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EFFECT OF COMMERCIAL FEEDING FREQUENCY ON ABSOLUTE WEIGHT GROWTH OF VANAME SHRIMP (LITOPENAEUS VANNAMEI) AGE PL 8-21 AT CV. ZELDA SUMENEP SUMENEP DISTRICT

Pengaruh Frekuensi Pemberian Pakan Komersial Terhadap Pertumbuhan Berat Mutlak Udang Vaname (Litopenaeus Vannamei) Umur Pl 8-21 Di Cv. Zelda Sumenep Kabupaten Sumenep

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ABSTRACT

One important factor in feeding management is the frequency of feeding, namely the number of times feed is given in one day. If this feeding frequency is used incorrectly, it can certainly affect the growth and survival of the shrimp. This study aims to determine the optimal commercial feeding frequency for the absolute weight growth vannamei shrimp (Litopennaeus vannamei) PL ages 8-21 at CV. Zelda Sumenep, Sumenep District. This study used an experimental method with a completely randomized design (CRD) with 4 treatments with 6 replications. The treatment in this study was the frequency of commercial feeding, treatment A; frequency of commercial feeding 2 times/day, treatment B ; frequency of commercial feeding 3 times/day, treatment C ; frequency of commercial feeding 4 times/day, and treatment D ; frequency of commercial feeding 5 times/day. The test animals used in this study were vannamei shrimp PL ages 8-21 with an average weight of 0,001 g/head. The stocking density was 1 head/liter and the experimental medium used fresh water with a volume of 15 liters/tub. The results showed that treatment D gave the highest results for the absolute weight growth of vannamei shrimp (Litopenaeus vannamei) PL 8-21 of 0,053 g. Water quality data obtained water temperatures ranged from 27,3 ºC – 27,5 ºC, acidity ranged from 7,7 – 7,72 and dissolved oxygen ranged from 6,17 – 6,21 ppm.

Keywords: feeding frequency, absolute weight growth, vannamei shrimp

ABSTRAK

Salah satu faktor penting dalam manajemen pemberian pakan adalah frekuensi pemberian pakan, yaitu berapa kali pakan diberikan dalam satu hari. Jika frekuensi pemberian pakan ini digunakan secara tidak tepat tentu dapat mempengaruhi pertumbuhan dan kelangsungan hidup udang. Penelitian ini bertujuan untuk mengetahui frekuensi pemberian pakan komersial yang optimal untuk pertumbuhan bobot absolut udang vannamei (*Litopennaeus vannamei*) PL umur

8-21 tahun di CV. Zelda Sumenep, Kabupaten Sumenep. Penelitian ini menggunakan metode eksperimen dengan rancangan acak lengkap (RAL) dengan 4 perlakuan dengan 6 ulangan. Perlakuan pada penelitian ini adalah frekuensi pemberian pakan komersial, perlakuan A; frekuensi pemberian pakan komersial 2 kali/hari, perlakuan B ; frekuensi pemberian pakan komersial 3 kali/hari, perlakuan C ; frekuensi pemberian pakan komersial 4 kali/hari, dan perlakuan D ; frekuensi pemberian pakan komersial 5 kali/hari. Hewan uji yang digunakan dalam penelitian ini adalah udang vannamei PL umur 8-21 tahun dengan berat rata-rata 0,001 g/ekor. Kepadatan penebaran 1 ekor/liter dan media percobaan menggunakan air tawar dengan volume 15 liter/bak. Hasil penelitian menunjukkan bahwa perlakuan D memberikan hasil tertinggi pada pertumbuhan bobot mutlak udang vannamei (*Litopenaeus vannamei*) PL 8-21 sebesar 0,053 g. Data kualitas air diperoleh suhu air berkisar antara 27,3 ºC – 27,5 ºC, keasaman berkisar antara 7,7 – 7,72 dan oksigen terlarut berkisar antara 6,17 – 6,21 ppm.

