GROWTH PERFORMANCE AND HEALTH STATUS OF GIANT GOURAMY (*OSPHRONEMUS GOURAMY* LAC.) SEED FEEDED WITH A COMBINATION OF CHITOSAN AND PROBIOTIC SUPPLEMENTS (SINBIOTIC)

Kinerja Pertumbuhan dan Status Kesehatan Benih Ikan Gurami (Osphronemus Goramy Lac.) yang Diberi Pakan dengan Kombinasi Suplemen Kitosan dan Probiotik (Sinbiotik)

Fitram Novian[1],Roffi Grandiosa [2],Rosidah[3],Dian Yuni Pratiwi[4]
[1]Study Program of Fisheries, Faculty of Fisheries and Marine Science, Padjadjaran University, Sumedang, West Java 45363, Indonesia
*Corresponding author: Fitram18001@mail.unpad.ac.id

ABSTRACT

Gourami is one type of fish that is widely used in aquaculture activities. Gourami fish (*Osphronemus gourami* Lac.) is one of the freshwater fish that has a fairly high selling value in the Indonesian market but has the disadvantage of slow growth. This study aims to determine the optimum level of addition of chitosan and probiotics (synbiotics) to feed against an increase in the growth rate and daily feed consumption of carp. The method used in this research is an experimental method using a Complete Randomized Design (RAL), which consists of five treatments and 4 tests. The treatment used was (A) giving chitosan of 2.5 g / kg and probiotics of 5 g / kg, (B) giving chitosan of 5 g / kg and probiotics of 5 g / kg, (C) giving chitosan of 7.5 g / kg and probiotics of 5 g / kg, (D) giving chitosan of 10 g / kg and probiotics of 5 g / kg, (E) without administration of chitosan and probiotics (control). The test fish used is carp with a length of 7-9 cm and a weight of 7-9 g. The container used is hapa measuring 1 x 1 x 1 m^3 as many as 20 pieces with a density of 20 fish per treatment and a maintenance period of 42 days. The amount of feed given is as much as 5% of fish biomass. The data from the observation of length and weight were analyzed using Analysis of Variance (ANOVA) with a confidence level of 95%, if there is a noticeable difference, the Duncan multiple distance test is carried out. The results showed that synbiotic administration of 7.5 g / kg of chitosan and 5 g / kg of probiotics in feed gave the best results with the highest absolute length growth of 4.48 ± 0.3 cm, the highest absolute weight growth of 24.03 ± 3.1 g, the highest daily growth rate of 57.20 ± 7.3%, the lowest feed conversion ratio of 1.6 ± 0.3 and survival the highest was 98% in gourami and the health of gourami visually observed there were 6 fish affected by *Anchor worms*, 2 affected by *Aerosomonas* sp, 2 tails hit by *White spot*.

Keywords: giant gouramy, synbiotic, growth, chitosan, probiotic

ABSTRAK

Ikan gurami merupakan salah satu jenis ikan yang banyak digunakan dalam kegiatan budidaya. Ikan gurami (*Osphronemus gourami* Lac.) merupakan salah satu ikan air tawar yang memiliki nilai jual yang cukup tinggi di pasaran Indonesia namun memiliki kelemahan yaitu pertumbuhan yang lambat. Penelitian ini bertujuan untuk menentukan kadar optimum penambahan kitosan dan probiotik (sinbiotik) pada pakan terhadap peningkatan laju pertumbuhan dan konsumi pakan harian ikan gurame. Metode yang digunakan dalam riset ini adalah metode eksperimental dengan menggunakan Rancangan Acak Lengkap (RAL), yang tediri dari lima perlakuan dan 4 ulangan. Perlakuan yang digunakan adalah (A) pemberian kitosan sebesar 2,5 g/kg dan probiotik sebesar 5 g/kg, (B) pemberian kitosan sebesar 5 g/kg dan probiotik sebesar 5 g/kg, (C) pemberian kitosan sebesar 7,5 g/kg dan probiotik sebesar 5 g/kg, (D) pemberian kitosan sebesar 10 g/kg dan probiotik sebesar 5 g/kg, (E) tanpa pemberian kitosan dan probiotik (kontrol). Ikan uji yang digunakan adalah ikan gurame dengan ukuran panjang 7 – 9 cm dan bobot 7 – 9 g. Wadah yang digunakan adalah hapa berukuran 1 x 1 x 1 m^3 sebanyak 20 buah dengan kepadatan 20 ekor ikan tiap perlakuan dan lama pemeliharaan selama 42 hari. Jumlah pakan yang diberikan sebanyak 5% dari biomassa ikan. Data hasil pengamatan panjang dan bobot dianalisis dengan menggunakan Analysis of Variance (ANOVA) dengan tingkat kepercayaan 95%, apabila terdapat perbedaan yang nyata maka dilakukan uji jarak berganda Duncan. Hasil riset menunjukkan pemberian sinbiotik sebesar 7,5 g/kg kitosan dan 5 g/kg probiotik dalam pakan memberikan hasil terbaik dengan pertumbuhan panjang mutlak tertinggi sebesar 4,48 ± 0,3 cm, pertumbuhan bobot mutlak tertinggi sebesar 24,03 ± 3,1 g, laju pertumbuhan harian tertinggi sebesar 57,20 ± 7,3 %, rasio konversi pakan terendah sebesar 1,6 ± 0,3 dan kelangsungan hidup tertinggi sebesar 98 % pada ikan

gurami serta kesehatan gurami yang diamati secara visual terdapat 6 ekor ikan yang terkena *Anchor worm*, 2 ekor terkena *Aerosomonas sp.*, 2 ekor terkena *White spot*.

Kata kunci: ikan gurame, sinbiotik, pertumbuhan, kitosan, probiotik

1. Introduction

Indonesia's fisheries sector is one of the significant contributors to state income, especially in aquaculture. The demand for farmed fish every year is quite high so that the production figures of aquaculture are also quite high. The number of fishery production in the field of fish farming in 2020 has reached 152,668.77 tons in Indonesia. Therefore, aquaculture is one of the most promising sectors, especially in the field of freshwater fish farming (KKP Statistics and Information Data Center, 2020).

