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CATFISH CULTURE (*Clarias sp*) BIOFLOC SYSTEM WITH PROBIOTICS EM-4

Nurjanah, Ninik Umi Hartanti, Sutaman, Jusmen Lani Kogoya

Faculty of Fisheries and Marine Sciences, Pancasakti University of Tegal, Central Java.

Email : nur.janah1963@gmail.com

ABSTRACT

Catfish (*Clarias sp*) is a freshwater commodity that has high economic value and its production increases every year. For this reason, efforts are needed to increase production, one of which is by increasing feed nutrition using EM-4 probiotics. This study aims to determine the effect of feeding fermented feed with EM-4 probiotics on the growth rate and survival rate of catfish (*Clarias sp*), which were cultured using biofloc technology. The method used was a completely randomized design (CRD) with 3 treatments 3 replications, with treatments A (dose 6 ml/kg), B (dose 8 ml/kg), C (dose 10 ml/kg) and K (without probiotics). . The test fish used were catfish seeds measuring 7-9 cm with a stocking density of 500 individuals/m3, a water level of 50 cm and a water volume of 3.5325 m3. Fish maintenance was carried out for 30 days with a frequency of feeding 3 times as much as 5% of the fish weight. The results showed that the administration of EM-4 at different doses of feed had a significant effect ($P<0.05$) on absolute individual body weight growth, daily growth rate and feed conversion ratio, but did not significantly differ on survival rates. The best results were C2 treatment (dose of 10 ml/kg) with an absolute individual weight gain of 270.5 g, a daily growth rate of 123.5%, feed conversion of 3.43, and a survival rate of 97%. Water quality parameters are in the range that is suitable for catfish life The results showed that the administration of EM-4 at different doses of feed had a significant effect ($P<0.05$) on absolute individual body weight growth, daily growth rate and feed conversion ratio, but did not significantly differ on survival rates. The best results were C2 treatment (dose of 10 ml/kg) with an absolute individual weight gain of 270.5 g, a daily growth rate of 123.5%, feed conversion of 3.43, and a survival rate of 97%. Water quality parameters are in the range that is suitable for catfish life *(Clarias sp).*

Keywords: Catfish *(Clarias sp*), EM-4 Probiotics, Biofloc

INTRODUCTION

Catfish (*Clarias sp*) is a type of consumption fish that has promising prospects, because catfish has the advantages of fast growth, higher production, more resistance to disease, very

easy to cultivate and simple maintenance techniques (Nasrudin, 2010). In addition, this fish can be kept in a narrow area with a high stocking density and is resistant to unfavorable environments. Cultivation of catfish (*Clarias sp*) is increasing along with the increasing demand for this fish. Efforts to meet market demand for catfish need to be cultivated intensively. The cultivation of this fish is carried out intensively using high stocking densities, intensive feed, and the need for feed during cultivation can reach around 60% -70% of the operational costs of cultivation (Suhenda *et al.*, 2017). One alternative that can be done is the provision of probiotics in fish feed.

Arief *et al.*, (2014) explained that probiotic bacteria produce enzymes that are able to break down complex compounds into simpler ones so that they are ready for use by fish. In improving feed nutrition, the bacteria contained in probiotics have a mechanism to produce several enzymes for feed digestion such as amylase, protease, lipase and cellulose. The type of probiotic that is commonly used is EM-4 (Effective Microorganism-4).

According to Anis and Hariani (2019), commercial feed with the addition of EM-4 can increase the growth rate of catfish. Agusta (2017) states that giving EM-4 to feed can increase the growth rate of fish and the water quality of catfish (*Clarias sp*) rearing media. Based on the problems above, the authors are interested in conducting research on the effect of giving EM-4 probiotics with different doses on the growth and survival of sangkuriang catfish. The working principle of fermentation is to break down non-digestible materials such as cellulose into simple sugars that are easily digested with the help of microorganisms. The enzymes produced in the fermentation process can improve nutritional value, growth, and increase the digestibility of crude fiber, protein and other feed nutrients (Wiranto in Amarwati, 2015).

This research aims to know the addition of probiotic EM4 (Effective Microorganism-4) in fish feed PF 1000 on the growth and survival of catfish (*Clarias sp*) in the biofloc system.

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RESEARCH METHODS

Time and Place of Research

The research was conducted from December 1 to December 30, 2022. Research locationin Kemantren Village, Kec, Gedeg, Mojokerto City, East Java.

