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Commercial Feed and Algae for Feeding *Pinna bicolor* in Indoor Tanks

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Abstract The research determined the growth rate and survival rate of *Pinna bicolor* fed with commercial feed mixed with algae in three different proportions under the indoor condition. *Pinna bicolor* with the size more than 13 cm. length were caught from the natural in Chonburi province and were acclimatized in the concrete pond for 10 days. 30-33 ppt. of seawater was used in the experiment. After acclimatization, *P. bicolor* were divided into 3 treatments with 3 replications. Treatment 1 was fed with 0.5 g. of commercial feed and 1 liter of mixed *Isochrysis* sp. + *Tetraselmis* sp. in 25-liter indoor tank. Treatment 2 was fed with 1.0 g. of commercial feed and 1 liter of mixed *Isochrysis* sp. + *Tetraselmis* sp. Treatment 3 was fed with 1.5 g. of commercial feed and 1 liter of mixed *Isochrysis* sp. + *Tetraselmis* sp. All three groups of were fed with the same microalgal species at the same density and the same kind of commercial feed. All treatments were fed once a day for 3 months. Water was changed every day at least 1 liter and sediment was removed. Length, width, weight and survival rate of *P. bicolor* were recorded every month. At the end of the experiment, it was found that all treatments had survival rates of 100% and growth rates showed no difference in length and width. Only weight had little higher than the initial weight but showed no statistical difference. This experiment revealed that *P. bicolor* could be cultured under the indoor condition.

Keywords: *Pinna bicolor*, commercial feed, algae, indoor tank

Introduction

Pinna bicolor (Family Pinnidae), commonly called razor fish, fan mussels or pen shells are large fan-shaped edible bivalve molluscs (30-50 cm long), that live embedded in Gulf of Thailand and found in the Indo-pacific oceans. It has been widely distributed from Southeast Africa to Thailand, Malaysia, New Zealand and northern Japan (Butler and Keough, 1981). The outer shell is yellow-brown to dark brown but the inner shell is pearly white, triangular in shape. They are found in littoral sand and mud habitats and embedded in the ground by their byssal threads. In Malaysia, *P. bicolor* lived in soft and sandy soil while *P. deltodes* Menke, differed in the width of shell and the position of

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posterior adductor muscle, lived in a harder ground (Idris *et al*., 2009). Garcia-March and Marquez-Aliaga (2007) investigated the age of *Pinna bicolor* by the traces appear on the inner shell that caused by the position of the posterior adductor muscle scars.

Pinna spp. are used in many ways, especially the adductor muscle are cooked into many types of food in the restaurants. Because of its economic value, *P. bicolor* has been exploited extensively by fishermen. Currently, *P. bicolor* is not cultured in Thailand, all of them were caught from the natural resources and catches more every year. But the volume is not enough to demand. In some years, it has been found that some of them disappear or were caught a little and the sizes of them were smaller.

P. bicolor have the potential to develop into the economic species of Thailand. They have a number of characteristics that make them suitable for aquaculture such as seed can be obtained from the wild through spat collection (Cabanellas-Reboredo *et al*., 2009) or from hatchery production. Growth rate is rapid and individuals may attain a shell length of 200–300 mm in 1 year. Therefore, it must be studied in terms of technical culture. This research was a continuation of the previous research and investigated the feasibility of raising *P. bicolor* in indoor tanks by feeding them with commercial feed and microalgae.

The objective of this research was to determine the growth and survival rate of *P. bicolor* fed with mixed commercial feed and microalgae in indoor tanks to apply to the way of farming.

Materials and methods

The experiments were conducted at Department of Fisheries, Faculty of Agriculture and Natural Resources, Rajamangala University of Technology Tawan - ok, Chonburi, Thailand. *P. bicolor* with more than 13 cm. height (length) were collected from the coast of Chonburi province and brought to the indoor hatchery. Before the experiment, they were acclimatized for 10 days in the concrete tanks filled with 30-33 ppt of seawater. *P. bicolor* were fed with single-celled green algae and marine shrimp larvae commercial feed 1 time a day with the aeration in the pond all the time.

After acclimatization, they were divided into 3 groups, each with 3 replications. Group 1 was fed with 0.5 g. of commercial feed and 1 liter of mixed *Isochrysis* sp. + *Tetraselmis* sp. in 25-liter indoor tank. Group 2 was fed with 1.0 g. of commercial feed and 1 liter of mixed *Isochrysis* sp. + *Tetraselmis* sp. Group 3 was fed with 1.5 g. of commercial feed and 1 liter of mixed *Isochrysis* sp. + *Tetraselmis* sp. All three groups of were fed with the same

microalgal species at the same density and the same kind of commercial feed. All treatments were fed once a day for 3 months. Water was changed every day at least 1 liter and sediment was removed. Length, width and weight of *P. bicolor* were measured every month (Fig. 2) to avoid disturbance of growth of shell. The survival rates and growth rates were subjected to analysis of variance (ANOVA) followed by the comparison of means using Duncan's new multiple range test in CRD.

