PENGARUH PADAT TEBAR TERHADAP PERTUMBUHAN DAN KELULUSHIDUPAN CACING LAUT (*Nereis* sp.)

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Abstract: Nereis sp. including one of the commodities that have high economic value as well as important commodities in the world of aquaculture. The survival rate of organisms affected by good cultivation management include solid spread, feed quality, water quality, parasites or diseases. High spread solids will have an impact on the decrease in growth rate, feed consumption and survival rate. Therefore, the importance of research on solid spread because it is very closely related to the production and growth speed of cultivated biota. This study was conducted to find out the influence of different scatter solids on the growth and kelulushidupan Nereis sp. The research was conducted for 35 days of maintenance using marine worm biota or Nereis sp. The method used is an experimental method using a Complete RandomIzed Design (RAL) with 5 treatments and 3 repeats namely, Treatment 1: solid spread 50 tails/m^2, Treatment 2: solid spread 100 heads/m^2, Treatment 3: solid spread 150 heads/m^2, Treatment 4: solid spread 200 heads/m^2 and Treatment 5: solid spread 250 heads/m^2. Treatment with solid spread 150 tails / m2 (P3) gives the best influence in improving the growth and survival of Nereis sp. 0.7838 g and 93.33%.

Keywords: growth, *Nereis* sp., and solid spread

I. Introduction

Sea worms or Nereis sp. is a marine invertebrate organism that belongs to the polychaeta class and the Nereidae family. Nereis sp. including one of the commodities that have high economic value and important commodities in the world of aquaculture. These animals usually live in tidal areas along the coast, both on sandy, muddy and sandy loam substrates (Everet, 2001 in Asnawi, 2018). According to Sahri and Yuwono (2005) in Asnawi (2018), these animals are also known as sediment eaters (defocyte feeders) that live in various habitats, one of which is the soft clay (mud) texture. Sea worms have a high economic value which can be seen from several hatchery centers that use Nereis sp. as a natural feed for shrimp broodstock. In addition to natural shrimp feed, sea worms are also commonly used as fishing bait, ornamental fish food, and their extract is in the form of a capsule as an anti-diabetes medicine. This is a great opportunity for marketing marine worm cultivation products, especially to meet the need for sea worms in shrimp farming in Indonesia. Based on data in 2012 from the Directorate of Aquaculture, the need for frozen Polychaeta imports continues to increase due to undeveloped marine worm cultivation in Indonesia, seen from the total import value of 2,550 tons with a value of US $ 17,973.80 it can be said to be very potential. to be developed in the future (Anonymous, 2012 in Rasidi, 2013). According to Wibowo et al. (2019), Nereis sp. Very good for use as broodstock feed for shrimp because there is a high nutrient content and protein source that can improve the quality of gamete cells and the viability of shrimp larvae. Further on the advantages of marine worms according to Subaidah et al. (2017) that Nereis sp. which is given as feed contains essential fatty acids, especially arachidonic acid (ARA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) can stimulate the maturation of shrimp gonads, both male and female broodstock. Nereis sp. also has various important ingredients such as protein, fat, carbohydrates, ash, amino acids, vitamins A, B1, B6, B12, E, and minerals Ca, Mg, which are almost equivalent to the nutritional content of fish (Silaban, 2012 in Nurhikmah, 2017). The high protein content in sea worm flour can increase the growth and fulfillment of feed, namely 56.29% protein, 11.32% fat and 14.34%

ash so that from the superiority of marine worms, it is expected to replace shrimp broodstock feed in the form of squid. which tends to be more expensive (Rahmad and Yuwono, 2000).

