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EFFECT OF ADDITION COMBINATION LIQUID AND DRY PROBIOTICS ON SIAMESE CATFISH GROWTH

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KeyWords

Juvenil, Siamese catfish, Probiotics, Survival, Growth rate, Food Convertion Ratio (FCR).

ABSTRACT

This research aims to analyze the effect of giving a combination of liquid and dry probiotics on fish feed on growth, survival, and conversion ratio of feed of Siamese catfish juvenile carried out from June 2019 to August 2019. The method used in this research is an experimental method with a Completely Randomized Design (CRD) consisting of four treatments with three replications, with different concentrations of probiotics. Treatment A : Control / without probiotics, treatment B: addition of probiotics (75% liquid) 11.25 ml / kg of feed & (25% dry) 2.5 g / kg of feed, treatment C: addition of probiotics by (50% liquid) 7.5 ml / kg of feed & 50% (dry) 5 g / kg of feed, treatment D: addition of probiotics by (25% liquid) 3.75 ml / kg of feed and (75% dry) 7.5 g / kg of feed. Parameters tested using analysis of variance include survival, average absolute weight growth, daily weight growth, food conversion ratio (FCR). While water quality is tested descriptively. The results of this study can be concluded that the addition of a combination of liquid and dry probiotics with the best results is the concentration of liquid 3.75 ml / kg of feed and dry 7.5 g / kg of feed with an average rate daily growth of 2.66%, the average value of long growth of 1.95 cm, and food conversion ratio of 0.95. Survival rates show 100% in all treatments.

INTRODUCTION

Siamese catfish (*Pangasius hypopthalmus*) is a type of catfish introduced from Thailand. Siamese catfish originated from the Mekong River in Vietnam to the Chao Phraya River in Thailand (Khairuman and Amri 2008). Siamese catfish is one of the introduced fish species that has economic value to be cultivated. Siamese catfish has a big economic value, especially in Sumatra and Kalimantan. Siamese catfish live in rivers and lakes of Kalimantan, Sumatra and Java (Kordi 2005). This is because siamese catfish has advantages such as fast growth rates, high fecundity, can be mass produced and has high selling prices and the great taste of meat (Susanto and Amri 2002).

Siamese catfish is an excellent commodity in the aquaculture sector, both for local and international markets. In fact, the value is predicted to continue to increase, along with the increase in population and awareness of the importance of fish consumption. Siamese catfish is still being cultivated by fish farmers in Sumatra, South Kalimantan and West Java. This fish cultivation is carried out intensively using commercially-made artificial feed. The efforts to increase the growth rate of catfish are still being improved so that the use of artificial feed is more efficient which in turn will reduce production costs (Jusadi et al. 2004).

The factors that influence a freshwater aquaculture business include water quality, continuous availability of feed and juveniles. The availability of juveniles must be sufficient, both in quantity, quality, and continuity. Good quality fish juveniles, efficient of feed given, healthy and fast growing, have resistance to disease and low mortality (Murtidjo 2004).

One effort that can be done to maintain good water quality is the use of probiotics in fish maintenance media. Probiotics are a collection of living microorganisms that have a beneficial effect on the host by modifying the microorganism community or associating with the host, ensuring improvements in feed use or improving nutrition, improving the host's response to disease and improving the quality of the environment (Verschuere *et al.* 2000). Probiotics are additional feed containing microorganisms that are not pathogenic. Probiotics in aquaculture play a role in increasing the rate of growth, boosting the immune system by changing the community of intestinal microorganisms (Fuller 1989).

Nowadays many alternative methods have been developed in aquaculture activities, one of them is the use of probiotics mixed into feed or on maintenance media. Probiotics do not accumulate in the body of fish and do not cause resistance to progenic organisms such as antibiotics (Guo *et al.* 2009). Probiotics are able to monitor biological maintenance conditions without causing adverse effects on the microbial ecological balance system both in digestion and in fish maintenance systems.

