Effect of Probiotics on the Growth of Vannamei Shrimp

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Abstract

This study aims to determine the proper concentration of probiotics in the maintenance of vannamei shrimp (Litopenaeus vannamei) and see the effectiveness of local probiotics given to growth and survival rate (SR). This research was conducted in June - July 2016. The method used was an experimental method with 4 treatments and 3 replications. The design used in this study is a Completely Randomized Design (CRD), using Analysis of Variance (ANOVA). The results showed that the addition of probiotics in each treatment, based on the analysis of various data, had no significant effect. The highest absolute weight growth was aimed at treatment A (0.2 ml / m3) which was 10.42 grams, followed by treatment C (0.6 ml / m3) 7.02 grams, B (0.4 ml / m3) 6.99 grams, and the lowest treatment D (0 ml / m3) 6.98 grams. The highest absolute length growth was aimed at treatment C, namely (0.6 ml / m3) 5.16 cm, followed by treatment A (0.2 ml / m3) 5.08 cm, D (0 ml / m3) 4.83 cm, and the lowest treatment B (0.4 ml / m3) 4.64 cm. The highest survival rate was in treatment A (0.2 ml / m3) which was 97%, followed by treatment B (0.4 ml / m3) 83%, D (0 ml / m3) 80% and lowest C (0.6 ml / m3) 73%.

Keywords: Probiotic; shrimp; vannamei; growth; survival.

Introduction

The rapid development of aquaculture activities with the application of intensive systems has raised problems in the form of a decrease in the carrying capacity of ponds for the life of fish / shrimp that are cultivated. A further impact is the occurrence of a series of disease attacks that cause large losses. Anticipatory steps through the application of cultivation technology based on the principle of ecosystem balance is a solution to prevent more serious damage. Among these steps is through the application of probiotics which have the ability to maintain water quality and inhibit the growth of pathogenic microorganisms in order to create a sustainable aquaculture system (Khasani, 2007 in Hidayat, 2010).

Probiotics are defined as any form of supplementary feed in the form of intact microbial cells (not necessarily living) that benefit the host animal by balancing the host microbiological conditions, modifying the form of association with the host or environmental microbial community, increasing the utilization of feed nutrients or increasing nutritional value, increasing response host immunity to pathogens or improve environmental quality (Gatesoupe, 1999; Verschure et al., 2000; Irianto, 2003; CP Prima, 2004; Gunarto and Hendraja, in Hidayat, 2010).

In Indonesia, especially in Pohuwato Regency vannamei shrimp (Litopenaeus vannamei) is no longer a stranger to farmers, where the introduced shrimp has won the sympathy of the cultivating community because of its advantages, so far it has been considered capable of replacing tiger shrimp (Penaeus monodon) as an alternative positive business diversification activities. Vannamei shrimp was officially introduced to the farming community in 2001 after a decline in tiger shrimp production due to various problems encountered in the production process, both technical and non-technical issues. However, in the cultivation business there are factors that play an important role that greatly determines the success of cultivation, namely feed. Feed as the biggest component in financing will determine the success of cultivation.

In addition to the use of feed in aquaculture, one of the efforts to increase vannamei shrimp productivity is by using probiotics that will be applied with local ingredients such as: turi leaves, fine bran, tapioca flour, "yakult" fermented drinks, sucrose or granulated sugar, and yeast. Research on the use of probiotics was carried out by Galugu 2008 which applied the Bacillus Plus-1 probiotic to vannamei

shrimp (PL-10). Based on this, in this study the application of probiotics made from local raw materials with different doses. This study aims to determine the effect of providing probiotics made from local raw materials at different dose levels on the growth of vanamei shrimp through improved pond water quality.

Research Methodology

The research was carried out in June to July 2016 in Mootilango Village, Duhiadaa District, Pohuwato Regency, Gorontalo Province. The test animals used were PL-14 vannamei shrimp totaling 120 heads, 10 heads for each pond. The container used in the study was a 1 x 1 x 1 meter ground pool with a volume of 1,000 liters, totaling 12 ponds.

The method used in this study is an experimental method with a completely randomized design (CRD) model consisting of 4 treatments and 3 replications. Each treatment uses a different dose, namely Treatment A (0.2 ml / m3), B (0.4 ml / m3), C (0.6 ml / m3) and D (0 ml / m3 / control). In addition, measurements of water quality were carried out in the research container which included Dissolved Oxygen, Salinity, pH and Temperature.

Growth is a picture of changes in the weight and length of the average individual at each treatment from the beginning to the end of maintenance.

The individual growth rate (gr / day) or Average Daily Growth (ADG) is determined based on the difference in the average weight of the end and the beginning of maintenance compared with the time of maintenance (Cholik et al, 2005).

Survival is the ratio of the number of fish that live to the end of maintenance with the number of fish at the beginning of maintenance. To calculate survival (SR) based on a formula (Goddard, 1996 in Effendi, 2006).

