



UNIVERSITI PUTRA MALAYSIA

***BLOOD FATTY ACIDS ANALYSIS IN CAPTIVE FALSE GHARIAL
(*Tomistoma schlegelii*)***

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BLOOD FATTY ACIDS ANALYSIS IN CAPTIVE FALSE GHARIAL

(Tomistoma schlegelii)

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A project submitted to the

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It is hereby certified that we have read this project paper entitled “Blood Fatty Acids Analysis in Captive False Gharial (*Tomistoma schlegelii*)”, by Nur Nabila binti Sarkawi and in our opinion it is satisfactory in terms of scope, quality, and presentation as partial fulfilment of the requirement for the course VPD 4999-Project.

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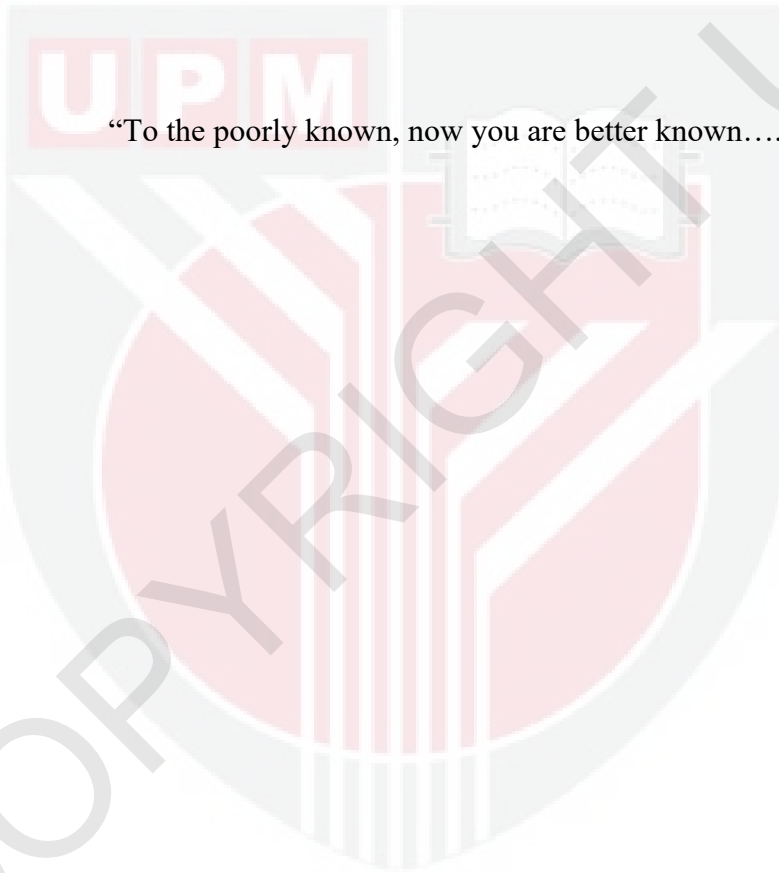
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DEDICATION

“To the poorly known, now you are better known....”



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CONTENTS

	Page
TITLE	i
CERTIFICATION	ii
DEDICATION	iii
ACKNOWLEDGEMENTS	iv
CONTENTS	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF PLATES	ix
LIST OF ABBREVIATION	x
ABSTRAK	xii
ABSTRACT	xiv
1.0 INTRODUCTION	1
2.0 LITERATURE REVIEW	3
2.1 False Gharial (<i>Tomistoma schlegelii</i>)	3
2.2 Diet and Feeding of <i>Tomistoma schlegelii</i>	4
2.3 Association of Diet with Fatty Acid Composition	5

2.4 Lipid and Fatty acid	5
2.5 Health Implications	9
3.0 MATERIAL AND METHODS	11
3.1 Crocodiles and Husbandry	11
3.2 Crocodile's Restraining and Blood Collection	11
3.3 Plasma Fatty Acid Profile Determination	12
3.3.1 Total Lipid Extraction	12
3.3.2 Fatty Acid Methyl Esters (FAME) Preparation	13
3.3.3 Gas-Liquid Chromatography	14
3.4 Data Analysis	15
4.0 RESULTS	16
5.0 DISCUSSION	23
6.0 CONCLUSION	28
7.0 RECOMMENDATIONS	29
REFERENCES	30
APPENDICES	35

LIST OF TABLES

		Page
Table 1	Details of the <i>T. schlegelii</i> involved (n=5)	11
Table 2	Plasma Fatty Acid Profile of <i>T. schlegelii</i> (n=5)	17
Table 3	Descriptive Analysis of Plasma Fatty Acid Profile of <i>T. schlegelii</i>	18
Table 4	Feed Fatty Acid Profile of Raw Chicken and Raw Catfish	21
Table 5	Inter-species comparison for dominant individual fatty acids from different studies	24

