



UNIVERSITI PUTRA MALAYSIA

Utilization of *Bacillus subtilis* (Cohn, 1872) and Neos-A as probiotics in the diet of GIFT tilapia

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**Utilization of *Bacillus subtilis* (Cohn, 1872) and Neos-A as probiotics in the
diet of GIFT tilapia**

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**This project report is submitted in partial fulfillment of the requirements for
the degree of Bachelor of Agriculture (Aquaculture)**

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This is to certify that I have examined the final project report and all corrections have been made as recommended by the panel of examiners. This report complies with the recommended format stipulated in the AKU 4999 project guidelines, Department of Aquaculture, Faculty of Agriculture, University Putra Malaysia.

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Abstract

An experiment on the utilization of *Bacillus subtilis* and Neos-A as probiotics in diet of GIFT (Genetic Improved Farmed Tilapia) was carried out. This experiment was conducted for 12 weeks at Wet Laboratory of the Department of Aquaculture, Faculty of Agriculture, University Putra Malaysia. The objective of this study was to determine the growth performance of fingerling GIFT fed with probiotic feed. Fingerlings with initial size ranged between 3 cm to 6 cm were used. Probiotic *B.subtilis* L10 strain and Neos-A were mixed with a commercial pellet. After feeding for 12 weeks, there were no significant differences ($P>0.05$) among treatments for growth performance of fish in both treatment. It was concluded that GIFT fish did not require probiotic in diets.



Abstrak

Satu eksperimen telah dijalankan ke atas penggunaan *Bacillus subtilis* dan Neos - A sebagai probiotik dalam makanan GIFT (*Genetic Improved Farmed Tilapia*). Eksperimen ini dijalankan sepanjang 12 minggu di Makmal Basah Jabatan Akuakultur, Fakulti Pertanian, Universiti Putra Malaysia. Objektif kajian ini adalah untuk menentukan pencapaian pertumbuhan anak ikan GIIFT diberi makanan mengandungi probiotik. Anak GIFT berukuran 3 cm hingga 6 cm. telah digunakan. Probiotik strain *B.subtilis* L10 dan Neos-A telah digaul dengan pelet komersial. Selepas 12 minggu pemberian makanan, tidak terdapat perbezaan yang bererti ($P>0.05$) bagi prestasi pertumbuhan ikan untuk semua rawatan. Kesimpulannya, ikan GIFT tidak memerlukan probiotik dalam makanannya.



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LIST OF ABBREVIATION

%	Percentage
ANOVA	Analysis of Variance
AOAC	Association of Official Analytical Chemist
CFU	Colony forming unit
cm	Centimeter
CSPB	Calf-specific probiotic
DO	Dissolved oxygen
DWG	Daily weight gains.
EPA	European Probiotic Association
FAO	Food and Agriculture organization
FCR	Feed conversion rate
g	Grams
GIFT	Genetically Improved Farmed Tilapia
LG	Lipid gain
mg/L	Milligram per litter
ml	Millimeter
MSPB	Multispecies probiotic

MYP agar	Mannitol-egg yolk-polymyxin agar
NBRC	NITE Biological Resource 'Center
NFE-	Nitrogen free extract
°C	Degree Celsius
PER	Protein efficiency ratio
PG	Protein gain
Rpm	Revolutions per minute
SE	Standard error
SGR	Specific growth rate
SPSS	Statistical package for the social sciences
TSA	Trypticase soy agar
TSB	Trypticase soy broth
UPM	University Putra Malaysia
US dollar	United States dollar
USDA	United States Department of Agriculture
WAS	World Aquaculture Society

CHAPTER 1

INTRODUCTION

Tilapia is the second most important group of farmed food fish after carps (Fitzsimmons, 2010; FAO, 2013). Tilapia has a high market demand in the world, Table 1.1, observed the world tilapia production in 2012 (USDA, 2013). The world tilapia production in 2012 was 350 million metric ton (WAS, 2013). Countries in Southeast Asia country are among major producers and consumers of tilapia production. Indonesia is the biggest exporter, followed by, Thailand, Vietnam and Philippines in ASEAN country.

Table 1.1: Tilapia production in selected ASEAN country in year 2012.

Country	Value production tilapia in year 2012 (1000 USD)
Indonesia	77 693
Thailand	15 458
Malaysia	4 440
Vietnam	978
Philippines	393
South Korea	187
Singapore	94

Source: USDA 2013

Tilapia is a popular fish because it is efficient in utilizing natural aquatic foods, fast growth, propensity to consume a variety of supplemental feeds, herbivorous nature, resistance to disease and handling, ease of reproduction in capacity, and tolerance to wide ranges of environmental conditions (Lovell, 1998). Beside that tilapia will take feed in meal form or sinking and floating pellet. However, they prefer smaller pellet because they like to chew their feed (Lovell, 1998).

According to the European Probiotic Association (EPA), probiotics are administered through feed and as a water additive in the aquaculture sector. The supplementation of probiotics through feed is a better method to ensuring the efficiency of the probiotic bacteria in the gastrointestinal tract of fish. However, the study on the use of probiotic through feed is still scarce and limited (Anonymous, 2012). The use of probiotic are currently accepted as key factor in order to enhance the growth in aquaculture (Verschuere. *et al.*, 2000; Wong *et al.*, 2008; Ziaei-Nejad *et al.*, 2006). In addition, research of Verschuere. *et al.*, (2000) have proved that probiotics contain nutrients and enzymes for enhancing digestion. Furthermore, probiotics can improve the water quality (de Souza *et al.*, 2011; Lalloo *et al.*, 2007 and Ma *et al.*, 2009), and improve digestibility of artificial diet.

The common probiotics applied in fish culture belong to *Saccharomyces*, *Clostridium*, *Bacillus*, *Enteroccus*, *Lactobacillus*, *Shewanella*, *Leuconostoc*, *Lactococcus*, *Carnobacterium*, *Aeromonas* and several other genera (Anonymous,

2012). Zokaeifar (2012) proved that *B.subtilis* is a good feed supplement which efficient in improving growth performance of white shrimp.

Good feeding management in aquaculture including appropriate frequency can reduce overfeeding and maximize efficiency (Riche *et.al.*, 2004). As the tilapia industry expands, there is a need to know what feeding rate and frequency are optimal and whether using probiotic is efficient for the growth of GIFT tilapia.

The objectives of this project were:

1. To determine the effect of probiotic of Neos A and *B.subtilis* on growth and survival of GIFT tilapia.
2. To evaluate the response of GIFT tilapia to probiotic.

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