Kata Kunci: Frekuensi pakan, pertumbuhan bobot absolut, udang vannamei

INTRODUCTION

Suriawan (2019) in Akmal *et al.,* (2022), stated that vaname shrimp (*Litopenaeus vannamei*) is one of the marine biological resources which is very widely distributed and is widely cultivated, growing rapidly and becoming the mainstay of exports of aquaculture products because it has several superiority compared to other species. The growth rate reaches 1-1.5 g/week, can be cultivated with high stocking densities (125 – 250 fish/m2), relatively wide salinity tolerance (0.5 – 45 ppt), lower feed protein requirements (20 – 30 %) compared to other species, the FCR is lower (1.1 – 1.3), the harvest size is relatively uniform and the number of undersized ones is relatively low.

The potential for shrimp production in Indonesia continues to increase from year to year. The rapid development of aquaculture activities with the implementation of intensive systems has given rise to problems in the form of decreasing the carrying capacity of ponds for the life of cultivated fish/shrimp. The occurrence of a series of disease attacks is a further impact that can cause large losses (Fatmala *et al.,* 2019).

Haliman and Adijaya (2005) argue that to produce superior vaname commodities, the maintenance process must pay attention to internal aspects, for example the origin and quality of the seeds. Apart from that, you must also pay attention to external factors, for example the quality of cultivation water, feeding, technology used and pest and disease control. Recently, the production of vaname shrimp rearing cultivation has increased significantly because farmers are using more tokolan fry aged PL 21, these tokolan fry are the result of natural selection in ponds so they have better vitality compared to fry directly from the hatchery (Markus & Suryanto, 2010)

Nuhman (2009), stated that feed is a very important factor in vaname shrimp cultivation because it absorbs 60-70% of total operational costs. Providing food that suits your needs will stimulate optimal growth and development of vaname shrimp so that their productivity can be increased. In principle, the denser the distribution of shrimp seeds means the availability of natural food is decreasing and dependence on artificial food is increasing. Artificial feeding is based on the nature and eating behavior of vaname shrimp. White shrimp have the characteristic of looking for food during the day and night (diurnal and nocturnal) and are very greedy. These characteristics need to be known because they are related to the amount of feed and the frequency of feeding that will be given. Efforts to optimize the use of feed to be given to shrimp is an action that can reduce costs and increase production efficiency.

One thing that needs to be considered when cultivating vaname shrimp is the frequency of feeding. More frequency of feeding can increase the ability to utilize carbohydrates. Apart from that, with a more frequent feeding frequency, the possibility that the feed can be consumed is

higher so that it can minimize the remaining feed that will enter the cultivation media which has the effect of reducing water quality (Zainuddin *et al.,* 2014)

To make efficient use of commercial feed, a system must be created that can ensure that the feed can be optimally utilized by shrimp. Therefore, it is necessary to conduct research on the appropriate frequency of giving commercial feed so that optimal growth of vaname shrimp aged PL 8-21 is obtained.

METHODS

Place and Time

This research was carried out at CV ponds. Zelda Sumenep, implementation for 12 days starting December 1 2022 - December 12 2022.

Tools and Materials

Tools: 24 used chlorine plastic drums with a capacity of 20 liters each, holding tank for holding vaname shrimp, siphon hose, analytical scales, plastic measuring cup bags, aerator and accessories, sponge, small table, stationery, small net, plastic spoon, Thermometer, pH meter, DO meter.

Materials: vaname shrimp fry aged PL 8 with an average weight of 0.001 g/fish, commercial feed brand Irawan 681, tissue, detergent, rubber bands, sea water.

Design Procedurs

This research uses experimental methods. Furthermore, this research used a Completely Randomized Design (CRD) with 4 treatments with 6 replications with the formula proposed by (Kusriningrum, 2010) as follows:

t = number of treatments

n= number of repetitions

$$(t - 1)(n - 1) \geq 15$$

Data Analysis

After the research was completed, the data was collected and then data analysis was carried out. To find out whether there is an influence of the independent variable on the dependent variable (the frequency of commercial feeding on the absolute weight growth of vaname shrimp aged PL 8 - 21), a one-way analysis of variance (ANOVA) was carried out by comparing the significance value of the 5% F test and the 5% F test. F 1% with conditions:

a. If the significance of the calculated F test is > 1%, then between the treatments there is a very real difference.
b. If the significance of the Fcount test is > 5%, then between the treatments there is a real difference.
c. If the significance of the calculated F test is <F Table (usually 5% and 1%) then there is no difference between the treatments.