To evaluate the effectiveness of administering probiotics with different doses to the growth and survival of PL-14 vannamei shrimp is done using Analysis of Variance, if the analysis shows a real effect then proceed with the Least Significant Difference Test (LSD) at a 95% confidence level (Gasperz, 1991).

Results and Discussion

Based on observations that have been made, the results of weight measurements of vannamei shrimp larvae during maintenance showed differences between treatments with different probiotic doses.

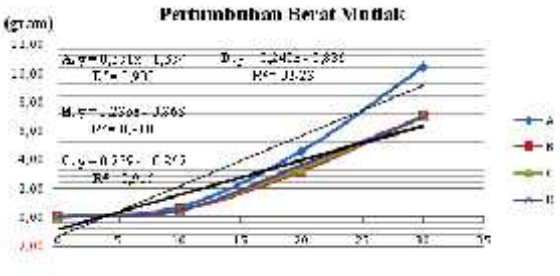

Figure 1 Graph of absolute weight growth of vannamei shrimp larvae

Figure 1 shows that the growth of absolute weight of vannamei shrimp larvae was significantly different in each treatment. The best weight growth was seen in treatment A (0.2 ml / m3) which was 10.42 grams, followed by treatment C (0.6 ml / m3) 7.03 grams, B (0.4 ml / m3) 7.00 grams, and D (0 ml / m3) 6.99 grams at the end of the study. Growth of vannamei shrimp larvae suspected the role of Lactobacillus sp. in the metabolic process of natural food contained in the research container. Based on linear regression, every treatment there is an increase in weight growth every 10 days allegedly because of the addition of probiotics that can inhibit the growth of pathogens in the container.

Mansyur and Malik (2008) in Buana and Surianti (2013) state that there are two ways of applying probiotics, namely through the environment (water and pond bottom) and orally through feed. The difference in absolute weight growth of vannamei shrimp larvae is thought to be due to the influence of the increase in the intake of probiotic material provided in pond water containers in which natural food is suspected.

Irianto (2003) in Jariyah, et al (2013) states that probiotics can regulate the microbial environment in the intestine, blocking pathogenic microorganisms in the intestine by releasing enzymes that help the digestive process of food. One of the bacteria that is believed to be able to increase the digestibility of fish is Bacillus sp. According to Fardiaz (1992); Jusadi

(2004) in Jariyah et al (2013) Bacteria Bacillus sp. has the ability to secrete protease, lipase and amylase enzymes.

The results of analysis of variance showed that the administration of probiotics with different doses in each treatment did not have a significantly different effect on the level of confidence of 5% on the growth of the absolute weight of vannamei shrimp larvae so that it was not followed by the Least Significant Difference Test (LSD). It is suspected that changes that occur due to changes in the balance of bacteria in the digestive tract do not affect the physiological condition of vannamei shrimp larvae (Puspita, 2009 in Suminto and Diana, 2015). In addition, this situation is supported by the range of water quality that is still in the optimal range for the growth of vannamei shrimp larvae. The results of the analysis of variance can be seen in Table 1.

Table 1 Results of analysis of variance in growth of absolute weight of vannamei shrimp

Variety Source	Square sum	Free degree	Total square	F count	F table 0.5
Treatment	26.34	3	8.78	2.71	4.07
Error	25.92	8	3.24		
Total	52.26	11			

Remark: *) Real at 5% level

Based on the measurement of vannamei shrimp larvae length during maintenance showed a difference in length between treatments using different doses of probiotics.

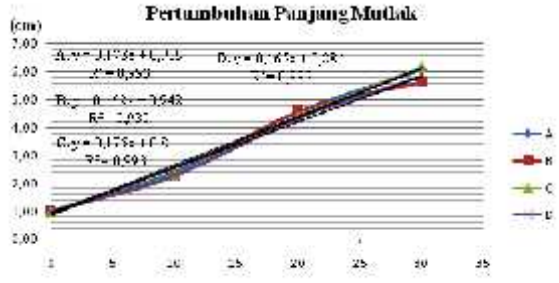

Figure 2 Graph of absolute length growth of vannamei shrimp larvae

Figure 2 shows that there is a significant difference in the absolute length growth of vannamei shrimp larvae in each treatment. The best growth of vannamei shrimp larvae was seen in treatment C, namely (0.6 ml / m3) 6.16 cm, followed by treatment A (0.2 ml / m3) 6.08 cm, D (0 ml / m3) 5, 83 cm, and B (0.4 ml / m3) 5.64 cm. Based on the linear regression of each treatment there is an increase in the length growth every 10 days.

The role of Lactobacillus sp. According to Samadi (2002); Arief, et al (2008) in Fadhilah, et al (2012) are able to balance the digestive tract microbes so as to increase the digestibility of fish by changing carbohydrates with lactic acid which can reduce pH, thereby stimulating the production of endogenous enzymes to increase nutrient absorption, feed consumption, growth and inhibit pathogenic organisms. In treatment B (0.4 ml / m3) 5.69 cm produced the lowest absolute length growth after treatment D (0 ml / m3) 5.83 grams.