Probiotics can be divided into two namely liquid and dry probiotics. Probiotics are widely circulated in the market, mostly in liquid forms, but are less efficient in terms of stability (expiration, storage) and packaging (Tamime and Robinson 1989). Besides that, the possibility to grow other bacteria is greater than in the dry form. Dry probiotics provide the means to convert components in liquid form into solid particles and protect material from environmental influences and are relatively more expensive (Yulinery and Nurhidayat 2012). One example is the Heryaki probiotics. There are two types of Heryaki Probiotics, a liquid and dry one. The content of microorganisms contained in liquid Heryaki probiotics are *Lactobacillus casei* and *Monascus fumeus.* While the dry one contained *Candida ethanolica, Monascus fumeus* and *Bacillus* sp.

MATERIAL AND METHODS

Research was carried out in April 2019 to June 2019 at the Ciparanje Wet Laboratory at Padjadjaran University. The research method used was an experimental method with a Completely Randomized Design (CRD) consisting of four treatments with three replications namely the administration of probiotics with different concentrations can be seen below :

A treat : Control/without using probiotics
B treat : With probiotics of (75% liquid) 11,25 ml/kg feed and (25% dry) 2,5 g/kg feed
C treat : With probiotics of (50% liquid) 7,5 ml/kg feed and 50% (dry) 5 g/kg feed
D treat : With probiotics of (25% liquid) 3,75 ml/kg feed and (75% kering) 7,5 g/kg feed

The linear model of this design is as follows (Gasperz 1991) :

$$Xij = \mu + \tau i + \varepsilon ij$$

Information :
Xij = The results of observations on the treatment of the i-th test
μ = General average
τi = Effect of 1st treatment
εij = Influence of random factors in the i-th test, j replications

OBSERVATION PARAMETER

1. Spesific Growth Rate (Weight)

Specific growth rate (weight) of fish is calculated using the formula (Effendie 1997) :

$$\text{SGR} = \frac{lnWt - lnWo}{t} \text{ x } 100\%$$

Information :
SGR = Daily growth rate (% per day)
Wt = Daily average of fish weight at the end of research (g)
Wo = Daily average of fish weight at the beginning of research (g)
t = Observation time (day)

2. Absolute Length Growth

Measurement of the body length of Siamese catfish is done by measuring the length of Siamese catfish at the beginning and end of the research. Absolute length calculation is done by using the following equation (Effendie 1997):

$$L = Lt - Lo$$

Keterangan :
L = Absolute length growth
Lt = Individual average length at t-time (mm)
Lo = Individual average length at the beginning of research (mm)

3. Food Conversion Ratio (FCR)

According to Effendie (1997), food conversion ratio is calculated using the following formula:

$$FCR = \frac{F}{(Wt+D)-Wo}$$

Information :
FCR = Food Convertion Ratio
F = The ammount of feed (g)
Wt = Biomass test animals at the end of research (g)
D = Dead fish weight (g)
Wo = Biomass test animals at the beginning of research (g)

4. Survival Rate

Calculation of data from survival parameters can be determined by using a formula (Effendie 1979) :

$$SR = \frac{Nt}{No} \times 100\%$$

Information
SR = Survival Rate (%)
Nt = The number of test animals at the end of observation (tail)
No = The number of test animals at the beginning of observation (tail)

5. Water Quality

The observed water quality parameters and the equipment used and the frequency of measurements can be seen in Table 1.

Tabel 1. Physical-Chemical Parameters, tools used, and measurement frequency

Physical-Chemical Parameters	Tools	Measurement frequency
pH	pH meter	Once in 10 days
Dissolved oxygen	DO meter and wingkler titrate	Once in 10 days
Temperature	Thermometer	Once in 10 days
Amonia	Spektrofotometer	Once in 10 days

RESULTS

Spesific Growth Rate (Weight)

The results of observations of daily weight growth made during 40 days of maintenance can be seen in Figure 1.

