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The Effect Of Efishery And Probiotic Dosage On Growth Rate And Survival Of Tilapia

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ABSTRACT. The growth rate and survival of tilapia greatly determines the level of production attained. Various attempts have been made to increase the growth rate and survival of tilapia. This study aims to analyze the effect of eFishery and probiotic doses on the growth rate and survival of tilapia. This study used a factorial randomized block design. The effect of eFishery and probiotic doses on growth rate and survival of tilapia were analyzed using analysis of variance. The results showed that (1) efishery did not have a single effect on the growth rate and survival of tilapia, (2) there was no interaction effect between efishery and probiotic on the survival of tilapia, (3) the dose of probiotics had a significant effect on growth rate and survival rate of tilapia. It is recommended that farmers sustainably adopt probiotic supplement technology in feed.

INTRODUCTION

The perpetrators of the enlargement of the tilapia floating net cage system in Lake Batur are always racing to increase their production capacity. Various efforts have been made, including revamping the floating net cage building and how to feed. However, efforts to increase production are still constrained by the longer time needed to reach a certain weight target in tilapia enlargement efforts. At the beginning of its development, the duration of enlargement of tilapia to reach a weight of 250 grams per head only takes 4-5 months, but now the time needed to reach the same weight (250 grams) reaches 6-7 months. Many factors are thought to influence the slowing of the growth rate of tilapia, such as lake water quality, fish seed quality, feed quality, stocking density, and feeding method. Stated that fish only absorb about 25% of the feed given, while the remaining 75% settles as waste in water. Waste from the feed will be mineralized by bacteria into ammonia(1). Ammonia accumulation can pollute the culture media and can even cause death (2). One way to solve this problem is to use an appropriate cultivation system and increase production in sufficient quantities and by administering probiotics(3).

The challenge to reduce the time needed to achieve a weight of 250 grams / head is a major problem that is very urgent and important to find a solution so that the business of tilapia floating net cage system can respond to the dynamics of demand preferences in terms of both quantity and quality. Achievement of the weight of the fish becomes very important to be considered for a successful harvest.

The weight of the fish depends on the nutrition of the feed provided, so that in tilapia farming, feeding efficiency is very important by taking into account the Food Conversion Ratio (FCR), which is the amount of feed needed to produce 1 kilogram of meat. The business of enlarging tilapia floating net cage system takes into account the problem of feed due to the price of fish that is not cheap. They still apply economic principles, where they want to increase the weight of fish with low feed conversion, so that later the benefits will be higher.

During this time, the business of tilapia enlargement floating net cage system in Lake Batur do feed manually by spreading feed in each pond or handfeeding. This is considered less effective, because tilapia need to eat at night. Handfeeding is also considered to be able to reduce the nutrition of the feed given because feed nutrition will be reduced if submerged in water for too long. If the spread of feed is carried out according to the specified schedule, but the fish do not feel hungry and then the fish eat the food but the nutrients contained are lost, it will reduce the final weight gain of the fish.

One technological innovation that needs to be studied further to reduce the length of time needed to achieve a weight of 250 grams / head and also to improve feed efficiency is eFishery technology. The technological innovation that was collaborated with eFishery to be tested was the treatment of probiotic doses. This research aims to (a) analyzing the effect of eFishery and probiotic doses on the growth rate of tilapia, (b) analyzing the effect of eFishery and probiotic doses on the survival rate of tilapia

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METHODOLOGY

This research was designed to build an experimental research approach. Experiments were conducted to determine the effect of giving probiotics in feed, and eFishery application on growth rate and survival of tilapia. The experiment used factorial randomized block design (RCBD) with four combination treatments and 3 (three) replications. The combination I treatment = without giving probiotics in commercial feed and without eFishery application. Combination II treatment = giving probiotics as much as 15 ml / kg of commercial feed and without eFishery application. Combination III treatment = without giving probiotics in commercial feed and with eFishery application. IV combination treatment = giving probiotics as much as 15 ml / kg of commercial feed and with eFishery application. The effect of eFishery application and probiotic dose on growth rate and survival of tilapia were analyzed by analysis of variance.

RESULTS AND DISCUSSION

Growth Rate of Tilapia

The effect of probiotic doses and eFishery application on the growth rate of tilapia floating net cage system in Lake Batur was analyzed by analysis of variance. The results of the analysis are presented in Table 1.