One of the fish farming activities that are currently commonly carried out is gourami. Gourami (*Osphronemus gourami Lac.*) is one of the freshwater fish that has a fairly high selling value in the Indonesian market. The high selling value of gourami is due to the dense texture of the meat, the savory and delicious taste of the meat, and has the peculiarity of the type of freshwater fish, which is that it has large thorns. The protein contained in gourami is also quite high, which is 21%, even often juxtaposed with snapper (Budiana, 2018). In 2020, the largest production of gourami was in the West Java area with a production value of 38,430.47 tons and with an average fish price in Indonesia of 38,000 per / kilo (KKP Statistical Data Center, 2020). Based on this production value, currently gourami still has a high potential to be developed, especially from the high price of the fish.

Gourami not only has advantages, but also has shortcomings that farmers often complain about. One of the factors that is a problem for gourami farming is its relatively slow growth rate. In general, to produce male gourami weighing 250 grams / tail and female gourami weighing 200 grams / head requires a maintenance time of 10-11 months (Budiana, 2018). The relatively slow growth rate is influenced by several factors including genetics, age, disease, feed and other factors that affect the quality of waters during aquaculture activities (Afrianto & Liviawaty, 2015). In addition, a factor that also affects the growth rate is the high conversion of feed (Herry *et al*, 2019). Each of these factors needs to be considered so that gourami farmers get maximum

Background

results. One of the efforts that can be done to increase the growth rate of fish is to innovate synbiotic feed additives (mixing prebiotics and probiotics) in fish feed.

Synbiotics is a term used in naming an ingredient that uses a mixture of probiotics and prebiotics. This innovation has a mechanism of action that increases intestinal resistance, stimulates good bacteria in the intestines, prevents the growth of bad bacteria, helps produce hormones and antibodies, helps the performance of the immune system, accelerates the process of nutrient absorption, and prevents fish digestive problems (Nekoubin, 2012). The innovation that will be applied to this study is the combination of chitosan and probiotics in commercial feed for gourami. And the main ingredient of this synbiotic is chitosan and also probiotics in the form of powders.

Chitosan is a deacetylated derivative compound from chitin sourced from shrimp and crab shell waste. The deacetylation process is the process of removing the acetyl group so as to leave the amine group from the shrimp shell (Dompeipen, 2016). Chitosan itself has many benefits and can be applied to various fields. According to Rieny, *et al.* (2015), chitosan can be used as an antimicrobial, antifungal, antioxidant in increasing growth rates, immunostimulants, encapsulation and purification of aquaculture water. Pangestika, *et al.* (2021) states that for aquatic animals chitosan can be used as a feed additive because it has good side effects on digestion, increases growth rate, improves immune function, inhibits pathogenic microbes in the intestines and lowers cholesterol in fish.

Chitosan is one of the materials that has saccharide elements such as xylo-oligosaccharides, galacto-oil-gosaccharides, and isomalto-oligosaccharides. These three elements can affect the intestinal microflora so that it grows bacterial activity. In addition, chitosan is also one of the prebiotic ingredients of inulin and fructosaccharides that can affect the intestinal microflora (Lee *et al.*, 2002)

Probiotics are an ingredient that contains good microorganisms. Probiotics are often used in living conditions or fainting to change the composition of the microflora by colonization in the host compartment. This has a healthy and beneficial effect on its host (Lestari & Helmyati, 2018).

The effect of chitosan and prebiotic levels on feed needs to be studied to see its effect on the growth rate of gourami. Research on the effect of chitosan and probiotic (synbiotic) levels in feed on the growth rate and daily feed consumption of gourami has never been conducted. The implementation of this study aims to determine the optimum level and influence of the level of chitosan and probiotic (synbiotic) addition in feed on increasing the growth rate, health and daily feed consumption of gourami fish

Intention

The purpose of this study was to determine the optimum level of chitosan and probiotic (synbiotic) addition in feed to increase the growth rate, health and daily feed consumption of gourami for 42 days from May to June 2022 in the Kawungsari Fishery Group, Kertayasa Village, Cijulang District, Pangandaran Regency.

2. Materials and Methods

Experimental Design

The method used in this study is an experimental method using a Complete Randomized Design (RAL) with five treatments and four repeats in each treatment, that is:

A: 2.5 g/kg Chitosan and 5 g/kg Probiotics
B: 5 g/kg Chitosan and 5 g/kg Probiotics
C: 7.5 g/kg Chitosan and 5 g/kg Probiotics
D: 10 g/kg Chitosan and 5 g/kg Probiotics
E: Control

The gourami used as test fish measuring 7-9 cm with a weight of 7-9 g as many as 400 heads came from the farmers of the Kawungsari Fishery Group, Pangandaran. And acclimatized in advance for 8 days on a separate pond. Fish are then put into hapa measuring 1 x 1 x 1 m^3 as many as 20 with a density of 20 heads per hapa on the fishpond. Feeding as much as 5% of fish biomass for 42 days, feeding twice a day, namely at 07.30 am and 16.00 pm. Then the fish will be sampled once every 7 days.

Research Procedure

The test fish was obtained from the Kawungsari Fishery Group, Pangandaran as many as 400 heads. Pwill be commercialized will be mixed with synbiotics (chitosan and probiotics) with a treatment of 2.5 g / kg, 5 g / kg, 7.5 g / kg and 10 g / kg in the form of powder mixed with 5 g / kg of probiotics in all treatments with an outboard system using a progol solution at a dose of 2 % - 3 % the reference for using chitosan and probiotics is the use of 7.5 gr/kg based on research (Maryanto, 2021) and the use of 5 gr/kg of probiotics based on research conducted by (Fauzi et. al, 2017).