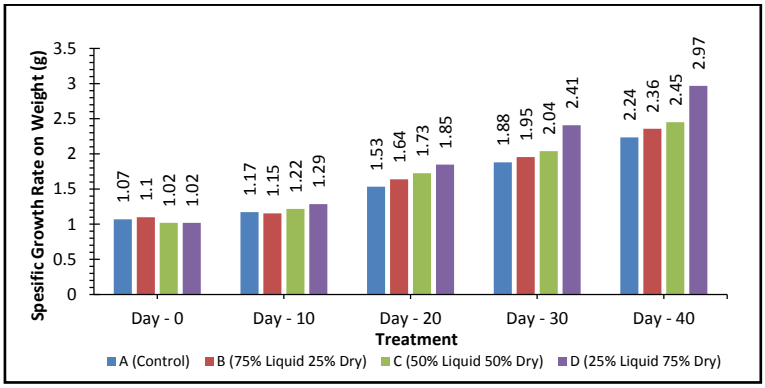

Figure 1. Spesific growth rate (weight) on siamese catfish juvenile

Based on Figure 6 of initial maintenance or t_0, the weight of the patina fish on treatment A was 1.07 g, treatment B 1.1 g, treatment C 1.02 g and treatment D 1.02 g the average of all treatments was 1.05 g. Then after a 10-day maintenance period the weight of each treatment showed an increase. The highest growth was obtained by treatment D with a growth value of 1.29 g, followed by treatment C of 1.22 g, treatment B of 1.15 g, and treatment A having the lowest daily growth value of 1.17 g. Entering the day-care period of 20-day-old fish was obtained with the highest growth value with treatment D having the highest value of 1.85 g, treatment followed by treatment C of 1.73 g, treatment B of 1.64 g, and treatment A was lowest with a value of 1.53 g. During the 30-day maintenance period the weight of each treatment increased with treatment with high D value of 2.41 g, treatment followed by treatment C of 2.04 g, treatment B of 1.95 g, and treatment A with value 1.88 g. Subsequently during the 40-day retention period, the weight of each treatment increased. Treatment D had the highest growth value of 2.97 g, followed by treatment C of 2.45 g, treatment B had growth of 2.36 g, and treatment A had the lowest growth rate of 2.36 g with a value of 2.24 g. Growth marked by increasing weight indicates that feeding provided during the study can enhance growth.

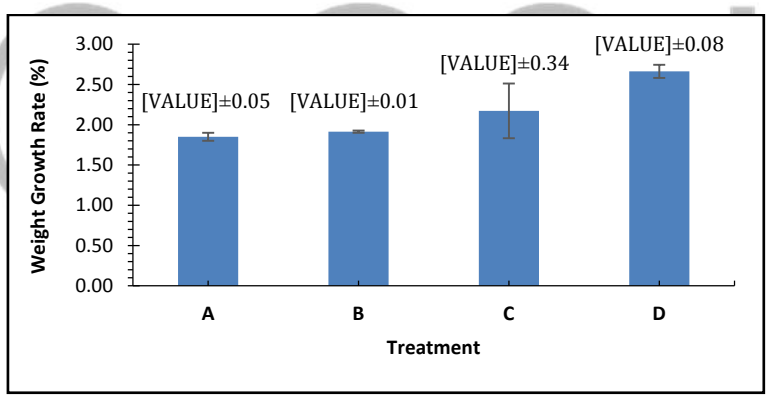

Figure 2. Weight growth rate of siamese catfish juvenile

Based on Figure 2 the average growth rate of the daily weight of Heryaki probiotic treatment during 40 days of maintenance. It is known that treatment D is the treatment with the largest value of growth rate with a value of 2.66%, followed by treatment C at 2.17%, treatment B at 1.9%, and the average value of the smallest growth rate is in treatment A or control that is equal to 1.85%. Based on the results of the F test at 5% level showed significantly different between treatments, with a value of Fhit> Ftab that is equal to 13.101> 4.066. Further tests were carried out to determine the differences between treatments. Further test results showed that treatment D was significantly different from treatments A, B, and C and was the treatment with the best results of 2.66%. Specific growth rate values (weights) and notations can be seen in Table 2.

Treatments	Spesific Growth Rate (Weight)
A (Control)	$1{,}85^{a}$ ± 0,05 %
B (75% Liquid 25% Dry)	$1{,}91^{ab}$ ± 0,01 %
C (50% Liquid 50% Dry)	$2{,}17^{b}$ ± 0,34 %
D (25% Liquid 75% Dry)	$2{,}66^{c}$ ± 0,08 %

Overall, the highest increase in daily weight growth was in treatment D, namely treatment added by liquid Heryaki probiotics by 25% and dry by 75%. This is according to Khotimah at.al (2016) which states the addition of probiotics can increase growth and survival in Siamese catfish. In probiotics there are microbial cells namely L.casei C.etanolica, M.fumeus and Bacillus sp. which can regulate microbes in the intestine, inhibit intestinal pathogenic microorganisms, improve feed efficiency and can improve the ability of fish to digest food (Irianto 2003). While the lowest growth in treatment A is control treatment. This is according to Nayak (2010)

which states that the control treatment tends to be lower in terms of improvement and survival compared to the treatment given probiotics.

