

## Protein-energy requirement of *Barbodes gonionotus* larvae

Carina Tayag, Mohd Salleh Kamarudin and Che Roos Saad

Department of Agrotechnology  
Faculty of Agriculture  
Universiti Putra Malaysia  
43400 UPM, Serdang, Selangor  
Malaysia

Telephone Number of Corresponding Author: 03-89464103

E-mail of Corresponding Author: msalleh@agri.upm.edu.my

**Key words:** *Barbodes gonionotus*, dietary protein/energy, larvae, nutrition

### Introduction

Availability of quality larvae is one of the most important factors in the success of commercial aquaculture production. At present, fish larviculture is still dependent on the use of expensive live food such as *Artemia* and rotifers. This is one of the major constraints in finfish hatchery production. Researchers and fish nutritionists are continuously developing artificial diets to eliminate or partially replace the use of these live foods.

The silver barb, *Barbodes gonionotus* is one of the important aquaculture fish species in Southeast Asia (FAO, 1996). It could be used as a model species for other high value Malaysian freshwater river carps. Larval protein requirements for this species have been determined (Kamarudin et al., 2003). This study was carried out to determine the optimum protein and energy requirements of *Barbodes gonionotus* larvae reared at laboratory conditions.

### Materials and Methods

The study was conducted at the Aquatic Resources Technology Laboratory, Faculty of Agriculture, Universiti Putra Malaysia. Five days old larvae with an initial length and weight of 4.36 mm and 0.78 mg respectively were used in the study. Larvae were produced through induced breeding using carp pituitary extract.

Six practical microbound diets containing 2 levels of protein (50% and 55%) and three gross energy levels (450, 470 and 490 kcal/100g). The protein levels were based from the previous work on the sub-optimum and optimum protein requirements for this species (Kamarudin et al., 2003). Feed ingredients include fishmeal, shrimp meal, soybean meal, palm oil, binder and vitamin-mineral premix. Two different feed sizes were used such as 125- 212  $\mu\text{m}$  for the first week and 212-250  $\mu\text{m}$  for the second week of feeding. Larvae were stocked at a rate of 10 larvae  $\text{l}^{-1}$  and were fed on test diets on an ad libitum basis three times a day for 16 days. During the experiment, aquaria were cleaned. Fish larval body composition at the beginning and at the end of the experiment was analyzed. Data on growth, survival, FCR, PER and body composition were subjected to one-way analysis of variance (ANOVA). Duncan's Multiple range test was used to compare treatment means.

### Results and Discussion

Larval survival was not affected by the dietary treatments. Significant differences in the growth response of the larvae began at Day 8. Larvae fed diet 50% protein and 470 kcal/100g energy obtained the highest final weight, weight gain and SGR. Body protein of the larvae was not significantly affected by dietary treatments. Lipid content tended to increase with an increase in protein content of the larvae.

The present study indicated that *B. gonionotus* larvae reared on diet containing 50% DP level and 470 kcal/100 g energy with a P/E ratio of 106.3 mg/kcal obtained the best growth and survival after 16 days of rearing period. Further increased of energy with the same protein level resulted in a significantly decreased growth. At 470 kcal/100g energy level, an increased in dietary protein also caused a slightly decreased in growth. The study suggested that a diet with the optimum P/E ratio produces the best growth. Winfree and Stickney (1981) reported that diets with the same P/E ratio but differing in protein and energy content could also produce different growth. In our previous study using lower isocaloric diets (Kamarudin et al., 2003), dietary protein of 55% was found to be optimum. This phenomenon may partly explained that diets used in earlier work were slightly deficient in energy and some of the dietary protein was used for energy needed for maintenance and voluntary activity which must be satisfied first before energy becomes available for growth (Lovell, 1989).

### Conclusions

A diet containing 50% protein and 470 kcal/100 g energy with a P/E ratio of 106.3 mg/kcal was ideal for optimal growth and survival of *Barbodes gonionotus*.

### Benefits from the study

To date, most hatchery operators are still depending on the use of live food in larval rearing. Results from this study should be able to eliminate that dependency, lessen the cost of fry production and prevent transmission of diseases through live food contamination.

### Patent(s), if applicable:

Nil

**Stage of Commercialization, if applicable :**

Nil

**Project Publications in Refereed Journals:**

Nil

**Project Publications in Conference Proceedings:**

Nil

**Graduate Research**

---

<b>Name Graduate</b>	<b>of</b>	<b>Research Topic</b>	<b>Field of Expertise</b>	<b>Degree Awarded</b>	<b>Graduation Year</b>
Carina Tayag		Nutritional requirements of <i>Barbodes gonionotus</i> larvae	Fish Nutrition	M.S.	2004
Emiliano Aralar		Digestive system of <i>Barbodes schwanenfeldii</i> larvae	Fish Nutrition	M.S.	2004

---

---

---

**IRPA Project number**01-02-04-0501

**UPM Research Cluster:**AFF