EFFECT OF PROBIOTIC ON DEVELOPMENT OF FINGERLING KERAI LAMPAM

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FP 2018 20

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DEPARTMENT OF AQUACULTURE

FACULTY OF AGRICULTURE

UNIVERSITI PUTRA MALAYSIA

SERDANG, SELANGOR

2018

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CERTIFICATION OF APPROVAL

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This is to certify that I have examined the final year project and all correction has been made as recommended by the panel examiners. This report complies with the recommended format stipulated in the AKU4999 project guidelines, Department of Aquaculture, Faculty of Agriculture, Universiti Putra Malaysia.

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_____

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ACKNOWLEDGEMENT

Alhamdulillah all praises to Allah S.W.T with His willing for giving me strength, health, knowledge and ability to complete my final year project. I would like to express my sincerest gratitude to my kindest supervisor, Dr Muhammad Fadhil Syukri bin Ismail for his patience helped me in supervising my writing and project, excellent guidance with his knowledge, continuously support and encouragement throughout my project and study.

I would like also to express my sincere thanks to my very helpful and supportive senior master students, Nur Jannah, Ain Azahar, Azfar Ismail and Atiyah Ramli who help me through whole project. They are always available whenever I had problem about my project, always responded to my questions with lots of patience and support me from the begin until the end of my project. Besides that, I would like to thank Mrs Nur Shafika Abdul Jalil, Mr. Zawawi Idris and Mrs. Hafiza as the technical assistant for their hard work in assisting and preparing the equipment during my project.

Never forgot, I owed my deepest gratitude to my colleages and my dearest friends especially to Fatin Nur Khairiyah, Nur Liyana, Nur Farhanum, Nafisah, Muhammad Ikhmal, Mohamad Azwan, Mohd Taslim who helped me during my sampling and who give a lot of support and spirit either directly or indirectly for me to complete my project.

Last but not least, I'm very grateful and thankful to my family especially my mother, Zaiton and my father, Awg Khalid for their prayers, encouragement and support throughout my project.

Words can not simply express my overwhelming appreciation to all of these people. Without them, I would not be able to complete this project successfully. Only prayers that I able to repay all of you. May Allah bless all of us.

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ABSTRACT

Probiotic is a live microorganism, capable of improving health and growth if given to the right species of probiotic. This research was aimed to examine the effect of different probiotics on development of growth, survival and body composition of fingerling Kerai Lampam. The treatment used of this experiment is a completely randomized with three treatment which is two different species of probiotic and control that do not added probiotic. The fingerlings were immersed every seven days with two different species of bacteria, *Bacillus pocheonensis* and *Lysinibacillus fusiformis* with concentration of 10^6 $CFUmL^{-1}$. The growth, survival and body composition parameters were measured prior and after one month of culture. According to the result, the growth and body composition showed no significance differences between the treatment ($P > 0.05$). However, it was relatively larger in the treatment treated with probiotic. Treated fish did not show any sign of infection during the experiment. In conclusion, both species of probiotic was not able to enhance the development of fingerlings Kerai Lampam.

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ABSTRAK

Probiotik adalah mikroorganisma hidup, yang mampu meningkatkan kesihatan dan pertumbuhan jika diberi spesies probiotik yang tepat. Kajian ini bertujuan untuk mengkaji kesan probiotik yang berlainan terhadap perkembangan pertumbuhan, kelangsungan hidup dan komposisi badan anak ikan Kerai Lampam. Rawatan yang digunakan untuk kajian ini ialah secara rawak sepenuhnya dengan tiga rawatan iaitu dua spesies probiotik yang berlainan dan satu rawatan yang tidak ditambah probiotik.Untuk tujuan ini, anak ikan itu direndam setiap tujuh hari dengan dua spesies bakteria berlainan, *Bacillus pocheonensis* dan *Lysinibacillus fusiformis* dengan kepekatan 10^6 $CFUmL^{-1}$. Parameter pertumbuhan, survival dan komposisi badan diukur sebelum dan selepas satu bulan kajian. Berdasarkan hasil kajian, pertumbuhan dan komposisi badan tidak menunjukkan perbezaan yang signifikan antara rawatan ($P > 0.05$). Walaubagaimanapun, kajian menunjukkan rawatan yang dirawat dengan probiotik lebih tinggi. Ikan yang dirawat tidak menunjukkan sebarang jangkitan sepanjang kajian. Sebagai kesimpulan, kedua-dua spesies probiotik tidak dapat meningkatkan perkembangan anak ikan Kerai Lampam

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LIST OF ABBREVIATION

DOF	Department of Fisheries
kJ	Kilojoules (unit of energy)
sp	Species
CFU	Colony forming unit
ml	Milimetre
°C	Degree celcius
h	Hour
g	Gram
SE	Standard error
ANOVA	Analysis of Variance
%	Percentage

