

Utilization of Trash Fish for Cultivation of Crablet Mud Crab (*Scylla serrata*)

Heppi Iromo^{1*}, Dori Rachmawani,² Abdul Jabarsyah², Zainuddin¹

¹Department of Aquaculture, Borneo Tarakan University

²Department of Water Resources Management, Borneo Tarakan University
Jl. Amal Lama Nomor 1, Tarakan Kalimantan Utara, Indonesia
Email: sholatdhuha4rakaat@gmail.com

Abstract

The high demand for mud crabs in North Kalimantan causes catch to increase in the wild. If it is not balanced with efforts to increase its aquaculture of mud crab, in the future there will be a decline in population. This study aims to determine the growth and survival rate of mud crab seed (crablet, *Scylla serrata*) in the application method of different types of trash fish. This research used a completely randomized design with 4 treatments and 3 replications. The Crablet used carapace width average 0.07-0.09 cm and weigh average 0.05-0.07 g with total 150 crablets. The treatments applied by trash fish were (A) Tilapia Fish (*Oreochromis mossambicus*), (B) Longfin Herrings Fish (*Ilisha elongata*), (C) Sword Fish (*Trichiurus lepturus*) and (D) Snails (*Telescopium telescopium*). The results were The best weight growth of crablet occurs in the treatment of *T. lepturus* ($P>0.05$) and the highest of survival rates of crablet were found in treatment *T. telescopium* ($P<0.05$) than the other. The trash fish were used turned out to be able survival of crablet mud crab (*Scylla serrata*).

Keywords: Crablet, mud crab, trash fish, feed, growth, survival rate

Introduction

Mud crabs are important fishery commodities in North Kalimantan Province which have high economic value. High demand for mud crabs leads to higher catches in nature. Its existence is currently in a condition that is concerned about massive exploitation ranging from small to mature female crabs (Iromo et al., 2014). The availability of mud crabs now decreased due to catching mud crabs carried out continuously. If it is not balanced with an increase in its aquaculture, there will be a decline in crabs population in the future. However, the hatchery technology of the mud crab's culture is in the developmental stage with a small number of breeding programs in a few countries (Noorbaiduri et al., 2014).

Another obstacle is that farmers do not want to buy mud crablets that are cultivated because they are considered small in size (Iromo, 2014). For this reason, it is necessary to develop the crablet into an adult crab to meet the needs of cultivation in traditional ponds. Crab cultivation activities require the availability of enough natural food to increase the level of seed life. In North Kalimantan Province, many traditional ponds are used to cultivate tiger shrimp, milkfish, and mud crabs. In the ponds, there are many types of fish and shellfish that have not been utilized, so they are called trash fish. For this reason, efforts are needed to develop mangrove crabs from seed size (crablet) to produce adult crabs that can be used

for cultivation in traditional ponds. It is the interest of the researchers to develop crablets by utilizing some trash fish that is widely available in this region. The purpose of this study was to determine the effect of giving various types of trash fish on the growth and survival of mud crablets

Material and Methods

This research was carried out in 1 ha traditional ponds at Tarakan Island, North Kalimantan, Indonesia. The four cages installed were used in this study is a net with a size of 1m x 2m x 1m as a container for maintenance, waring shelter as a crablet hiding place. The research used 150 mud crab crablets with carapace width 0.07-0.09 cm and weigh 0.05-0.07 g.

This study was done for 1 month experimentally, with 4 treatments and 3 replications. The treatments were types of trash fish to feed the crablets, namely (A) Tilapia Fish (*Oreochromis mossambicus*), (B) Longfin Herrings Fish (*Ilisha elongata*), (C) Sword Fish (*Trichiurus lepturus*) and (D) snails (*Telescopium telescopium*). Feeding is done twice a day (08.00 and 17.00). The daily dose of feeding is given based on the development of the size of the test animal, which is 30% by weight of the crablet. Proximate tests were also performed on the trash fish.

This study measured crablets weight gain, survival rate, and Feed Conversion Rate (FCR). Water quality parameters monitored were water temperature (daily), while salinity, pH, ammonia and DO (dissolved oxygen) were measured every 7 days. The absolute growth calculations refers to formula Everhart and Rounsefell (1962), while survival rate calculation was based on Effendy (1979). FCR calculations were done by Tacon formula (1987) as follows;

$$FCR = \frac{F}{W_t - W_o} \times 100\%$$

Note: FCR = Feed conversion ratio; F = Amount of feed consumed (g); Wt = Total animal weight at the end of the study (g); Wo = Total animal weight at the beginning of the study (g).