Feed that has been mixed with synbiotics will be sprayed with a solution of progol which is then dried in the sun because if under the scorching sun it will cause damage and evaporation to the synbiotics, spraying is carried out in a ratio of 3: 1. Before being given feed with a mixture of synbiotic treatment, the test fish is first weighed and calculated biomass and the fish will be acclimatized first for 8 days, after that the fish will be given treatment feed as much as 5% of fish biomass in the morning at 07.30 WIB and afternoon at 16.00 WIB and fish sampled once every 7 days with absolute growth checks, absolute weight, daily growth rate, feed conversion, survival and water quality.

Collection Data

Fish data collection is weighing weights using digital scales with an accuracy of 0.01, growth by measurement using caliper, measurement of water quality which includes a degree of acidity with a pH meter of temperature using a thermometer and dissolved oxygen using a DO meter. The data is taken once every 7 days in the morning time.

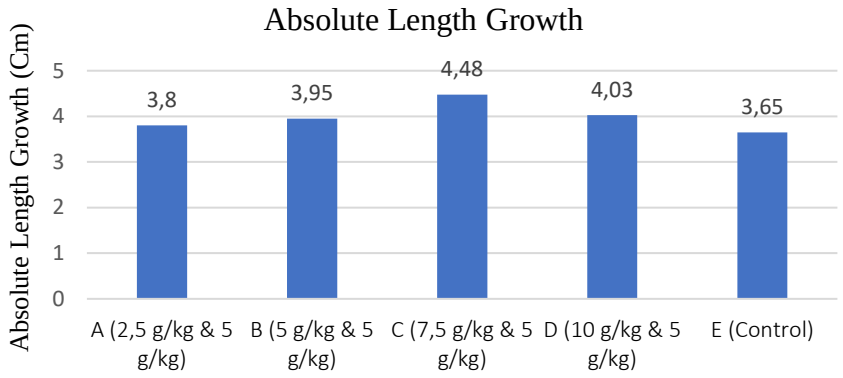
The data that has been collected is then analyzed with a variety of Anova tests with a confidence level of 95%, if there is a noticeable difference, duncan multiple distance tests are carried out. As for data water quality is analyzed descriptivelyf

3. Results and Discussion

Result

1. Absolute Length Growth

Absolute length growth is the difference in the final length with the beginning of the fish during rearing. Based on the observations, the growth of the absolute length of gourami after being treated for 42 days was different for each treatment (Figure 1).



Synbiotic Addition Treatment In Feed

Figure 1 Absolute Length Growth Chart

Based on Figure 1, it can be seen that the resulting absolute length growth is in the range of 3.65 – 4.48 cm. The highest absolute length growth occurred in practice C with the addition of synbiotics to the feed as much as 7.5 g / kg and 5 g / kg of feed which was 4.48 ± 0.3 cm and the lowest absolute length growth occurred in the E (control) exercise of 3.65 ± 0.3 cm.

The results of the ANOVA analysis with a confidence level of 95% showed that the control treatment and those treated with the addition of chitosan and probiotics in the feed did not differ markedly from the growth of the absolute length of gourami. So the addition of chitosan and probiotics to gourami feed has an influence but is not very significant on the growth of the absolute length of gourami.

The magnitude of the resulting growth in the absolute length of gourami shows that the addition of chitosan to the gourami feed has a good influence, especially on the treatment of B (3.95 ± 0.3 cm), C (4.48 ± 0.3 cm) and D (4.03 ± 0.3 cm) compared to the k ontrol and this is because the addition of chitosan 7.5 gr / kg and probiotics 5 gr / kg can increase growth as a prebiotic agent and is well utilized by probiotics in the intestines of fish and by giving synbiotics with the right dose can increase fish appetite (Rozi *et al*. 2018; Maryanto *et al.* , 2021; Fauzi *et al*. 2017) . The results showed that the C treatment with the addition of chitosan 7.5 gr / kg and probiotics 5 gr / kg in gourami feed has the potential to increase the growth of the absolute length of gourami. The results obtained during maintenance are in accordance with the research of Rozi *et al.* (2018) which states the addition of chitosan to the feed can increase the growth of the absolute length of tilapia (*Oreochromis niloticus*). According to BSNI (2000) the length of gourami during nursery V reaches 8 – 11 cm with a maintenance time of 40 days. This statement corresponds to the length of the fish produced during the maintenance of both the treated and the control fish.

2. Absolute Weight Growth

Absolute weight growth is the difference in the final weight with the beginning of the fish during rearing. Based on the results of observations, the growth of the absolute weight of gourami after being treated for 42 days was different for each treatment (Figure 2).