Figure 1. Research Locations

Experimental design

The method used in this study was an experimental method, using a completely randomized design (CRD), with 3 treatments with 3 replications each. The treatments in this study were A1 (6 ml/kg feed), B1 (8 ml/kg feed), C1 (10 ml/kg feed), and Control (without probiotics).

Method of collecting data

Data measured in this study included Absolute Weight Growth (Wm), Daily Growth Rate (LPH), Relative Growth Rate (LPR), Survival Rate (SR), Feed Conversion Ratio (FCR), Quality and Thickness of Floc Volume.

Data analysis method

Prior to analysis of variance (ANOVA), data normality and data homogeneity tests were carried out. Analysis of variance used the SPSS application to determine the effect of treatment on absolute weight growth (g), daily growth rate (%), and weekly growth rate (%). If the Anova test results are significant, the Duncan test is continued to find the best treatment. Data on water quality and flock volume were analyzed descriptively.

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RESULTS AND DISCUSSION

Based on the research, it was obtained from each treatment that was measured, namely, absolute weight 260 gr -100 gr, LPH 26.02% -100%, relative growth rate 497.67% - 100%, SR 97% - 100%, FCR 3.43% - 5% as shown in table 1.

Parameter	Treatment			
	A	**B**	**C**	**K**
Mutlat Weight	100±220.33g	100±230.33g	100±260.33g	100±210.16g
LPH	100±22.03%	100±23.03%	100±26.02%	100±21.01%
Relative Weight	100±316.67%	100±325.33%	100±497.67%	100±310.67%
SR	100±94.67%	100±94.67%	100±97%	100±96.33%
FCR	5±2.17%	5±3.24%	5±3.43%	5±3%

Note: Different superscript letters on the same line indicate differences Significant (P<0.05).

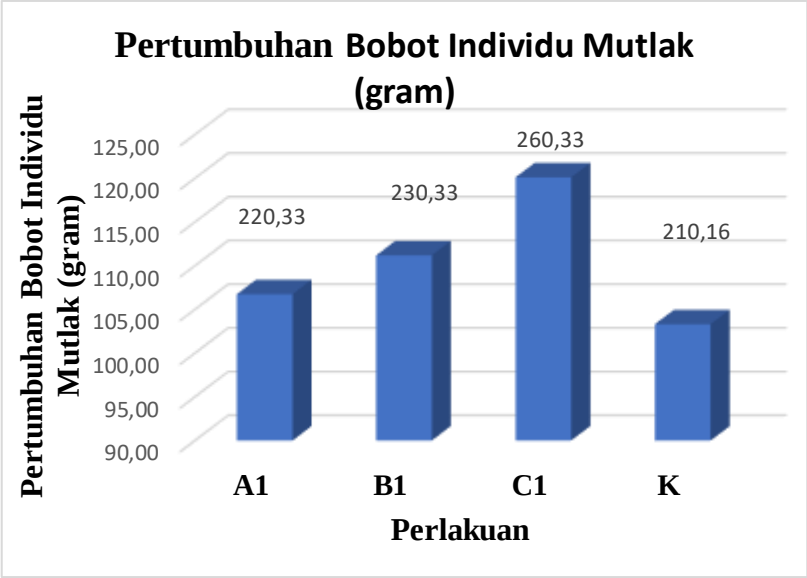

Figure 2. Absolute individual weight growth (gr) of catfish (*Clarias sp*)

The addition of probiotic EM-4 as much as 10 mL/kg feed (C) resulted in the highest growth rate in catfish reared in biofloc media, namely absolute weight 260.33 g, LPH 26.02%/day, and relative weight 497.67%. . While the lowest was in the control treatment (K), namely absolute weight 210.16 g, LPH 21.01%/day, and relative weight 310.67%. This

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shows that giving EM-4 as much as 10 mL/kg of feed is the optimal dose that can increase the growth of catfish. The results of the analysis of variance (ANOVA) showed that the administration of EM-4 at different doses of feed had an effect between treatments ($p<0.05$) on the growth of absolute weight, LPH, relative weight, SR and feed conversion ratio.

