

COMPARISON OF VARIOUS WAYS OF EMULSIFYING COD  
LIVER OIL TO INCREASE THE n<sub>3</sub> POLYUNSATURATED  
FATTY ACID (PUFA) CONTENT IN *Artemia salina* L

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1993/94





TERENGGANU

UNIVERSITI PERTANIAN MALAYSIA  
FAKULTI PERIKANAN DAN SAINS SAMUDERA  
PSF 499 - PROJEK DAN SEMINAR

BORANG PENGESAHAN DAN KELULUSAN LAPORAN AKHIR PROJEK

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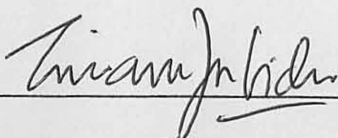
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Tajuk Projek :

Comparison of various ways of emulsifying cod liver oil to increase the n3 polyunsaturated fatty acid (PUFA) content in *Artemia salina* L.

Dengan ini disahkan bahawa saya telah menyemak laporan akhir projek ini dan

- i) semua pembetulan yang disarankan oleh pemeriksa-pemeriksa telah dibuat, dan
- ii) laporan ini telah mengikut format yang diberikan dalam Panduan PSF 499 - Projek dan Seminar, 1991, Fakulti Perikanan dan Sains Samudera, Universiti Pertanian Malaysia.



(Tandatangan Penyelia Utama)

21-4-94.

(Tarikh)

0200003122

1100023762

COMPARISON OF VARIOUS WAYS OF EMULSIFYING COD LIVER OIL TO  
INCREASE THE  $n_3$  POLYUNSATURATED FATTY ACID (PUFA)  
CONTENT IN *Artemia salina* L.

by

C. VALLEAMAH SINNIAH

DEDICATED

TO

My dearest Krishna

This thesis is submitted in partial fulfilment of the requirements  
for the degree of Bachelor of Science (Fisheries).

FACULTY OF FISHERIES AND MARINE SCIENCE  
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0200003122

## ACKNOWLEDGMENT

I would like to record my deepest appreciation and gratitude to En. Ahran Zamil Abidin, my supervisor for his constant encouragement and willingness in helping me during the course of the project. I wish to thank Dr. Che Rosli Saad my co-supervisor and Dr. Mohd. Salleh Bin Haji Kamaruddin for giving me constructive criticism in writing up my proposal.

I am grateful to En. Zakaria Md. Saif for his guidance in analyzing my samples in the nutrition laboratory and fatty acid analysis using the gas chromatography. A special thanks to Anizam Md. Saif for all the help that he had given me especially in the larval culture of *Microbrachium rosenbergii*.

### DEDICATED

Lately, to all my friends and family I would like to convey my thanks.

TO

My dearest *Krishna*

## ACKNOWLEDGMENT

I would like to record my deepest appreciation and gratitude to En. Aizam Zainal Abidin, my supervisor for his constant encouragement and willingness in helping me during the course of the project. I wish to thank Dr. Che Ross Saad my co-supervisor and Dr. Mohd. Salleh Bin Haji Kamaruddin for giving me constructive criticism in writing up my proposal.

I am grateful to En. Zakaria Md. Sah for his guidance in analyzing my samples in the nutrition laboratory and fatty acid analysis using the gas chromatography. A special thanks to Ahlihan Md. Sis for all the help that he had given me especially in the larval culture of *Macrobrachium rosenbergii*.

Lastly, to all my friends and coursemates I would like to convey my thanks.

## ABSTRACT

*Studies on the improvement of dietary values of Artemia salina as live food by feeding them with n3 PUFA were carried out. Feeding was carried out based on the direct method. By this method, cod liver oil which contains high n3 PUFA was emulsified with either caesin, soybean lecithin or raw egg yolk. Results from this study showed that the concentration of n3 PUFA of cod liver oil emulsified in caesin was the highest compared to soybean lecithin and raw egg yolk. Analyses carried out indicated that 20:5n3 and 22:6n3 present in the cod liver oil emulsified caesin was also present in the tissues of Artemia salina. This, therefore entails that the nutritional value of Artemia as live food for fish larvae and invertebrates will be enhanced.*

*The concentration of n3 PUFA in Artemia reached its maximum value between 6 and 12 hours of the enrichment period for cod liver oil emulsified in caesin, while in the case of using soybean lecithin as emulsifier, the maximum level was obtained between 6th and 9th hours of enrichment before the level decreased from the 9th to the 12th hour.*

*From this study too it can be said that the globule size formed when different emulsifier were used did not vary much. This means that the globule sizes would not influence in the concentrations of n3 PUFA formed in the enriched Artemia.*

*This study also showed that the different emulsifiers did not affect the composition of n3 PUFA present in the tissues of Macrobrachium rosenbergii.*



## ABSTRAK

Kajian telah dijalankan untuk meningkatkan nilai pemakanan naupli *Artemia salina* sebagai makanan hidup dengan cara memberikannya makanan yang telah diperkayakan dengan n3 PUFA. Pemberian makanan ini dilakukan secara langsung. Dalam kaedah ini, minyak ikan kod yang mengandungi n3 PUFA yang tinggi diemulsikan dengan menggunakan agen pengemulsi kasein, lesitin kacang soya dan kuning telur mentah. Dalam kajian yang telah dijalankan, kepekatan n3 PUFA di dalam minyak ikan kod yang diemulsikan dengan kasein mempunyai peratus yang tertinggi berbanding dengan lesitin kacang soya dan kuning telur mentah. Analisis yang telah dijalankan menunjukkan bahawa asid lemak (20:5n3 dan 22:6n3) di dalam minyak ikan kod yang diemulsikan dengan kasein wujud didalam tisu naupli *Artemia salina*. Ini selanjutnya memperbaiki nilai pemakanan *Artemia salina* sebagai makanan hidup bagi larva ikan dan invertebrat.

Kepekatan n3 PUFA di dalam *Artemia* meningkat kepada tahap maksimum di antara 6 hingga 12 jam selepas diperkayakan, kecuali bagi *Artemia* yang diperkayakan dengan minyak ikan kod yang telah diemulsikan dengan lesitin kacang soya mencapai tahap maksimum di antara 6 hingga 9 jam, tetapi kandungannya menurun dari jam 9 ke 12 selepas diperkayakan.

Dari kajian ini juga didapati tidak ada perbezaan antara saiz globul minyak yang terbentuk bila diemulsikan dengan agen pengemulsi yang berlainan. Ini bermakna saiz globul dari berbagai jenis pengemulsi tidak ada pengaruh terhadap kandungan n3 PUFA *Artemia*.

Kajian ini juga telah menunjukkan bahawa *Artemia* yang diperkayakan dengan menggunakan 3 jenis pengemulsi tidak memberi kesan ke atas kandungan n3 PUFA di dalam tisu *Macrobrachium rosenbergii*.