If the ANOVA results show that the treatments show significantly different results or are very significantly different, then proceed with the Least Significant Difference (BNT) or LSD test. According to Suhaemi (2011) states that the BNT test is a comparison procedure of the treatment mean value (treatment average) using the combined residual middle square (KTG/S) from the variance results. The test value uses the values in the t table, the formula used is as follows:

Research procedure

Research Preparation

a. Preparation of research container
   - The test animal holding tank was washed using detergent then rinsed with fresh water, then dried.
   - The 24 research containers were washed using detergent then rinsed with fresh water, then dried.
   - Place the research container in accordance with the research layout.
   - Each research container was filled with sea water with a volume of 15 liters use a measuring cup.
   - Install the aerator and its equipment, then turn it on.

b. Preparation of test animals
   - Before the research was carried out, the test animals were weighed on analytical scales. This weighing aims to determine the initial average weight of the test animals.
   - After being weighed, the test animals were kept in a holding tank and given commercial feed of the Irawan 681 brand.

c. Preparation of commercial feeding frequency
   - Commercial feed brand Irawan 681 is weighed at a dosage of 30% of the biomass.

Research Implementation

a. Test animals were put into each research container with a stocking density of 15 animals/tub.

b. The test animals that had been stocked in each research container were then given commercial feed of the Irawan 681 brand.

c. Each research container was syphoned once a week using a siphon tube, this siphoning was carried out before the first feeding at 06.00 WIB – finished. Next, to replace the lack of water volume, add fresh water until it returns to the initial volume.

d. Each media water in the experimental tanks was measured for water quality. Water temperature is measured using a thermometer, dissolved oxygen using a DO meter and acidity using a pH meter. Water quality measurements are carried out twice a day, in the morning at 06.30 WIB - finished and in the afternoon at 16.00 WIB - finished.

e. At the end of the study, all test animals in each treatment and replication were weighed and recorded. This is done to determine the absolute weight growth of the test animals.

b. **Observation of Absolute Weight Growth**

Absolute weight growth is defined as the difference between the total body weight of the fish at the end of the study and the total body weight of the fish at the beginning of the study using the following formula Efendi (2003) **:**

$$\mathbf{Wm = Wt - Wo}$$

Keterangan :

Wm = absolute weight of the test animal (g).

Wt = average weight of test animals at the end of the study (g).

Wo = average weight of test animals at the start of the study (g)

RESULT

1. Absolute Weight Growth of Vaname Shrimp (*Litopenaeus vannamei*)

Absolute weight growth is an important indicator in evaluating the health and productivity of vaname shrimp (*Litopenaeus vannamei*) cultivation. This assessment of weight growth not only provides an overview of feed efficiency and farming environmental conditions, but also helps in identifying the potential for increasing production and sustainability of shrimp farming businesses.

The following is a table that describes the absolute weight growth of Vaname shrimp (*Litopenaeus vannamei*):

Table 1. Range, average and standard deviation of absolute weight growth of vaname shrimp (*Litopenaeus vannamei*) aged PL 8-21 for each treatment.

Treatment	Absolute Weight (gr)	Average (gr)	StDev
A	0,034-0,037	0,035	0,001
B	0,041-0,047	0,043	0,002
C	0,047-0,05	0,048	0,001
D	0,051-0,054	0,053	0,001

Based on Table 1, it can be explained that treatment D showed the highest average growth in absolute weight of vaname shrimp (*Litopenaeus vannamei*) aged PL 8-21. Furthermore, treatments C, B, and A sequentially decreased in average. Based on the results of statistical tests, treatment A is significantly different from treatments B, C, and D. Furthermore, treatment B is significantly different from treatments C and D. Likewise, treatment C is significantly different from treatment D.

