AQUACULTURE EXPERIMENT

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I. BACKGROUND

Fish culture in Thung Ma Ha Bay is mainly on sea bass, grouper and green mussels. Normally, the feeds for the fish culture are trash fishes caught by push net. Early in the morning, the fishermen operate their push nets around the fish cages, which are not more than 3 km from a relevant baseline. After CBRM project started in October 2001, a provincial coastal demarcated zone announcement on 4 October 2002 prohibited push nets, purse seines and dredges in the area. Many fish culturists got affected from this proclamation since they could no longer catch trash fish for their culture operations. While understanding the situation, the project tried to solve the problem. Thus in 2006, the Chumphon Marine Fisheries Development and Research Center (CMDEC) started a demonstration cum experiment with Chumphon Coastal Aquaculture Station (CCAS) on ARs feeds for fish culture. The responsibility of looking after the culture facilities and feeding the stocks was entrusted to a fish farmer who was designated by the aquaculture group.
Without cage culture, crab trap fishermen had problems because the crabs they caught were below the marketable size. In a group discussion among the staff of CMDEC and the crab trap fishermen in December 2004, they agreed to conduct an experimental crab culture in cages until marketable size. The CMDEC coordinated the whole scheme and provided the necessary expenses, while the crab trap fishermen were responsible for the practical implementation of the activity

II. SEA BASS AQUACULTURE

1. Objective

To demonstrate the benefit of ARs feeds in sea bass aquaculture

2. Fishermen participating in the sea bass aquaculture

Mr. Phirin Suwannaphut	4 cages
Mr. Niyom Daengtae	1 cage
Mr. Chaisit Chaiythui	1 cage
Mr. Cherd Khewmanee	3 cages
Mr. Teing Phumchat	3 cage

3. Experiment and demonstration

Equipment and Methods
12 fish cages, 4x4 meter, 6 cages for trash fish feeds and 6 cages for ARs feeds. Each cage was stocked with 1,000 fishes, size: 2-3 in and ave weight: 3.94 g.

Growth rate = (Final weight – First weight)/Number of days; measurement not by water technique

feeding and looking after the stocks by the fishermen. Consultant by CCAS

Experiment
The experiment commenced on 24th April 2006 with the transfer of 12,000 fishes from a private farmer in Phetchaburi Province. The ave weight of the fish was 3.94 g and the price was 4 Baht/piece. The fishes were distributed to the 12 cages at 1,000 pieces per cage.

In the Agreement, for ARs feeds, the capital was provide by CMDEC and after the culture and having profit, the fishermen will return the capital to CMDEC but for trash fish feeds, the fishermen had to find capital by themselves. A farmer stays in a hut to look after the culture facilities and feed the fishes. The amount of feeds given twice per day was recorded. The location of the trash fish feeds experiment was at sea while that of the ARs feeds experiment was set at a channel with salinity of 30-32 ppt and 15-16 ppt, respectively (Fig. 1). The weight was measured and recorded by CMDEC officer using a technique instead of the water technique in beginning and upon termination of the experiment.

Fig. 1 Location of trash fish feeds and ARs feeds experiment

Results

In the afternoon of 15 May 2006, one fish culturist, Mr.Cherd use anchovy bought from a middleman to feed the sea bass but in the morning of the next day all fishes in 3 cages were dead. While that of Mr.Teing's, the fishes were injured and found dead everyday because it was continuously raining during the first week of July 2006, so the experiment was terminated. For the ARs feeds experiment when it was raining in July, many fishes died because the farmer moved the fishes to a pond and he could not immediately find an air pump. He tried to keep the fishes in the pond until the situation became normal. In this connection, the researchers from CCAS observed that:

Fig. 2 Fish affected by bacterial disease

- All fishes that have been dead in the morning of 16 May 2006 may have been given trash fish with residues of chemicals used to preserve the fish.

- When it rains, low salinity stresses and agitates the fish and since there are parasites in the sea, when the fish rubs its body with the net where the parasites hold on, the bacteria enters the sore parts of the fish leading to mortalities (Fig. 2).

During that time, the staff of CMDEC checked the water quality in the canal, the results of which are shown in Table 1.

