Analysis of feed management on vannamei shrimp 
(*Litopenaues vannamei*) enlargement in BBPBAP Jepara

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Abstract. Many people are interested in shrimp farming because the large profits. One type of 
shrimp that is often exported is vannamei shrimp. This study aimed to analysis the feed 
management of vannamei shrimp at BBPBAP Jepara. The working method used in this study 
was descriptive method by utilizing primary and secondary 
data. There were 3 ponds observed, 
namely A51 (268,500 density), A52 (292,000 density) and A61 (399,000 density). Observation 
time until shrimp is harvested. The method of feeding was to spread the feed evenly to the pond 
by walking around the pond plot. The percentage of white snapper nursery in the form of seed 
survival rate at harvest was 80%, feed conversion ratio was 1.51. The average results of water 
quality parameters in white snapper fish rearing ponds included salinity ranging from 30-35 ppt, 
DO ranging from 3.2-3.8 mg/L, and water temperature ranging from 28.6-32.6 °C. It could be 
concluded the white snapper nursery in BBPBAP Jepara showed good results.

1. Introduction

Many people are interested in shrimp farming because the profits are very large. One type of shrimp 
that is often exported is vannamei shrimp. The demand for vannamei shrimp is very large, both in the 
national and international markets [1]. This is because vannamei shrimp has the advantage of very high 
nutritional value and has a fairly high economic value [2]. According to data from the Central Statistics 
Agency, Indonesia is able to produce vannamei shrimp for export of nearly 110,000 tons or around 930 
million US dollars). In 2018, the export shrimp commodity is in second place based on the number, 
therefore many are cultivating it.

The factor that plays an important role in determining the success of aquaculture is feed. Feed as the 
largest component in financing will determine the success of cultivation [3]. Efficient use of feed in 
aquaculture is very important because feed is the most expensive production factor. This is because the 
price of feed ingredients has increased from year to year. Therefore, efforts to improve the composition 
of nutrients and improve the efficiency of feed use need to be carried out in order to increase the 
production of cultivated products and reduce the cost of procuring feed and minimize the production of 
residue in the cultivation media. To achieve this goal, feed management is needed to understand the 
nutrition and nutrient requirements of the cultivar, feed manufacturing technology, and the ability to 
manage feed for each type of cultivation of a particular cultivar [4]. This feed management must adapt 
to the needs of vannamei shrimp feed both from larvae to rearing / brooders.

The Center for Brackish Water Cultivation Fisheries or BBPBAP Jepara is a Technical 
Implementation Unit (UPT) of the Directorate General of Aquaculture, the Ministry of Marine Affairs
and Fisheries, which started its activities in 1971. One of the commodities in BBPBAP Jepara is vannamei shrimp, be it hatchery or grow-out. The development of vannamei shrimp culture technology at BBPBAP Jepara is quite advanced and is included in the ranks of a very good brackish water aquaculture center. This study aims to determine the feed management in BBPBAP Jepara.

2. Materials and methods
2.1. Research design
The working method used in this study was descriptive method by utilizing primary and secondary data [5]. There were 3 ponds observed, namely A51 (268,500 density), A52 (292,000 density) and A61 (399,000 density). Observation time until shrimp is harvested.

2.2. Research parameter calculation
The parameters tested in this study were ABW (Average Body Weight), FCR (Feed Conversion Rate) and SR (Survival Rate). Average body weight could be seen in the following formula [5]:

\[
ABW = \frac{\text{Weight Sampling}}{\text{Total Sampling}}
\]

The number of dead fish was counted every day until the end of the study. According to previous study the survival rate of fish was calculated using the formula [6]:

\[
SR = \frac{N_t}{N_0} \times 100\% 
\]

SR : Survival rate (%)
Nt : Final number of fish (fishes)
N0 : Initial number of fish (fishes)

FCR was calculated by using the formula [7]:

\[
FCR = \frac{F}{(W_t + W_d) - W_o}
\]

FCR = Feed Conversion Ratio
F = Amount of feed given (g)
W0 = Initial weight (g)
Wt = Final weight (g)
Wd = Weight of death fish (g)

The water parameter quality measured in this study were salinity, temperature and DO (Dissolved Oxygen). Temperature and DO measurements use a DO meter, while salinity measurements use a refractometer.