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CHAPTER 1

INTRODUCTION

Aquaculture industry in Malaysia plays a vital part as real provider of animal protein that can improve the economy of our country. Aquaculture is an essential method for expanding food security for local production and increase export incomes. Fish has been comprehensively known as a good source of protein and furthermore they are good for maintenance of healthy body (Andrew, 2001). At southest Asian region which include Peninsular Malaysia and the island of Borneo, consist of highest freshwater diversity in the world (Zakaria Ismail, 1990). As stated by Inger and Chin (1962), Mohsin and Ambak (1983), in Malaysia the most species are fishes in the sub-family Cyprininae (i.e. genera Barbodes, Barbonymus, Cyclocheilichthys, Hampala, Osteochillus, Puntius and Tor). Family Cyprinidae forms the largest family in terms of number of genera and species in almost every water body in the region (Mohsin & Ambak, 1983; Zakaria Ismail, 1990).

In aquaculture, a technique of breeding to produce new strain from two distinct species is called hybridization. Production of several species of freshwater and marine fishes is from hybridsation as it play a significant role for in increasing aquaculture production. The purpose of hybrid production is to improve traits by combine desirable traits of two species into a single group of fishes such as improve growth rate and stronger resistance to disease (Bartley et. al, 2001). According to Aminur Rah et. al (2013), hybrid produced is to enhance development rate, productivity by hybrid vigor, produce desirable trait, prevent unwanted reproduction through induced breeding using own broodstock (sterile fish), combine valuable characteristic of their parent, for example, good quality of flesh,

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disease resistance and better environmental tolerances. These were demonstrated in hybrid catfish in Thailand, hybrid stripped bass in the USA, hybrid tilapia in Israel and hybrid characids in Venezuela. This technique was implemented to produce better commercialize fish. This fish have higher market value and quite limited because hybrid fish depends on availability of the broodstock in the wild. In this study, Kerai Lampam (*Hypsibarbus wetmorei*, Kerai X *Barbodes gonionotus*, Lampam jawa*)* was selected as our model organism for the probiotic treatment. Lemon fin barb hybrid is a cross between the male broodstock, Lemon fin barb (kerai kunyit), *Hypsibarbus wetmorei*, and the female broodstock Silver barb (lampam Jawa) *Barbodes gonionotus*, can reproduce in captivity. The hybrid has the external features of the lemon fin barb with the fast growing feature of the silver barb.

Meanwhile one problem in hybridisation is the lack of growth promoter for hybrid fish. Growth promoter is needed to produce better fish quality compare with natural for commercialize purpose. The supplement of probiotic in fish, can be used to improve overall development. Probiotic is live microorganisms that colonize in the digestive system of the host. Probiotic act as a growth promoter by improving in digestion and good for health of the host (Gatesoupe et.al., 1999). It also able to improve nutrient absorption and it able to make high rate of growth feed efficiency and act as disease prevention of anti-nutritional factors present in the ingredients of pre digestion.

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However, lack of studies have been carried out in using probiotic for growth performances of hybrid species and lack of supplement for Kerai Lampam. Thus, the aim of this study were :

1) To examine the effect of different probiotic on development of Kerai Lampam fingerling, hybrid breeding *Hypsibarbus wetmorei* (Kerai) and *Barbodes gonionotus* (Lampam Jawa)
2) To identify the best probiotic use in fingerling Kerai Lampam. The development were examined are growth, body composition, liver, survival and deformity.

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REFERENCES

Andrew A.E (2001). Fish processing Technology. University of Horin press. Nigeria., pp.7-8.

Anizah et al. (n.d). Effect of dietary protein and protein energy ratio on the growth performance of Lemon Fin Barb hybrid *(Hypsibarbus WetmoreiXPuntius Goniotus*) Larvae.

Ahammad, A.K.S., Khan, M.M.R., Hossain, M.A. and Parvez I. (2009). Nursery rearing of Thai sarpunti, *Barbonymus gonionotus* larvae using three different supplementary feeds. Journal of Bangladesh Agriculture, 7(1), 139-1

Alavandi, S.V., Vijayan, K.K., Santiago, T.C., Poornima, M., Jithendran, K.P., Ali, S.A., Rajan, J.J.S. (2004). Evaluation of *Pseudomonas* sp. PM11 and *Vibrio fluviales* PM17 on immune indices of tigre shrimp, *Penaeus monodon*. Fish Shellfish Immunol. 17, 115–120

Bartley, Devin & Rana, K & Immink, AJ. (2001). The use of inter-specific hybrids in aquaculture and fisheries. Reviews in Fish Biology and Fisheries. 10. 325-337. 10.1023/A:1016691725361.