The Student Newman Keuls (SNK) follow-up test showed that (C) was significantly different with each treatment of the observed parameters. Fish weight growth is influenced by the availability of feed given and adapted to the new environment. The individual weight of catfish seeds increased with the time of rearing and growth of fish body weight, this illustrates that the availability of feed in rearing containers can be utilized for the growth process to increase fish growth. Giving EM-4 to fish feed certainly affects the efficiency in the use of feed by fish. According to Kurniawan et al., (2020), the amount of feed consumed will directly affect fish growth.

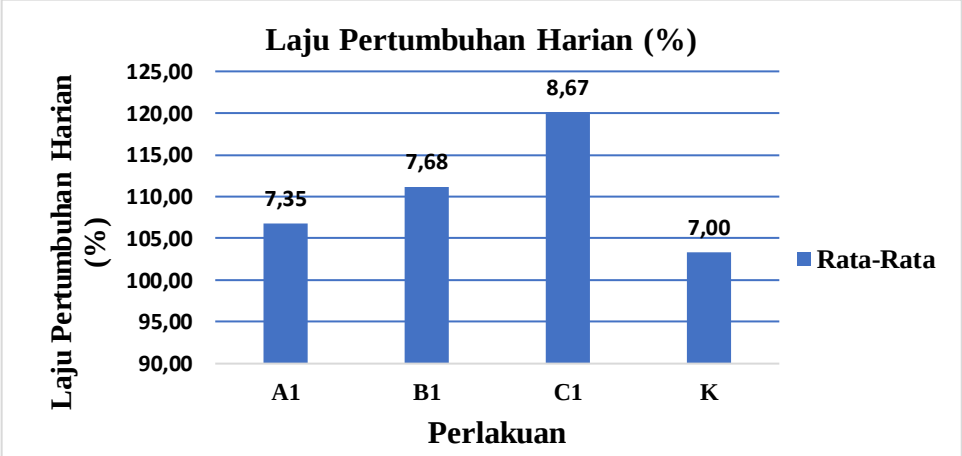

Figure 3. Relative Growth of Catfish (*Clarias sp*)

The relative growth of fish is also influenced by the energy that enters the fish's body. Fish can grow optimally if there are a number of nutritional intakes that are received and absorbed by the body. Dontriska et al., (2014), excess feed energy is used for body maintenance, so it is used to grow. Giving EM-4 also affects LPH and catfish feed conversion ratio, when compared to treatment without giving EM-4. This shows that the provision of probiotics in feed can increase the growth rate. According to Lisna and Insulistyowati (2015) fish growth increases due to the effect of adding probiotics to the feed so that the bacteria in the probiotics work to improve the digestive tract of fish. According to Mulyadi (2011), the proportion of the number of probiotic bacteria colonies can work optimally in the digestion of fish, so that the digestibility of fish becomes higher in absorbing nutrients and producing

good growth. The use of probiotics in fermented catfish feed and in aquaculture waters with biofloc technology causes the availability of feed other than the feed given, namely the presence of biofloc which can be used as a natural feed source.

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The use of heterotrophic bacteria with different doses has a significant effect on the feed conversion ratio. This is thought to be influenced by feed fermentation and the nutritional content of the flock. Fermentation can make feed easier to digest, and can increase the nutritional value of feed and the rate of absorption of nutrients, so that the utilization of feed by the body is more efficient. This is supported by the statement of Verschuere *et al.,* (2000), which stated that the treatment of probiotics resulted in a better feed conversion ratio than the control, because the addition of probiotics in the feed could increase feed utilization more efficiently than the control.

Survival Rate (SR)

The survival of catfish by feeding with the addition of EM-4 had no effect between treatments ($P>0.05$). The survival rate of catfish ranged from 97% - 94.67%, Treatment C (10 mg/kg) gave the highest survival rate, which was 97% and the lowest was for K (Control) which was 94.67% as shown in Figure 4.