LIST OF FIGURES

		Page
Figure 1	Enzymatic process of desaturation and elongation	8
Figure 2	Plasma Fatty Acid for each <i>T. schlegelii</i> (n=5)	19
Figure 3	Plasma Fatty Acid of <i>T. schlegelii</i> expressed in total mean value (%)	20
Figure 4	Feed Fatty Acid in Raw Chicken and Raw Catfish	22
Figure 5	Comparison of omega-3 essential fatty acid composition in chicken, fish and plasma	26

LIST OF PLATES

		Page
Plate 1	The false gharial subjected for this study	35
Plate 2	The restraining procedure	35
Plate 3	Blood sampling via lateral tail vein	36
Plate 4	The fatty acids methyl ester (FAME) is quantified by using gas chromatography	36

LIST OF ABBREVIATION

%	percentage
°C /min	degrees celcius/minute
µl	microlitre
18G	18 Gauge
ALA	Alpha linolenic acid
ARA	Arachidonic acid
BF ₃	Methanolic borontrifluoride
CITES	Convention of International Trade of Endangered Species
DHA	Docosahexaenoic acid
DPA	Docosapentaenoic acid
EDTA	Ethylenediaminettetraacetic
EPA	Eicosapentaenoic acid
FAME	Fatty acid methyl ester
FID	Flame ionization detector
g	gram
GC	Gas chromatography
ID	Ionization detector

IUCN	International Union for Conservation of Nature
LA	Linoleic acid
LDL	Low-density lipoprotein
mL	millilitre
ml/min	millilitre/minute
mm	millimetre
μm	micrometre
MUFA	Monounsaturated fatty acid
N	moles
n=5	Sample size = 5
n-3	Omega-3
n-6	Omega-6
$^{\circ}\text{C}$	degrees celcius
PUFA	Polyunsaturated fatty acid
rpm	revolutions per minute
SFA	Saturated fatty acid
<i>T. schlegelii</i>	<i>Tomistoma schlegelii</i>
v/v	volume/volume
α -linolenic acid	Alpha linolenic acid

ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4999-Projek

ANALISIS ASID LEMAK DALAM DARAH BUAYA JENJULUNG

(Tomistoma schlegelii)

Oleh

Nur Nabila Binti Sarkawi

2016

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Asid lemak adalah alat fisiologikal yang penting untuk lebih memahami mekanisma badan haiwan. Sebarang data yang diperoleh daripada analisis sedikit sebanyak membantu meningkatkan pengurusan hidupan liar dalam kurungan dan sekaligus meningkatkan kualiti hidup terutamanya bagi spesis yang berada di ambang kepupusan. Kajian terhadap komposisi asid lemak dalam buaya jengjulong adalah terhad berbanding spesis buaya yang lain. Oleh itu, kajian asid lemak telah dilakukan ke atas lima ekor buaya jengjulong yang terdiri daripada dua jantan dan tiga betina. Komposisi asid lemak dikaji lebih lanjut dengan mengambil kira aspek pengurusan makanan. Darah diambil menerusi sisi vena ekor menggunakan jarum bersaiz 18G untuk kegunaan analisis asid lemak dalam plasma dan sampel makanan

juga turut diperolehi. Pengenalpastian dan penentuukuran komposisi asid lemak dilakukan dengan menggunakan gas kromatografi setelah melalui prosedur pengekstrakan lipid dan penyediaan metil ester asid lemak. Keputusan asid lemak dalam plasma menunjukkan kesemua buaya jenzulung mengandungi asid lemak taktepu yang tinggi. Khususnya, asid lemak politaktepu adalah yang tertinggi, diikuti oleh asid lemak tepu dan asid lemak monotaktepu, masing-masing dengan kadar peratusan 47.30%, 29.24% dan 23.47%. Berdasarkan analisis kandungan asid lemak dalam makanan, ayam dan ikan dipercayai merupakan sumber omega-6 asid lemak politaktepu. Memandangkan terdapat kekurangan sumber omega-3 asid lemak politaktepu, nilai asid eikosapentaenoik (EPA, C20:5 n-3) dalam plasma adalah rendah. Berbeza daripada itu, asid dokosaheksaenoik (DHA, C22:6 n-3) didapati tinggi berbanding spesies buaya yang lain dan juga dengan nilai asid lemak yang diperolehi daripada makanan (ayam dan ikan). Oleh itu, beberapa faktor penyebab dapat menjelaskan punca peningkatan nilai DHA di dalam plasma. Sebagai kesimpulannya, komposisi asid lemak di dalam buaya jenzulung bukan sahaja disebabkan diet, malahan juga bergantung kepada bagaimana mekanisma badan bertindakbalas terhadap punca lain yang terdapat dalam persekitaran.

