



## Feeding management on the growth and survival rate of mud crab (*Scylla serrata*)

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### Abstract

This study aimed to assess the growth and survival of mud crab (*Scylla serrata*) cultured in a brackish water fed with supplemental feeds. The experiment was laid out in a two-factor experiment, sex of mud crab and the kind of feeds. This is arranged in a Randomized Complete Block Design (RCBD). There were three replications with two samples per treatment. The first factor was the supplemental feeds and the second one was the sexes. Factor A comprised supplemental feeds such as trash fish, bread meal and grated coconut and Factor B was on the sexes, male and female. Majority of the male mud crabs supplemented with trash fish and those females fed with grated coconut survived on the second week. Of the three supplemental feeds used, male mud crabs gained the highest growth on bread meal while female mud crabs performed better in grated coconut. There is sufficient evidence to reject the null hypothesis since there is a significant difference on the performance of mud crabs between the use of supplemental feeds and sexes on their weight and length.

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## Introduction

Mud crab (*Scylla serrata*) or red mud crab locally named as “*alimango*” is considered as one of the most important food from the sea. This is a lucrative for business because of its taste and high price command in the market (Palattao, 2008). *Scylla serrata* can be defined by the following physical characteristics. The front is cut into four lobes of about equal size and prominence. The anteriolateral border is cut into nine sharply acuminate teeth of approximately the same size. The carapace is smooth, except for faint granular ridges running from the last anteriolateral spine going obliquely onwards and is interrupted more or less at the cervical groove and a ridge on the region of the epibranchial. The chelipeds are smooth. Three strong spines are present on the anterior border of the arm and followed proximally with one or two large tubercles. On the posterior border of the arm are two spines, one distally located and the other a short distance behind. The inner border of the wrist is armed with a strong spine and its outer border with a comparatively smaller spine. The upper surface of the hand bears three spines which are sometimes reduced to mere tubercles. These spines are distributed as follows: one of the wrist articulations and one each on the inner and outer borders of the upper surface and are located distally. The penultimate segment of the male abdomen is broader than long and has convergent sides. The ultimate segment is triangularly rounded (Fernandez *et al.*, 1996).

The environmental impact of marine fish-farming depends very much on species, culture method, stocking density, and feed type, hydrography of the site and husbandry practices. There is concern that rapid expansion of aquaculture may be constrained in the future by dependence on low-value marine fish (trash fish) and fish meal which is used as aquaculture feed ingredients (Tidwell and Allan, 2001). One of the most important issues in fisheries all over the world is that of trash fish. Cai and Sun (2007) described that it is important to determine the carrying capacity of an aquaculture area to effectively manage the mariculture environment. Similar study of Cho *et al.* (1994) that the use of trash fish in marine

aquaculture has always been associated with environmental degradation, over-exploitation of finite pelagic fish stocks and issues with pathogen transmission. Another type of feeds is the bread meal and grated coconut which has the greater contribution in the growth and survival of different fishery products. Breadmeal supplies a significant portion of the nutrients required for growth. It has 8% to 13% protein content (Ambasankar *et al.*, 2009).

There has been a huge interest in the aquaculture of this species due to its high demand and price, high flesh content and rapid growth rates in captivity. In addition, Marketman (2005) emphasize that mud crab usually has high tolerance to nitrate and ammonia which is beneficial because ammonia-N is often the most limiting factor on closed aquaculture systems. With the aforementioned characteristics and importance of mud crabs and the fact that Filipinos nowadays really have to find ways in order to support the needs of the increasing number of populations through aquaculture, the researchers chose to study mud crab and find out its growth by using trash fish, bread meal and grated coconut as their source of food.

Generally, this study aimed to determine the growth and survival rate of mudcrab fed with supplemental feeds cultured in brackish water pond. Specifically, the study aimed to answer the following questions: What is the survival percentage and growth rate of the mud crab fed with trash fish, grated coconut, and bread meal as supplemental feeds?; What is the environmental condition of the experimental set-up? Is there any significant difference of the growth of mud crab fed with trash fish, grated coconut, and bread meal as supplemental feeds?; and What feeding management program can be proposed.