Results and Discussion

Mud crabs generally were fed with natural feeds or fresh feeds, such as mussel (*Perna* sp.), squid (*Loligo* sp.), fish (*Leiognathus* sp. or *Oreochromis* sp.), small bivalves (*Potamocorbula* sp.), shrimp (*Fenneropenaeus* sp.) (Azra et al., 2016). This study used trash fishes that have no-economic value at North Kalimantan Province, since people do not like to consume them, and the price is very cheap.

Based on the proximate results of the nutrient content of the feed ingredients used in the study can be seen in Table 1.

A sufficient amount of diets such as protein lipids, and carbohydrates (Millamena and Quintio, 2000), should be provided in the diet to permit the successful development of the mud crabs. The higher level of protein in the formulated diet of crablet mud crab showed that protein must be included in the diet formulation for growth better crablet mud crabs.

Utilization trash fish can achieve more consistency in growth and survival crablet and enhance the quality of seed production in the traditional pond (Table 2).

During the research process, most crablets respond adequately to the feed given each day, because crabs prefer to consume fresh types of trash. The observation of the growth of the weight of mud crablets (*Scylla serrata*) during the study showed that the average weight gain and mutual weight growth were presented in the form of Table 2.

Crablet feed by *T. lepturus* has a better absolute growth value of 0.89 g than other feed treatments, whereas in treatment *I. elongata* shows a low absolute growth. However, the results showed that the treatments of different types of feed did not give a significant effect (P>0.05) on the growth (weight) of the crablet. Based on the protein content of *T. lepturus* (18%), *T. telescopium* (12.60%), *O. mossambicus* (10.05%), and *I. elongata* (11.9%), where all four trash fishes contain protein which is almost the same to produce crablet growth is not significantly (Table 2).

This research, trash fish is widely available in traditional ponds that have never been used for mud crab feed. Maybe if another type of trash fish is used which has a high protein content, it is likely to produce better growth. This is by the opinion Anderson et al. (2004) that the protein has higher levels in trash fish showed that crablet mud crabs grew well.

The use of *T. lepturus* feed which has a higher protein content than others but it does not produce a higher survival value of crablets than others. Based on Table 3. that the survival of crablets mud crab in the *T. telescopium* treatment (70%) was significantly (P<0.05) better than other treatments. This is presumably because *T. telescopium* is not easily destroyed in water like trash from fish, so it can still be consumed by crablets, so that the need for feed is available at any time.

Based on research that high protein content does not automatically affect the growth and survival rate of crablets mud crab. Growth rates and survival of mud crabs can be caused by several factors including; water quality, feed availability, and physiological characteristics of mud crabs that are active at night (Suharyanto, 2012). Good food quality

Table 1. Results of proximate for trash fish from tradisional pond

Organism	Protein (%)	Fat (%)	Waters (%)
Tilapia Fish (<i>O. mossambicus</i>)	10,05	0,38	79,51
Longfin Herrings Fish (<i>I. elongata</i>)	11,90	6,80	78,00
Sword Fish (<i>T. lepturus</i>)	18,00	2,79	78,09
Snails (<i>T. telescopium</i>)	12,62	0,27	71,89

Table 2. The Weight (g) of Mud Crabs Crablet

Days	Treatments			
	Tilapia Fish (<i>O. mossambicus</i>)	Sword Fish (<i>T. lepturus</i>)	Snails (<i>T. telescopium</i>)	Longfin Herrings (<i>I. elongata</i>)
0	0.09±0.28	0.09±0.15	0.09±0.06	0.09±0.52
7	0.30±0.18	0.31±0.98	0.32±1.08	0.31±0.66
14	0.57±0.33	0.54±0.50	0.52±0.62	0.41±0.58
21	0.58±0.52	0.60±1.58	0.67±2.11	0.48±0.74
28	0.83±1.88 ^a	0.89±1.58 ^a	0.79±0.99 ^a	0.75±1.57 ^a

The same superscripts at each treatments shows not significantly different ($P>0.05$).

Table 3. Survival Rate (%) of mud crab crablet

Days	Treatments			
	Tilapia Fish (<i>O. mossambicus</i>)	Sword Fish (<i>T. lepturus</i>)	Snails (<i>T. telescopium</i>)	Longfin Herrings (<i>I. elongata</i>)
1	100	100	100	100
7	100	100	100	100
14	57	77	93	87
21	53	73	73	83
28	43 ^a	63 ^a	70 ^b	57 ^a

The different superscripts at each treatments shows significantly different ($P<0.05$).

was not only determined by the high protein content but also determined by the ability to be digested and absorbed (Effendi, 1997).

When compared with other types of trash fish that are soft and easily destroyed in water. Low crablet survival rates can also be caused in terms of environmental factors in the form of water quality or terms of inadequate feed supply. Crablet death can also be caused by the nature of cannibalistic in crabs. In general, death occurs due to cannibalism between individuals, especially when moulting occurs, because the crablet that is currently or just finished moulting is very weak and looks white, and the possibility of a stimulating odor attracts attention to other crablets that are larger or more active (Azra, 2016).

