terancam oleh polusi logam karena kerang *A. granosa* berpotensi mengakumulasi pencemar, termasuk *trace metals*. Selain ikan, spesies kerang ini termasuk salah satu *seafood* yang biasa dikonsumsi di kawasan tersebut. Penelitian ini bertujuan untuk menentukan kandungan zinc (Zn), Cd, copper (Cu), Pb, lipid, protein dan glikogen pada *A. granosa* dari empat lokasi di pantai utara Jawa Tengah (Demak, Kendal, Batang, Semarang). Estimasi tingkat konsumsi kerang dan tingkat konsumsi dari tiap *trace metals* dilakukan untuk menentukan estimasi resiko keseluruhan. Berdasarkan pada tujuan penelitian, digunakan 25 ekor kerang. Penentuan parameter ukuran, yaitu panjang, lebar, berat basah dan berat kering, digunakan seratus ekor kerang dari tiap lokasi. Pengukuran kandungan *trace metals* menggunakan *graphite furnace AAS* (Cd, Cu, Pb) dan *flame AAS* (Zn). Kandungan protein diukur dengan metode Bradford, kandungan glikogen dengan reagen anthrone Dreywood dan kandungan lipid dengan metode sulfofosfovanillin. Wawancara dilakukan di empat warung soto ayam dengan mewawancarai 25 responden tiap warung berdasarkan sebuah kuesioner, guna mengestimasi asupan harian *trace metals* populasi masyarakat Semarang. Konsentrasi Cd pada *A. granosa* telah melewati ambang batas yang ditetapkan. Glikogen mempunyai proporsi terbesar dalam nutrisi jaringan diikuti oleh lipid dan protein. Lipid berkorelasi negatif dengan konsentrasi Cd dalam kerang ($p < 0.001$). Terdapat korelasi positif antara konsentrasi Zn dan Cu. Kerang berukuran besar cenderung mempunyai kandungan Cd lebih tinggi dan kandungan Pb yang lebih rendah. Berdasarkan pada kandungan logam, kerang dari semua lokasi studi dapat dikategorikan tidak aman untuk dikonsumsi meskipun konsumsi logam tersebut per minggu oleh populasi Semarang tidak melampaui asupan maksimum yang dianjurkan.

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TABLE OF CONTENTS

	Page
SUMMARY	i
RINGKASAN	ii
PREFACE	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	v
LIST OF ILLUSTRATIONS	vi
1. INTRODUCTION	1
2. MATERIAL AND METHODS	
2.1. Sampling Locations	7
2.2. The Cockles Samples Collection.....	7
2.3. Chemical Analyses	8
2.3.1 Glycogen content	8
2.3.2. Lipid content	9
2.3.3. Protein content	9
2.3.4. Heavy metal content	9
2.4. Consumption Interviews	11
2.5. Data Analysis	11
3. RESULTS	
3.1. Body Size, Weight & Nutrient Content	12
3.2. Reference Material Bovine Liver, and Detection Limits	14
3.3. Trace Metals	15
3.4. Consumption of <i>Anadara granosa</i> According to The Interview Result	20
3.4.1. Age distribution of the respondents	20
3.4.2. Cockle consumption of the respondents and exposure scenario of weekly trace metals consumption	21
3.4.3. Maximum tolerable weekly consumption according to several exposure scenarios based on gender grouping and cockle's location of origin	24
4. DISCUSSION	26
5. CONCLUSIONS	32
6. REFERENCES	33
APPENDICES	

LIST OF TABLES

	Page
Table 1. The locations of the samples	7
Table 2. Length and width of <i>A. granosa</i> from four locations at northern coast of Central Java	12
Table 3. Fresh and dry weight (g) of <i>A. granosa</i> from four locations at northern coast of Central Java. Data referred to soft tissues	12
Table 4. Nutrient concentrations (mg/g dry weight) of <i>A. granosa</i> from four locations at northern coast of Central Java	13
Table 5. Trace element concentrations and body burden ($\mu\text{g}/\text{cockle}$) in bovine liver (CRM 185) standard reference material	14
Table 6. The detection limits of trace metals concentration measurement using AAS ($\mu\text{g}/\text{g}$)	14
Table 7. Trace metals concentrations ($\mu\text{g}/\text{g}$ dry weight) of <i>A. granosa</i> from four locations at northern coast of Central Java.....	15
Table 8. Pearson correlation matrix for eleven parameters of <i>A. granosa</i>	19
Table 9. Cockle consumption of respondents (cockle/kg-human body weight) according to gender-age grouping	22
Table 10. Weekly consumption of trace metals ($\mu\text{g}/\text{kg}$ -human body weight) according to several exposure scenarios based on gender grouping and cockle's location of origin	23
Table 11. Maximum tolerable weekly according to several exposure scenarios based on gender grouping and cockle's location of origin	24

LIST OF ILLUSTRATIONS

	Page
Figure 1a. Right shell valve of <i>Anadara senilis</i> , inner surface	5
Figure 1b. Lateral view of <i>Anadara senilis</i>	5
Figure 2. A part of northern coast of Central Java	7
Figure 3. Zinc concentrations of <i>Anadara granosa</i> from four locations at northern coast of Central Java	16
Figure 4. Cadmium concentrations of <i>Anadara granosa</i> from four locations at northern coast of Central Java	16
Figure 5. Copper concentrations of <i>Anadara granosa</i> from four locations at northern coast of Central Java	17
Figure 6. Lead concentrations of <i>Anadara granosa</i> from four locations at northern coast of Central Java	17
Figure 7. Age distribution of male respondents (years)	20
Figure 8. Age distribution of female respondents (years)	20
Figure 9. Age distribution of total respondents (years)	21

