

**THE EFFECT OF ADDITIONAL BREAD'S YEAST IN FEED AT
DIFFERENT DOSES ON INCREASING THE GROWTH OF NILE
TILAPIA (*Oreochromis niloticus*)**

Pengaruh Penambahan Ragi Roti Pada Pakan Dengan Dosis Berbeda Terhadap
Peningkatan Pertumbuhan Ikan Nila (*Oreochromis niloticus*)

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ABSTRACT

Tilapia (*Oreochromis niloticus*) is a freshwater fish that is easy to maintain and susceptible to disease, making it a widely cultivated freshwater fish commodity. Its growth rate makes tilapia more efficient in using feed, making it more profitable to cultivate. Growth is a process of increasing the length and weight of an organism that can be seen from changes in length and weight in a unit of time. The quality and quantity of feed affect the growth of tilapia. Baker's yeast (*Saccharomyces cerevisiae*) contains nucleotides in the form of purines and pyrimidines. The nucleotides contained in baker's yeast can increase fish appetite. This makes fish tend to eat and are able to digest feed well, which results in growth. The purpose of this study was to determine the effect of adding baker's yeast to feed at different doses on increasing the growth of tilapia. This study will use three different doses of baker's yeast to observe how each dose can affect the growth of tilapia. The method used is a Completely Randomized Design (CRD) with 3 replications for each dose of baker's yeast. The collected data will be analyzed using descriptive statistical analysis to provide an overview of what happens with the data on the effect of adding baker's yeast to feed at different doses on increasing the growth of Tilapia fish.

Key words: Tilapia (*Oreochromis niloticus*); baker's yeast (*Saccharomyces cerevisiae*); absolute growth; feed

ABSTRAK

Ikan Nila (*Oreochromis niloticus*) merupakan ikan air tawar yang mudah dipelihara dan rentan terhadap penyakit, sehingga merupakan komoditas ikan air tawar yang banyak dibudidayakan. Kecepatan pertumbuhan membuat ikan Nila lebih efisien dalam penggunaan pakan, sehingga lebih menguntungkan untuk dibudidayakan. Pertumbuhan merupakan suatu proses pertambahan panjang dan juga berat dari suatu organisme yang mampu dilihat dari perubahan ukuran panjang dan berat dalam satuan waktu. Kualitas dan kuantitas pakan mempengaruhi

pertrumbuhan ikan Nila. Ragi roti (*Saccharomyces cerevisiae*) mengandung nukleotida dalam bentuk purin dan pirimidin. Nukleotida yang terkandung dalam ragi roti dapat meningkatkan nafsu makan ikan. Hal ini membuat ikan cenderung makan dan mampu mencerna pakan dengan baik yang mengakibatkan pertumbuhan. Tujuan dari penelitian ini adalah untuk mengetahui pengaruh penambahan ragi roti pada pakan dengan dosis yang berbeda terhadap peningkatan pertumbuhan ikan Nila. Penelitian ini akan menggunakan tiga perlakuan dosis ragi roti yang berbeda, untuk mengamati bagaimana masing masing dosis yang dapat mempengaruhi peningkatan pertumbuhan ikan Nila. Metode yang akan digunakan adalah Rancangan Acak Lengkap (RAL) dengan 3 kali ulangan untuk setiap dosis ragi roti. Data yang dikumpulkan akan dianalisis menggunakan analisis statistik deskriptif untuk memberikan gambaran umum tentang apa yang terjadi dengan data pada pengaruh penambahan ragi roti pada pakan dengan dosis yang berbeda terhadap peningkatan pertumbuhan ikan Nila.

Kata kunci: ikan Nila (*Oreochromis niloticus*); ragi roti (*Saccharomyces cerevisiae*); pertumbuhan mutlak; pakan

INTRODUCTION

Tilapia (*Oreochromis niloticus*) is a freshwater fish widely consumed by Indonesians. Besides its affordability, tilapia is also readily available throughout Indonesia. Global tilapia production has increased significantly. In 2010, global tilapia production reached 4.3 million tons and is predicted to increase to 7.3 million tons by 2030 (Ashuri, 2016).

Tilapia ranks third after shrimp and salmon as an example of successful aquaculture (Samsu and Nanang, 2020). Indonesian tilapia (*Oreochromis niloticus*) is one of the fishery products trusted in the international market. Therefore, tilapia (*Oreochromis niloticus*) is one of the 10 leading Indonesian fishery export commodities (Bratadharma, 2022), making it a widely cultivated freshwater fish commodity. Tilapia (*Oreochromis niloticus*) is a popular fish species for both cultivation and consumption. Its rapid growth potential, omnivorous nature, and easy reproduction make this fish a favorite among fish farmers. The rapid growth rate makes tilapia (*Oreochromis niloticus*) more efficient in feed utilization, making it more profitable to cultivate (Kurnianti, 2015).

