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# Nursing of silver barb (*Puntius gonionotus*) in hapas at Huay Siet Reservoir Lao PDR

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Management of River and Reservoir Fisheries in the Mekong Component

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## ABSTRACT

In the past, fish stocking at the Huay Siet Reservoir used small fry purchased from local hatcheries, which had low survival rate after stocking because of their relatively small size and predation from natural fish, especially carnivorous species living in the reservoir. Therefore, in order to find a solution to this problem, an experiment was conducted with the objective to study the effectiveness of nursing fry up to fingerling size prior stocking to increase their size and survival rate. The experiment on nursing fry of silver barb (*Puntius gonionotus*) in hapas was conducted from 19<sup>th</sup> August to 20<sup>th</sup> October 2004 at the Huay Siet Reservoir located in Paksan District, Bolikhamxay Province. Data on feeds and feeding were gathered in order to identify appropriate feeding regimes for nursing fry of silver barb in hapas in the reservoir.

The experiment was conducted as a Randomized Complete Block Design with three treatments and three replications for each. The size of each hapa was 2 x 5 x 0.9m. Stocking density was 1000 fishes/hapa or 100 fishes/m<sup>2</sup>. The initial weight and length of the fish were between 0.49 to 0.53g and 2.52 to 2.54cm. Fish were fed with commercial catfish feed (>30%). Feeding was made twice a day for T1, 3 times/day for T2 and 5 times/day for T3. After the end of the experiment, there was no significant difference among the three treatments (P>0.05). The average total lengths were 7.37, 7.73, and 7.53cm in T1, T2 and T3. For the average weight of fish, there was no significant difference (P>0.05) between T3 (8.42g) and T1 (8.37g). However, T2 (9g) was greater than T3 and T1. Food Conversion Rate was calculated to be 1.68, 1.62 and 1.72 in T1, T2 and T3. Over 73% of the fish in all treatments survived.

Economic analysis indicated that the economic profit of those three treatments were \$US 41 for T2, \$US 26 for T1 and \$US 32 for T3.

**KEYWORDS:** Stocking, survival rates, growth, length, economic analysis, feeding frequency, treatment, replicates, food conversion

## INTRODUCTION

The experiment on nursing of silver barb (*Puntius gonionotus*) fish in hapas was conducted from 19 August to 20 October 2004 at Huay Siet Reservoir, Pakxan District, Bolikhamxay Province. The objective of the study was to evaluate the impact of feeding frequency on length, weight, food conversion rate and survival of silver barb nursed in hapas over a two-month period. To meet these objectives, we looked at appropriate feeding regimes for nursing silver barb in hapas and compared silver barb growth rates by varying the number of times that feeding took place per day. In addition we also determined the profitability of each feeding regime.

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## METHODS

### *Location and duration of study*

The study was conducted from 19 August to 20 October 2004 at Huay siet Reservoir Paksan District, Bolikhamxay Province, Lao PDR.

### *Experimental design*

The experiment was designed with 3 treatments (T1, T2, T3), each with 3 replications, The size of each hapa was 2 x 5 x 0.9m

### *Feed and feeding*

Fish were fed with commercial catfish feed (protein >30%). Feed was given twice a day for treatment 1 (T1), at 06:00 hours and 18:00 hours. For treatment 2 (T2), feed was given three times/ day at 06:00 hours, 12:00 hours and 18:00 hours. For treatment 3 (T3), feed was given five times/ day at 06:00 hours, 09:00 hours, 12:00 hours, 15:00 hours and at 18:00 hours.

### *Local made feed procedure*

Percentage of feed given per body weight was 10 per cent for weeks 1 and 2, 8 per cent for weeks 3 and 4, and 6 per cent for weeks 5 to 8.

## DESIGN

The experimental design was a Randomized Complete Block Design. Three treatments were applied with three replications for each treatment.