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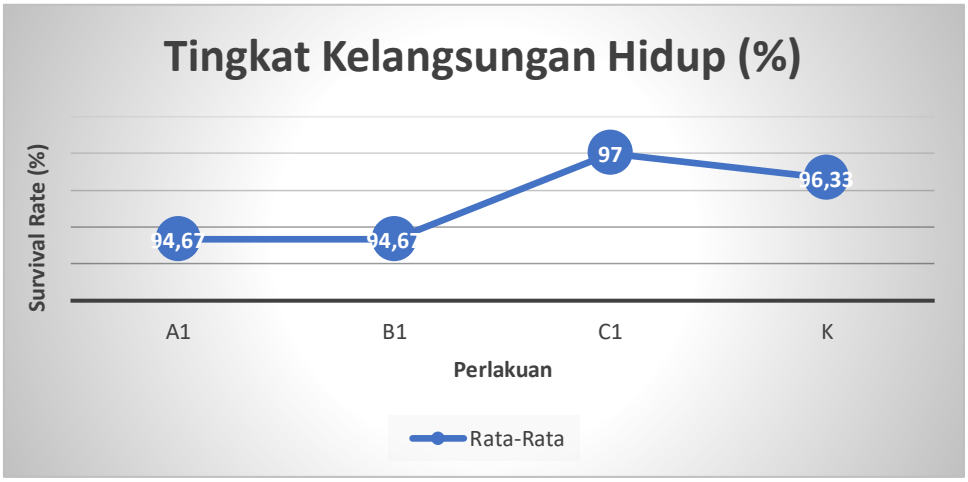

Figure 4. Survival Rate of Catfish (Clarias sp)

The survival rate of catfish (*Clarias sp*) during the study ranged from 94.67% -97%, and was quite good. According to Najib (2018), the survival rate of >50% is considered good, the survival rate of 30-50% is moderate and the survival rate of less than 30% is not good. The high survival rate is influenced by the quality of the feed and the addition of probiotics to the rearing medium. Giving probiotics regularly, namely once a week, helps create ideal conditions for aquatic ecosystems both in terms of feed absorption efficiency and the nitrification process. Bacteria in probiotic B such as Bacillus and Nitrosomonas work effectively to decompose organic matter so that water quality remains stable. This is in accordance with the statement of Pitrianingsih *et al.*, (2014),

Water quality

Water quality is a very important factor in aquaculture activities. In addition to adequate water sources and quality, the water used for fish rearing must meet optimal integrity for fish growth (Ghufran, 2011). The water quality measured is temperature, pH, DO and Ammonia as shown in Table 2.

Table 2.Water Quality Measurement

Treatment	Temperature (0C)	pH	DO (mg/L)	Ammonia (mg/L)
A	27-31	7-8,2	5.5-6.7	<0.1-0.093
B	27-30	7-8	5.1-6.0	<0.1-0.095
C	26-30	7,2-8,4	5,6-6,9	<0.1-0.97
K	26-31	7,1-8	5-6,1	<0.1-0.80

The water quality conditions in each treatment were good and met the standards to support catfish life. The water temperature during the study was included in the optimal range for the feasibility of catfish life, namely between 270C - 310C. Djoko (2006) stated that factors related to the environment of fish must always be maintained and considered. The optimum temperature for the growth of sangkuriang catfish is around 25-300C (Wulansari *et al.*, 2017) . Temperatures that are above or below the optimum temperature will result in a decrease in catfish growth.

Ammonia content is in the proper range for fish farming, which is 0.01 mg/l. – 0.021 mg/l. According to Ahmadi *et al.*, (2012), good ammonia levels are <1 mg/l. If it exceeds the tolerance limit it will affect the life of catfish.

Dissolved oxygen (DO) during the study ranged from 5.0 mg/L - 6.2 mg/L, according to Kordi and Tancung (2007) dissolved oxygen content in cultivated fish > 5 is very good for fish growth.

The pH value of the culture media water ranges from 6 - 6.7 mg/L and is in the proper range for catfish life. This is influenced by the provision of EM-4 which functions to improve water quality so that it is maintained according to the needs of catfish. PFish growth will be optimal if the pH is in the range of 6 – 9 (Imaduddin *et l.*, 2017).

CONCLUSION

Based on the research it was concluded that feeding fermented EM-4 to the growth rate of absolute individual weight, feed conversion, and survival rates had a significant effect on

the life and growth of catfish. The best treatment was obtained by C, namely feeding with the addition of 10 ml/kg of probiotics which resulted in an absolute individual weight growth of 270.5 g, an FCR of 3.5, and a survival rate of 97%. The range of water quality during the study was in a reasonable range for the life of catfish. In the treatment, the temperature was 26 – 32 oC, pH 7.2 – 8.4, dissolved oxygen was 5 mg/l, and ammonia was in the range of 0.001 – 0.097 mg/L.

SUGGESTION

Suggestions in this study, namely, the addition of EM-4 probiotics in the feed as much as 10 ml/kg of feed, because according to the results of research that has been done it has the best effect on the growth and survival of catfish (*Clarias sp*).

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