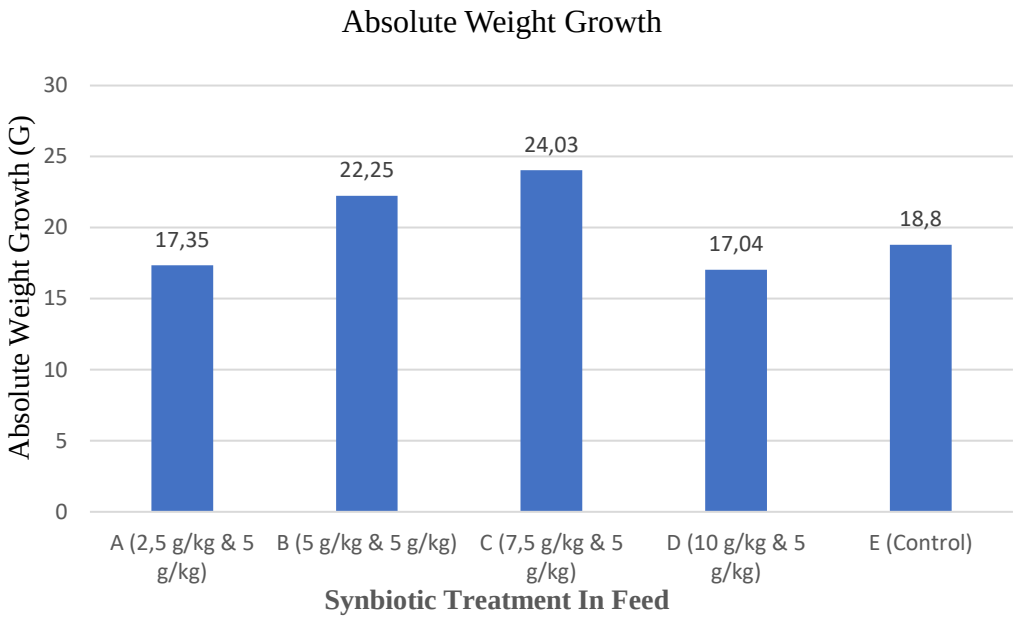


Figure 2 Absolute Weight Gain Graph

Figure 2 shows that the resulting absolute weight growth is in the range of 17.04 – 24.03 g. The highest absolute weight growth occurred in treatment C with the addition of synbiotics to the feed as much as 7.5 g / kg and 5 g / kg of feed, which was 24.03 ± 3.1 g and the lowest absolute weight growth occurred in D (synbiotic addition of 10 g / kg and 5 g / kg) which was 17.04 ± 3.1 g. The results of statistical analysis using Anova showed that the treatment did not provide a noticeable difference in the weight growth of gourami so that the duncan test results at a confidence level of 95% were not continued but the administration showed that the control treatment was significantly different from the B and C treatments so that the control treatment and those given the treatment of adding chitosan and probiotics in the feed did not differ markedly from the growth of the absolute weight of gourami. The Anova table attached below is one of the calculation results of the growth of gourami weights against perlakuam and control.

Absolute Weight Growth ANOVA Table

Variety Sources	Db	JK	Other	Fhit	Ftab 0.05
Treatment	4	153,78	38,44425	1,73	9,12
Deuteronomy	3	456,07	152,0245		
Error	12	267,17	22,26453		
Entire	19	420,95			

Description: Fhit > Ftab = no real difference at 95% confidence level

The magnitude of the growth of the absolute weight of gourami in the resulting C treatment shows that the addition of synbiotics to the gourami feed has a good influence. The results of observations show that C treatment with the addition of chitosan and probiotics to gourami feed as much as 7.5 g / kg and 5 g / kg of feed can increase the growth of absolute weight of gourami, this is because the dose given can be digested both by gourami and strengthened in the study (Maryanto 2021). The results obtained during maintenance are in accordance with the research of Rozi *et al.* (2018) which states the addition of chitosan to the feed can increase the growth of the absolute weight of tilapia

(*Oreochromis niloticus*). This statement is also reinforced by the results of the research of Udo *et al.* (2018) which states that the addition of chitosan to the feed at the optimum dose results in a greater final weight of catfish (*Clarias gariepinus*) compared to fish that are not given chitosan.

3. Daily Growth Rate

The daily growth rate is a percentage of the difference in the final weight with the initial weight of the fish divided by the length of maintenance time. Based on the results of observations, the daily growth rate of gourami after being treated for 42 days varies for each treatment (Figure 3).

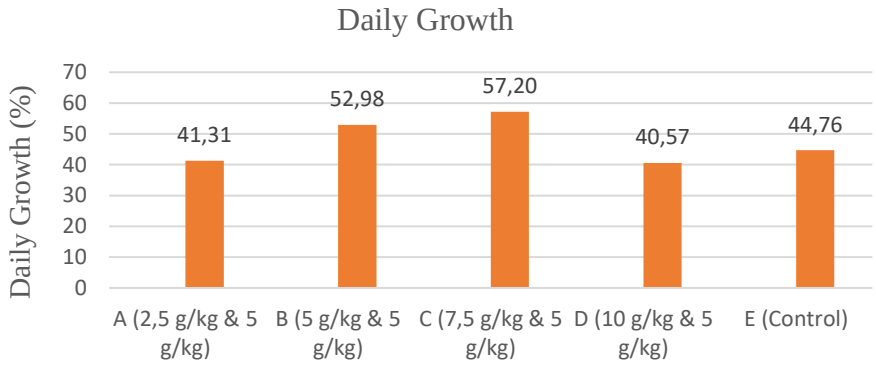


Figure 3 Daily Growth Chart

Based on the results of observations that have been carried out for 42 days, it shows that the value of the daily growth rate produced is around 40.57 – 57.20%. The highest daily growth rate occurred in C with the addition of synbiotics to the feed as much as 7.5 g / kg and 5 g / kg of feed, which was 57.20 ± 7.3 % and the lowest daily growth rate occurred in D (addition of synbiotics 10 g / kg and 5 g / kg of feed) which was 40.57 ± 7.3 %. The results of statistical analysis using Anova showed that the treatment provided a noticeable difference in the weight growth of gourami so that it was continued with the results of the Duncan test at a confidence level of 95%. The best daily growth rate value occurred in C with the addition of synbiotics to the feed as much as 7.5 g / kg and 5 g / kg of feed, which was 57.20 ± 7.3 %. The magnitude of the value of the daily growth rate of gourami produced shows that the addition of synbiotics to the gourami feed has a good influence. Fish growth can occur if the feed consumed both in quality and quantity has exceeded its need for survival and maintaining the weight of the fish itself (Effendie 1997). The weight of the fish will not increase if the fish do not consume the feed given. Gourami fed with feed have a good feed response. This is in accordance with the statement of Sukenda *et al.* (2008) which states the addition of synbiotics can increase appetite in fish.

Chitosan is a substance that can be used as a *feed additive or feed additive* in feed to increase feed utilization and growth in fish. Chitosan can improve the morphology of the small intestine so that it can increase the absorption of nutrients in feed (Abdel and Salem 2020). Abnormal intestinal morphology can inhibit growth. In short, intestinal villi can decrease the surface area for nutrient absorption, causing poor absorption of nutrients and ineffective performance. Research of Zaki *et al.* (2015) showed chitosan can improve intestinal epithelial health and produce longer intestinal villi length in snapper (*Dicentrarchus labrax*). And apart from chitosan consumed, there are also probiotics as agents in the sustainability of fish growth by utilizing chitosan as the basic ingredient of probiotic food in the intestines of fish so that probiotics can be more optimal in working to absorb nutrients in the intestines of fish.