The low biomass and survival of marine worms are influenced by the motion of marine worms, usually found in marine worms that swim and crawl due to energy depletion in motion. Utilization of marine worm biomass may not always rely on natural catches, one alternative to reduce fishing in nature is by cultivation, but knowledge about cultivation is still minimal so that more research is needed on sea worms (Olive, 1999 in Hermawan, 2015). Cultivation of Nereis sp. in Indonesia it is still underdeveloped because it is not considered an important commodity and is still at the research stage, so there is no attention to this commodity either. Unlike the case with the cultivation of earthworms that have developed. Research on marine worm cultivation has actually been initiated since the 2000s and at this time it is still necessary to conduct a deeper study of aspects of its cultivation. Yuwono et al. Conducted research on sea worms (Dendonereis pinnaticirris). (2002), Yuwono (2003) in Rasidi (2013). Research from various aspects of cultivation for the types of marine worms used in shrimp hatcheries is still very much needed regarding aspects of biology, ecology, reproduction and aspects of mass cultivation as well as economic aspects so that marine worm cultivation can develop in Indonesia as an effort to provide food and other needs. According to Fajar (1988) in Gamis et al. (2016) stated that the survival rate of organisms is influenced by good cultivation management, including stocking density, feed quality, water quality, parasites or disease. High stocking density will have an impact on reducing growth rates, utilization of feed and survival rates. Previous research has not done much research on marine worms, especially in terms of density in the cultivation of Nereis sp. Some examples of research that have been successfully carried out by Asnawi et al (2018) used a density of 5 fish / container with a diameter of 50 cm, while research conducted by Wibowo et al (2019) used a density of 10 individuals / container area of 0.06 m2 or about 167 individuals / m2. Therefore, it is important to do research on stocking density because it is closely related to the production and growth rate of cultivated biota, so this research aims to determine the most effective stocking density for survival and increase the biomass of Nereis sp. and increase knowledge from marine worm cultivation which is still underdeveloped.

II. Research methods

Materials and tools The materials used in this research are sea worms (Nereis sp.), Sea water, sea sand substrate, commercial pellet feed, chlorine, thiosulfate, detergent, gravel. The tools used in this study are trays (35x30cm), pipes, DO meters, pH meters, analytical scales, aerators, hoses, refractometers, rulers, nets.

Research methods

The test animal used was Nereis sp which was obtained from catching in its natural habitat, then carried out maintenance for 35 in a container with an area of 0.1 m2. The method used was an experimental method using a completely randomized design (CRD) with 5 treatments and 3 replications, namely, Treatment 1: stocking density 50 individuals / m2, Treatment 2: stocking density 100 heads / m2, Treatment 3: stocking density 150 individuals / m2 , Treatment 4: stocking density 200 fish / m2 and Treatment 5: stocking density 250 fish / m2.

Data analysis

The data collected during the research process were analyzed using ANOVA with a 95% confidence level. If there is a difference, continue with the Lower Significance Difference test. The analysis was performed using the SPSS software program.

III. Results and Discussion

Result

Absolute Growth Rate

The results of analysis of variance (Anova) and further tests on the effect of stocking density on absolute growth and absolute length growth (weight, length) of marine worms can be seen in Figure 1 and Figure 2.

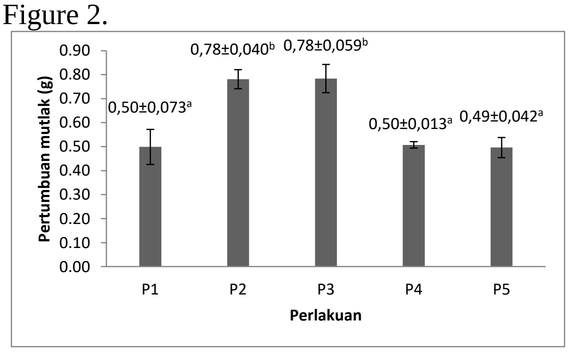

Figure 1. Graph of Absolute Weight Growth of Nereis sp.

The absolute length growth of Nereis sp. observed during maintenance showed no significant difference in different stocking density treatments ($p > 0.05$) (Figure 2).

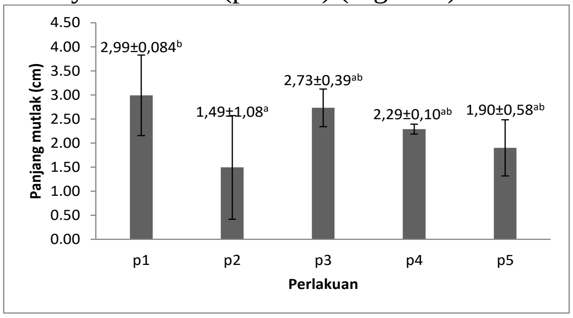

Figure 2. Graph of Absolute Length Growth of Nereis sp.

