Global Scientific JOURNALS

GSJ: Volume 7, Issue 12, December 2019, Online: ISSN 2320-9186

www.globalscientificjournal.com

EFFECT USE OF COCONUT TESTA IN FEED ON GROWTH RATE OF RED TILAPIA (*Oreochromis niloticus*)

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ABSTRACT

This study aims to determine the coconut testa in the most effective formulation of feed for the growth of red tilapia to providing a high survival rate. The study was conducted in May and June 2019 at the Aquaculture Laboratory. Building 4 Fisheries and Agricultural Engineering. Faculty of Fisheries and Marine Science, Padjadjaran University. The method used was the experimental method using a completely randomized design (CRD) with five treatments and three replications. The treatment used was feed containing coconut testa A (0%), B (5%), C (10%), D (15%) and E (20%). The parameters observed were feed response, survival rate, and water quality. Absolute weight growth and fish survival rates were analyzed by F-ANOVA with a 5% error rate, while water quality will be analyzed descriptively comparatively. The results showed that the use of 5% coconut testa in feed was effective for growth rate of red tilapia because response to feed relatively faster, and the highest survival rate 92%, and growth rate 6,19 g. Feed is able to fulfill the energy needs and help the growth of red tilapia, because the range of nutrient content of pellets is in accordance with the fish needs.

Keywords: *Oreochromis niloticus, coconut testa, red tilapia and feed*

INTRODUCTION

Red tilapia (*Oreochromis niloticus*) is a type of freshwater fish that has several advantages, including a period of growth relatively fast, easily cultivated, high tolerance to various environmental conditions, Efficient in utilizing artificial feed (Khoironi 1996). This fish is one of the important types of economical fish that many people demand as a source of food from animal protein. Red tilapia have good market prospects in the world.

The feed is the most important factor in supporting aquaculture activities. Feed as the biggest component in financing will determine the success of aquaculture activities. About 40-60% of the costs in aquaculture activities used for feed. The feed provided must be good quality by the requirements for consumption. Feed formulations that are suitable for fish needs must consist of protein, fat, carbohydrates, vitamins, and minerals. Feed must always be available continuously so as not to interfere with the course of aquaculture activities.

The use of artificial feed is an effort to reduce production costs. The artificial feed is feed that utilizes local raw materials, including the utilization of agricultural industrial waste based on the nutritional fish needs . The availability of local raw materials determines the production target in aquaculture activities so that it requires cheaper, easier, and high-quality feed ingredients, therefore, one way is to utilize coconut testa which contains relatively high metabolic energy and is important for growth.

Coconut plants have high economic value. Coconut plants in Indonesia are very potential as producers of coconut-based products, such as coir, testa, meat and so on. One of the benefits of coconut is a source of vegetable oil. Fruit flesh has a thin layer of brown on the outside which is often called coconut testa (Adrianto 2014). Coconut testa is the inner testa of the coconut testa which is often called testa and is a waste that is commonly found in traditional markets that can be used as an alternative material for feed ingredients. Coconut testa has high economic value and oil content, which is 28% of the 1 part of the coconut. The existence of coconut testa waste in feed formulations is predicted to be responded well by red tilapia fish because it contains 3328 kcal/kg of metabolic energy (Ruminant Animal Nutrition and Animal Food Chemistry Laboratory (Faculty of Animal Husbandry 2006) or equivalent to the gross energy content.

The limiting factor in the use of coconut epidermis is crude fiber and relatively high fat that is easily rancid due to oxidation. Making pellets must be done in a short time before being given to fish.

METHOD

This study aims to determine the coconut testa in the most effective feed formulation for the growth of red tilapia (*Oreochromis niloticus*). thus providing a high growth rate. The study was conducted in May and June 2019 at the Aquaculture Laboratory. Fisheries Building. Faculty of Fisheries and Marine Science, Padjadjaran University. The method used is an experimental method using a Completely Randomized Design (CRD) with five treatments and three replications. The treatments used were artificial feed containing coconut testa A (0%), B (5%), C (10%), D (15%) and E (20%). The parameters observed were growth rate, feed efficiency, survival rate, and water quality.

RESULT AND DISCUSSION

Growth

Based on the results of research on red tilapia for 42 days of reared, it is known that differences in the level of use of coconut testa in the formulation of artificial feed produce an average increase in the weight of different individual red tilapia. The average weight of individual red tilapia has increased with increasing reared time. At the beginning, the average individual weight of all treatments was

3,89 grams, while at the end of reared ranged from 4,96 to 6,19 grams. In treatment B (5%) produced the highest average individual weight about 6,19 grams while in treatment E (20%) produced the lowest average individual weight about 4,96 grams (Figure 1).