4. Feed Conversion Rate

Feed *conversion ratio* (FCR) is the ratio of the amount of feed needed to produce 1 kg of cultured fish meat. The lower the ratio value of feed conversion to meat produced, the better the value of the feed conversion ratio and vice versa. Based on the results of observations, the conversion ratio of gourami fish feed after being treated for 42 days varies for each treatment (Figure 4).

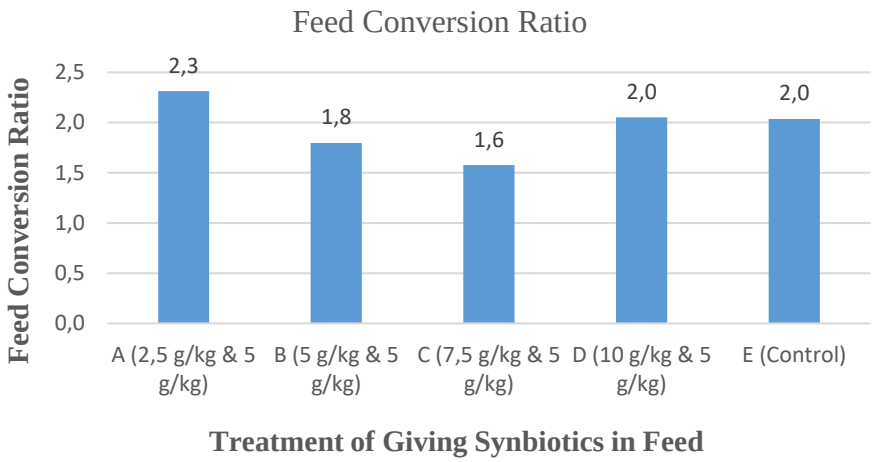


Figure 4 Feed Conversion Ratio Graph

Based on the results of observations that have been carried out for 42 days, it shows that the value of the feed conversion ratio is around 1.6 – 2.3. The highest feed conversion ratio value occurred in A (synbiotic addition of 2.5 g/kg and 5 g/kg) which was 2.3 ± 0.3 and the lowest feed conversion value occurred in the C treatment with the addition of synbiotics to the feed as much as 7.5 g/kg and 5 g/kg of feed, which was 1.6 ± 0.3 and this is because probiotics can have a beneficial effect on the health of gourami and improve the balance of intestinal microflora when entering the channel digestion is carried out by lactic acid bacteria that convert glucose into lactic acid so that the incoming feed is best utilized in the intestines of fish which causes the feed conversion ratio to be very good. The addition of synbiotics to the gourami feed has a significant influence on the feed conversion ratio of gourami. The results of statistical analysis using Anova showed that the treatment did not provide a noticeable difference in the feed conversion ratio in gourami so that it was not continued with the results of the Duncan test at a confidence level of 95%. The best feed conversion ratio value occurred in C with the addition of synbiotics to the feed as much as 7.5 g / kg and 5 g / kg of feed, which was 1.6 ± 0.3. The high low value of the feed conversion ratio is influenced by several factors. Defrizal and Khalil (2015) stated that the high low value of the feed conversion ratio is influenced by the quality of the feed, the quantity of feed, the type of species and the size of the fish. The value of the feed conversion ratio in fish is generally around 1.5 – 8 (Mudjiman 2011). Based on this statement, it can be said that the value of the feed conversion ratio of all treatments is good because it is still in the area.

The feed conversion ratio value is usually used to find out the good and bad quality of the feed given for the growth of fish (Saputra *et al.* 2018). The low conversion value of gourami feed suggests that the addition of synbiotics to gourami feed has a good influence. The addition of synbiotics to the gourami feed can improve the quality of gourami feed. This statement is reinforced by the research of Aathi *et al.* (2013) which states the addition of chitosan can increase the proximate value of crude protein in indian fish feed major carp (*Labeo rohita*).

5. Survival

Survival is a comparison of the number of fish that live at the end of maintenance with the beginning of rearing. Survival in cultivation activities is one of the main parameters that indicate the success of these cultivation activities. Based on the results of observations on the survival of gourami after being treated for 42 days, it was different for each treatment (Figure 5).

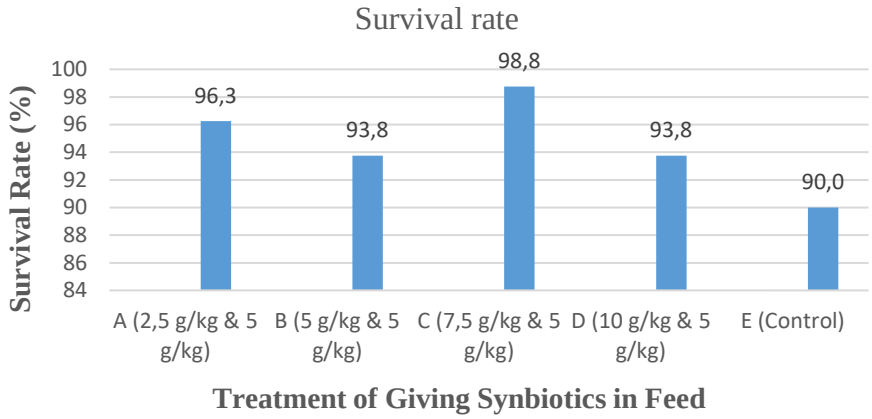


Figure 5 Survival Graph

Based on the results of observations that have been carried out for 42 days, it shows that the survival rate of gourami is around 90-98.8%. The highest survival value occurred in C with the addition of synbiotics to the feed as much as 7.5 g / kg and 5 g / kg of feed, which was 98.8 ± 3.2% this is because the effect of giving chitosan and probiotics can provide health to fish both in digestion, the fish immune system (Maryanto 2021) (Fauzi *et al* 2018). And the lowest survival value occurred in E (control) which was 90 ± 3.2%. The addition of synbiotics to gourami feed has a but not very significant influence on the survival of gourami. The results of statistical analysis using Anova showed that the treatment did not provide a noticeable difference in survival in gourami so that it was not continued with the results of the Duncan test at a 95% confidence level. The high survival value of gourami indicates that the addition of synbiotics to the gourami feed does not interfere with the survival of gourami. According to BSNI (2000) the optimum survival of gourami is above 80%. The high and low survival value is influenced by several factors. Several factors that affect fish survival consist of 2 factors, namely internal factors and external factors. Internal factors are factors derived from the individual fish, while external factors are factors that are influenced from the outside such as feed quality, water quality and the environment (Rozi *et al.* 2018).