Specific Growth Rate The results of the analysis of the specific growth rates observed during maintenance showed that there were differences in the specific growth rates of Nereis sp. at different stocking density treatments (Figure 3).

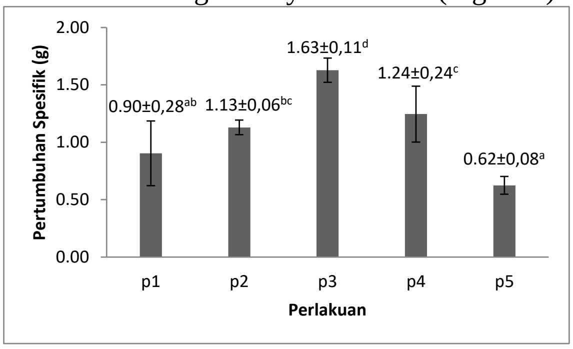

Figure 3. Graph of Specific Growth Rate of Nereis sp.

Feed Efficiency The results of the feed efficiency analysis observed during maintenance showed a difference in the efficiency of feed utilization in the stocking density treatment (Figure 4).

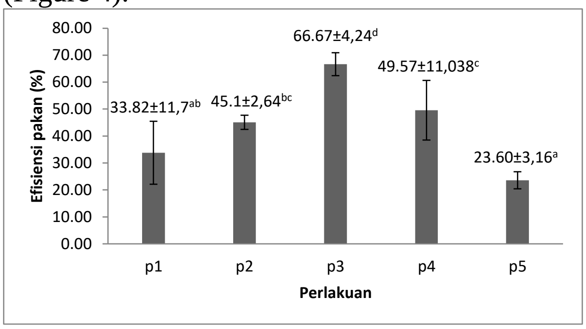

Figure 4. Feed Efficiency Graph Nereis sp.

Feed Conversion The results of the analysis of feed conversion values observed during Nereis sp. showed that there was a difference in feed conversion value at different stocking density treatments (Figure 5).

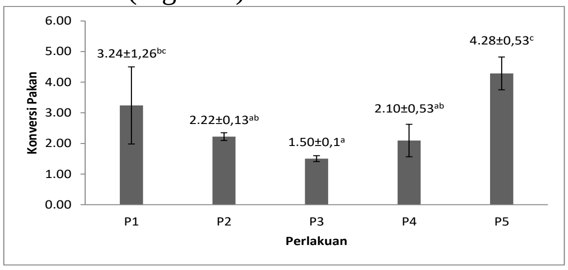

Figure 5. Graph of Feed Conversion Value of Nereis sp.

Survival Rate The results of the survival rate for Nereis sp. observed during maintenance at different stocking density treatments ranged from 73.33% - 93.33% (Figure 6).

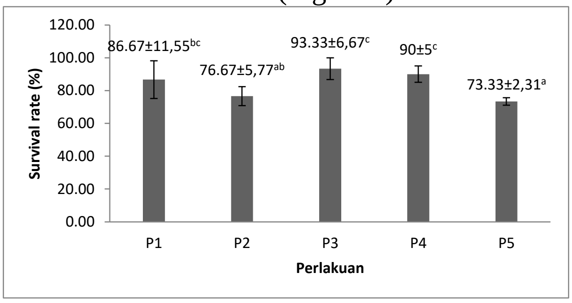

Figure 6. Graph of Survival Rate for Nereis sp

Water quality

Water quality is a supporting factor in the maintenance of Nereis sp. The results of water quality observations for 35 days of maintenance showed that the temperature range, pH, DO and salinity values were still within the feasibility limits for Nereis sp.

