International Research Journal of Natural and Applied Sciences
ISSN: (2349-4077)
Impact Factor 5.46 Volume 6, Issue 12, December 2019
Website- www.aarf.asia, **Email** : editor@aarf.asia , editoraarf@gmail.com

SPECIFIC GROWTH RATE AND SURVIVAL RATE OF NILE TILAPIA USING LOCAL RAW MATERIAL BASED FEEDING

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Abstract

Abundance of natural resources in Indonesia is a potential that can be used to find alternative substitution to replace fish meal and soybean flour that has been imported. As an alternative source of animal protein substitute for fish meal can be used golden snails and a source of vegetable protein substitute soybean is replaced using water hyacinth flour. This study was designed with six treatments A1, A2, A3, A4, A5 and A6 treatments. Observations on the growth rate of niletilapia showed that treatments A6, A1 and A2 were not significantly different (P> 0.05), while treatments A3, A4 and A5 were significantly different (P <0.05). While observing the survival rate of each treatment was not significantly different (p> 0.05). Water quality for 45 days of maintenance still meets the standards of tilapia culture.

Keywords: *niletilapia, golden snails, water hyacinth*

Introduction

Production of aquaculture products both in sea water, fresh water and brackish water is an indication that there has been an increase in demand for fishery products. One of the freshwater fisheries commodities that has experienced a significant increase in production and economic value is nile tilapia (*Oreochromisniloticus*). Nile tilapia fish production in 2010 was around 2.5 million tons and increased to reach 3.9 million tons in 2015 [1]. Increased demand will always be followed by other components as a testament to the success of aquaculture production. One important component in aquaculture is the need for feed during the cultivation process. Until now the cost of feed in the cultivation production process still dominates to around 60-80%. The high cost of feed is caused by the still

dependence of imported raw materials imported from abroad, especially for animal and vegetable protein sources. While these raw materials such as fish meal are reported to be no longer sustainable [2; 3] and substitution with other materials is still a challenge [3]. Similarly, soybean flour which reportedly continues to experience price increases due to competition with other sectors as a material for human consumption [4]. his problem can be overcome by utilizing local resources as raw material for artificial feed in fish culture so that dependence on imported raw materials can be overcome. The abundance of natural resources in Indonesia is a potential that can be used to find alternative ingredients to replace fish meal and soybean flour that has been imported. As an alternative source of animal protein substitute for fish meal use of golden snails in artificial feed formulations can affect fish growth [5]. Next, it has been reported that water hyacinth can be used as raw material for fish feed [6]. Both materials are the worst invasive animals and plants in the world because of their abundant availability and have not been used optimally [7].

RESEARCH METHODS

a. Place and time of research

This research was conducted from May to July 2019 at the Wet Laboratory of the Fisheries Fakulty , University of 45 Mataram, West Nusa Tenggara.

b. Procedure

The first activity in this study was the preparation of feed making starting with the manufacture of conch teung, water hyacinth flour which was then proximate tested to determine the levels of feed ingredients proetein. Furthermore, the manufacture of artificial feed is made by those prepared by the worksheet method. The protein content in the feed is targeted to range from 30-35%. Proximate analysis results and feed formulations are presented in the table below.

Table 1. Proximate results of protein content of feed ingredients

Materials	Protein (%)
Gold Snails Flour	51.70
Water Hyacinth Flour	14.04
Antractan	26.98

Table 2. Composition of Feed Formulations

Materials	amount of material (%)
Gold Snails Flour	25
Water Hyacinth Flour	55
Antractan	10
Tapioca flour	10

Maintenance containers use a 100 m2 tarpaulin pool. Test fish used have an average length of 4-5 cm. The seeds are stocked as many as 50 fish per pond.

Research design

The design used in this study was a Completely Randomized Design (CRD) consisting of 6 treatments and 3 replications.