The results of research on the effect of frequency of commercial feeding on the absolute weight growth of vaname shrimp (*Litopenaeus vannamei*) aged PL 8-21 in experimental tanks obtained the following data: treatment A = 0.035 g, treatment B = 0.044 g, treatment C = 0.048 g and treatment D = 0.053 g. Based on the 5% one-way ANOVA test, it can be explained that the frequency of commercial feeding has a significantly different effect on the absolute weight growth of vaname shrimp (*Litopenaeus vannamei*) aged PL 8-21. Furthermore, the 5% BNT test illustrated that treatment D gave the highest results for the absolute weight growth of vaname shrimp (*Litopenaeus vannamei*) aged PL 8-21 of 0.053 g..

When compared with treatments C, B, and A, treatment D gave the highest average absolute weight growth of vaname shrimp (*Litopenaeus vannamei*) aged PL 8-21. At this frequency of commercial feeding, the vaname shrimp fry are able to consume it optimally. At the bottom of the experimental tank in treatment D, it can be seen that the remaining amount of feed that is not consumed by the vaname shrimp fry is the least when compared to treatments C, B, and A. The positive impact of the rearing media Vaname shrimp fry are relatively uncontaminated by various piles of organic materials whose sources come from commercial feed residues and feces, as a result the level of feed consumption and growth rate of vaname shrimp fry run normally. According to Zainuddin *et al.,* (2014) a feeding frequency of 5 times indicates faster growth because the more frequent feeding will provide greater opportunities for vaname shrimp fry to obtain food at any time, so that their feed needs are always met. The more frequently the frequency of feeding, the higher the level of feed digestibility by vaname shrimp and vice versa. If feeding is done as often as possible, the impact can minimize the remaining feed that accumulates at the bottom of the cultivation media.

The effects of treatments C, B, and A on the growth of vaname (*Litopenaeus vannamei*) aged PL 8-21 decreased sequentially. By providing commercial feed with increasingly rare frequency, vaname shrimp fry are increasingly unable to consume commercial feed. At the bottom of the experimental tank, sequentially in treatments C, B and A, it was seen that the

remaining feed that was not consumed by the vaname shrimp fry was increasing. The negative impact was that the rearing media for vaname shrimp fry in treatments C, B and A were sequentially increasingly contaminated by various piles of organic material whose source came from commercial feed waste and feces, as a result, the level of feed consumption and growth rate of vaname shrimp fry increasingly decreased. Supono (2017), stated that providing commercial feed with increasingly infrequent frequency has a very bad effect on the growth of vaname shrimp fry. Meanwhile, according to Nuhman (2009), the frequency of feeding must be done correctly so that the vaname shrimp fry do not experience a lack of feed (underfeeding) or excess feed (overfeeding). The less frequent the frequency of feeding, the whiter vaname shrimp fry can be exposed to various types of diseases due to the accumulation of unconsumed feed residue and feces.

2. Water Quality

a. Temperature

Table 2. Content range, average and standard deviation of water temperature for each treatment.

Treatment	Temperature (°C)	Average (°C)	Standard Deviation (SD)
A	27,3-27,5	27,41	0,07
B	27,3-27,5	27,4	0,06
C	27,3-27,5	27,41	0,07
D	27,3-27,5	27,4	0,08

Based on Table 2, it can be explained that statistically the average water temperature in each treatment shows relatively the same figures. In order to find out whether there was a real difference between the water temperatures in each treatment, a one-way ANOVA test was carried out showing that the water temperature in each treatment had no significant effect on the absolute weight growth of vaname shrimp (*Litopenaeus vannamei*) aged PL 8-21 ($P > 0.05$).

During the research, the media water quality levels in plastic drums used for chlorine were still relatively homogeneous and within the normal range that can be tolerated by white shrimp aged PL 8 - 21 for growth.

b. Acidity (pH)

Table 3. Content range, average and standard deviation of acidity levels for each treatment.