(Table 1) Table 1. Data on Water Quality Values during the Study

Parameter	Satuan	Hasil	Pustaka kelayakan
Suhu	^oC	25,3 - 27,6	23-32 ^oC (Yuwono *et al.*,2002 *dalam* Wibowo *et al.*,2018)
pH	-	7,12 - 8,17	7,0-8,5 (Kepmen KLH No. 51 tahun 2004 *dalam* Hermawan *et al.*,2015)
DO	ppm	4,6 - 7,3	0,80-9,30 ppm (Yuwono *et al.*,1998 *dalam* Wibowo *et al.*,2018)
Salinitas	ppt	27 - 32	5-32 ppt (Mustofa,2012 *dalam* Wibowo *et al.*,2018)

Discussion

Absolute Growth Rate

The results of analysis of variance on absolute weight growth showed that the use of different stocking density treatments had a significant effect ($p < 0.05$) for each treatment, so Duncan continued testing to determine the best treatment. Further test results showed that P1 (stocking density of 50 fish / m2) was not significantly different from P4 (stocking density of 200 individuals / m2) and P5 (stocking density of 250 individuals / m2), but was significantly different from P2 (stocking density of 100 individuals / m2).) and P3 (stocking density of 150 individuals / m2).

The results of this study indicate that the absolute weight growth at P3 (stocking density 150 individuals / m2) obtained the highest value compared to other treatments, this is because the use of sufficient stocking density will increase the growth of sea worms, but if the use of stocking density is too high it can causing competition for feed and space for biota so that it can affect the value of growth. According to Fajar (1988) in Gamis et al. (2016) stated that the survival rate of organisms is influenced by good cultivation management, including stocking density, feed quality, water quality, parasites or disease. High stocking density will have an impact on reducing growth rates, utilization of feed and survival rates. Furthermore, Hickling (1971) explains that stocking density is closely related to the production and growth rate of the biota being maintained. The stocking density will determine the level of maintenance intensity. The higher the stocking density, the higher the amount / biomass of seeds per unit area, the higher the level of maintenance. The limiting factors in determining the stocking density of the biota are environment and feed.

The results of analysis of variance on absolute length growth showed that the use of different stocking density treatments had the same effect between treatments ($p > 0.05$) (Appendix 2). The absolute length growth obtained ranged from 1.49 to 2.99 cm, this value did not show a significant difference in each treatment because it was difficult to observe the length measurement of sea worms because of the uncertain length of sea worms which could lengthen and shorten, this was due to worms. The sea has segments along its body that allow worms to elongate. According to Rasidi (2012) that morphologically, the outer body structure of marine worms has a characteristic body that is composed of segments, has a pair of parapods and has a chaeta in each segment of the body.

Specific Growth Rate

The results of the analysis of variance showed that the use of different stocking density treatments had a significant effect ($p < 0.05$) on the specific growth rate of Nereis sp., So Duncan's continued test was carried out to determine the best treatment. Further test results showed that P1 (stocking density 50 individuals / m2) was not significantly different from P2 (stocking density 100 individuals / m2) and P5 (stocking density 250 individuals / m2), but significantly different from P3 (stocking density 150 individuals / m2).) and P4 (stocking density 200 individuals / m2).

The specific growth rate is the daily growth rate or the percentage of weight added each day. The specific growth rate of Nereis sp. the highest was in P3 (stocking density of 150 fish / m2), which was 1.6275 g, and the lowest was in P5 (stocking density of 250 individuals / m2), which was 0.624 g. The low growth value at P5 is thought to be due to the excessive stocking density in the cultivation container causing competition to meet the nutritional needs of the feed to support the growth of Nereis sp. According to Hermawan (2015) that the feed factor is also very important in supporting the specific growth rate because the availability of feed in cultivation greatly affects growth. The growth of sea worms is closely related to the availability of protein in feed, because protein is a source of energy for sea worms and nutrients needed for their growth. Therefore, the relationship between density and fulfillment of sea worm feed needs is very much considered in this cultivation to achieve optimal growth. Furthermore, according to Slembrouck et al, (2005) that high stocking density will have an impact on increasing oxygen and feed requirements, as well as metabolic wastes such as feces, ammonia, so that the carbon dioxide (CO_2) content also increases. As a result, there is a decrease in the quality of water in the cultivation media, stunted growth, low survival and heterogeneous size of the biota. Conversely, if the stocking density is low, it will result in low production.