Results

During acclimatization, many *P. bicolor* were died due to catching method. Their shells and byssal threads were destroyed (Fig. 3). The survive *P. bicolor* were divided into 3 treatments with 3 replications. After 3 months of experimental period, their growth rates in term of length, width and weight of *P. bicolor* were shown in Tables 1, 2 and 3.

Figure 1. Indoor tanks for rearing *P. bicolor*

A **B**

Figure 2. Measure the length and width of *P. bicolor* (A) length (B) width.

Figure 3. Shell of *P. bicolor* was destroyed due to catching method.

Table 1. The average length of *P. bicolor* in each month.

Treatment	Initial length (cm) ±SD[/1]	Length (cm) at the end of each month		
		1	2	3
1	14.6 ±1.37	14.6	14.6	14.6
2	15.6 ±0.79	15.6	15.6	15.6
3	14.4 ±1.04	14.4	14.4	14.4

[1/] No statistical difference in initial length

Table 2. The average width of *P. bicolor* in each month.

Treatment	Initial width (cm) ±SD[/1]	Width (cm) at the end of each month		
		1	2	3
1	9.6±0.21	9.6	9.6	9.6
2	9.7±0.15	9.7	9.7	9.7
3	9.3±0.31	9.3	9.3	9.3

[1/] No statistical difference in initial width

Table 3. The average weight of *P. bicolor* in each month.

Treatment	Initial weight(g) ±SD[/1]	Weight (g) at the end of each month		
		1	2	3
1	186±25.06	188	191	190
2	206 ±24.25	210	215	210
3	155 ±13.23	155	160	156

[1/] No statistical difference in initial weight

P. bicolor showed no increasing in size. Length and width of all *P. bicolor* at the end of the trials were similar to the initial length and width. While their weight showed little higher than the beginning but had no statistical difference.

At the end of the experiment, all experimental groups had a survival rate of 100 %, as shown in Table 4.

Table 4. The survival rate of *P. bicolor* in each month.

Treatment	No. of individuals per treatment	Survival rate (%) at the end of each month		
		1	2	3
1	9	100	100	100
2	9	100	100	100
3	9	100	100	100

All of *P. bicolor* that were not injured too much by catching method and survived after the acclimatization, were still alive in every treatments. Some of them which their shells has been wound, got better during experimental period.

Discussion

Although the shells of *P. bicolor* were not longer and wider but their weights showed little higher than the initial weights. From observation, *P. bicolor* had repaired their damaged shells which the wound were caused by catching them from the nature. In the first time, feeds were used for repair their body and shell. Later, they were used in reproductive activities that caused the growth rates did not increase. A study of Beer and Southgate (2006) found that *P. bicolor* had a fast growth rate until 40 weeks of age, then growth rate started to decline. They had an average hinge length of about 146.3 millimeters (the shell lengths were in the range of 77-237 millimeters). At that time, the temperature of the sea in that area was growing higher. The reason for the decrease in growth rate was caused by the reproductive activity of *P. bicolor*. Compared to the size of *P. bicolor* held by Beer and Southgate (2006), *P. bicolor* in this experiment should be in the stop growing stage to prepare themselves for reproductive activity. In *P. nobilis*, growth rate had a seasonal pattern and varied with shell size. Small shell (4.5 cm.) grew faster, followed by a sharp decline to an approximately constant level (9 to 15 cm.) and a further decline with larger sizes down to almost zero (20 cm.) (Katsanevakis, 2007)

Even though *P. bicolor* showed a little higher weight than the beginning of the experiment but they were looked healthy and recovered their wounded shell. *P. bicolor* in all treatments were alived until the end of the experiment. This mentioned that commercial feed mixed *Isochrysis* sp. and *Tetraselmis* sp. could be use for feeding. Davenport *et al*. (2011) found that *P. nobilis* of different sizes ingested different food. Young *P. nobilis* ingested copious quantities of undetermined detritus, phytoplankton, zooplankton, pollen grains and bivalve larvae while large *P. nobilis* consumed calanoid copepods. All fan shells took in high numbers of harpacticoid copepods that were benthonic, feeding on microbial communities of detritus and benthic vegetation.

Nowaday, many bivalves can be induced spawning in the hatchery (Neo *et al*., 2011; Soria *et al*., 2010). *P. bicolor* showed the potential to develop into the economic species. They were easily fed with commercial feed and phytoplankton such as *Isochrysis* sp. and *Tetraselmis* sp. in the indoor tanks with aeration. In the future, fan shell culture will decrease contend between small scale fisheries and the community.

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