A. Artificial Feed Based on Local Raw Materials (80%) + Commercial Feed (20%)

B. Artificial Feed Based on Local Raw Materials (60%) + Commercial Feed (40%)

C. Artificial Feed Based on Local Raw Materials (40%) + Commercial Feed (60%)

D. Artificial Feed Based on Local Raw Materials (20%) + Commercial Feed (80%)

E. Artificial Feed Based on Local Raw Materials (100%)

F. Commercial Feed (100%)

Data analysis

1. Specific growth rate [8]:

$$SGR\ (\%) = \frac{\ln Wt - \ln W0}{T}\ x\ 100\%$$

SGR: Specific growth rate (%)

Wt: Weight biomasaa end of the study (gr)

W0: Weight of biomass early of study (gr)

T: Duration of Maintenance (days)

2. Survival rate [9]

$$SR\ (\%) = \frac{Nt}{N0}\ x\ 100\%$$

R = survival of fish (%)

Nt = Number of live fish study end (tail)

No = Number of live fish early in the study (tail)

RESULTS AND DISCUSSION

a. Growth rate

Growth is an increase in length and weight over a certain period of time. One that affects growth is the nutrition consumed by fish. The results of observations on the growth rate of tilapia for 45 days maintenance with the use of local ingredients-based materials in this study are presented in table 3.

Table 3. Observation Results of Growth Rate

No	Variabel	Perlakuan					
		A1	A2	A3	A4	A5	A6
1	Rata – rata beratawal (g)	1.84±0.20	1.81±0.15	1.81±0.06	1.84±0.09	1.81±0.10	1.81±0.11
2	Rata – rata beratakhir (g)	18.99±1.11	16.15±4.53	14.02±4.50	13.02±0.91	10.41±1.19	20.00±3.21
3	LajupertumbuhanSpesifik (%)	5.18±0.28[b]	4.64±0.04[b]	4.41±0.77[a]	4.43±0.18[a]	3.95±0.50[a]	5.29±0.37[b]

Note: The same superscript in the same line shows the effect of the treatment that is not significantly different (P> 0.05).

Based on the table above it is known that the A6 treatment showed the highest growth rate, followed by the treatments A1, A2, A3, A4 and the lowest in the A5 treatment. A6 treatment is treatment with 100% commercial feed during maintenance. Although the growth rate at A6 is higher than other treatments with a growth rate value of 5.29 ± 0.37b. However, statistically A1 and A2 treatments showed effects that were not significantly different from treatments A6. This is because the commercial feed turnover in A1 is only 20% while in A2 it is 40%. The growth rate at A1 is 5.18 ± 0.28b and at A2 it reaches 4.64 ± 0.04b. The results

of this study indicate that the higher the commercial feed replacement dose, the lower the growth rate.

