PATHOGENESIS OF *Streptococcus agalactiae* IN HYBRID TILAPIA, *Oreochromis niloticus* (Linnaeus, 1758) x *Oreochromis mossambicus* (Peter, 1852)

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Thesis Submitted in Fulfilment of the Requirement for the Degree of Master of Institute of Marine Biotechnology

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*D*edicated to my beloved mother, family,

friends and to those who had contributed tosuccess
this thesis

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Institute : Institute Marine Biotechnology

This study was conducted to examine the development of Streptococcosis in farmed tilapia (*Oreochromis sp.*). The fish samples were collected from WakafTapai, Kuala Terengganu. The fish samples were screened and acclimatized to the water condition in Freshwater Hatchery of Universiti Malaysia Terengganu for two weeks before the experiment been conducted. Meanwhile, the bacteria were collected during the Streptococcosis outbreak at cage cultured tilapia at Arau, Perlis. The bacteria were screened, cultured, isolated and identified. Temperature tolerant and growth rate tests were conducted to access the ability of survival of *S. agalactiae* in different temperatures and in different media. The optimum temperature of bacteria growth was applied as the culture temperature for *in-vivo* test.Result shows that *S. agalactiae* grow in all tested temperature and showed the optimum growth rate at 32 °C.

Then the *in-vitro* test was conducted to examine the attachment of bacteria on nostril, gills and intestine of fish for 8 hours. Result shows the bacteria attached in all selected organs in this study and were fully colonized on all organ surfaces by the seventh hour. Lastly the *in-vivo* test was conducted;bacteria with concentration 1.64 x 10^8 cfu/ml were adding to the fish samples by immersion method. Referring to the sequence of bacteria attachment for the first 12 hours in *In-vivo* test, *S. agalactiae* was found started to attach on gills, then on kidney, liver and intestine. The bacteria were believed to enter fish body through the gills to kidney, then to liver following the blood stream and lastly go to the intestine of the fish. Unfortunately there was no bacterium in the fish blood sample. So the hypothesis of bacteria move through the blood was rejected. Thusfurthur studies are needed to understand the full picture of *S. agalactiae* movement in fish.

Abstrak tesis ini dikemukakan kepada senat Universiti Malaysia Terengganu untuk memenuhi keperluan untuk Ijazah Sarjana Sains

PATHOGENESIS JANGKITAN *Streptococcus agalactiae* PADA TALAPIA HIBRID, *Oreochromis niloticus* (Linnaues, 1758) x *Oreochromis mossambicus* (Peter, 1852)

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Ujikaji ini telah dijalankan untuk mengaji perkembangan penyakit Streptococcosis dalam ikan tilpia (*Oreochromis sp.*). Sampel ikan didapati dari Wakaf Tapai, Kuala Terengganu. Ikan-ikan tersebut telah diskrin dan ditenangkan kepada keadaan air di Hatcheri Air Tawar, Universiti Malaysia Terengganu selama 2 minggu sebelum ujikaji dijalankan. Sementara itu, bakteria *S. agalactiae* yang digunakan dalam ujikaji ini didapatkan dari tilapia ternakan di Arau, Perlis semasa wabak Streptococcosis meletus. Sebaik sahaja bakteria tersebut didapati, ia telah diskrin, diasingkan dan dikenalpastikan. Ujikaji terhadap tahap tahanan bakteria terhadap suhu yang berbeza telah dijalankan dan kadar pertumbuhan bakteria dalam media yang berlainan telah dicatat. Suhu optima yang didapati dari kedua-dua ujian ini telah digunakan untuk kajian *in-vivo* dalam ujikaji ini. Kajian i*n-vitro* telah dijalankan untuk mengkaji lampiran bacteria di atas hidung,

insang dan usus ikan mengikut masa selama 8 jam. Akhirnya dalam kajian *in-vivo*, bakteria pada kepekatan 1.64 x 10^{10} cfu/ml telah dimasukkan ke dalam tangki ikan bersama dengan air tangki yang telah dirawat untuk menghasilkan bakteria dengan kepekatan 1.18 x 10^{8} dan diinokulasi ke atas sampel ikan dengan menggunakan kaedah rendaman. Menurut keputusan dari kajian-kajian tersebut, bakteria menunjukkan pertumbuhan dalam semua suhu yang dikaji dan tumbuh dengan sangat pesat pada 32 °C. Dalam kajian *in-vitro*, bakteria didapati melekat di atas semua organ yang terpilih untuk kajian ini dan bakteria-bakteria tersebut berjaya menyelaputi permukaan organ-organ tersebut dalam masa 7 jam. Menurut aliran lampiran bacteria secara *in-vivo* selama 12 jam, bakteria didapati terlekat di permukaan insang pada mulanya, kemudian di ginjal, hepar dan akhirnya di usus. Bakteria-bakteria tersebut dipercayai memasuki ke dalam badan ikan melalui insang, kemudian ginjal, ke hepar dan akhirnya ke usus dengan mengikut aliran darah. Malangnya tiada bakteria ditemui dalam darah ikan. Maka hipotesis ini telah ditolak. Kajian-kajian terperinci diperlukan untuk memahami gambaran terperinci mengenai pergerakkan *S. agalactiae* dalam badan ikan.