In general, production in the fisheries sector, particularly tilapia, has increased year after year. This high export volume presents an opportunity for stakeholders to capitalize on by developing alternatives to similar commodities to increase diversity and further boost the development of fish farming in Indonesia.

Growth is a process of increasing the length and weight of an organism that can be seen from changes in length and weight in a unit of time. The quality and quantity of feed affect the growth of Tilapia (*Oreochromis niloticus*), in addition to age and water quality can also affect its growth (Mulqan, Afdhal, Rahimi, & Dewiyanti, 2017). Feed conversion and feed efficiency are indicators to determine the effectiveness of feed. Feed conversion can be interpreted as the ability of aquaculture species to convert feed into meat. The feed conversion value indicates the extent to which food is efficiently utilized by fish (Amalia, Amrullah, & Suriyanti, 2018). The habitat and diet of Tilapia (*Oreochromis niloticus*) play a major role in determining its survival. Providing sufficient and appropriate food, along with a conducive environment, can increase the percentage of survival (Iskardar and Elrifadah, 2015).

Upon further examination, it can be seen that increasing fish body weight is also related to the fish's ability to utilize and digest the feed provided. Kammarudin *et al.*, (2019), further explained that baker's yeast can improve feed digestibility and growth in Baronang fish, which in turn simultaneously increases the growth of fish consuming feed enriched with baker's yeast. In addition to containing nucleotides, baker's yeast can also act as a probiotic that can enhance

the immune response, provide enzymes that are good for digesting feed, and improve feed digestibility.

RESEARCH METHODS

Place and Time of Research

This research will be conducted from October 2025 to December 2025. In Datengan village, Grogol sub-district, Kediri district.

Research Tools and Materials

The research tools that will be used consist of 175 Tilapia fish as experimental animals, commercial feed (pellets) PF 1000, well water as a maintenance medium, 25 research containers (gallons of mineral water), digital scales to measure biomass, rulers/measuring tools, stationery, aerators, bread yeast (Fermipan). Each maintenance container is filled with 7 liters of water, then left to settle for 24 hours.

Research methods

This study uses an experimental method, this method is the most scientifically reliable (most valid), because it is carried out with strict control of interfering variables outside the experimental ones (Arsyad, N and F. Fatmawati, 2018). Furthermore, this study uses a Completely Randomized Design (CRD) with 5 treatments and 5 replications. The treatment used is the addition of baker's yeast with different doses in Tilapia fish feed, namely (a) 0%, (b) 2%, (c) 4%, (d) 6%, (e) 8%.

Research Procedures

The research began with the preparation and arrangement of the research containers. The containers used in this study were 25 mineral water gallon jugs with the tops cut off, each with a capacity of 15 liters. Before use, the gallons were washed thoroughly with soap and water. They were then arranged according to the predetermined research layout and filled with the prepared water.

Next, the research feed was prepared, using commercial feed. Before the feed was given to the test animals, it was first weighed according to the predetermined treatment. According to Manurung *et al.* (2013), before the feed was given to the test animals, the feed and bread yeast were first weighed according to the predetermined treatment dosage. After the fish were placed in the treatment container, they were acclimatized for 15-20 minutes. The purpose of this acclimatization was so that the fish could adjust to their new environment. Furthermore, the fish were less easily stressed due to the temperature difference between the plastic and the research container (Yanuassary M, 2017).

The stocking density of the test animals used in the study was 5 fish per container. Bangun Swasono (2021) stated that the ideal stocking density for fish is 1-2 fish per liter. Water changes were performed every 3 days, and water quality was monitored. At the end of the study, the fish were weighed to determine their final weight.

Testing Parameters

The parameters observed in this study include the absolute weight growth of Tilapia fish as the main parameter and water quality as a supporting parameter.

Absolute Weight Growth Measurement

At the end of the study, absolute weight growth (Wt) was measured by weighing the total weight of biomass in each treatment and recording it to obtain the absolute weight growth results for each treatment using the Effendie (1997) formula as follows:

Average weight formula

$$H = W_t - W_o$$

H : Absolute weight growth

Wt : Final weight
Wo : Initial weight

Data analysis

After the research is completed, the data is collected and then analyzed. Prayitno, D (2012), states that to determine whether or not the independent variable has an influence on the dependent variable, a one-way analysis of variance (ANOVA) is performed.