The survival of gourami that does not differ markedly for each treatment is due to the positive response of the fish to the feed given. It is characterized by the feeding of test feeds given during maintenance, since synbiotics do not give changes in taste and texture to the feed. This statement is in accordance with Cahyono's (2018) statement that commercial synbiotics are powdery, white in color, and odorless. The results of the observations showed C treatment with the addition of synbiotics to the feed

Gourami have the potential to improve the survival of gourami. This result corresponds to the statement of Udo *et al.* (2018) which states that the addition of chitosan to the feed at the optimum dose can increase the survival of catfish (*Clarias gariepinus*).

The death of fish during rearing occurs weekly except during the fifth week of rearing. The number of gourami that died during rearing was 22 gouramie. The most fish deaths occurred in treatment E as a control treatment of eight heads throughout the maintenance time for 42 days. The results of observations of dead fish show clear indications, namely the occurrence of disease attacks in fish. Dead fish have damage to fish body organs due to fungal attacks such as *Aeromonas hydrophila* apart from fish fungus attacks that die due to the influence of *Anchor worm attacks*. Fish that die during the observation usually float on the surface of the water after 24 hours. The death of fish during the study is suspected to be due to fish experiencing stress and disease attacks during maintenance. Stress in fish can reduce the immune system of fish and cause the absorption of feed is not optimal and besides that the consequences of this fish stress will be able to cause disease attacks so easily (Slembrouck *et al.* 2005).

6. Water Quality and Health Status

Water quality is one of the parameters that must be considered in cultivation activities. Water quality can affect the growth and survival of cultured fish. The water used in aquaculture activities must meet quality standards so that the cultured fish can live and develop properly. The results of measuring the water quality of gourami during maintenance can be seen in Table 1.

Table1. Water Quality Measurement Results

Parameters	Range Value	Quality Standards
Temperature (°C)	25 - 29	25-30°C (BSNI 2000)
pH	7,1 – 8,5	6.5 - 8.5 (BSNI 2000)
DO (mg/L)	6,9 – 8,9	± 5 mg/L (Sugianti and Astuti 2018)

The results of measuring water quality between those treated and not treated have a value that is not much different. Based on the

measurement results, the temperature range on the hapa is around 25 – 29°C. This temperature range is still around the standard temperature quality standard according to BSNI (2000) which is around 25-30 °C. Temperatures that do not meet quality standards can interfere with the growth and survival of the gourami raised. Gunawan *et al.* (2019) states that the amount of feed consumed by fish at low temperatures will be small, the amount of feed consumed will increase a lot to the optimum temperature and will decrease again when the temperature is high or above optimum. Temperature also has an inversely proportional relationship with DO (*dissolved oxygen*) or dissolved oxygen levels (Nasrul 2018).

The results of the DO measurement showed results that were in the range of 6.9 – 8.9 mg / L. This DO range is still around the do quality standard standard according to Sugianti and Astuti (2018) which states that tropical freshwater fish require a minimum DO ± of 5 mg / L. DO measurements reaching 8.9 mg / L occur because the hapa installation is in an open place so that the DO value produced is quite high. This incident is supported by Patty's statement (2018) which states that in the surface layer, dissolved oxygen levels will be higher due to the diffusion process between water and free air. Gourami are fish that can live in water with low DO levels, gourami have additional breathing devices in the form of labyrinths that can be used to take oxygen from free air (Sugianti and Astuti 2018).

The results of the pH measurement show results that are in the range of 7.1 – 8.5. This pH range is still around the pH quality standard according to BSNI (2000) which is around 6.5 – 8.5. PH values that do not meet quality standards can interfere with the growth and survival of gourami raised. Syahrizal *et al. (*2017) stated that a pH range of 4 – 6.5 and 9 – 11 can slow down the growth of fish, while a pH of less than 4 and more than 11 can cause death in fish. A high pH value can inhibit growth and increase the amount of ammonia in the water which can be toxic to fish. The high content of ammonia in water can lead to an increase in oxygen consumption, damage to the gills and reduce the ability to transfuse oxygen in the blood of fish. PH values that are less than the quality standard can inhibit growth and make fish sensitive to bacteria and parasites (Puspitasari and Nugroho 2018).

The results of water quality measurements show that the addition of synbiotics to the feed does not interfere with water quality during the maintenance of gourami. This is supported by the value of measuring water quality during maintenance is still around the standard water quality standards for the maintenance of gourami.

The health status of fish is one of the very important factors in gourami farming, this is because fish health is a factor that can support the success and survival of aquaculture so that the figures obtained will provide good profits (Fauzi *et al* 2018). The results of observations that have been carried out by mixing commercial feed with synbiotic ingredients (chitosan and probiotics) provide excellent results from visual observations obtained gourami are easily susceptible to A *nchor worm* disease. From the observation results, there were 6 fish affected by *anchor worms*, 2 were affected by *Aerosomonas sp.*

, 2 tails were exposed to *White spot* this is because chitosan as a prebiotic and probiotic is able to suppress the rate of disease attacks in gourami fry and this statement is reinforced by (Fauzi *et al* 2018) (Lestari & Helmyati, 2018) . However, for the health status in gourami fry, it is still necessary to conduct further research with lab tests on the health of the outer body and digestive tract of gouramy.

Conclusion

The conclusions that can be drawn from this study are that a good dose of synbiotic addition is 7.5 g / kg and 5 g / kg of feed by producing the highest absolute length growth of 4.48 ± 0.3 cm, the highest absolute weight growth of 24.03 ± 3.1 g, the highest daily growth rate of 57.20 ± 7.3 %, the lowest feed conversion ratio of 1.6 ± 0.3 and the highest survival of 98.8 % in gourami and the health of gourami visually observed there were 6 fish affected by *Anchor worms*, 2 affected by *Aerosomonas sp.* , 2 tails hit by *White spot*.