## Materials and methods

The experiment was laid out in a two-factor experiment, sex of mud crab and the kind of feeds. This is arranged in a Randomized Complete Block Design (RCBD). There were three replications with

two samples per treatment. The first factor was the supplemental feeds and the second one was the sexes. Factor A comprised supplemental feeds such as trash fish, bread meal and grated coconut and Factor B was on the sexes, male and female. The stocking density applied is one mud crab per container.

The materials used of the study were 36 mud crab juveniles that were secured from Bentig, Calape, Bohol. They were transferred from the said project area. Thirty-six pieces of containers were utilized in the fattening of mud crab. One ruler and one tape measure were used to measure the size of the bamboo screen and the length of the mud crab. Thirty-six pieces of bamboo screen served as the cover of the container. One weighing scale was utilized for weighing the mud crab in every sampling. A large long-handled scoop net with meshes was used in catching the mud crab. Other materials used were 36 pieces of ties for tying the mud crab during the harvesting period, one refractometer for determining the salinity of the water, one piece of saw for cutting the container and one roll of #20 nylon twine to tie.

Each sample was placed inside the container and covered with a lattice bamboo screen. The containers were prepared after finding a good and suitable location for the experimental study. They were placed horizontally in a right position so that the structure becomes stronger. Growth rate of the samples was recorded every week. Water parameters were monitored three times daily. Growth (weight and length) were analyzed following the analysis of variance for two-by-two factorial experiment.

### Results and discussion

The percent survival of mud crab was recorded on the second week after the set-up. There were 36 mud crabs stocked in different containers. Out of the 36 mud crabs, only two male mud crabs fed with bread meal and grated coconut survived. Male mud crabs fed with trash fish got the highest percentage of survival (50%) (Table 1). For the female mud crabs, those fed with grated coconut had the highest percentage survival of 83.3% among others. Both mud crabs fed with bread meal and trash fish had a percentage survival of 66.7% only.

**Table 1.** Percent survival of mud crab (*Scylla serrata*) fed with supplemental feeds

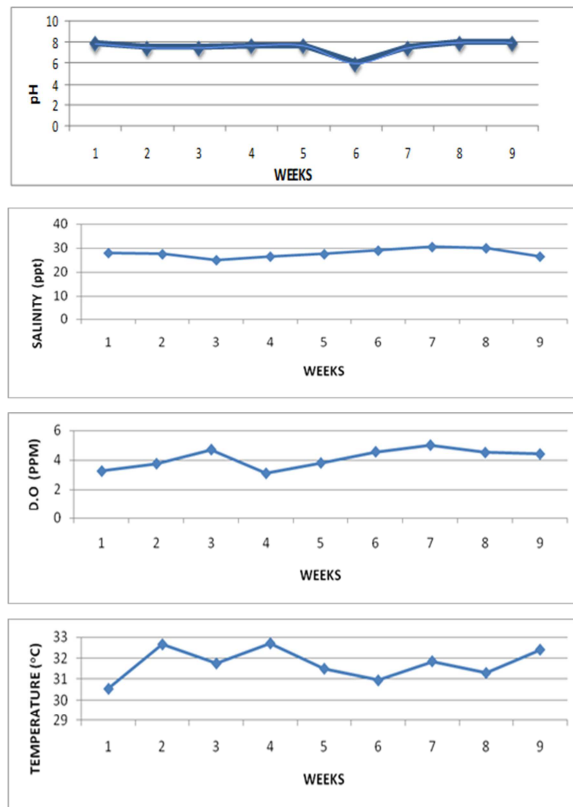
Mud crab sexes	Treatment	Total number of samples stocked	Number of survival	Percent survival (%)
Male	Bread meal	6	2	33.30
	Trash fish	6	3	50.00
	Grated coconut	6	2	33.30
	Total	18	7	39.00
Female	Bread meal	6	4	66.70
	Trash fish	6	4	66.70
	Grated coconut	6	5	83.30
	Total	18	13	72.22

During the changing of water, environmental parameters such as level of salinity, potential hydrogen and temperature were gathered. The schedule of getting and washing the containers was twice a week, Wednesday and Sunday, every morning and afternoon, depending upon the height of the tide. There is a certain tolerable range of environmental parameters to observe in culturing mud crab. There's a possibility that changes on environmental parameters affected its growth and survival. In this study, the pH level of the water used in the cultured mud crab was constant. There

was a slight decrease of salinity during the third week of the culture period dropping into 25 ppt.