Treatment	Acidity (pH)	Average (pH)	Standard Deviation (SD)
A	7,70-7,71	7,70	0,005
B	7,70-7,71	7,71	0,005
C	7,70-7,71	7,71	0,005
D	7,70-7,71	7,71	0,005

Based on Table 3, it can be explained that statistically the average degree of acidity in each treatment shows relatively the same numbers. In order to find out whether there was a real difference between the degree of acidity in each treatment, a one-way ANOVA test was carried out and the result was that the degree of acidity in each treatment had no significant effect on the absolute weight growth of vaname shrimp (*Litopenaeus vannamei*) aged PL 8-21 ($P > 0$, 05).

The degree of acidity (pH) of the experimental media water during the research ranged from 7.70 – 7.71. This range value still shows within normal limits. Subaidah (2005), believes

that the ideal pH range for PL aged white shrimp is 7.7-8.1. Meanwhile, based on WWF Indonesia (2014), the optimum pH for cultivating PL aged shrimp is around 7-8.5.

c. Dissolved Oxygen (O_2)

Table 4. Range of dissolved oxygen content, average and standard deviation for each treatment.

Treatment	Dissolved Oxygen (ppm)	Average (ppm)	Standard Deviation (sd)
A	6,18-6,21	6,18	0,01
B	6,17-6,20	6,18	0,01
C	6,18-6,20	6,28	0,01
D	6,17-6,20	6,28	0,01

Based on Table 4 above, it can be explained that statistically the average dissolved oxygen in each treatment shows relatively the same numbers. In order to find out whether there was a real difference between dissolved oxygen in each treatment, a one-way ANOVA test was carried out and the results were that dissolved oxygen in each treatment had no significant effect on the absolute weight growth of vaname shrimp (*Litopenaeus vannamei*) aged PL 8-21 ($P > 0.05$).

The dissolved oxygen content in the experimental water media during the study ranged from 6.17 – 6.20 ppm. This range value still shows within normal limits. According to Jayanti *et al.,* (2022), good dissolved oxygen levels for PL aged vaname shrimp range from 4.6-6.5 ppm. Meanwhile, according to Suharyadi (2011), the dissolved oxygen content for rearing vaname shrimp aged PL is a minimum of 3 ppm.

DISCUSSSION

a. Absolute Weight Growth of Vaname Shrimp (*Litopenaeus vannamei*)

The results showed that the frequency of commercial feeding had a significant influence on the absolute weight growth of vaname shrimp (*Litopenaeus vannamei*) in the PL 8-21 age range. From the results of the ANOVA test with a significance level of 5%, it is proven that there are real differences between the different treatments. Furthermore, the results of the Least Significant Difference (BNT) test at a significance level of 5% showed that treatment D had the highest absolute weight growth of 0.053 g, outperforming the other treatments.

Treatment D showed the most optimal results in the absolute weight growth of the vaname shrimp when compared with treatments C, B, and A. This shows that the frequency of feeding in treatment D was able to provide conditions that allowed the vaname shrimp fry to consume feed optimally.

Apart from that, in treatment D it was seen that the remaining feed that was not consumed by the vaname shrimp fry was the least compared to other treatments. The positive impact is that the environment for rearing vaname shrimp fry is relatively uncontaminated by piles of organic material from leftover feed and feces. As a result, the level of feed consumption and growth rate of vaname shrimp fry can run normally.

Providing different feeds has a significant impact on shrimp growth. Research conducted on vaname shrimp (*Litopenaeus vannamei*) shows that providing appropriate feed to needs can stimulate optimal growth and development of shrimp, increase productivity, and optimize feed use.

Providing different feeds can affect shrimp growth through several factors, such as feed quality, amount of feed, and frequency of feeding. Good quality feed can meet the nutritional needs of shrimp, thereby allowing faster and more balanced growth. The right amount of feed must be adjusted to the vaname shrimp biomass to avoid underfeeding or overfeeding, which can result in slow growth, non-uniform size and a porous-looking body.