References

Abd El-Naby, F. S., Naiel, M. A., Al-Sagheer, A. A. dan Negm, S. S. 2019. Dietary Chitosan Nanoparticles Enhance the Growth, Production Performance, and Immunity in *Oreochromis niloticus*. *Aquaculture*, *501*, 82-89.

Abdel-Ghany, H. M., dan Salem, M. E. S. 2020. Effects of Dietary Chitosan Supplementation on Farmed fish; a Review. *Reviews in Aquaculture*, *12*(1), 438-452.

Adi Sukoco, F., Boedi Setya Rahardja, & Abdul Manan. (2016). Pengaruh Pemberian Probiotik Berbeda Dalam Sistem Akuaponik Terhadap Fcr (*Feed Convertion Ratio*) Dan Biomassa Ikan Lele (*Clarias sp.*). *Journal of Aquaculture and Fish Health*, *6*(1), 24–31.

Affrianto, E., & Lisviawaty, E. (2015). *Penyakit Ikan*. Update Buku.Com.

Aquarista, F., Iskandar, & Ujang Subhan. (2012). Pemberian Probiotik Dengan Carrier Zeolit Pada Pembesaran Ikan Lele Dumbo (*Clarias garipinus*). *Jurnal Perikanan dan Kelautan*, 3(4), 133–140.

Badan Standar Nasional Indonesia (BSNI). 2000. SNI: 01- 6485.3 – 2000 Produksi Benih Ikan Gurame (*Osphronemus gouramy*) Kelas Benih Sebar. Badan Standar Nasional Indonesia. Jakarta.

Baharudin, A., Seilla I., Rivan K., & Susi N. (2017). Pengaruh Pemberian Kitosan Serbuk pada Pakan Ikan Comfeed untuk Menunjang Percepatan Pertumbuhan Ikan Patin Siam (*Pangasius* sp.) di Kelompok Budidaya Kabupaten Bogor. *Jurnal Teknologi Perikanan dan Kelautan,* 1 (2), 12–22.

Budiana, & Boedi S. R. (2018). Teknik Pembenihan Ikan Gurami (*Osphronemus gouramy*) Di Balai Benih Ikan Ngoro, Jombang. *Journal of Aquaculture and Fish Health*, *7* (3), 90–97.

Cahyono, E. 2018. Karakteristik Kitosan Dari Limbah Cangkang Udang Windu (*Panaeus monodon*). *Akuatika Indonesia*, *3*(2), 96-102.

Dompeipen, E. J. (2016). Isolasi Kitin dan Kitosan Dari Limbah Kulit Udang. *Majalah BIAM*, 12 (1) : 32-38.

Effendi, H. (2003). *Telaah Kualitas Air bagi Pengelolaan Sumber Daya dan Lingkungan Perairan (Kelima)*. Kanisius.

Effendi, M. I. (2004). *Pengantar Akuakultur*. Penebar Swadaya.

Effendi, M.I, 1997. *Biologi Perikanan*. Yayasan Pustaka Nusantara.Yogyakarta. 163 hlm.

Geng, X., Dong, X. H., Tan, B. P., Yang, Q. H., Chi, S. Y., Liu, H. Y., & Liu, X. Q. (2011). Effects Of Dietary Chitosan And Bacillus Subtilis On The Growth Performance, Non-Specific Immunity And Disease Resistance Of Cobia (*Rachycentron canadum*). Fish and Shellfish Immunology, 31(3), 400–406. https://doi.org/10.1016/j.fsi.2011.06.006

Gunawan, H., Tang, U. M., dan Mulyadi, M. 2019. The effect different of temperature on growth and survival rate of *Kryptopterus lais*. *Jurnal Perikanan dan Kelautan*, *24*(2), 101-105.

Herry, Setiadi Jaya., Farhan, Sidik., Gemilang Jaya (2019). Inovasi Pembuatan Probiotik Dari Limbah Pengolahan Ikan Jambal Roti. *Jurnal Airaha*, 8 (1), 33–36.

Hidayat, D. dan Sasanti, A. D. 2013. Kelangsungan Hidup, Pertumbuhan dan Efisiensi Pakan Ikan Gabus (*Channa striata*) yang Diberi Pakan Berbahan Baku Tepung Keong Mas (*Pomacea* sp). *Jurnal Akuakultur Rawa Indonesia*, *1*(2), 161-172.

Jaya, B., Agustriani, F., dan Isnaini, I. 2013. Laju Pertumbuhan dan Tingkat Kelangsungan Hidup Benih Kakap Putih (*Lates calcarifer*, Bloch) dengan Pemberian Pakan yang Berbeda. *Maspari Journal*, 5(1), 56-63.

Khoirudin, M. (2018). Lumbung Inovasi: Jurnal Pengabdian Kepada Masyarakat Pemberdayaan Ekonomi Masyarakat Melalui Program Pemanfaatan Lahan Untuk Budidaya Ikan Gurami. *Jurnal Pengabdian Kepada Masyarakat*, *3*(2), 43–47. https://doi.org/10.36312/linov.v3i2.446

Lee, H. W., Park, Y. S., Jung, J. S., & Shin, W. S. (2002). Chitosan Oligosaccharides, Dp 2-8, Have Prebiotic Effect on the *Bifidobacterium bifidium* and *Lactobacillus sp*. *Anaerobe*, 8 (6), 319–324. https://doi.org/10.1016/S10759964(03)00030-1

Lestari, B., dan Suswanta, N. (2019). Pemberdayaan Masyarakat Dalam Perspektif *Collaborative Governance*. JPK: *Jurnal Pemerintahan Dan Kebijakan*, 1–22.

Lestari, L. A., & Helmyati, S. (2018). *Peran Probiotik Di Bidang Gizi Dan Kesehatan.* Yogyakarta: Gadjah Mada University Press.