The highest salinity level was 31 ppt on week seven of the culture period. The temperature of the water increased during the second week (32.5°C). There was also an abrupt decrease of temperature on the third week. The dissolved oxygen increased after three weeks. There was an abrupt decrease on the fourth week. The following week, the dissolved oxygen increased. The environmental parameters affected the growth and survival of mud crab

especially the water temperature because it was not within the tolerable range (Fig. 1).



**Fig. 1.** Average weekly pH, salinity, temperature and dissolved oxygen

**Table 2.** Growth of mud crab (*Scylla serrata*) fed with supplemental feeds

Mud crab sexes	Feeds	Growth	
		Weight (g)	Length (mm)
Male	Bread meal	62.3	10.00
	Trash fish	34.97	10.00
	Grated coconut	42.16	15.00
	Total	139.43	35.00
	Mean	46.48	11.67
Female	Bread meal	62.33	10.00
	Trash fish	48.58	15.00
	Grated coconut	70.50	16.70
	Total	181.41	41.70
	Mean	60.47	13.90

**Table 3.** Test of hypothesis of the growth of mud crab fed with trash fish, bread meal and grated coconut as supplemental feeds

Source of variation	SS	DF	MS	Cal. F	Tab. F (0.05)	Decision	Interpretation
Mud crab sexes	20,060.52	1	20,060.52	3.35	4.75	Accept $H_0$	Not significant
Supplemental feeds	3,025.35	2	1,513	44.54	3.89	Reject $H_0$	Significant
Feeds and mud crab sexes	17,681.48	2	8,840.74	19.63	3.89	Reject $H_0$	Significant
Feeds and mud crab sexes	17,681.48	2	8,840.74	19.63	3.89	Reject $H_0$	Significant
Within treatment	4,538.35	12	450.36				
Total	45,305.70	17					

#### Growth of mud crab fed with supplemental feeds

The growth of mud crab fed with supplemental feeds was evaluated in terms of weight and length. In terms of weight, male mud crabs fed with bread meal gained the highest growth of 62.3 grams (Table 2). The lowest was those fed with trash fish which only gained the weight increment of 34.97 grams. This is due to early mortality of the mud crabs fed with trash fish. For the female mud crabs, those fed with grated coconut has the highest growth of 70.5 grams. In terms of length, male mud crabs fed with grated coconut gained the highest growth of 15 mm while those fed with both bread meal and trash fish gained 10 mm growth. For the female mud crabs, those fed with grated coconut gained 16.7 mm which was the highest growth. Those fed with bread meal gained the lowest growth of 10 mm.

The mud crab sexes F-value of 3.35 is lower than the tabular value of 4.75 (Table 3). Hence, the null hypothesis is accepted. There is no significant difference between the mud crab sexes in their mean performances in the growth of mud crab. The supplemental feeds F-value of 44.54 is greater than the tabular F-value of 3.89 hence, there is a sufficient evident to reject the null hypothesis. Therefore, significant difference exists between the three supplemental feeds in their mean performances in the growth of mud crab. For interaction, the computed F-value of 19.63 is greater than the tabular F-value of 3.89. This is at 5 percent significant level with 2 and 12 degrees of freedom. The rejection of the null hypothesis leads to the conclusion that there was no interaction between the mud crab sexes and the supplemental feeds used in their mean performance in the growth of mud crab.

**Conclusion**

Majority of the male mud crabs supplemented with trash fish and those females fed with grated coconut survived on the second week. Of the three supplemental feeds used, male mud crabs gained the highest growth on bread meal while female mud crabs performed better in grated coconut. There is sufficient evidence to reject the null hypothesis since there is a significant difference on the performance of mud crabs between the use of supplemental feeds and sexes on their weight and length.

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