TABLE 1. Tests of Between-Subjects Effects

Dependent Variable: Production

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2912.250[a]	5	582.450	45.983	.000
Intercept	279990.750	1	279990.750	22104.533	.000
Dosis	2852.083	1	2852.083	225.164	.000
Efishery	2.083	1	2.083	.164	.699
Ulangan	56.000	2	28.000	2.211	.191
Dosis * Efishery	2.083	1	2.083	.164	.699
Error	76.000	6	12.667		
Total	282979.000	12			
Corrected Total	2988.250	11			

a. R Squared = .975 (Adjusted R Squared = .953)

Based on Table 1, it can be explained as follows.

1) The dose of probiotics has a very significant effect on the growth rate of the tilapia floating net cage system. Probiotics can increase the growth rate of tilapia. The results of this study are in line with the research results of concluded from the results of his research on the effect of the addition of Bacillus SP probiotics. in commercial feed on feed conversion and growth of catfish that the addition of probiotics in feed up to a dose of 15 ml/kg of feed causes an increase in protein retention, fat retention, and the daily growth rate of fish, and decreases feed conversion(4). Probiotics are able to process complex compounds into simple compounds so that they are easily digested by fish digestion(5). Through the provision of probiotics, the food becomes more quickly ready for fish digestion so that it can provide a direct influence on increasing the growth rate of tilapia.
2) eFishery application does not significantly affect the growth rate of the tilapia floating net cage system, there is no tendency to increase the growth rate of tilapia by eFishery operations in fish feeding. Or it can also be narrated that the eFishery application is random to the growth rate of tilapia. This is probably caused by the use of eFishery which only functions as a tilapia robot feeder replacing human labor, which is not related to the creation of certain conditions in the body of the fish. The use of eFishery actually can relatively reduce the level of stress experienced by tilapia, due to the reduced presence of farmers to the middle of the cage, but this has no significant effect on the growth rate of tilapia.
3) The combination treatment (probiotic dose and eFishery application) did not significantly affect the growth rate of tilapia. This means that there is no interaction between the dose of probiotics with eFishery application in spurring the growth rate of tilapia. Thus, the effect of probiotic doses can be mitigated by the eFishery application so that the combination treatment does not significantly affect the growth rate of tilapia.

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4) Repeat factor did not significantly affect the growth rate of tilapia. This gives the meaning that the same treatment gives a consistent influence on the growth rate of tilapia. There were no significant differences between replications in the same treatment, or in other words one treatment was able to give the same effect. This shows that there is no difference in the growth rate of tilapia caused by the intervention of the same treatment, so the results of the study are free from bias.
5) The coefficient of determination (R^2) is obtained at 0.975. This figure means that 97.5% of the variation in the variable growth rate of tilapia can be explained together by independent variables (probiotic dose, eFishery application, and replication), while the remaining 2.5% is explained by other factors not included in the model. This shows that the model used in the analysis has high precision.

The results of different tests between treatments of the growth rate of tilapia are presented in Table 2.

TABLE 2. Multiple Comparisons

Dependent Variable: Production

	(I) treatment	(J) treatment	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	1.00	2.00	-31.6667*	2.90593	.000	-41.7262	-21.6072
		3.00	.0000	2.90593	1.000	-10.0595	10.0595
		4.00	-30.0000*	2.90593	.000	-40.0595	-19.9405
	2.00	1.00	31.6667*	2.90593	.000	21.6072	41.7262
		3.00	31.6667*	2.90593	.000	21.6072	41.7262
		4.00	1.6667	2.90593	.936	-8.3928	11.7262
	3.00	1.00	.0000	2.90593	1.000	-10.0595	10.0595
		2.00	-31.6667*	2.90593	.000	-41.7262	-21.6072
		4.00	-30.0000*	2.90593	.000	-40.0595	-19.9405
	4.00	1.00	30.0000*	2.90593	.000	19.9405	40.0595
		2.00	-1.6667	2.90593	.936	-11.7262	8.3928
		3.00	30.0000*	2.90593	.000	19.9405	40.0595

*. The mean difference is significant at the .05 level.

Based on the test results between treatments (Table 2), it can be explained as follows.