Bomba, A., R Nemcoa, S. Gancarefkova, R. Herich, P. Guba, and D.Mundronova.2002. Improvement of probiotic effects in microorganisms by their combination with maltodextrins, fructo- oligosaccharides and poly unsaturated fatty acids.British Journal of Nutrition 88:95–99

Brunt, J. and Austin, B. (2005). Use of a probiotic to control *Lactococcosis* and *Streptococcosis* in rainbow trout, *Oncorhynchus mykiss* (Walbaum). Dis 28, 693–701.

Cherif A, Ouzari H, Daffonchio D, Cherif H, BenSlama K,Hassen A, Jaoua S, Boudabous A. (2001). Thuricin 7:anovel bacteriocin produced by *Bacillus thuringiensis* BMG1.7, a new strain isolated from soil. Lett Appl Microbiol. 32:243_247.

Dall, W., Moriarty, D.J.W. (1983). Functional aspects of nutrition and digestion. In:Mantel, L.H. (Ed.), The Biology of Crustacea, vol. 5.

© COPYRIGHT UPM

De Schrijver, R. Ollevier (2000). Protein digestion in juvenile turbot (Scophthalmus maximus) and effects of dietary administration of *Vibrio proteolyticus*. Aquaculture 186, 107-116.

DOF (2013). Annual Fisheries Statistics 2012. Kuala Lumpur: Department of Fisheries Malaysia.

DOF (2014). Annual Fisheries Statistics 2013. Putrajaya: Department of Fisheries Malaysia.

DOF (2014). Annual Fisheries Statistics 2013. Putrajaya: Department of Fisheries Malaysia

Dey, M.M., M.A. Rab, F.J. Paraguas, S. Piumsombun, R. Bhatta, Md. F. Alam, W. Miao and M. Ahmed (2004). Fish consumption in selected Asian countries: A disaggregated analysis by types of fish and classes of consumers. Aquaculture Economics and Management (In press).

FAO/WHO (2001). Report on Joint FAO/WHO Expert, Consultation on Evaluation of Health and Nutritional Properties of Probiotics in Food Including Powder Milk with Live Lactic Acid Bacteria.

Fuller, R. (1989). Probiotics in man and animals, Journal of Applied Bacteriology, 66: 365-378.

Gatesoupe F.J (1999). The use of probiotics in aquaculture. Aquaculture 180: 147 165. Ghosh, S., Sinha, A., Sahu, C. (2008). Dietary probiotic supplementation ingrowth and health of live-bearing ornamental fishes. AquacNutr 14: 289-99.

Gildberg, A. and Mikkelsen, H. (1998). Effects of supplementing the need to Atlantic cod (*Gadus morhua*) fingerling with lactic acid bacteria and immuno-stimulating peptides during a challenge trial with *Vibrio anguillarum.* Aquaculture 167, 103–113.

Ghosh, A. K., Biswas, S., Sarder, L., & SabbirW, R. S. (2012). Induced breeding, embryonic and larval development of Koi carp *Cyprinus carpio* in Khulna, Bangladesh. Mesopotamian Journal of Marine Science, 27(1), 1-14.

Hussain, M.G., M. Akhteruzzaman, A.H.M., Kohinoor and K.A. Shah (1989). Semi intensive culture of silver barb. Journal of Fisheries, 12 : 32-38. Jeff Mittelmark & Anne Kapuscinski (n.d). Induced Reproduction in Fish.

© COPYRIGHT UPM

Minnesota Grant Sea.

Jamali, H., Tafi, AA., Jafaryan, H., Patimar, R (2014) Effect of Enriched *Artemia parthenogenetica* with Probiotic (*Bacillus spp*.) on Growth, Survival, Fecal Production and Nitrogenous Excretion in Rainbow Trout (*Oncorhynchus mykiss*) Larvae. J Fisheries Livest Prod 2:111. doi:10.4172/2332-2608.1000111

Johndevadoss Gobinath, and Ravichandran Ramanibai (2014). Histopathological Studies In The Gill, Liver And Kidney Of The Freshwater Fish *Labeo Rohita* Fingerlings.

Kamarudin S. (2015). Feeding and Nutritional Requirement of Young Fish.

Mohapatra S, Chakraborty T, Prusty AK, Das P, Paniprasad K, et al. (2012) Use of different microbial probiotics in the diet of Rohu, *Labeo rohita*, fingerling : Effect on growth, nutrient digestibility and retention, digestive enzyme activities and intestinal microflora. Aquaculture Nutritioon 18: 1-11.

Moriarty, D. (1997). The role of microorganisms in aquaculture ponds. Aquaculture 151, 333–349

Marte C.L., N.M. Sherwood, L.W. Crim and J.D. Tan (1987). Induced spawning of maturing milkfish (*Chanos chanos* Forskal) using human chorionic gonadotropin and mammalian and salmon gonadotropin-releasing hormone analogous. Aquaculture, 73 : 333 - 340.