Feed Conversion and Efficiency

The results of analysis of variance showed that the use of different stocking density treatments had a significant effect in all treatments ($p < 0.05$) on the efficiency of feed utilization and feed conversion by Nereis sp.

The conversion and feed efficiency are the same as the growth rate which shows that at P3 (stocking density 150 heads / m2) is the best value, while at the highest density P5 (stocking density 250 birds / m2) shows poor conversion value and feed efficiency, This is related to the fact that the density at P5 which is too high causes a lack of utilization of the feed given due to competition for feed and living space. According to Puspita and Ratih (2018) the difference in space causes competition in foraging for food, so that feeding is more effective at lower densities. Moniruzzaman et al (2014) high stocking density has a lower ability to convert feed into meat, whereas fish with low density feed is used for growth. According to Herdiana (2013), a low feed efficiency value can cause growth to decline from low feed consumption. According to Hepher and Pruginin (1981), an increase in density will be followed by a decrease in growth so that at certain densities the growth will stop because it has reached its maximum point. One of the increases in stocking density will be followed by an increase in the amount of feed, so that it will have an impact on feed utilization that is not maximal in the growth of Nereis sp.

Survival Rate

The results of the study on the survival rate of marine worms obtained values ranging from 73.33% - 93.33%, where the highest value was at P3 (stocking density 150 individuals / m2) and the lowest value was at P5 (stocking density 250 individuals / m2). The results of analysis of variance showed that the use of different stocking density treatments had a significant effect ($p < 0.05$) on the survival rate of Nereis sp., So Duncan continued to test to determine the best treatment. The results of further tests showed that P1 (stocking density of 50 fish / m2) was only significantly different from P5 (stocking density of 250 individuals / m2) and was not different from other treatments.

The survival value of these marine worms is still quite high when compared to research conducted by Brown et al. (2011) who use fish feed waste as feed produces a survival rate of 45.2% - 87.2%, this is due to the change of water at the bottom every day so that water quality will be maintained and support the life of marine worms in the maintenance container. The high mortality rate can be caused by the density that marine worms cannot tolerate in the rearing media so that there will be competition for food and a place to live. According to Fajar (1988) in Kadar (2014), states that the survival rate of organisms is influenced by good cultivation management including stocking density, feed quality, water quality, parasites or disease.

Water quality

Water quality is an environmental factor that plays a very important role in the success of aquaculture business, so that its processing must be in accordance with optimal standards to support the growth and survival of cultivated organisms. In this study, water quality was always maintained by performing routine tapping on the basis of the maintenance medium to remove uneaten feces and feed that could damage water quality. The range of water quality values in marine worm rearing media is still classified as optimal and can be tolerated for the survival and growth of marine worms (Table 3). According to Yuwono et al. (2002) in Wibowo et al. (2018) the optimal temperature range for marine worms is 23-32 oC. Increased temperature will cause metabolic processes to also increase. According to Mustofa (2012) in Wibowo et al. (2018) traffic that can be tolerated by sea worms ranges from 5-32 ppt. Furthermore, according to Hermawan et al. (2010) at low salinity sea worms carry out a high osmoregulation process so that they will expend a lot of energy. A good pH value for marine worms ranges from 7.0 to 8.5 (Kepmen KLH No. 51 of 2004 in Hermawan et al., 2015). According to Yuwono et al. (1998) in Wibowo et al. (2018) dissolved oxygen content which is still within normal limits ranges from 0.80 to 9.30 ppm. According to Fardiaz (1992) in Nur et al. (2017) stated that oxygen saturation in water is influenced by water temperature, the higher the temperature, the lower the DO concentration.

IV. Conclusion

The results showed that the use of different stocking densities could affect growth, feed efficiency, feed conversion and survival rate of Nereis sp. Treatment with stocking density of 150 individuals / m2 (P3) gave the best effect in increasing the growth and survival of Nereis sp. namely 0.7838 g and 93.33%, respectively.

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