Lin, S., Mao, S., Guan, Y., Luo, L., Luo, L., & Pan, Y. (2012). Effects Of Dietary Chitosan Oligosaccharides And Bacillus Coagulans On The Growth, Innate Immunity And Resistance Of Koi (*Cyprinus carpio koi*). Aquaculture, 342–343(1), 36–41. https://doi.org/10.1016/j.aquaculture.2012.02.009

Mareta, E. R., Subandiyono, & Sri Hastuti. (2017). Pengaruh Enzim Papain Dan Probiotik Dalam Pakan Terhadap Tingkat Efisiensi Pemanfaatan Pakan Dan Pertumbuhan Ikan Gurami (*Ospronemus gouramy*). *Jurnal Sains Akuakultur Tropis*, 1 (1), 21–30.

Mudjiman, A. 2011. *Makanan Ikan*. Penebar Swadaya, Jakarta.

Nekoubin, H., Javaheri, S., & Imanpour, M. R. (2012). Effects of Synbiotic (Biomin imbo) on Fecundity and Reproductive Factors of Zebrafish (*Danio rerio*). *World Journal of Fish and Marine Sciences*, *4*(1), 65–67. https://doi.org/10.5829/idosi.wjfms.2012.04.01.6242

Nasrul, N. 2018. Evaluasi Kesesuaian Lahan Tambak Ikan Bandeng Di Desa Salemba Kecamatan Ujung Loe Kabupaten Bulukumba. *Jurnal Environmental Science*, 1(1).

Nazilah, M. A. 2017. Penggunaan Ekstrak Daun Bakau Api-Api (*Avicennia marina*) Untuk Mengobati Ikan Gurami (*Osphronemus gouramy*) Yang Terserang Bakteri *Aeromonas hydrophila*. Skripsi. Universitas Muhammadiyah Purwokerto. Purwokerto.

Pangaestika, W., Nusaibah, & Amalia, N. D. (2021). Pemanfaatan Kitosan Dan Ekstrak Bunga Kecombrang Untuk Pembuatan Minuman Kesehatan. Media Teknologi Hasil Perikanan,9 (2),43–50. https://doi.org/https://doi.org/10.35800mthp.9.2.2021.31563

Pusat Data Statistik KKP. (2020). Satu Data Produksi Kelautan dan Perikanan Tahun 2020.300 hlm

Puspitasari, D. dan Purnomo, N. H. 2018. Kajian Kesesuaian Kualitas Air untuk Budidaya Ikan Gurami di Desa Ngranti Kecamatan Boyolangu Kabupaten Tulungagung. *Swara Bhumi*, *5*(9).

Riauwaty, M., Windarti, Henni, S., dan Isma, M. (2019). Pemberdayaan Masyarakat Melalui Budidaya Ikan Dengan Menggunakan Pakan Yang Mengandung Kunyit Di Kelurahan Umban Sari Kecamatan Rumbai Pekanbaru. *Unri Conference Series: Community Engagement*, *1*, 658–662. https://doi.org/10.31258/unricsce.1.658-662

Rieny, H, Rivan, F., Roni, S., & Achmad, K. 2015. Manfaat Penggunaan Kitosan dan Kelulushidupan Pada Ikan Nila Merah (*Oreochromis niloticus*). *Jurnal Perikanan.* 3 (1). 31-39.

Rozi, A. T. Mukti, S. H. Samara dan M. B. Santanumurti. 2018. Pengaruh Pemberian Kitosan dalam Pakan terhadap Pertumbuhan, Sintasan dan Efisiensi Pemanfaatan Pakan Nila (*Oreochromis niloticus*). *Jurnal Perikanan* Universitas Gadjah Mada 20 (2): 103-111

Slembrouck, J., Komarudin, O. M. A. N. dan Legendre, M. 2005. Petunjuk Teknis Pembenihan Ikan Patin Indonesia, *Pangasius djambal*. *Badan Riset Kelautan dan Perikanan. Jakarta*.

Sugianti, Y., dan Astuti, L. P. 2018. Respons Oksigen Terlarut Terhadap Pencemaran dan Pengaruhnya Terhadap Keberadaan Sumber Daya Ikan di Sungai Citarum. *Jurnal Teknologi Lingku-ngan*, *19*(2), 203-212.

Sukenda, L. J., Wahyuningrum, D., dan Hasan, A. 2008. Penggunaan Kitosan Untuk Pencegahan Infeksi Aeromonas Hydrophila Pada Ikan Lele Dumbo *Clarias* sp. *Jurnal Akuakultur Indonesia*, *7*(2), 159-169.

Sulistijowati, R., Lukman, M., & Kartika, W. (2015). Aktivitas Antibakteri Kitosan Kulit Udang Vaname (*Litopenaeus vannamei*) Terhadap Bakteri Kontaminan Bakso Ikan Tuna *(Thunnus Sp.)*. 1–7.

Sutanto, D. (2020). *Sukses Budidaya Gurami (Pertama)*. Pustaka Baru Press.144 hlm.

Syahrizal, S., Rustam, Z., dan Hajar, S. 2017. Pemeliharaan Ikan Gurami (*Osphoronemus gouramy* Lac.) dalam Wadah Akuarium Diberi Pakan Cacing Sutra (*Tubifex* sp.) Pada Strata Vertikal. *Jurnal Ilmiah Universitas Batanghari Jambi*, *15*(4), 164-169.

Udo, I. U., Etukudo, U., dan Anwana, U. I. U. 2018. Effects of Chitosan and Chitosan Nanoparticles on Water Quality, Growth Performance, Survival Rate and Meat Quality of the African Catfish, *Clarias gariepinus*. *Nanoscience*, *1*(1), 12-25.

Wang, Y. dan Li, J. 2011. Effects of Chitosan Nanoparticles on Survival, Growth and Meat Quality of Tilapia (*Oreochromis nilotica*). *Nanotoxicology* 5: 425–431.

Zaki, M. A., Shatby, E., dan Shatby, E. 2015. Effect of chitosan supplemented diet on survival, growth, feed utilization, body composition & histology of sea bass (*Dicentrarchus labrax*). *World Journal of Engineering and Technology*, *3*(04),38