EFFICACY OF BINDERS ON THE QUALITY OF MICROBOUMD DIETS AND GROWTH PERFORMANCES OF FRESHWATER PRAWN, *Macrobrachium rosenbergii* POST LARVAE

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DEDICATION

This thesis is exclusively dedicated:

Especially my parents,
Nik Kamaruzaman & Hasnah

My brothers and sisters,
Hisham, Edi, Ekin, Rosminiey, Fendy, Hafiz, Izzati, Arif, Amira, Shazlin

My nieces and nephews,
Natasha, Nabella, Nazeem, Farish, Elina, Elisya, Ezzara, Damia

Also my husband,
Ahmad Hariri Mohd Nawi

Their love and encouragement are the most wonderful of the many blessing that Allah S.W.T has given to me.

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EFFICACY OF BINDERS ON THE QUALITY OF MICROBOUND DIETS AND GROWTH PERFORMANCES OF FRESHWATER PRAWN, *Macrobrachium rosenbergii* POST LARVAE

NIK NUR AYU HAFIZAH BINTI N KAMARUZAMAN

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School : School of Fisheries and Aquaculture Sciences

Effects of microbound diets (MBD) in post larvae of *Macrobrachium rosenbergii* were investigated in series of experiments. Five MBDs were formulated with different binders (carboxymethyl cellulose (CMC), agar, zein, alginate and carrageenan). The water stability of the diets was analyzed by monitoring the dry matter retention, turbidity of water and observation of physical structure from 0 to 360 minutes. MBD with zein showed higher dry matter retention, followed by MBD with agar. Absorbance value of MBD water sample was increased with the increasing disintegration of the MBD in the water. Throughout the experiment, MBD with zein consistently showed the lowest value of absorbance. The physical structure of all MBDs remained stable after 40 minutes of immersion except for MBD with alginate which partial disintegrated. Survival and growth performance of post larvae of *M. rosenbergii* fed with the same five sets of MBD also evaluated for 14 days. At the end of the feeding trial, survival rate of post larvae fed with MBD formulated with CMC, agar, zein, alginate and carrageenan were 44, 62, 53, 43 and 52%, respectively. For growth performances, there were no significant differences.

In third experiment, MBD formulated with agar was fed to post larvae of *M. rosenbergii* at various frequencies and timing (0800, 2000, 0800-2000, 0800-1400-2000 and 0800-1200-1600-2000) for two weeks. The effects of this feeding regime on *M. rosenbergii* showed that post larvae fed three times a day, 0800-1400-2000 had significantly higher survival rate (45%) compare to other treatments. Significant difference was not obtained from growth performances however, 0800-1400-2000 feeding had the best growth performances compared to other treatments. For body composition in protein content, no significant different was observed among all treatments ($P>0.05$). Meanwhile, histological study of hepatopancreas showed significant differences on length, width and size of the cell ($P<0.05$). Results from these experiments have high practical value and readily applied. Appropriate binder type and optimal feeding regime will boost hatchery culture of *M. rosenbergii* by optimizing their survival, growth, reduce management cost and manage good water quality.

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

KEBERKESANAN BAHAN PENGIKAT KE ATAS DIET MIKRO DAN PRESTASI TUMBESARAN PASCA LARVA UDANG GALAH, *Macrobrachium rosenbergii*

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Kesan-kesan diet mikro (MBD) ke atas pasca larva *Macrobrachium rosenbergii* dikaji dengan beberapa siri eksperimen. Lima MBD telah diformulasikan dengan lima bahan pengikat yang berbeza (*carboxymethyl* selulosa (CMC), agar, zein, alginat dan karagenan). Kestabilan air telah dianalisis dengan mengkaji baki berat bahan kering, kekeruhan air dan pemerhatian keadaan fizikal diet mikro dari 0 ke 360 minit. MBD dengan zein menunjukkan baki berat bahan kering adalah yang paling tinggi diikuti MBD dengan agar. Nilai serapan sampel air bagi MBD meningkat dengan kadar peningkatan kelarutan MBD dalam air. Bagi keseluruhan eksperimen kekeruhan air, MBD dengan zein menunjukkan nilai serapan yang paling rendah secara konsisten. Struktur fizikal bagi semua MBD kekal stabil selepas minit ke 40 rendaman kecuali MBD dengan alginat yang sebahagiannya telah larut. Kadar hidup dan pertumbuhan bagi pasca larva *M. rosenbergii* dikaji setelah larva diberi makan dengan menggunakan lima set MBD yang sama selama 14 hari. Pada hujung percubaan pemakanan, kadar hidup bagi pasca larva yang telah diberi makan MBD

dengan CMC, agar, zein, alginat dan karagenan adalah masing-masing 44, 62, 53, 43 dan 52%. Bagi perkembangan tumbesaran, tiada perbezaan yang signifikasi bagi semua MBD. Dalam eksperimen yang ketiga, MBD yang diformulasi dengan agar telah digunakan untuk eksperimen regim pemakanan pasca larva *M. rosenbergii* pada masa dan frekuensi yang berbeza (0800, 2000, 0800-2000, 0800-1400-2000 and 0800-1200-1600-2000) selama dua minngu. Kesan regim pemakanan ke atas *M. rosenbergii* menunjukkan, pasca larva yang diberi makan tiga kali sehari, 0800-1400-2000 mempunyai signifikasi kadar hidup yang lebih tinggi (45%) berbanding dengan regim pemakanan yang lain. Perbezaan yang signifikasi tidak diperolehi di dalam perkembangan tumbesaran, namun, rawatan 0800-1400-2000 mempunyai perkembangan tumbesaran yang paling baik berbanding regim pemakanan lain. Bagi komposisi badan untuk kandungan protein, tiada perbezaan signifikasi bagi semua regim pemakanan ($P>0.05$). Kajian histologi pada hepatopankreas pula menunjukkan perbezaan signifikan ke atas panjang, lebar dan saiz sel ($P<0.05$). Keputusan kajian mempunyai nilai yang praktikal dan boleh diaplikasi. Kesesuaian bahan pengikat dan regim pemakanan yang optimal boleh meningkatkan penternakan hatcheri bagi *M. rosenbergii* melalui peningkatan kadar hidup, perkembangan tumbesaran, pengurangan kos pengurusan dan kawalan kualiti air yang baik.