Retraction

Retraction: Optimal Stocking Density of Vannamei Shrimp *Lytopenaeus Vannamei* at Low Salinity Using Spherical Tarpaulin Pond (*IOP Conf. Ser.: Earth Environ. Sci.* **537** 012041)

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Optimal Stocking Density of Vannamei Shrimp *Lytopenaes vannamei* at Low Salinity Using Spherical Tarpaulin Pond

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**Abstract.** The worsening environmental conditions cause disease attack on shrimp farming cannot be avoided, the high cost of Vannamei shrimp production resulting in shrimp farming can only be owned by certain circles. Therefore, it is necessary to find alternative shrimp farming in order to avoid disease and affordable cost to increase production. The farming of vannamei shrimp (*Lytopenaes vannamei*) using tarpaulin is expected to minimize production cost, utilize narrow land and far from sea water source, and facilitate control of shrimp health at the time of cultivation. The aim of this research is to obtain the data of shrimp average weight (Mean Body Weight), survival rate and best Food Conversion Ratio for vannamei shrimp at low salinity using container of 1 m\(^3\) tarpaulin pond with three different densities which are: A (density of 175 shrimp/m\(^3\)), B (225 shrimp/m\(^3\)) and C (275 shrimp/m\(^3\)) with three replications. Shrimp seeds used were PL 11 (post larvae) which acclimatized prior to the treatment along with the decrease of media salinity until 5-10 ppt for 7 days, then shrimp seeds were placed on the tarpaulin pond according to the treatment. Maintenance was performed for 60 days with Feeding Rate of 5-10\% and 4 times/day feeding frequency. Based on the result of the research, it was found that the optimal stocking density of shrimp was shrimp rearing with the density of 175 shrimp/m\(^3\) with Mean Body Weight (MBW) value of 10.52 ± 0.2 gram, Survival Rate (SR) of 91.39 ± 1.0% and Food Conversion Ratio (FCR) of 1.6 ± 0.1. Based on the Tukey test (<0.05) showed that stocking density had an effect on shrimp average weight and vannamei shrimp survival rate.

1. Introduction

Vannamei shrimp (*Lytopenaes vannamei*) originated from the Pacific Coast of Latin America. The shrimp entered Indonesia in 2001. [1] This aquaculture commodity has high economic value. The advantage of Vannamei shrimp is that it can live in the water column so that it can be cultivated with high density, faster growth, resistant to disease attacks and short maintenance cycles between 90-100 days [2].

Vannamei shrimp are euryhaline so that they become commodities that can be cultivated at low salinity [3]. Salinity is a very basic environmental factor [3] because it affects growth and survival rates as well as space for shrimp life [2]. On the other hand, technology that can be applied can be cheap, easy and profitable. One alternative for cultivation is to use a tarpaulin pond.

Stocking density is important in determining productivity of Vannamei shrimp farming. This greatly influences growth and survival. Based on this, optimal stocking density research on Vannamei shrimp farming with low salinity using tarpaulin ponds needs to be done.

The purpose of this study was to analyze the growth and survival rate of Vannamei shrimp cultivated at low salinity with different stocking densities using tarpaulin ponds.
2. Material and Method

2.1. Experiment Animals and Activities
Test animals used were Vannamei shrimp on post larval stage aged 11 days with an average weight of 0.005608 gram obtained from PT. Citra Larva Kalianda, South Lampung, Indonesia. The feed used is in the form of powder with the frequency of giving 4 times a day. Seawater is obtained from the Hurun Bay, Pesawaran Regency.

The equipment used is a 1 meter diameter round tarpaulin pond with a height of 1 meter as many as 9 pieces, water quality measurement equipment including pH meter, DO meter, refractometer, ammonia test kits and thermometer.

The method used is direct observation (experimental) using a Completely Randomized Design (CRD) of three levels of treatment with three repetitions, with random media placement. The three treatments were:
A: stocking density of 175 shrimp/m^3
B: stocking density of 225 shrimp/m^3
C: stocking density of 275 shrimp/m^3

2.2. Research Procedure
Shrimp used were acclimatized for 7 days on media with a salinity of 35 ppt. Decrease in salinity of 2-3 ppt was done every day until it reaches 10 ppt. shrimp were then stocked into a 100 cm diameter tarpaulin pond according to treatment. To reduce stress, shrimp are fasted for 1 day before being fed.

Shrimp maintenance for 60 days by feeding in the first month by blind feeding method [4]. Meanwhile, feeding in the second month with demand feeding 5-10% of biomass. Sampling is carried out every seven days during maintenance to determine growth and survival. Water quality measurements were carried out once a week. Parameters measured are temperature, salinity, pH, ammonia. Water quality management is carried out by chlortan and filtration treatment.