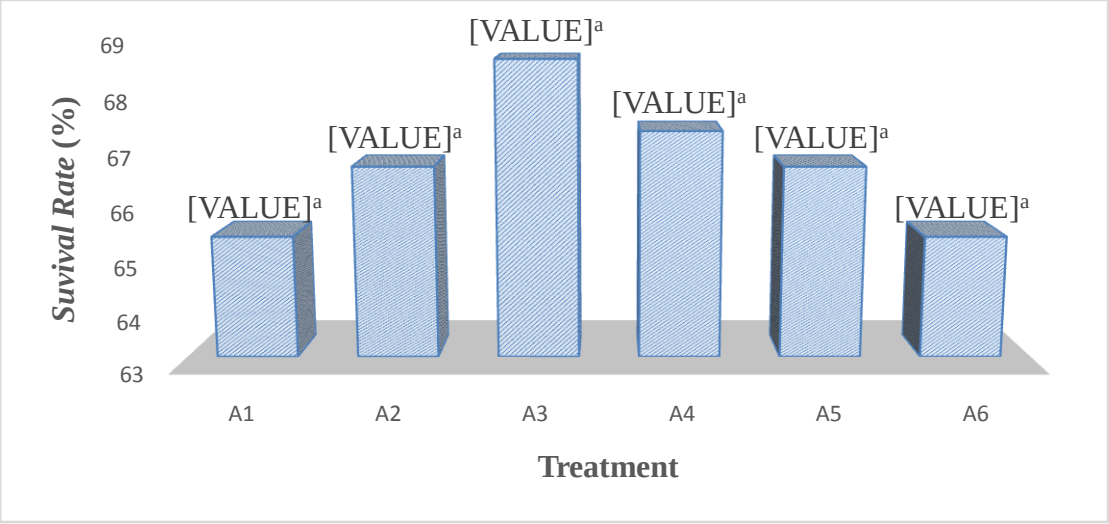
The high growth rate in the treatment given commercial food in full due to the nutritional content of commercial food is more complete than artificial feed based on local raw materials. This is due to the source of animal protein content in commercial comes from fish meal, whereas in artificial feed comes from golden snail flour. Fish meal is one of the main dietary ingredients in fish feed which is rich in protein, balanced essential amino acids and has a very good digestibility rate [10]. Fish meal from Sardinella fish is composed of 20 types of amino acids [11], whereas golden snails are only composed of 15 types of amino acids [12].

Furthermore, vegetable protein in commercial feed generally uses soy flour as a source of feed ingredients. However, in this study the use of soy flour was replaced with water hyacinth flour which had been fermented. Fermentation aims to improve the digestibility of feed ingredients. Water hyacinth can be used after going through processing to reduce coarse fiber and improve digestibility [13]. Nevertheless water hyacinth still has limited amino acids [14]. This is comparable with the results of this study which showed that the increasing provision of artificial feed based on local ingredients at the time of maintenance showed the lowest growth yield due to the lack of amino acids in the artificial feed.

b. Survival rate

Observations on survival rates in this study are presented in the figure below.

Figure 1. Graph of the results of the survival rate of tilapia



Note: The same superscript in the same line shows the effect of the treatment that is not significantly different (P> 0.05).

observations on survival rates showed that treatment A3 produced the highest survival rate of 69%, followed by A2, A4 and A5 with a survival rate of 67% and the lowest in treatments A1 and A6.

The survival rate in this study is very low compared to the results of the study [14] in the same study using water hyacinth obtained a survival rate of 95%. This low value is caused by the death of fish that occurs a lot in the first week, allegedly because the seeds are still in the process of adaptation to food and the environment.

Although this survival rate was different for each treatment, it showed a statistically not significantly different treatment outcome (P> 0.05).

c. Water quality

Table 4. Results of observing water quality

Treatment	Parameter			
	Temperature (^{0}C)	pH	Do (mg/l)	Amoniak (mg/l)
A1	28[a]	7.4 [a]	5.7 [a]	0.003 – 0.3 [a]
A2	28 [a]	7.4 [a]	5.7 [a]	0.003 – 0.3 [a]
A3	28 [a]	7.5 [a]	5.7 [a]	0.003 – 0.3 [a]
A4	28 [a]	7.4 [a]	5.7 [a]	0.003 – 0.3 [a]
A5	28 [a]	7.4 [a]	5.7 [a]	0.003 – 0.3 [a]
A6	28 [a]	7.4 [a]	5.7 [a]	0.003 – 0.3 [a]
Optimum Standar	26-30[15]	6-9[15]	≥3[15]	0.17-3.87[16]

Note: The same superscript in the same line shows the effect of the treatment that is not significantly different (P> 0.05).

Based on the table above shows that the water quality at the time of tilapia maintenance for 45 days is still within the normal range. This is because the water source used is good water and is not polluted and water is replaced.

CONCLUSION

The use of artificial feed based on local raw materials at the level of 20% and 40% given to tilapia for 45 days showed results that were not significantly different from commercial feed.**REFERENCES**

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