The frequency of feeding also affects the growth of vaname shrimp. Regular feeding, such as three times a day, can enable vaname shrimp to eat effectively and meet nutritional needs. Research conducted on vaname shrimp shows that regular feeding can increase daily growth rate and optimize feed use (Nuhman, 2009)

In the synthesis, feeding different foods has a significant impact on the growth of vaname shrimp. Providing food according to needs, good quality feed, the right amount of feed, and regular feeding frequency can stimulate optimal growth and development of vaname shrimp, increase productivity, and optimize feed use.

Research that shows the relationship between treatment and the growth results of vaname shrimp is research conducted by Purba (2012). This research found that the growth of vaname shrimp is influenced by many factors, one of which is the stocking density of the vaname shrimp being kept. The success of this research shows that treatments that affect stocking density can influence the growth results of vaname shrimp. This shows that proper treatment can increase the growth results of vaname shrimp and affect the quality of the environment in which they are reared.

b. Water Quality

During the research, the water quality conditions in the plastic drums used for chlorine remained stable and in accordance with the growth needs of vaname shrimp in the PL 8-21 age range. The water temperature, degree of acidity (pH), and dissolved oxygen content are within acceptable limits for vaname shrimp. Water temperature ranges from 27.3°C to 27.5°C, pH ranges from 7.70 to 7.71, and dissolved oxygen content ranges from 6.17 to 6.20 ppm. This shows that the water environment in the experiment meets optimal standards for rearing vaname shrimp, which can support healthy and optimal growth for the shrimp fry.

Stable and warm water temperature is very important for the growth of vaname shrimp. In this study, the water temperature was maintained within a very narrow range of 27.3°C to 27.5°C. This temperature range is considered ideal because a stable temperature supports optimal metabolism and growth. Significant temperature variations can cause stress to vaname shrimp and disrupt health. Water temperatures that are too high can cause vaname shrimp to experience thermal stress which can disrupt metabolic and growth processes. On the other hand, water temperatures that are too low can cause vaname shrimp to experience hypothermic stress which can also harm their health. Therefore, a stable and warm water temperature is very important to ensure healthy and optimal growth of vaname shrimp.

The dissolved oxygen content in water is very important for vaname shrimp respiration. In this study, the dissolved oxygen content was maintained between 6.17 and 6.20 ppm. Sufficient dissolved oxygen is essential to ensure that shrimp can breathe efficiently and reduce the risk of hypoxia. Insufficient oxygen levels can cause stress and death in shrimp. Therefore, optimal dissolved oxygen content is essential to ensure healthy and optimal shrimp growth.

The results of these measurements indicate that the water environment in plastic drums used for chlorine meets optimal standards for rearing vaname shrimp. All of these parameters are within acceptable limits for vaname shrimp, supporting healthy and optimal growth for the shrimp fry. A stable water environment with appropriate quality parameters ensures that shrimp can grow well without being exposed to adverse conditions, such as extreme temperature fluctuations, drastic changes in pH, or lack of oxygen.

CONCLUSION

Connlusion:

1. The frequency of commercial feeding has a significant effect on the absolute weight growth of vaname shrimp (*Litopenaeus vannamei*) aged PL 8 - 21, treatment D gave the highest yield of 0.053 g.

2. Water quality data obtained from water temperature ranged from 27.3 0C – 27.5 0C, acidity ranged from 7.7 – 7.72 and dissolved oxygen ranged from 6.17 – 6.21 ppm. Methodologically, the three water quality parameters are homogeneous, meaning they have no effect on the absolute weight growth of vaname shrimp (*Litopenaeus vannamei*) aged PL 8 – 21.

Suggestion:

1. Providing commercial feed for absolute weight growth of vaname shrimp (Litopenaeus vannamei) aged PL 8 - 21 is recommended using a frequency of 5x a day.
2. Further research needs to be carried out on the effect of the frequency of commercial feeding on the absolute weight growth of other types of shrimp commodities

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