2.3. Observation parameters

2.3.1. Mean Body Weight (MBW)
MBW is the average weight of shrimp (gr/shrimp) from the sampling results. It can be calculated as follows [4].

\[
MBW = \frac{\text{shrimp weight}}{\text{number of shrimp}}
\]

2.3.2. Food Conversion Ratio (FCR)
FCR is the amount of food given to produce one kg of fish meat. FCR calculation used is as follows

\[
FCR = \frac{F}{(BT + BD) - B0}
\]

where \(F\) = total feed (gr), \(BT\) = total final weight (gr), \(BD\) = dead fish weight (gr), and \(B0\) = total initial weight (gr).

2.3.3. Survival Rate (SR)
SR is the survival of shrimp compared to the number of stockings and expressed by percent. SR can be calculated by the following formula [5]

\[
SR = \frac{Nt}{N0} \times 100\%
\]

where \(SR\) = survival rate of the shrimp (%), \(Nt\) = the final number of shrimp, and \(N0\) = the initial number of shrimp.
2.3.4. Data analysis
Data obtained from research results were presented in the form of tables and graphs. Data of growth and survival of tested shrimp were analyzed statistically. To see the effect of each treatment, Tukey test was conducted with a 95% confidence level (P < 0.05).

3. Results and Discussion

3.1. Vannamei Shrimp Growth (Mean Body Weight of Shrimp vannamei)
The average weight of Vannamei Shrimp is measured by sampling every 7 days with a minimum sample of 10% of each treatment and repetition. Data on Vannamei shrimp growth during rearing with different densities were presented in the following Table:

| Treatment    | Observation day |
|--------------|-----------------|
|              | 30   | 34   | 44   | 51   | 59   |
| 175 shrimp/m³| 2.41 | 3.61 | 5.02 | 9.54 | 10.5 |
| 225 shrimp/m³| 1.97 | 2.97 | 7.98 | 8.22 | 9.73 |
| 275 shrimp/m³| 2.03 | 3.12 | 5.11 | 6.41 | 8.5  |

The results showed that the best growth was shrimp in treatment A and the lowest in shrimp with treatment C. This occurs because high density resulted in limited space and limited competition for food, place of life and oxygen, causing the average weight gain of shrimp produced. At the end of maintenance cannot be maximized [2].

Figure 1 shows that stocking density significantly affected the growth rate of Vannamei shrimp weights. The highest growth of 10.52 gr was higher when compared with the results obtained [6] namely 10.28 grams using a stocking density of 150 shrimp / m². Internal factors that influence growth are genetics, while external factors are feeding management and the environment. Media salinity is one of the environmental factors [3] that affects shrimp metabolism through the osmoregulation process so that shrimp can absorb nutrients properly as seen from good growth.
3.2. Survival Rate
Shrimp survival rates show significant differences. Shrimp survival in pond A was 91.39% then shrimp in pond B 77.18% and the lowest was shrimp in pond C 55.03%. According to [7] in [8] factors that influence the high and low survival are abiotic and biotic factors. Abiotic factors are the physical and chemical parameters of water. The physiological process of fish will run well if the living environment is in a range that can be tolerated, so as to maintain its life. Shrimp survival at each treatment can be seen in the Figure below:

![Survival Rate](image)

**Figure 2.** Survival Rate of Vannamei Shrimp Maintained for 58 Days with Different Stocking Density

Based on the data above, the survival of Vannamei shrimp with 175 stock/m$^3$ stocking density (pond A) and 225 stock/m$^3$ stocking density is higher when compared to the results of the study [6] which is 70%.

3.3. Food Conversion Ratio

Based on the results of this research, the conversion ratio of Vannamei maintained in round tarpaulin pond with different densities using low salinity media can be seen in the graph below.

![Food Conversion Ratio](image)

**Figure 3.** Food Conversion Ratio (FCR) of Vannamei Shrimp Reared for 58 Days with Different Stocking Density

The lowest FCR value in treatment A is 1.6 which means it requires 1.6 kg of feed to produce one kilogram of meat. This FCR value is better when compared with [8] the resulting FCR of 1.9. A low FCR value indicates that shrimp can absorb nutrients properly so that the feed needed for growth is less. Conversely, if the high FCR is caused by a decrease in appetite or fish, it is suspected that it is due to poor absorption of nutrients caused by several factors, either due to inappropriate feed or poor water quality.
4. Conclusions
Based on the results of the research that has been done, it can be concluded that shrimp stocking density maintained in low salinity tarpaulin ponds significantly affected the growth and survival of Vannamei. Optimal stocking density for rearing of vanamei shrimp in low salinity is 175 shrimp/m³. This is indicated by the highest growth yield of 10.25 grams, and survival rate of 91.39%.

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