For the ARs feeds experiment during raining period in July, the culturist transferred the fishes to a small pond but could not find air-pump immediately. After 1 hour, some fishes with ave. length and weight of 18.5 cm and 75.78 g, respectively died while some 1,637 fishes survived. The surviving fishes were again cultured in the floating cages until 2 February 2007 (Fig. 3). In this experiment, sea bass grew satisfactorily in 63 days from initial ave. weight of 3.94 g to 75.77 g. In August, change ARs feed to bigger size that percentage of protein lower than old size. The fishes had ave. weight of 263.12 g within 214 days or at a growth rate of 1.18 g/day. A researcher from CCAS considers feeds as among the reasons for the slow growth. On 17 April, CMDEC sent ARs feed sample to the Freshwater Fish Feed Research Institute for the analysis of total protein content. The result showed that the protein content was standard for culture. In fact, with limited laboratory facilities, can not determine the protein content from fish meal or part of animals such as feather. For example , if use feather in ARs feed ,the total protein content was standard but may have been of lower in quality

4. Conclusion

In order to confirm the result, the farmer continued to culture the fish using trash fish. The results showed increase in weight of about 149.28 g during the next 61 days. On 3 May 2007, the farmer sold 121 kg sea bass with ave. weight of 500-700 g, 88 kg at 400-500 g, and 18 kg at 300-400 g valued at 20,050 Baht. The remaining 100 fishes weighed less than 300 g.

This experiment could not be concluded as a failure due to feeds, water quality or culture technique because the result from trash fish feeds could not confirm that the ARs feeds were of low quality. However, the fisherman learned that floating cages are better than fixed cages because these can be moved to another area when the water quality of a culture area starts to deteriorate.

Table 1. Water quality monitored in July

Water quality	normal	rainy
ammonia	0.11	0.103
nitrite	0.017	0.013
phosphate	0.73	0.100
DO	3.43	4.360
pH	9.06	9.230
salinity	16.07	3.160

5. Limitations

- Could not set the experiment in a neighboring location because the area was designated for aquaculture
- The project site was far from the CMDEC so its staff could not often visit the farmer and solve any problem immediately

III. Swimming Crab Aquaculture

1. Objective

To study the possibility of swimming crab culture in cages

2. Experiment and demonstration

Construction and installation of cages

In January 2005, cages with net mesh size of 6/8 inch were constructed by the fishermen in Ban Koh Teab. On 28 June 2005, staff from CMDEC and Crab Trap Fishermen group (CTFG) installed 10x10 m cages in the sea near the crab bank while installation of smaller cages, 4x4 m was done on 28 April 2006.

Experiment

This experiment has 2 phases: the first phase was from 28 June to 29 September 2005 in the 10x10 m cages stocked with 1,200 crabs of mixed sexes; and the second phase was from 28 May to 11 July 2006 in 4x4 m cages, one cage containing 100 male crabs, one cage had 100 female crabs and the other cage with mixed 50 female and 50 male crabs.

Chairman of CTFG, Mr. Chang looked after the culture and in feeding the crabs. Every day before or after operating the crab trap, he feeds the juvenile crabs with trash fish bought from middlemen at 10 Baht/kg. The feed quantity depends on the growth stages of the crabs.

Monthly sampling of data in the 10x10 m cages was done using the crab trap but before collecting the data, the crabs must not be fed for one day because it is easy to catch the crabs when they are hungry. For the 4x4 m cages, restricted net is used and making use of a boat to measure the weight and length (Fig. 4).

Fig. 4 Technique for collecting data on crabs in cage

3. Result

In 2005, good growth rate was observed in 2 months, from 22.22 g to 76.92 g but after that the increase was only 6.67 g in one month and survival was only 1.58% (Table 2).

Table 2. Growth of swimming crab in 10x10 m cage

month	weight(g)	Remain (crab)
1	22.22	1200
2	43.48	
3	76.92	
4	83.33	19 (1.58%)

Observations from the first experiment: culture period should not be more than 2 months. In 2006, the culture period was 45 days in the 4x4 m cages and using different sexes. Results indicated that the all male cage had ave size of 26.44 g at the start to 68.57 g during harvest with a survival of 13%. In the all female cage, the ave size was 28.48 g at the start to 58.92 g during harvest and survival of 7 %, while in mixed sex cage the ave size was 27.51 g at the start 58.39 g at harvest with survival of 56% (Table 3).

Table 3. Growth of swimming crab in 4x4 m cages

day	male		Female		Mixed female and male	
	weight(g)	remain	weight(g)	remain	weight(g)	remain
start	26.44	100	28.48	100	27.51	100
final	68.57	13	58.92	7	58.39	56

4. Conclusion

Swimming crab culture is not suitable for fishermen because more time must be used to be take care and observe behavior of the crabs. If the feeds given is not enough, the strong crabs eat the weak crabs especially during molting .The benefit is therefore not worthwhile.