RESULTS

Based on the results of research on the effect of commercial feed doses on the absolute weight growth of Tilapia (*Oreochromis niloticus*), different averages were obtained between treatments as presented in the Appendix. The range, average, standard deviation and absolute weight growth of Tilapia (*Oreochromis niloticus*) for each treatment can be seen in the table below.

Table 1. Range, mean and standard deviation of absolute weight growth of Nile tilapia

Treatment	Absolute weight growth range of Nile tilapia (<i>Oreochromis niloticus</i>) (g)	Average (g)	Standard deviation (sd)
A	2 – 3	2,6	0,54772
B	4 – 5	4,2	0,44721
C	5 – 7	5,8	0,83666
D	7 – 8	7,6	0,54772
E	8 – 10	9,2	0,83666

Based on table 1 above, the results obtained are that treatment A (0% bread yeast dose) gives an average absolute weight growth value of 2.6 grams with a standard deviation of. Treatment B (2% bread yeast dose) gives an average absolute weight growth value of 4.2 grams with a standard deviation of. Treatment C (4% bread yeast dose) gives an average absolute weight growth value of 5.8 grams with a standard deviation of. Treatment D (6% bread yeast dose) gives an average absolute weight growth value of 7.6 grams with a standard deviation of. Treatment E (8% bread yeast dose) gives an average absolute weight growth value of 9.2 grams with a standard deviation.

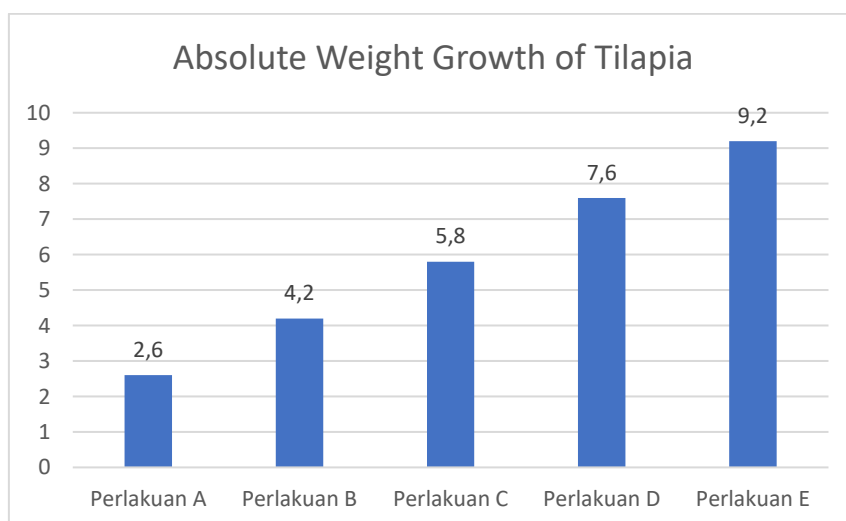


Figure 1. Graph of the average absolute weight growth of Tilapia fish

The results of Figure 1 above show that the absolute weight of Tilapia fish during the study had the highest average weight in treatment E (8% bread yeast dose) with an average absolute weight of 9.2 g, followed by treatment D (6% bread yeast dose) with an average absolute weight of 7.6 g, then treatment C (4% bread yeast dose) of 5.8 g and treatment B (2% bread yeast dose) of 4.2 g, ending with treatment A (0% bread yeast dose) of 2.6 g.

To determine whether there are significant differences between treatments, an ANOVA test was carried out and the results are presented in table 2 below.

Table 2. One-Way ANOVA Test of Absolute Weight Growth of Tilapia

	Sum of Squares	Df	Mean Square	F	Sign.
Between Groups	137,840	4	34,460	78,318	0,001
Within Groups	8,800	20	0,440		
Total	146,640	24			

Based on Table 2 above, it can be explained that the dosage of baker's yeast significantly affected the absolute length growth of Tilapia fish ($F > \text{Sign.}$). Furthermore, to determine the level of difference between each treatment on the absolute weight growth of Tilapia fish, a 5% LSD test was conducted. Meanwhile, the average and notation of the absolute weight growth of Tilapia fish can be seen in Table 3 below.

Table 3. Average and Notation of Absolute Weight Growth of Tilapia

Treatment	N	Subset for alpha = 0,05				
		1	2	3	4	5
A	5	2,6 ^a				
B	5		4,2 ^b			
C	5			5,8 ^c		
D	5				7,6 ^d	
E	5					9,2 ^e

Based on table 3 above, it can be explained that treatment A is significantly different from treatments B, C, D and E, then treatment B is significantly different from treatments C,

D and E. Meanwhile, treatment C is significantly different from treatments D and E, and likewise treatment D is significantly different from treatment E.