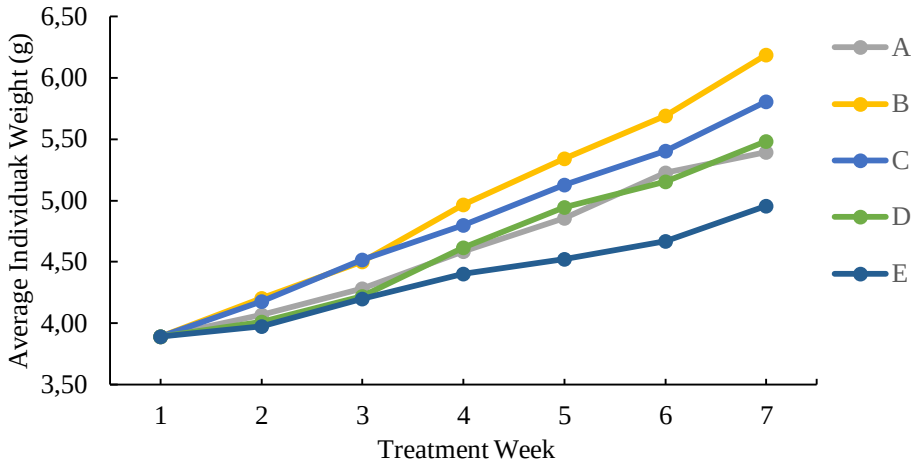

Figure 1. Graph of Addition to Average Weight of Red Tilapia(g)

An increase in the average individual weight in each treatment shows that the feed given can be utilized by test fish. Each treatment produces different individual weight gain, this means that the feed has a different quality but is able to fulfill energy needs and help the growth of red tilapia, because the range of nutrient content of pellets is following the fish needs. The feed used in research shows good results for red tilapia. Red tilapia need 24-30% protein, and adults need 20-25% protein in their feed (Sahwan 2003).

The use of coconut testa waste in feed seen in Figure 1 does not show a negative effect on growth. Feed containing coconut testa can be consumed by fish, then it will undergo the process of digestion, absorption, transportation and metabolism. The part of feed that is not digested and absorbed by the body will be discarded as feces, while the food substances that are absorbed after being transported to the target organs and some will be used as material to arrange new cells. Energy is needed by fish for metabolic processes, body care, physical activity, growth, and reproduction. The effect of the use of coconut testa on the growth of red tilapia is presented in Figure 2.

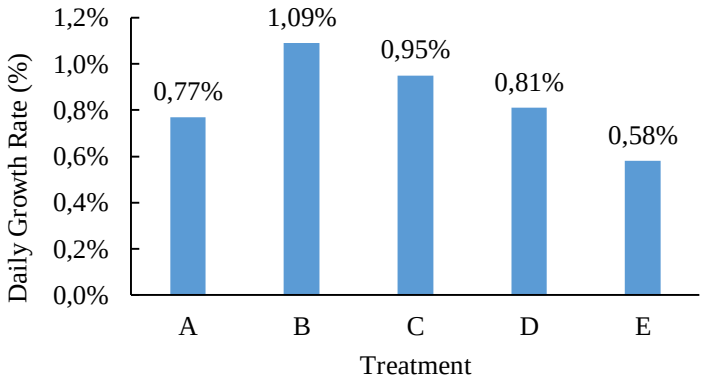

Figure 2. Graph of the Average Growth Rate Of Red Tilapia

The results of the study in Figure 2 show that the use of coconut testa in the feed formulation produced a growth rate of red tilapia which ranged from 0,58 to 1,09%. The

use of coconut testa 5% in feed formulations produces the highest growth rate about 1,09%. While the use of coconut testa as much as 20% in feed formulations produced the lowest growth rate about 0,58%. From the results of this study, the nutritional content of coconut testa can support the growth of fish. The results of analysis of variance showed that the level of use of coconut testa gave a significantly different effect on the growth rate of red tilapia. To analyze the differences between treatments for using coconut testa, a duncan test was carried out, the results of which can be seen in Table 1.

Table 1. Average Daily Growth Rate of Red Tilapia

Treatment	Growth Rate (%)
A	0,77±0,21ab
B	1,09±0,34b
C	0,95±0,13ab
D	0,81±0,12ab
E	0,58±0,07a

Feed B (5%) produces the highest daily growth rate especially when compared to Feed E (20%). The growth of cultured fish depends on the chemical quality of the feed, which includes macro and micro nutrients (Roberts 1989). Macro nutrients such as protein, carbohydrates, fat, and crude fiber affect fish growth. Protein is a source of essential amino acids that fish need to support optimum growth, as well as a source of energy for fish (Furuichi, 1988; Schulz *et al*., 2008). The higher growth of fish in treatment B means that it is caused by the nutritional needs of red tilapia have been met. The nutritional content of the treatment B (5%) formulation can be balanced. Nutritional balance can be seen in the following table.