1) The control treatment (without probiotic doses and without eFishery application) gave a significantly different growth rate with treatment II (15 ml/kg probiotic dose of feed and without eFishery application) and IV treatment (15 ml/kg probiotic dose of feed and with eFishery application), but no effect on growth rates that are different from treatment III (without probiotic doses and with eFishery application).
2) Treatment II (15 ml/kg probiotic dose of feed and without eFishery application) gives an effect on the growth rate of tilapia that is significantly different from treatment I (without probiotic dose and without eFishery application) and treatment III (without probiotic dose and with eFishery application), but not significantly different from the IV treatment. This shows that the dose of probiotics is very influential on the growth rate of tilapia. The results of this study are consistent with the results of the study of which states that the administration of probiotics to pellets containing calliandra with different concentrations of probiotic administration in each treatment results in an average weighting of individual tilapia seeds that differ every 7 days(6). The role of Lactobacillus sp. is able to balance the digestive tract microbes so as to increase the digestibility of fish by converting carbohydrates to lactic acid which can reduce pH, thereby stimulating the production of endogenous enzymes to increase nutrient absorption, feed consumption, growth, and inhibit pathogenic organisms(7). Probiotics are able to break down nutrients into simpler compounds which can help the process of absorbing nutrients better(8). Increased nutrition due to the addition of probiotics produces exogenous enzymes such as amylase lipase, protease and cellulose. The enzyme will help endogenous enzymes in the host to hydrolyze feed(9).
3) Treatment III (without probiotic dosage and with eFishery application) gives an effect on the growth rate of tilapia that is significantly different from treatment II (15 ml / kg probiotic dose of feed and without eFishery application) and IV treatment (15 ml / kg probiotic dose of feed and with eFishery application), but not significantly different from treatment I (without probiotic doses and without eFishery application).
4) Treatment IV (15 ml / kg probiotic dose of feed and with eFishery application) gives an effect on the growth rate of tilapia that is significantly different from treatment I (without probiotic dose and without eFishery application) and treatment III (without probiotic dose and with eFishery application), but not significantly different from treatment II (15 ml / kg probiotic dose of feed and without eFishery application).

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Survival Rate

The effect of probiotic doses and eFishery application on the survival rate of tilapia floating net cage system in Lake Batur was analyzed by analysis of variance. The results of the analysis are presented in Table 5.3

TABLE 3. Tests of Between-Subjects Effects

Dependent Variable: Survival rate

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	16591.500[a]	5	3318.300	36.365	.000
Intercept	2172603.000	1	2172603.000	23809.348	.000
Dosis	16280.333	1	16280.333	178.415	.000
Efishery	1.333	1	1.333	.015	.908
Ulangan	276.500	2	138.250	1.515	.293
Dosis * Efishery	33.333	1	33.333	.365	.568
Error	547.500	6	91.250		
Total	2189742.000	12			
Corrected Total	17139.000	11			

a. R Squared = .968 (Adjusted R Squared = .941)

Analysis of the effect of probiotic doses and eFishery application on the survival rate of tilapia, as presented in Table 3 can be explained as follows.

1) Probiotic dose factor has a very significant effect on the survival rate of tilapia floating net cage system in Lake Batur. Provision of 15 ml/kg of probiotic dosage can provide a significant effect on the survival rate of tilapia. This happens because probiotics contain antibiotics that can increase the resistance of tilapia to several diseases. Resistance to disease can smooth the survival of tilapia. Besides that, as a supplementary explanation it can be revealed that probiotics can improve the digestibility of nutrients in the body of the fish so that tilapia becomes fitter, which then leads to its resistance to various diseases so that the survival of tilapia becomes more awake.
2) eFishery factor does not have a real influence on the survival rate of tilapia. Factually, eFishery can provide timely feed on tilapia, but this has no effect on the survival rate of tilapia. Timeliness of feeding does not provide a guarantee for increasing the survival of tilapia. This is likely related to the internal condition of tilapia, which then influences the level of resilience in facing various challenges that confront including pest attacks and diseases that threaten their survival.
3) Combination treatment factors (probiotic and eFishery doses) have no significant effect on the survival rate of tilapia. This gives the meaning that there is no interaction between the treatment of probiotic doses with the eFishery application treatment in giving effect to the survival rate of tilapia. The possibility of these conditions is caused by the influence that does not reinforce each other between the two factors, it is even possible that one factor weakens the influence of the other factors, so that the accumulative effect does not affect the survival rate of tilapia.
4) The repeat factor did not have a significant effect on the survival rate of tilapia. This gives the meaning that the inter-replication factors in one treatment provide the same survival rate. Such conditions indicate that the implementation of research is relatively unbiased so that the accuracy of the results can be scientifically justified, in the sense that the survival rate of fish is only influenced by the treatment factors analyzed.
5) The coefficient of determination (R^2) is 94.1% which means that 94.1% of the variation of the dependent variable can be explained together by the independent variables (probiotic dose factor and eFishery factor), while the remaining 5.9% explained by other variables not included in the model. The high achievement of the coefficient of determination shows that the model used is very suitable for estimating the effect of probiotic doses and eFishery applications on the survival rate of tilapia. The achievement of the coefficient of determination on the analysis of the effect of probiotic doses and eFisheri application on the growth rate of tilapia is higher than the analysis of the effect of the probiotic dose and eFishery application on the survival rate of tilapia. This means that the estimation model on the analysis of the effect of probiotic doses and eFisheri application on the growth rate of tilapia is better than the analysis of the effect of the probiotic dose and eFisheri application on the survival of tilapia.