Water Quality Monitoring

Water Temperature

Based on the research results, the water temperature in each treatment did not have a significant effect on the absolute weight growth of Tilapia fish. The range of values, averages, and standard deviations of water temperature levels on the absolute weight growth of Tilapia fish in each treatment and replication are presented in Table 4 below.

Table 4. Range, Mean and Standard Deviation of Temperature for Each Treatment

Treatment	Range	Average	Standard Deviation
A: Bread Yeast Dosage 0%	27 – 29 °C	27,8	0,8367
B: Bread Yeast Dosage 2%	27 – 28 °C	27,6	0,5477
C: Bread Yeast Dosage 4%	27 – 28 °C	27,4	0,5477
D: Bread Yeast Dosage 6%	27 – 29 °C	28	0,7071
E: Bread Yeast Dosage 8%	27 – 29 °C	27,8	0,8367

Based on Table 4 above, relatively similar temperatures ranging between 27 and 29 °C are still considered normal for tilapia. Furthermore, to determine any significant differences between water temperatures in each treatment, a one-way ANOVA test was conducted, the results of which can be seen in Table 5 below.

Table 5. One-Way ANOVA Test of Temperature

	Sum of squares	Df	Mean square	F	Sign.
Between Groups	1,040	4	0,260	0,520	0,772
Within Groups	10,000	20	0,500		
Total	11,040	24			

Based on the table above, it shows that the water temperature level in each treatment did not have a significant effect on the absolute weight growth of Tilapia fish.

Degree of Acidity (pH)

Based on the research results, water pH in each treatment did not significantly affect the absolute weight growth of tilapia. The range, average, and standard deviation of water pH levels on the absolute weight growth of tilapia in each treatment and replication are presented in Table 6 below.

Table 6. Range, Average and Standard Deviation of Acidity Degree for Each Treatment

Treatment	Range	Average	Standard Deviation
A: Bread Yeast Dosage 0%	7,2 – 7,4	7,28	0,1095
B: Bread Yeast Dosage 2%	7,1 – 7,3	7,24	0,0894
C: Bread Yeast Dosage 4%	7,2 – 7,5	7,3	0,1225
D: Bread Yeast Dosage 6%	7,2 – 7,4	7,32	0,0837
E: Bread Yeast Dosage 8%	7,2 – 7,4	7,28	0,1095

Table 6 above shows that a relatively consistent pH ranging from 7.1 to 7.5 is still considered normal for tilapia. Furthermore, to determine any significant differences between the water pH values in each treatment, a one-way ANOVA test was conducted, and the results are shown in Table 7 below.

Table 7. One-Way ANOVA Test of Acidity Degree

	Sum of squares	Df	Mean square	F	Sign.
Between Groups	0,018	4	0,004	0,407	0,801
Within Groups	0,216	20	0,011		
Total	0,234	24			

Based on the table above, it shows that the pH level of the water in each treatment did not have a significant effect on the absolute weight growth of Tilapia fish.

Dissolved Oxygen (DO)

Based on the research results, dissolved oxygen in water in each treatment did not have a significant effect on the absolute weight growth of tilapia. The range of values, averages, and standard deviations of dissolved oxygen levels in water on the absolute weight growth of tilapia in each treatment and replication are presented in Table 8 below.

Table 8. Range, Mean and Standard Deviation of Dissolved Oxygen for Each Treatment

Treatment	Range	Average	Standard Deviation
A: Bread Yeast Dosage 0%	5,3 – 5,7	5,52	0,1483
B: Bread Yeast Dosage 2%	5,4 – 5,6	5,46	0,0894
C: Bread Yeast Dosage 4%	5,3 – 5,7	5,52	0,1643
D: Bread Yeast Dosage 6%	5,3 – 5,6	5,48	0,1304
E: Bread Yeast Dosage 8 %	5,4 – 5,5	5,46	0,0548

Based on Table 8 above, the relatively similar dissolved oxygen levels, ranging from 5.3 to 5.7 ppm, are still considered normal for tilapia. Furthermore, to determine any significant differences between the DO levels in each treatment, a one-way ANOVA test was conducted, and the results can be seen in Table 9 below.

Table 9. One-Way ANOVA Test of Dissolved Oxygen

	Sum of squares	Df	Mean square	F	Sign.
Between Groups	0,000	4	0,000	0,022	0,999
Within Groups	0,041	20	0,002		
Total	0,041	24			

Based on the table above, it shows that the DO levels of water in each treatment did not have a significant effect on the absolute weight growth of Tilapia fish.