Table 2. Feed Nutrition and Tilapia Fish Needs

Womb	**A***	**B***	**C***	**D***	**E***	**Tilapia's need (%)****
Protein	24,95	**24,86**	25,2	25,3	24,99	20-25
Fat	6,68	**8,58**	9,2	10,38	11,71	6-8
Rough fiber	5,8	**6,7**	6,78	7,34	8,36	7

Table 2 shows that the protein, fat, crude fiber content in feed B (5%) can fulfill the nutritional needs of red tilapia. The optimum protein content in feed with a balanced composition of amino acids can accelerate fish growth. Fat is an energy source, the maximum use of fat in feed can accelerate fish growth and the occurrence of protein sparing effect which can reduce production costs (Beamish & Medland, 1986) The use of coconut testa as much as 5% in feed formulations produces a fat content of 8,56% so that the red tilapia can digest feed B optimally.

Treatments A, C, D are not different from B because red tilapia can utilize feed for growth and survival. According to the results of research by Sukarman and Ramadhan (2015) the utilization of coconut testa flour can be used as alternative feed ingredients up to 15%.

Treatment E (with 20% coconut testa content) resulted in a significantly lower daily growth rate than treatment B (5%). The low growth rate in fish fed treatment E can be caused by fat content that is too high in feed formulations among other treatments. Excess fat in feed can also cause nutritional pathology such as fat accumulation and degeneration of cultured fish liver (Roberts 1989; Hepher 1990).

According to Sahwan (2003) the fat requirement in red tilapia is 6-8%, while the fat content in the E feed formulation (20%) is 11,71%. Excess levels of fat in the feed cause the body of tilapia to experience slow growth

because the fish becomes full quickly, thereby reducing appetite in fish. In treatment E (20%), fish did not consume feed maximally, causing a lot of wasted food and causing aquarium water pollution.

The treatments A (0%), B (5%), C (10%), and D (15%) produced the same or not significantly different growth. It shows that the use of coconut testa up to 15% can match the control feed and does not adversely affect fish growth. The use of coconut testa 5% is the most optimal in producing daily growth rate so that it can be used in a balanced feed formulation for red tilapia.

Efficiency of Feeding

Efficient use of feed by fish shows the value (percentage) of food that can be utilized by the body of the fish (Wilson and Halver, 1989). The efficiency of feeding is directly proportional to the increase in body weight, so the higher the value of the efficiency of feeding means the more efficient the fish use the food consumed for growth (Djadjasewaka 1985). Feed can be said to be good if the efficiency of feeding is more than 50% or even close to 100% (Craig and Helfrich 2002)

The level of use of coconut testa with different concentrations results in varying feeding efficiency values. The results showed that the efficiency of feeding ranged between 23,61 – 41,8%. In treatment B (5%) the highest feeding efficiency was 41,8%. Whereas treatment E (20%) produced the lowest feeding efficiency of 23,61% (Figure 3).

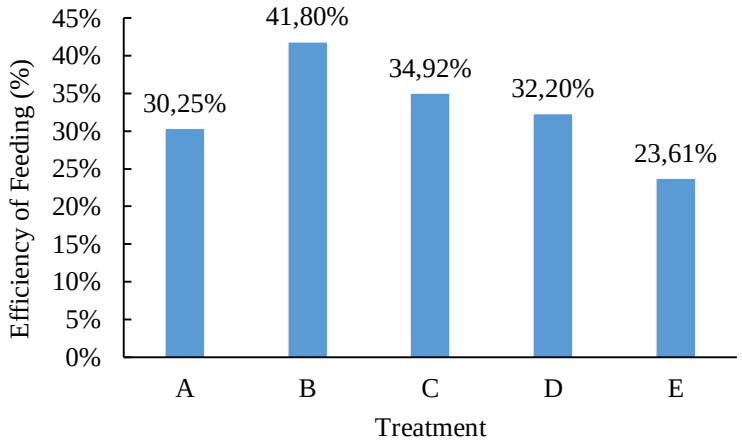

Figure 3. Diagram the Efficiency of Feeding The Red Tilapia

The results of analysis of variance showed that the level of use of coconut testa gave a significantly different effect on the efficiency of feeding (table 3). From the results of follow-up tests with the doubled distance test at 5% confidence level showed that treatment B (5%) was significantly different compared to treatments A (0%), C (10%), and D (15%).