Absolute Length Growth

The results of observations of the daily growth rate which is carried out for 40 days of maintenance can be seen in Figure 3.

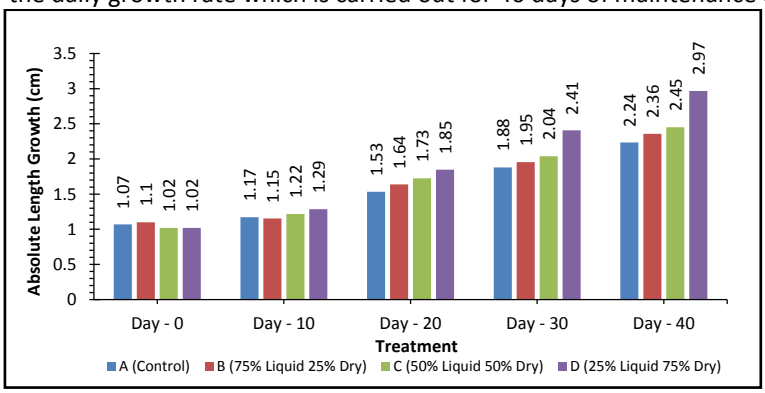

Figure 3. Absolute length growth on siamese catfish juvenile

At the beginning of the fish uptake or t_0 TL lengths were of the same value, after sampling on day 10 it was found that the average length of fish was 4.60 cm, with the highest growth in treatment D with an average length of 4.71 cm , followed by treatment B of 4.62 cm, treatment C of 4.56 cm, and the lowest growth was treatment A without probiotic administration or control of 4.53 cm. Treatment on day 20 was achieved with an average length of 5.24 cm and mean increase in Treatment D had the highest growth rate of 5.48 cm, followed by treatment C of 5.23 cm, treatment B of 5.19 cm, and treatment A had the lowest value of 5.07 cm. The 30 day treatment was obtained with an average length of 5.57 cm. Treatment D had the highest growth value of 5.86 cm, followed by treatment C of 5.51 cm, treatment B of 5.46 cm, and treatment A of 5.47 cm. There was an increase in length increase in treatment A compared to treatment B in day 30. Further in the course of day 40 experienced a long growth path with an average value of 6.06 cm, treatment D became the highest-value treatment. was 6.44 cm, followed by treatment C 6.00 cm, treatment B 5.88 cm, and treatment A 5.94 cm.

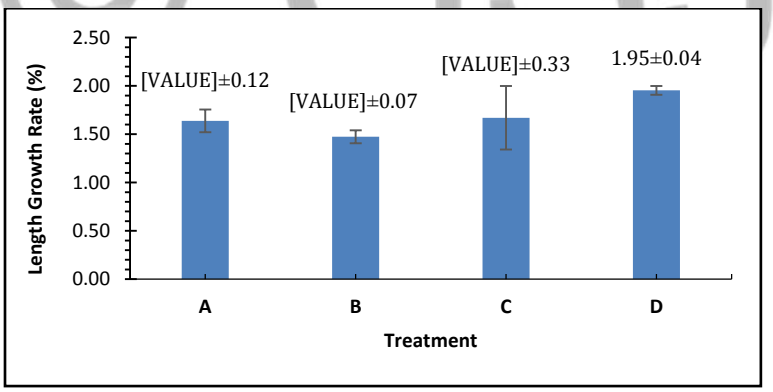

Figure 4. Length growth rate of siamese catfish juvenile

Provision of probiotics in feed produces a different length growth in each treatment after a maintenance period of 40 days. Treatment D had the highest length growth value with a value of 1.95 cm, followed by treatment C of 1.67 cm, treatment A of 1.64 cm, and the lowest growth value of length was found in treatment B with a value of 1.47 cm. Based on the F test results, the level of 5% showed that the inter treatments were not significantly different from the Fhit <Ftab value, which was 3.707 <4.066. Specific growth rate values (length) and notations can be seen in Table 3.