DISCUSSION

The Effect of Adding Baker's Yeast to Feed at Different Doses on Increasing the Growth of Tilapia (*Oreochromis niloticus*)

The Effect of Adding Bread Yeast to Feed with Different Doses on Increasing the Growth of Tilapia (*Oreochromis niloticus*) The treatment of E bread yeast with a dose of 8%

gave the highest value, this result is suspected that the feed treatment given can meet the nutritional needs required by Tilapia compared to other treatments. This is because Tilapia does not only obtain the nutrients contained in commercial feed but also nutrients from bread yeast, because bread yeast contains high enough protein so that it can meet the nutritional needs required by Tilapia seeds.

The results of the study showed that the absolute weight growth value of the 8% yeast treatment indicated that the feed could be utilized well by Tilapia. Providing different doses of yeast in Tilapia fry feed is a good way to help the fish in their growth process. The protein content in yeast is also quite high so that the combination of yeast and commercial feed in the form of pellets will be able to accelerate the weight growth process of Tilapia. Protein in the process of fish growth is very necessary if the protein in the feed is lacking, then the protein in the body tissue will be used to maintain more important tissue functions. Therefore, providing sufficient protein in the feed is necessary. According to Juliana *et al.*, (2018) The protein required by fish in the growth phase requires at least 30%-36% protein to be able to provide significant value to the growth of the fish. Therefore, the excess protein in the combination of yeast and pellets can play a role in the growth rate of fish because high protein can increase the body weight of fish.

Protein is essential for fish growth. If protein in the feed is insufficient, the protein in the body's tissues will be utilized to maintain more important tissue functions. Therefore, providing sufficient protein in the feed is necessary. According to Juliana *et al.*, (2018), the protein required by fish during the growth phase requires at least 30%-36% protein to significantly contribute to their growth. Therefore, the excess protein in the combination of bread yeast and pellets can play a role in fish growth rate because high protein can increase fish body weight.

While in treatment A (100% Pellet) gave the lowest value of this result is suspected because treatment A does not use bread yeast so that the nutritional needs of Tilapia fish cannot be met and causes the feed to not be utilized properly. From the results of previous studies it explains that providing commercial feed alone is not able to meet the growth of fish weight. The nutritional content contained in commercial feed without any combination is less able to help the fish growth process so that it causes fish growth to be low because natural feed is the best feed, this is because the nutritional content contained in natural feed cannot be replaced by any artificial feed Herawati *et.al.*, (2013).

Water Quality

During the research, the water quality levels in the research media still showed normal conditions that could be tolerated by Nile tilapia for their growth.

Water Temperature

The water temperature during the study ranged between 27 and 29°C, a range considered normal for tilapia. Sudden, drastic drops in temperature can stress tilapia and hinder their growth. Jumaidi *et al.* (2016) stated that the average temperature for maintaining tilapia is 25-30°C.

Degree of Acidity (pH)

The acidity level in the research media obtained a value ranging from 7.1 – 7.5, which is still considered normal for Tilapia. According to Supriatna, *et al.*, (2020), pH concentration can affect the level of water fertility. (Pratama and Mukti, 2015) stated that the optimal pH level for raising Tilapia fish seeds is 6.5-8.0.

Dissolved Oxygen (DO)

Dissolved oxygen is an important element in the life of fish in research media. Dissolved oxygen in the media during the research obtained values ranging from 5.3 - 5.7 ppm, this value is still considered normal for Tilapia. According to Sulistyono *et al.*, (2016) in Pratama

et al., (2018) a good dissolved oxygen level for Tilapia cultivation is 4-6 ppm. The dissolved oxygen level for Tilapia seed enlargement is 5.3 -7 ppm. This dissolved oxygen level is still at an optimal level to support survival and growth rate.

CONCLUSION

Based on the results of research on the Effect of Adding Bread Yeast to Feed with Different Doses on Increasing the Growth of Tilapia (*Oreochromis niloticus*). It can be concluded that (a) The effect of adding bread yeast to feed with different doses has a significant effect on the absolute weight growth of Tilapia (*Oreochromis niloticus*). In treatment E (addition of bread yeast with a dose of 8%) it provides the highest growth value of 9.2 grams. (b) Water quality data during the study was in a good range or could be said to be normal, namely Temperature: 27 - 29 °C, pH: 7.1 - 7.5 and Dissolved Oxygen: 5.3 - 5.7 ppm.

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