3. Results and discussion
During the study, sampling was conducted four times. In the first sampling, the results obtained were ABW in A51 ponds weighing 3.2 grams, A52 ponds weighing 4.9 grams, A61 ponds weighing 4.25 grams. The second sampling resulted in the ABW of the A51 ponds weighing 4.7 grams, the A52 ponds weighing 6.82 grams, and the A61 ponds weighing 5.57 grams. From this second ABW data, the ADG value could be obtained by subtracting ABW I by ABW II and then dividing by seven (time interval). The ADG (Average Daily Gained) values for each pond plot were A51 pond plots weighing 0.21, A52 pond plots weighing 0.26 grams, A61 pond plots weighing 0.18 grams. From the third sampling, the
ABW data obtained were A51 pond plots weighing 5.2 grams, A52 pond plots weighing 6.82 grams, A61 pond plots weighing 6.01 grams. Meanwhile, the ADG data that had been calculated were A51 pond plots weighing 0.07 grams, A52 pond plots weighing 0.17 grams, A61 pond plots weighing 0.06 grams. The fourth sampling was carried out so that the ABW data obtained were A51 pond plots weighing 6.47 grams, A52 pond plots weighing 9.25 grams, A61 pond plots weighing 8.11 grams. ADG data that had been calculated were A51 pond plots weighing 0.18 grams, A52 pond plots weighing 0.17 grams, A61 pond plots weighing 0.3 grams. The data could be seen in Figure 1.

This increase was due to the provision of sufficient frequency of feed. Feeding the right shrimp will increase the growth of shrimp [8]. The feeding was carried out four times a day at 07.00, 11.00, 16.00, and 20.00. Meanwhile close to harvest time, feeding five times a day was carried out at 07.00, 11.00, 14.00, 17.00, and 20.00. According to previous study, the influencing factors in feeding are the dose, time, and response of shrimp [9]. The amount of feed given to shrimp will continue to increase in line with the age of the shrimp. Meanwhile, the initial frequency of feeding was carried out 3 times a day until the final frequency (before harvest) was 5 times a day.

![Figure 1. Data of shrimp absolute body weight in this study](image)

The results obtained from vannamei shrimp culture are in Table 1.

Table 1. Data on shrimp culture results in this study

| Pond | Initial density | Harvested | Size | SR (%) | Total Feed | FCR |
|------|----------------|-----------|------|--------|------------|-----|
| A51  | 298.500        | 2.3 ton   | 113  | 87.06  | 3856 kg    | 1.6 |
| A52  | 292.000        | 2.1 ton   | 79   | 56.80  | 3853 kg    | 1.8 |
| A61  | 399.000        | 3 ton     | 116  | 87.22  | 3764 kg    | 1.2 |

Shrimp size in aquaculture indicates the number of shrimp in 1 kg. Therefore, the lower the size of the shrimp, the higher the weight of the shrimp. Based on the yield data, the largest shrimp size was shrimp from the A52 pond plot and the largest FCR was also owned by the A52 pond plot. This was because the SR of the A52 pond plots was very low considering that the FCR was calculated by dividing
the total feed with the yield of live shrimp. The FCR value in this study was high because previous studies stated that good shrimp ponds had an FCR ranging from 1.4-1.8 [10]. The survival rate values for A51 and A61 showed good values. According to previous studies, good survival rate >70% [10]. Good survival rate and FCR values are indicated because the nutritional content received by shrimp is sufficient. The feed used has a protein content of at least 36%. Protein is an important ingredient for the growth of shrimp [11].

The survival rate in A52 was low compared to other pools. The results of laboratory tests showed that the shrimp in A52 were infected with a disease called WSSV (White Spot Syndrome Virus). WSSV is a dangerous disease in shrimp that can cause death [12].

The water quality data could be seen in Table 2. The water quality of salinity and temperature in the research ponds was not in accordance with the shrimp culture standards from the source used in this study.

Table 2. Water quality parameter on white snapper in this study

| No | Parameter     | A51  | A52  | A61  | Optimum [10] |
|----|---------------|------|------|------|--------------|
| 1. | Salinity (ppt)| 13-23| 12-21| 15-20| 15-25        |
| 2. | Temperature (°C)| 25.3-28.6| 25.5-28.7| 25.5-29.7| 28.5-31.5   |
| 3. | DO (ppm)      | 4.4-7.7| 4.4-7.2| 4.3-7 | >3          |
| 4. | pH            | 8.3-8.7| 8.1-8.9| 8.3-8.7| 7.5-8.5     |

4. Conclusion
It could be concluded the white snapper nursery in BBPBAP Jepara showed good results. The percentage of white snapper nursery in the form of seed survival rate at harvest was 80%, feed conversion ratio was 1.51. The average results of water quality parameters in white snapper fish rearing ponds included salinity ranging from 30-35 ppt, DO ranging from 3.2-3.8 mg/L, and water temperature ranging from 28.6-32.6 °C.

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