This is presumably because there is no balance between the bekteri that already exists in the digestive tract with the incoming bacteria. The required concentration of bacteria must be the right amount. If the number of bacteria is too much it will cause overgrowth. Atlas and Richard (1993) in Fadhilah, et al (2012) explain that high bacterial density causes high competition in taking substrates or nutrients so that bacterial activity is inhibited. The amount of bacteria that is too much causes the bacteria to experience rapid sporulation (forming spores) so that the function and activity of the bacteria Lactobacillus sp. Not optimal (Mulyadi, 2011 in Fadhilah, et al, 2012).

The results of the analysis of variance showed that the administration of probiotics with different doses in each treatment did not have a significantly different effect on the level of confidence of 5% on the growth of the absolute length of vannamei shrimp larvae so that it was not followed by the Least Significant Difference Test (LSD). This is presumably due to the difference in the dosage that is not too different and the presence of pests in consuming natural food in the container and the use of dissolved oxygen. The results of the analysis of variance can be seen in Table 2.

Table 2 Results of analysis of variance in growth of absolute weight of vannamei shrimp

Variety Source	Square sum	Free degree	Total square	F count	F table 0.5
Treatment	0.36	3	0.12	0.33	4.07
Error	2.89	8	0.36		
Total	3.25	11			

Remark: *) Real at 5% level

According to Cahyono (2009) in Faiz (2013), a measure of the success of cultivation activities is a high percentage of survival or survival. Results The survival percentage in vannamei shrimp larvae during the study showed the highest survival rate in treatment A (0.2 ml / m3) which was 97%, followed by treatment B (0.4 ml / m3) 83%, D (0 ml / m3) 80% and C (0.6 ml / m3) 73%.

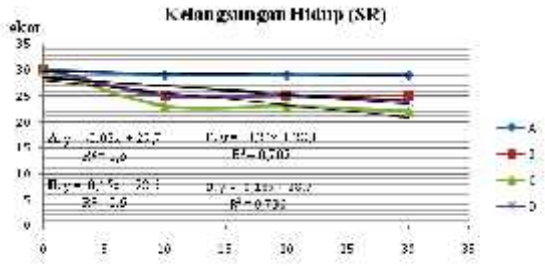

Figure 3 Survival chart (SR) of vannamei shrimp larvae

Figure 3 shows that the results of observations of survival in vannamei shrimp larvae during the study showed the highest survival rate in treatment A (0.2 ml / m3) of 29 individuals, followed by treatment B (0.4 ml / m3) of 25 individuals, D (0 ml / m3) 24 tails and C (0.6 ml / m3) 22 tails from 30 vannamei shrimp larvae in each treatment. Based on linear regression, each treatment experienced a decrease in survival during the study, suspected low dissolved oxygen for feed metabolism in the experimental container but in the range of salinity, pH and temperature in the optimal range so that vannamei shrimp larvae were able to survive.

According to Cahyono (2009) in M. Faiz (2013), factors that influence the level of life pass in cultivation are abiotic and biotic factors. Abiotic factors include physical and chemical factors of a water or often referred to as water quality. Good water quality will cause the physiological processes in the body of the biota to run well, thereby supporting the growth and survival rate of the biota.

Water as a living medium for biota must have characteristics suitable for biota life, because water quality can have an influence on the growth of living things in water (Djatmika, 1986 in Faisol, 2014). Water quality is a limiting factor for the type of biota that is cultivated in a waters (Kordi and Tancung, 2007 in Faisol, 2014). Exogenous factors that influence growth are temperature, salinity, feed, space and exposure time (Heasman et al. 1985 in Abdul Malik, 2006).

Conclusion and Suggestion

The results of making probiotics using raw materials 500 grams of turi leaves, 500 grams of fine bran, 25 grams of sugar, 15 grams of yeast and 65 ml of yakult mixed into 5,000 ml of boiled water. Probiotics that were left for 2 weeks were tested for bacteria contained in probiotics and analysis of total plate count (ALT).

Probiotic test results with a storage duration of 2 weeks, the bacteria contained in the probiotics are Lactobacillus sp. and the results of the total plate plate (ALT) test results obtained 2,690,909 colonies / ml or equivalent 2.69 x 106 according to the test results at the Fish Quarantine Station Testing Laboratory, Quality Control and Safety of Class I Fishery Products in Gorontalo.

The application of probiotics shows that the addition of probiotics in each treatment, based on analysis of various data, does not significantly affect the growth of absolute weight and growth of absolute length of vannamei shrimp larvae.

Further research needs to be carried out on a controlled container to find out the effectiveness of probiotics made from local raw materials because based on the analysis of various data does not significantly affect the growth and survival of vannamei shrimp larvae and there needs to be routine monitoring of pond water quality and in-depth studies of water quality relationships with growth and survival of shrimp vannamei larvae (Litopenaeus vannamei).

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