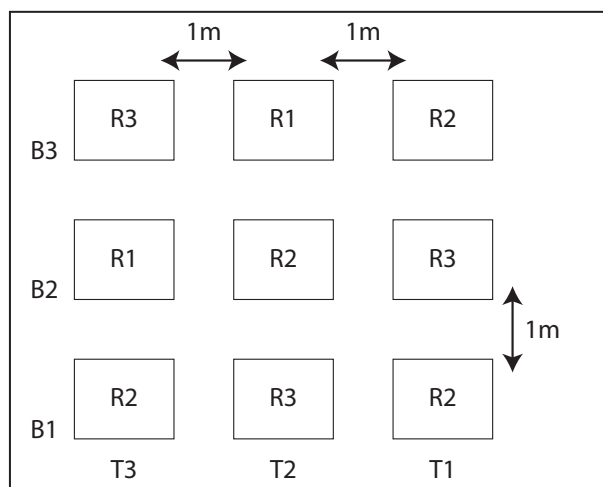


Figure 1: Treatments and three replications

### *Fish and Stocking density*

The stocking density was 1,000 fish/hapa or 100 fish/m<sup>2</sup>. Initial weight and length of the fish that were stocked was between 0.49g to 0.53g and 2.52cm to 2.54cm respectively.

### **Data collection**

Weight and length of fish:

- At the start and end of research 20 fish were selected and measured individually for weight and length
- Weight and length of fish was measured twice every month.

Water quality:

- Temperature, Dissolved Oxygen and pH were measured in the hapa once every week.

## RESULTS

### *The growth rate of the fish*

#### **Weight and length**

Table 1 shows the average weight and length of fish, measured twice per month, across the three treatments. The highest growth rate was found in treatment 2, but with all treatment under test, the fish showed rapid growth in the last two weeks of the experiment. Fish length was found to increase steadily throughout the experiment.

Table 1. *Average weight and length of fish under different treatment during the experimental period*

Treatment	Week II		Week IV		Week VI		Week VIII	
	Weight (g)	Length (cm)	Weight (g)	Length (cm)	Weight (g)	Length (cm)	Weight (g)	Length (cm)
T1	1.61	3.18	2.78	4.83	3.92	5.60	8.37	7.37
T2	1.71	3.33	3.20	5.60	4.44	6.00	9.00	7.73
T3	1.62	3.27	3.06	5.22	4.22	5.56	8.42	7.53

*Note:* Initial weight was 0.50 g, 0.52 g and 0.49 g for T1, T2 and T3 respectively. Initial length was 2.50 cm, 2.51 cm and 2.49 for T1, T2 and T3 respectively

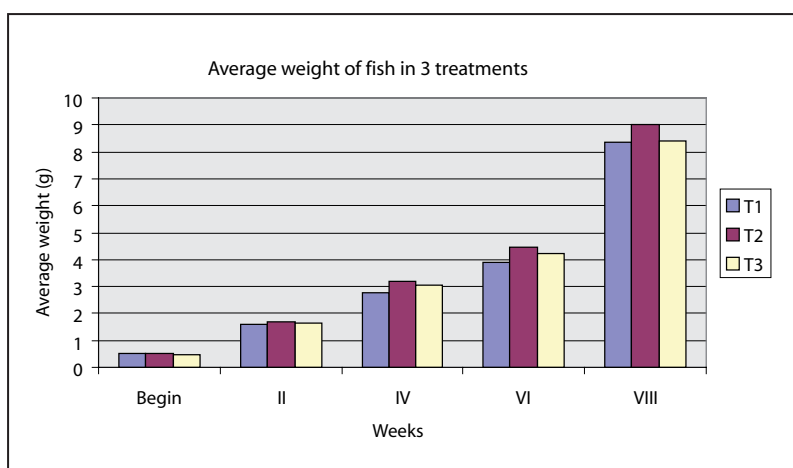


Figure 2. Average weight of fish in three treatments during the experimental period.