Treatments	Absolute Length Growth
A (Control)	1,64 ± 0,12 %
B (75% Liquid 25% Dry)	1,47 ± 0,07 %
C (50% Liquid 50% Dry)	1,67 ± 0,33 %
D (25% Liquid 75% Dry)	1,95 ± 0,04 %

The nutritional content of the feed will affect the growth of fish, feed is given to determine the effect of nutrients contained in the feed provided by observing the growth of fish for some time. The activity of bacteria in digestion will change quickly if there are microbes that enter through feed or water which causes a change in the balance of bacteria that already exists in the digestive tract with bacteria that enter (Putri 2012).

According to Effendie (2003), growth is influenced by internal and external factors. Internal factors largely depend on the condition of the fish's body, for example the ability of fish to utilize the remaining energy and protein after metabolism for growth. Meanwhile, external factors such as environmental factors and feed are very influential on fish plants. Both of these factors will balance the state of the body of the fish while in the media maintenance and support the growth of the body of the fish.

Food Convertion Ratio (FCR)

Fish growth is largely determined by the nutrition of the food eaten by fish. The more perfect and complete nutrition in the feed and the ease with which it is digested will have an influence on feed conversion, it can be seen in Figure 5.

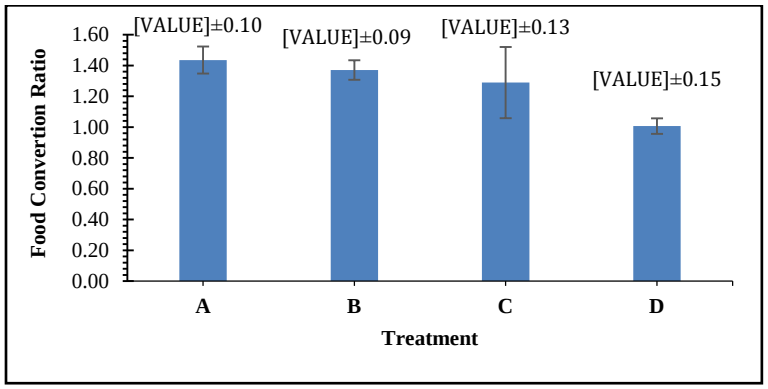

Figure 5. Food Convertion Ratio of siamese catfish juvenile

Based on the graph data above, the highest value of feed conversion ratio is treatment A with a value of 1.44, followed by treatment B of 1.37, treatment C of 1.29 and treatment D has the lowest feed conversion ratio of 1.01 . Based on the results of the F test at 5% level showed significantly different between treatments, with the value of Fhit> Ftab which is 6.406> 4.066. This shows that the addition of probiotics has an effect on each treatment. Further tests were carried out to determine the differences between treatments. Further test results showed that treatment D was significantly different from treatments A, B, and C and was the treatment with the best results of 1.01. The higher the probiotic, the smaller the ratio value, which means the better treatment. The ability of fish to be able to convert feed consumed into meat that is absorbed is shown by the smaller value. Thus the feeding by adding probiotics to the best feed conversion ratio, is in treatment D. The FCR value and notation can be seen in Table 4.

Treatments	Food Convertion Ratio
A (Control)	$1,44^{a}$ ± 0,10
B (75% Liquid 25% Dry)	$1,37^{b}$ ± 0,09
C (50% Liquid 50% Dry)	$1,29^{bc}$ ± 0,13
D (25% Liquid 75% Dry)	$1,01^{c}$ ± 0,15

Feed conversion ratio value is closely related to feed quality so that the lower the value, the better the quality of feed and the more efficient the fish in utilizing the food consumed for growth. So that the body weight of fish can be increased because the feed can be digested perfectly. This is caused by the presence of probiotic microbes in the feed which then enter the digestive tract so that it can help the process of absorption of food more quickly. Thus the feed provided has a fairly good quality, because the feed given has a fairly good quality, because the feed given can really be utilized by fish for maximum growth (Mudjiman 2001).

The digestive tract of fish in the seed stage is still not perfect, so it is difficult for fish to utilize fiber where fish have limitations in terms of the availability of cellulotic enzymes in the digestive tract. Fish also need a protein high enough to support growth and survival (Webster 2002).