Table 3. Average Feeding Efficiency

Treatment	EPP(%)
A	30,25±5,28ab
B	41,80±9,82b
C	34,92±2,74ab
D	32,20±1,77ab
E	23,61±8,67a

The level of use of coconut testa at treatment level B (5%) produced the highest efficiency value of 41,8%. While the lowest value of feeding efficiency is 23,61% which is

produced from feed with the level of treatment E (20%).

The value of feeding efficiency resulting from the use of 5% coconut testa feed produces an efficiency value, which is 41,8%. The results of this study produce high efficiency values. This is because the coconut testa can be digested properly, so even though the fat is relatively high (8,5%) can increase growth. The greater the value of the efficiency of feeding, the better the fish utilize the feed provided so the greater the body weight of the fish produced.

Treatment E (20%) results in a low feeding efficiency of 23,61% because fish cannot utilize fat content in feed formulations for growth. This shows that artificial feed containing coconut-testa flour flour produces good feeding efficiency if the levels of the epidermis used in the formulation match the nutritional needs of red tilapia.

Survival Rate

Survival during reared is influenced by the age of reared of test fish, the greater the age of fish, the endurance and adaptation of the environment becomes better so that the survival value is higher. Dunham (2008) argues that differences in age or increasing age affect the survival of the fish being kept. According to Djunaidah (2004) in Qorina 2015, stated that survival can be influenced by biotic and abiotic factors. Biotic factors consist of age and the ability of fish to adapt to the environment. Abiotic factors include food availability and quality of life media. The availability of feed in this study is thought to be sufficient to fulfill the fish needs in self-defense.

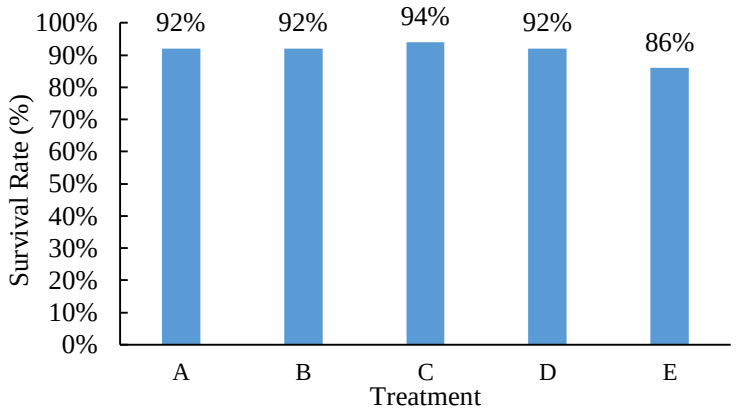

Figure 4. Survival Rate Diagram

The results in Figure 4 show that the survival of red tilapia ranged from 86 to 94%. The highest survival was 94% in treatment C (15%) and the lowest survival was 86% in treatment E (20%). The survival of red tilapia is not significantly different.

The results of analysis of variance showed that the level of use of coconut testa did not have a significantly different effect on feed efficiency (Table 4). From the results of duncan test with a 5% error rate showed that the survival of the red tilapia was not significantly different.

Table 4. Survival rate

Treatment	Survival Rate (%)
A	92,00±0,00a
B	92,00±0,00a
C	94,33±9,82b
D	91,67±8,51a
E	86,00±5,2a

Water Quality

During the study measurements of several parameters of water quality, temperature, pH, and dissolved oxygen. The average water quality during the study was in a decent range for the growth of red tilapia. The temperature during the study ranged from 25,3 to 32,1°C still within the level of eligibility for the reared of red tilapia. Tilapia can live in a wide temperature range of 14-38°C. The optimum temperature for red tilapia ranges from 25-30°C (Suyanto 1999). At temperatures less than 14°C or more than 30°C causes stunted tilapia growth. Deadly temperatures are at 6°C and 42°C. The content of dissolved oxygen during the study was in the range of 4.4-11,9 mg / L. The dissolved oxygen range is suitable for the growth of red tilapia. The value of dissolved oxygen for red tilapia ranges from 4-10 mg / L (Suyanto 1999). According to Odum 1971, Oxygen levels in water will increase with lower temperatures. On the surface layer, oxygen content will be higher, because of the diffusion between water and free air. The results of pH measurements during the study ranged from 6 to 8,65, while tilapia will grow optimally at pH 6-8,5 (Suyanto, 1999). The pH range during the study was still within the feasibility level for reared of tilapia seeds.

CONCLUSION

Based on research data and analysis that has been done it can be concluded that:

1. The use of coconut testa can increase the rate of growth, the efficiency of feeding the red tilapia but does not effect the survival rate
2. The level of use of coconut testa in feed formulations 5% produces an optimal growth rate of red tilapia which is 6,19 grams and feeding efficiency about 41,8%.

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