SELECTED HEAVY METAL CONTENTS IN COMMERCIAL MARINE FISHES LANDED AT LKIM COMPLEX, PULAU KAMBING KUALA TERENGGANU

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Thesis Submitted in Fulfillment of the Requirement for the Degree of Master of Science
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Specially dedicated to:

Abah and Mama,

TUAN HJ ABD AZIZ BIN ABD RAHMAN

PUAN HAJJAH NORMA BINTI RAMLI

My siblings,

AZRIN BIN ABD AZIZ

AZMER BIN ABD AZIZ

NORHAYATI BINTI ABD AZIZ

NOR HANANI BINTI ABD AZIZ

AZIZI BIN ABD AZIZ

HAMIMAH ZAMNAH BINTI MUSLAN

ADZMI BIN HJ AHMAT

My Little Nephews,

AMNAN MUHAIMIN BIN AZRIN

AMJAD MUJAHID BIN AZRIN

My Soulmate,

MOHD NOR RIDHZUAN BIN MD RAZALI

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfillment of the requirement for the degree of Master of Sciences

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Co-Supervisor : Emeritus Professor Noor Azhar bin Mohamed Shazili, Ph.D.

School : School of Marine and Environmental Sciences

Heavy metals can enter the aquatic environments through several pathways such as agricultural activities and domestic sewage. In Kuala Terengganu, offshore embankments as well as domestic sewage are considered as main sources of heavy metals pollution in aquatic environments. Increasing activities of offshore embankment due to the coastal erosion along the beaches in Terengganu might increase the amount of heavy metals that flow into the ocean. Thus, this study was carried out to determine the level of heavy metals concentration (chromium, cobalt, copper, zinc, cadmium, lead, arsenic and mercury) in muscle tissues of commercial fishes landed at LKIM Complex, Pulau Kambing. The fishes which are including pelagic and demersal species were caught at Terengganu waters including the area near Pulau Bidong, Pulau Kapas and Pulau Redang.

Consequently, this study was also designed to evaluate the human health impacts due to the intake of heavy metals through the ingestion of food (commercial fishes). The detections of heavy metals content in fishes were using Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) and the assessments of human health were calculated by using formula. In this study, the average level of As and Hg were exceeded the permitted level set by Malaysian Food Act (1983) and Malaysian Food Regulation (1985) while another six metals were recorded below the limit and safe to be consumed. In addition, the exceeded level of As were recorded in all species while Hg level were higher in some species only. Consequently, Provisional Tolerable Weekly Intake (PTWI) were calculated and it was showed that Co, Cu, Zn, Cd, Pb and Hg were normal for consumption while Cr and As were exceeded the permitted level set by FAO/WHO and USEPA. Overall, the commercial fishes landed at LKIM Complex Pulau Kambing are not recommended to be consumed regularly due to the higher content of As and Hg.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu sebagai memenuhi keperluan untuk Ijazah Sarjana Sains

KANDUNGAN LOGAM BERAT TERPILIH DI DALAM IKAN LAUT YANG DIDARATKAN DI KOMPLEKS LKIM, PULAU KAMBING KUALA TERENGGANU

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Mei 2016

Penyelia Utama : Ong Meng Chuan, Ph.D.

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Pusat Pengajian : Pusat Pengajian Sains Marin dan Sekitaran

Kemasukan logam berat ke dalam persekitaran lautan boleh melalui pelbagai kaedah seperti pengaliran sisa dari aktiviti pertanian dan hasil pembuangan domestik. Di Kuala Terengganu, aktiviti penambakan pantai dan hasil pembuangan domestik adalah menjadi sumber utama pencemaran logam berat di persekitaran akuatik. Pencemaran logam berat di dalam lautan boleh bertambah ekoran dari kesan aktiviti penambakan yang dijalankan di sepanjang pantai di Terengganu. Oleh itu, kajian ini telah dijalankan bagi mengkaji tahap kepekatan logam berat (kromium, kobalt, kuprum, zink, kadmium, arsenik dan merkuri) dalam isi ikan komersial yang didaratkan di Kompleks LKIM, Pulau Kambing. Spesis ikan yang digunakan di dalam kajian ini ialah dari spesis pelagik dan demersal yang ditangkap di Perairan Terengganu termasuklah kawasan berdekatan Pulau Bidong, Pulau Kapas dan Pulau Redang.

Justeru, kajian ini juga merangkumi kesan pengambilan logam berat melalui pemakanan ikan-ikan komersial terhadap kesihatan manusia. Pengesanan tahap kepekatan logam berat di dalam isi ikan komersial telah dilakukan dengan menggunakan *Inductively Coupled Plasma-Mass Spectrometry* (ICP-MS) manakala penilaian terhadap kesihatan manusia telah ditentukan dengan menggunakan formula. Di dalam kajian ini, purata tahap kepekatan As dan Hg adalah melebihi paras yang dibenarkan oleh Akta Makanan Malaysia (1983) dan Peraturan Makanan Malaysia (1985), manakala enam logam berat selebihnya adalah dicatatkan rendah dan diklasifikasikan sebagai selamat untuk dimakan. Tambahan pula, kandungan As adalah dicatatkan tinggi dan melebihi paras yang dibenarkan di dalam kesemua spesis ikan manakala kandungan Hg pula direkodkan tinggi dalam beberapa spesis ikan sahaja. Sehubungan dengan itu, *Provisonal Tolerable Weekly Intake* (PTWI) telah dikira dan hasil telah menunjukkan bahawa kepekatan logam berat seperti Co, Cu, Zn, Cd, Pb dan Hg yang terkumpul di dalam isi ikan adalah pada tahap selamat untuk dimakan manakala kandungan Cr dan As adalah melebihi tahap yang dibenarkan oleh FAO/WHO dan USEPA. Secara keseluruhannya, pengambilan ikan-ikan komersial yang didaratkan di Kompleks LKIM Pulau Kambing untuk dijadikan makanan secara kerap adalah tidak digalakkan atas faktor kandungan As dan Hg yang tinggi.