Feed efficiency is examined to assess feed quality, the higher the feed efficiency value, the better feed proves. Feed efficiency serves to determine the quality of the best feed value in the test crab. The efficiency of food use by organisms shows the value (percentage) of food that can be utilized by the organism's body. The amount and quality of food given to the organism affects the growth of the organism (Millamena *et.al.*,2000).

The calculation results of feed conversion show that the absorption of feed is not maximal by crablet mud crab. Crablet sized crabs should require a greater percentage of feed than adult crabs. Small-sized crabs need more energy supply for growth.

Feeds used for growth and survival in the treatment of *O. mossambicus*, *I. elongata*, and *T. telescopium*, have high FCR values. The percentage of FCR values from the calculation results can be seen in Figure 1.

Based on Figure 1. that the lowest FCR value is treatment *T. lepturus* than the order treatment. The smaller the FCR value means that the more efficient the utilization of feed. Feed quality can be known through feed conversion, because the FCR value provides an overview of the efficiency of feed use for growth. This was that the smaller the crab weight will result in higher growth and lower feed conversion (Suharyanto, 2012).

As mentioned above both the temperature, oxygen content and other water quality parameters by with the requirements of good cultivation media. These variables were chosen as monitoring factors, because they were considered to have an important influence on the growth and survival of mud crab crablet. Poor water quality management can be detrimental because it can affect the growth of crabs that are maintained and can cause death.

Temperature variations will greatly affect the energy needed by the organism. The temperature during the study ranged between 24-28 °C. See Table 4. According to Karim (2005) that the temperature for the maintenance of crabs in the production of soft shelled crab is 26–32°C. Temperature is one of the important abiotic factors that affect activity, appetite, oxygen consumption, metabolic rate, survival, growth and molting of crustaceans.

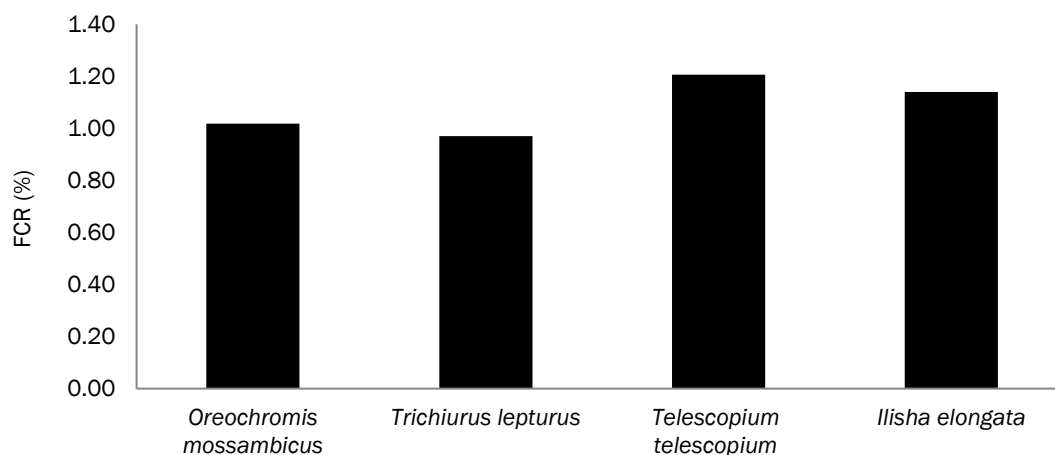


Figure 1. FCR crablet mud crab

Tabel 4. Water quality parameters of tradisional ponds

Water quality	Value
pH	6,94 - 7,07
Salinity	27 - 28 ppt
Temperature	24 - 28 °C
DO	5,5 - 6,8 ppm
Ammonia	0,15 - 0,17 ppm

Salinity during research in traditional farms is around, 27-28 ppt (Table 4.). The mud crabs can live in the range of salinity between 5-25 ppt. While dissolve oxygen will ensure the process of respiration and can avoid the critical oxygen partial pressure which will endanger the life of aquatic organisms. Baylon (2011) said that dissolved oxygen content must be maintained above the concentration of the critical point, because it will affect the organism in the form of hyperoxy and hypoxic. Dissolved oxygen fluctuations during the study ranged from 6.5-7.8 ppm. In general, low dissolved oxygen content (<3 ppm) will cause the organism's appetite and utilization rates to be low, affecting behavior and physiological processes such as survival, respiration, circulation, eating, metabolism, moting, and crustacean growth (Karim, 2005).

Conclusion

The use of *T. lepturus* trash fish provides higher crablet mud crab growth than other trash feeds. The use of *T. telescopium* trash feed can improve the survival rate of crablet mud crab rather than trash fish.

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