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The results of different tests between treatments of the growth rate of tilapia are presented in Table 4

TABLE 4. Multiple Comparisons
Dependent Variable: survival rate

	(I) treatment	(J) treatment	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Tukey HSD	1.00	2.00	-77.0000*	7.79957	.000	-103.9999	-50.0001
		3.00	-2.6667	7.79957	.985	-29.6665	24.3332
		4.00	-73.0000*	7.79957	.000	-99.9999	-46.0001
	2.00	1.00	77.0000*	7.79957	.000	50.0001	103.9999
		3.00	74.3333*	7.79957	.000	47.3335	101.3332
		4.00	4.0000	7.79957	.953	-22.9999	30.9999
	3.00	1.00	2.6667	7.79957	.985	-24.3332	29.6665
		2.00	-74.3333*	7.79957	.000	-101.3332	-47.3335
		4.00	-70.3333*	7.79957	.000	-97.3332	-43.3335
	4.00	1.00	73.0000*	7.79957	.000	46.0001	99.9999
		2.00	-4.0000	7.79957	.953	-30.9999	22.9999
		3.00	70.3333*	7.79957	.000	43.3335	97.3332

*. The mean difference is significant at the .05 level.

Based on the different test results between treatments (Table 4), it can be explained as follows.

1) Control treatment (without probiotic doses and without eFishery application) results in a significantly different survival rate for tilapia with treatment II (15 ml/kg probiotic dose of feed and without eFishery application) and IV treatment (15 ml / kg probiotic dose of feed and with the eFishery application), but it did not provide results for the survival rate of tilapia that is different from treatment III (without probiotic doses and with the eFishery application).
2) Treatment II (15 ml/kg probiotic dose of feed and without eFishery application) results in a significantly different survival rate for tilapia with treatment I (without probiotic dose and without eFishery application) and treatment III (without probiotic dose and with eFishery application), but not significantly different from the IV treatment. This fact shows that probiotics play a role in increasing the survival of tilapia. 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 interfere with the digestive system so that fish will be healthy and avoid disease that can make a percentage of the level of survival life goes down(10).
3) Treatment III (without probiotic doses and with the application of eFishery) results in a significantly different survival rate for tilapia with treatment II (15 ml/kg probiotic dose of feed and without eFishery application) and IV treatment (15 ml/kg probiotic dose of feed and with eFishery application), but not significantly different from treatment I (without probiotic doses and without eFishery application).
4) Treatment IV (15 ml/kg probiotic dose of feed and with eFishery application) results in a significantly different tilapia survival rate with treatment I (without probiotic dose and without eFishery application) and treatment III (without probiotic dose and with eFishery application), but not significantly different from treatment II (15 ml/kg probiotic dose of feed and without eFishery application).

E-fishery provides convenience to farmers in terms of feeding tilapia. farmers who should provide food twice in the middle of the lake, can save time and energy by only once a week delivering food to the middle of the lake. Feeding has been setup through an android device so that it greatly facilitates the work of farmers. The amount of feed given per termin is very measurable with the use of the efishery tool so that feed efficiency can be achieved.

But statistically the efishery application does not have a significant impact on the growth rate of tilapia. This happens, because the application of efishery does not work as a growth booster, but only as an appropriate technology to save farmers' labor in conducting a farming of enlarged tilapia floating net cage system. Savings are not only for the use of labor, but also for the use of feed, because the dose of feeding per termin is measured according to the right dose.

CONCLUSION

(1) Efishery does not have effect on the growth rate and survival of tilapia,
(2) There is no effect of interactions between efishery and probotics on the growth rate and survival of tilapia,
(3) Dose of probiotics have significant affects on the growth rate and survival of tilapia.

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