Basically, probiotics added to the feed are used to smooth the digestive system in fish so that the food eaten is more efficient. The value of the feed conversion ratio obtained shows that the performance of the digestive system of each treatment is different or not all are in maximum condition, so it looks after the addition of probiotic treatment affects the digestion and growth of fish.

Survival Rate

Survival rate is the percentage of organisms that live at the end of maintenance of the number of organisms that are spread at the beginning of maintenance in one container. Based on the results of the study, obtained calculation results that the survival rate of fish in all treatments can be seen in Figure 6.

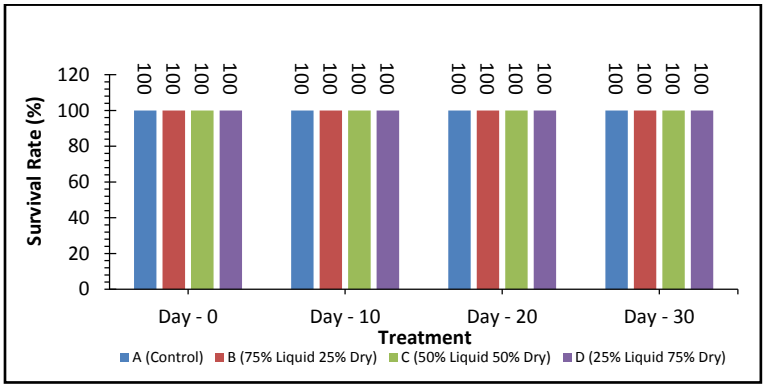

Figure 6. Survival rate of siamese catfish juvenile

Observation of the survival rate of Siamese catfish which was carried out for 40 days for the addition of Heryaki probiotics added to the feed for growth and survival of Siamese catfish showed that no Siamese catfish died during maintenance, so it can be said that Heryaki probiotics had no significant effect on survival rate of Siamese catfish. Good water quality conditions make fish survive longer. This is consistent with the opinion of Effendie (2003) states that the survival of fish in a waters is influenced as a variety of factors including the density of water quality.

According to Irianto (2003) probiotic microbes are safe and relatively beneficial microbes in the digestive tract. These microbes produce substances that are not harmful to fish but instead destroy pathogens that disturb the digestive system.

Water Quality

Water quality is the nature of water and the content of living things, energy substances or other components in water. Quality is stated by parameters namely physical parameters (temperature, turbidity, dissolved solids and so on), chemical parameters (pH, dissolved oxygen, BOD, metal content and so on), and biological parameters (the presence of plankton, bacteria and so on) (PP RI Number 20 in 1990 in Nafiadi 2013). Water quality during the study period can be seen in Table 5 as follows:

Tabel 5. Water Quality During the Maintenance Period of Siamese Catfish

Parameter	Unit	Standard Needs of Siamese Catfish Juveniles*	Analysis Results			
			A	B	C	D
Temperature	ºC	25 – 30	29 – 30,1	28,3-29,3	28,1-30,2	28-29,1
pH	-	6,5 – 8,5	7,47-7,9	7,22-7,81	7,25-8,18	7,4 -7,91
DO	$mg.L^{-1}$	>4	5,4 – 6,3	5,5 – 6,3	5,7 – 6,4	5,4 – 6,7
Ammonia	$mg.L^{-1}$	<0,01	0,15-0,25	0,15-0,25	0,15-0,25	0,15-0,25

Based on Table 2. that the average temperature is in the range 28 - 30.2oC, the average pH of each treatment is in the range of 7.2 - 8.18, the average DO value is in the range of 5.4 - 6.7 mg / L, and the ammonia content is in the range 0.15-0.25 mg / L. The results of the measurement of water quality at each treatment during the maintenance period are still in the optimal range and meet the requirements of Siamese catfish seedlings according to SNI 01-6483.5, 2002.

CONCLUSIONS

These results can be concluded that the addition of a combination of liquid and dry probiotics with the best results is the concentration of liquid administration of 3.75 ml / kg of feed and dry 7.5 g / kg of feed with an average specific growth rate (Weight) of 2.66 %, the average specific growth rate (length) is 1.95 cm, and the feed conversion ratio is 1.01 and the survival rate is 100% for all treatments.

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