Kata Kunci: komposisi asid lemak, buaya jenzulung, asid lemak perlu, diet

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfilment of the course VPD 4999-Project.

BLOOD FATTY ACIDS ANALYSIS OF CAPTIVE FALSE GHARIAL

(Tomistoma schlegelii)

By

Nur Nabila binti Sarkawi

2016

Supervisor: Dr. Tengku Rinalfi Putra Tengku Azizan

Co-supervisor: Dr. Hafandi Ahmad

Fatty acid is an important physiological tool to further understand the animal's body mechanism. Any data obtained from the analysis might help in captive wildlife management and thus improving their quality of life especially for those species that are on the brink of extinction. Research on the fatty acid composition in false gharial is limited compared to other crocodylian species. Therefore, fatty acid study was done on five captive false gharials consisting of two males and three females. The fatty acid composition is then further investigated by taking into account their essential fatty acid composition in the diet. Blood sample was collected from lateral tail vein using 18G spinal needle for plasma fatty acid analysis and feed sample comprised of chicken and fish meat was also analysed.

Then, identification and quantification of fatty acid composition was done by using gas chromatography following the procedure of total lipid extraction and fatty acids methyl esters (FAME) preparation. The plasma fatty acid result showed all of the false gharials have predominant increase in unsaturated fatty acids. Specifically, polyunsaturated fatty acids was the highest, followed by saturated fatty acids and monounsaturated fatty acids with 47.30%, 29.24% and 23.47% respectively. Based on feed fatty acid analysis, chicken and fish was known to be the dietary source of omega-6 polyunsaturated fatty acid. As there was lack of dietary source in omega-3 polyunsaturated fatty acid, eicosapentaenoic acid (EPA, C20:5 n-3) value in plasma was also found to be low. On the contrary, docosahexaenoic acid (DHA, C22:6 n-3) was significantly high compared to other species of crocodylian and in relation to the fatty acid values obtained from feed (chicken and fish). Thus, several possible contributing factors were pointed out regarding the high DHA content in the plasma. In conclusion, the fatty acid composition in false gharial is not solely affected by the diet, but it can also depend on how its body mechanism react to other sources from the environment.

Keywords: fatty acid composition, false gharial, essential fatty acid, diet

1.0 INTRODUCTION

Crocodile is a reptile in the Order of Crocodylia. It consists of family Alligatoridae, Crocodylidae and Gavialidae. There are about 23 species of crocodiles recognized. The False Gharial or *Tomistoma schlegelii* is one of the species listed as 'vulnerable' by the IUCN Red List due to insufficient data. This species is also known as Tomistoma, Sunda Gharial, or Malayan Gharial and is categorised as freshwater crocodile. The ecology including its nesting, size and age of sexual maturity, diet and population demography remains poorly known. According to the study done by Stuebing *et al.* (2006), the current distribution of *T. schlegelii* in South East Asia is restricted to peat swamps of Indonesia and Malaysia. In Malaysia itself, it was reported to be found in Sarawak, Perak, Pahang and Selangor states.

This species is known to have a broad diet. Pigs, monkeys, and snakes were the most commonly reported animals eaten by *T. schlegelii*. Others include fish, shrimp, birds, otters, turtles and monitor lizards. The stomach content revealed prey items including vertebrates, invertebrates and plant materials. Usually captive *T. schlegelii* are fed with chicken, beef, pigs, rats and fish and the frequency of feeding might vary according to management preferences.

The diet given to the crocodiles is believed to have direct relation to the fatty acid composition in their body. Fatty acid profile is an important physiological tool to further understand the animal's body mechanism. Any data obtained from the study might help in the improvement of the management and thus improving their quality of life especially in those species that are on the brink of extinction. Since the

study of this species is limited, no data of fatty acid profile for this species has been reported to date.

Fatty acids consist of saturated and unsaturated fatty acids. Saturated fatty acids are considered as bad cholesterol, unlike the unsaturated. Unsaturated fatty acids consist of monounsaturated and polyunsaturated fatty acids. The polyunsaturated fatty acids, namely omega-3 and omega-6 PUFA are essential fatty acids as they can only be acquired from the diet and cannot be synthesized by the body. They provide fluidity and stability in terms of cell membrane structure. In addition to the previously mentioned role, omega-3 and omega-6 PUFA also contribute in maintaining the animal's health condition. Omega-3 plays a crucial role in brain structure and function. Along with omega-3, omega-6 fatty acids is essential in brain function and normal growth and development. Information obtained from the fatty acid profile of this species in some ways reflect the major concern in its health status and especially the suitability of the diet.

Realizing the benefits of fatty acids in animals, this study was undertaken with the objective to establish the fatty acid profile in plasma from captive false gharial with regular diet of raw chicken and catfish.

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