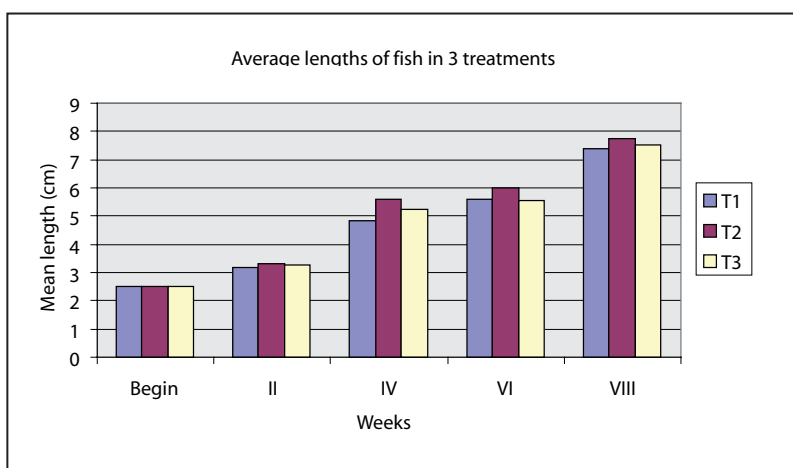


Figure 3. Mean length of fish in three treatments during the experimental period.

### Growth performance of the fish

Table 2. Weight and length measurement of fish in 3 treatments.

Item	T1	T2	T3
Weight gain (Fish/g)	8.37 ( $\pm 0.5$ )	9 ( $\pm 0.76$ )	8.42 ( $\pm 0.3$ )
Length gain (Fish/cm)	7.37 ( $\pm 0.133$ )	7.73 ( $\pm 0.136$ )	7.53 ( $\pm 0.016$ )
FCR	1.68	1.62	1.72
Survival rate (%)	73.37	78.4	74.27

Table 2 showing weight gain and change in length, with relatively high Food Conversion Ratios (FCRs) and fairly consistent survival rates across all treatments.

#### Water quality

Water quality data from 19 August to 20 October 2004 are presented in Table 3

Table 3. *Water quality parameters.*

Week	Water Temperature (°c)	DO (ppm)	NH <sub>3</sub> (mg/l)	pH
I	28	5	0.2	6.2
II	29	5	0.2	6.3
III	30	4.5	0.2	6.3
IV	27	4	0.3	7.5
V	28	3	0.4	7.8
VI	30	4.5	0.5	6.5
VII	29	5.2	0.6	6.3
VIII	31	5.3	0.6	6.4

#### ECONOMIC ANALYSIS

Table 4. *The economics of the three experimental treatments (US\$)*

Item	T1	T2	T3
Fixed capital	66.72	66.72	66.72
Revolving capital	16.35	18.32	17.13
Total expenses	83	85	83.85
Income from fish sales	109	126	111.85
Profit	26	41	32

#### DISCUSSION

The experiment on nursing of silver barb (*Puntius gonionotus*) fish in hapas at Huay Siet Reservoir (size around 150ha). However, it should be noted that the experiment was carried out during the wet-season months. During this time, water level increases and the water becomes turbid. Dissolved Oxygen (DO) levels may have been affected close to the hapas where the experiment took place. Predatory birds were a problem. Covering the hapas with a nylon-net can help to protect fish from predators, especially birds. The fish were fed with a commercial catfish feed (protein >30%) during the experiment. However, the size of the pellet given was quite big, and this may have affected growth rates during the initial period of the experiment (about 2 to 4 weeks after starting the trial). Later on, the fish adapted to this diet, and began feeding well in the hapas.

## CONCLUSIONS

- The most economically viable feeding regime in terms of profit was treatment at three times per day (T2).
- Statistically there was no significant difference in weight and length between the three treatments ( $P>0.05$ ).
- Economic analysis showed that the highest profit was T2 at \$US 41.

## RECOMMENDATIONS

- Nursing of silver barb (*P. gonionotus*) in hapas should be less than two months to avoid over-crowding that may lead to slow growth.
- Hapas should be covered with a nylon-net to protect fish from predators, especially birds.

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