Minar, M. H., Shamsuddin, M. M. G. U., Bablu, M. G. U., & Bhuyan, S. I. (2012). Induced spawning practices of different fishes in the hatcheries of Barisal district, Bangladesh. Trends in Fisheries Research, 1(2), 14-17.

Montchowui, E., Bonou, C. A., Lalèyè, P., Philippart, J. C., & Poncin, P. (2011). Successful artificial reproduction of the African carp: *Labeo parvus* Boulenger. 1902 (Pisces: Cyprinidae). Int J Fisheries Aquac, 3(3), 36-41.

Mohanta, K.N., Mohanty, S.N., Jena, J.K. an Sahu, N.P. (2008). Protein requirement of Silver barb, *Puntius gonionotus* fingerlings. Aquaculture Nutrition, 14, 143-15244.

Nayak S. K (2010). Probiotics and immunity: A fish perspective. Fish Shellfish Immunol 29: 2-14.

© COPYRIGHT UPM

Nikoskelainen, S., Ouwehand, A.C., Bylund, G. and Salminen, S. (2001) Protection of rainbow trout *(Oncorhynchus mykiss*) from furunculosis by *Lactobacillus rhamnosus*. Aquaculture 198, 229–236.

Prieur, G., Nicolas, J.L., Plusquellec, A., Vigneulle, M. (1990). Interactions between bivalves molluscs and bacteria in the marine environment. Oceanogr. Mar. Biol. Annu. Rev. 28, 227–352.

Rainboth, W. (2012). *Hypsibarbus wetmorei*. The IUCN Red List of Threatened Species 2012

Rengpipat, S., Phianphak, W., Piyatiratitivorakul, S. and Menasveta, P. (1998) Effects of a probiotic bacterium on black tiger shrimp *Penaeus monodon* survival and growth. Aquaculture 167, 301–313

Rainboth, W.J. (1996). The taxonomy, systematics, and zoogeography of hypsibarbus, a new genus of large barbs (Pisces: Cyprinidae) from the river of southern Asia (Vol. 129). University of California, London: University of California Press. 199.

S. Ismail et al. (2015). Dietary lipid requirement of lemon fin barb hybrid.

Sokheng C., C.K. Chhea, S. Viravong, K. Bouakhamvongsa, U. Suntornratana, N. Yoorong, N.T. Tung, T.Q. Bao, A.F. Poulsen and J.V. Jørgensen (1999). Fish migrations and spawning habits in the Mekong mainstream: a survey using local knowledge (basin-wide). Assessment of Mekong fisheries: Fish Migrations and Spawning and the Impact of Water Management Project (AMFC). AMFP Report 2/99. Vientiane, Lao, P.D.R.

Samsudeen Abideen and Manickam Babuselvam (2014). Antagonistic activity of *Lysinibacillus fusiformis* n 139 strain isolated from marine fish *Triacanthus strigilifer* and genome sequence, Int.J.Curr.Microbiol.App.Sci (2014) 3(4): 1066-1072

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Suharmili, R., Kamarudin, M. S., Saad, C. R., Md Yasin, I. S., RamezaniFard, E. & Mahmud, M. H. (2015). Effects of varying dietary protein level on the growth, feed efficiency and body composition of lemon fin barb hybrid fingerlings. Iranian Journal of Fisheries Sciences.

Sakata, T. (1990). Microflora in the digestive tract of fish and shell- fish. In: Microbiology in Poecilotherms. Elsevier, Amsterdam, pp. 171–176.

Tannock, G.W. (1988). The normal microflora: new concepts in health promotion. Microbiology Scientific Journals, 5(1): 4-8.

Taki, Y. (1974). Fishes of the Lao Mekong Basin. United States Agency for International Development, Mission to Laos. Agriculture Division, Vientane.

Verschuere, L., Rombaut, G., Sorgeloos, P., Verstraete, W. (2000). Probiotic bacteria as biological control agents in aquaculture. Microbiol. Mol. Biol. Rev. 64, 655–671.

Vine, N.G., Leukes, W.D., Kaiser, H. (2004). In vitro growth characteristics of five andidate aquaculture probiotics and two fish pathogens grown in fish intestinal mucus. FEMS Microbiol. Lett. 231, 145–152

Wang, X., Li, H., Zhang, X., Li, Y., Ji, W., Xu, H. (2000). Microbial flora in the digestive tract of adult penaeid shrimp (*Penaeus chinensis*). J. Ocean. Univ. Qingdao 30, 493–498.

Walker, W.A. and L.C. Duffy (1998). Diet and bacterial colonization: role of probiotics and prebiotics. Journal Nutritional Biochemistry, 9: 668-675.

Zakaria Ismail, M. (1990). Cyprinid fishes of the Genus Cyclocheilichtys in Peninsular Malaysia. Malayan Nature Journal, 44, 109-121.

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