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Use of Turi Leaf Powder (Sesbania grandiflora) in Artificial Feed to Increase Growth and Survival of Gourami (Osphronemus gouramy)

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ABSTRACT

This study aims to determine the best and appropriate percentage of turi leaf meal used in artificial feed compositions to increase the growth and survival of gourami, while the benefit of this study is as a source of information for fish farmers regarding the best percentage of turi leaf meal for growth and survival. live gourami. The research was conducted in October-December 2016 at the Fisheries Wet Laboratory, Muhammadiyah University, Pontianak, West Kalimantan. for 70 days, including 10 days of preparation of tools and materials and 60 days of research observation. This study used a completely randomized design (CRD) with 4 treatments and 3 replications. The treatment with the use of turi leaf flour is Treatment A: 0% turi leaf flour in feed (control), Treatment B: Turi leaf powder 15% in feed, Treatment C: Turi leaf powder 30% in feed and Treatment D: Turi leaf powder 45% in feed. Based on research results. Based on the results of research regarding the percentage of use of turi leaf flour that is the best and appropriate in the composition of artificial feed to increase the growth and survival of gourami which was carried out for 60 days, the following conclusions were obtained: (i) Treatment C with a percentage of use of turi leaf flour 30% gave the best specific weight and length growth values with each value of 3.80% and 3.40%. (ii) The best feed conversion value is found in treatment C, which is 2.56. (ii) The best survival value in treatment C is 86.67%. (vi) The best protein and fat retention values in treatment C were 33.91% and 39. 74% and the water quality parameter during observation was temperature 27-32°C pH ranged from 5.0-6.0. Dissolved oxygen is 4.0-5.0 ppm and NH3 ranges from 0.25-0.50 ppm.

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1. INTRODUCTION

Indonesia has the potential for fish natural resources which are quite large, namely there are more than 4,000 types of fish which include sea fish, brackish fish and fresh water fish. Most of them can be consumed safely (Suseno, 2000). As time goes by, the human need for consumption fish is increasing, one of which is the gourami (Osphronemus goramy).

Gouramy has a fairly high economic value and is very much loved by the community as a consumption fish, because this gouramy has dense flesh, has large spines and tastes good and

tasty. Unfortunately, gourami is known by the public as a slow growing fish compared to other freshwater fish. The growth of gourami tends to be slow, this is because the gouramy changes its eating habits in each growth phase, namely carnivores in the one month phase of its life, omnivores in the juvenile phase and herbivores in the adult phase (Aslamsyah, 2008).

Based on this, to overcome the slow growth, it is necessary to provide additional feed in the form of artificial feed, because regular feeding of artificial feed will accelerate the growth of gourami (Puspowardoyo et al., 1992). A good supplementary feed is usually feed with a higher protein content than carbohydrates because protein is the main source of energy for fish. In general, the stunted growth of gouramy is due to the insufficient protein requirement in the feed to stimulate growth.

Making feed should be based on consideration of fish nutrient needs, quality of raw materials and economic value. With good consideration, it will produce artificial feed that is preferred by fish with high protein, but so far the source of vegetable protein in feed has come from soy flour, while soy flour is an imported ingredient which is relatively expensive and competes for human needs. Based on this, it is necessary to look for alternative ingredients to replace soy flour. Turi leaves have the potential to be used as an alternative fish feed ingredient as a source of protein for herbivorous and omnivorous fish, because turi leaves contain complete nutrients, namely 27.54% protein, 4.7% fat, 21.30% carbohydrates, 20.45% ash. %, 14.01% crude fiber and 11.97% water (Lukito et al., 2007). Utilization of turi leaves has been widely used for animal feed, but not much has been done as a raw material for fish feed, so information on the use of turi leaves in fish feed is still limited. Dani et al, (2005) conducted research on the use of turi leaves for the growth of tawes fish where tawes produced the best growth and the highest meat protein content using 30% turi leaf meal and 42% fish meal.

The preparation of fish rations should use protein derived from vegetable and animal sources simultaneously for a balance of nutrients at relatively low prices (Mudjiman, 2002). The addition of turi leaf flour to artificial feed can be done to help increase the growth and survival rate of gouramy.

2. METHOD

2.1 Time and place

The research was conducted from October to December 2016 at the Pontianak Muhammadiyah University wet laboratory. West Kalimantan.

2.2 Tools and materials

The equipment used in this study are: - Aquarium, serves as a place for raising seeds. There are 12 units of aquariums measuring 60 x 30 x 40cm, and each tank is aerated to supply oxygen. The fiber tub will be filled with water at a height of 30 cm. The feed mill functions to grind all feed ingredients. - Scales, for weighing the initial test fish, sampling, and the end of the study as well as weighing the feed. - Drain, serves to sort fish seeds. - The thermometer is used to measure temperature. - pH meter, serves to measure the degree of acidity of water. - DO meter, serves to measure the oxygen content in the water. - Other documentation tools, as a complement to data documentation. The materials used are: - The test fish used were 120 local gourami seeds with a size of 8 cm for each aquarium containing 10 fish (Handayani, 2006). 13 14 - Gouramy seeds were obtained from the Central Fish Seed Center (BBIS), Anjongan. - Turi leaves which have been used as flour and other feed ingredients according to the composition to be made.

2.3 Research procedure

The research activity was carried out for 2 months, several stages were carried out such as preparing the maintenance container, making the test feed to raising the fish to analyzing the final data of the study.

2.4 Research methods

This study used a completely randomized design (CRD) with 4 treatments and 3 replications. The treatment using turi leaf flour which was applied based on Dani et al., (2005) was as follows: Treatment A: 0% turi leaf powder in feed (control); Treatment B: Turi leaf meal 15% in feed; Treatment C: Turi leaf meal 30% in feed; Treatment D: Turi leaf meal 45% in feed.

2.5 Observation Parameters

The observed parameters were specific growth, feed conversion, survival rate and water quality.

3. RESULTS AND DISCUSSION

3.1 Research result

Based on the results of research conducted for sixty days, data were obtained which included specific weight growth, specific length growth, feed conversion, survival, protein retention and fat retention. As supporting data, observations of water quality (temperature, pH, DO, ammonia) are carried out.

3.1.1 Specific Weight and Specific Length Growth (%)

Growth in simple terms can be interpreted as an increase in length and weight over time. Growth can be influenced by several internal and external factors. Internal factors include heredity, age, resistance to disease and use of food, while external factors include environmental chemical factors, temperature, and available food. (Huets, 1972). Fish growth is closely related to the availability of protein in feed. Protein is a nutrient that fish really need (Halver, 1988). So with the utilization of feed protein it is hoped that fish growth will occur. Research conducted during the sixty day period of raising gourami seeds showed that there were differences between feed treatment and the use of turi leaf powder in the maintenance of gourami seeds.

The results of this study indicate that the use of turi leaf flour mixed into artificial feed with different percentages has an effect on the growth of gouramy. During the maintenance period, it was clear that turi leaf powder was used from each treatment, but the utilization rate for each treatment was not the same and this was shown by the percentage of turi leaf powder used, which can be seen in Figure 1.

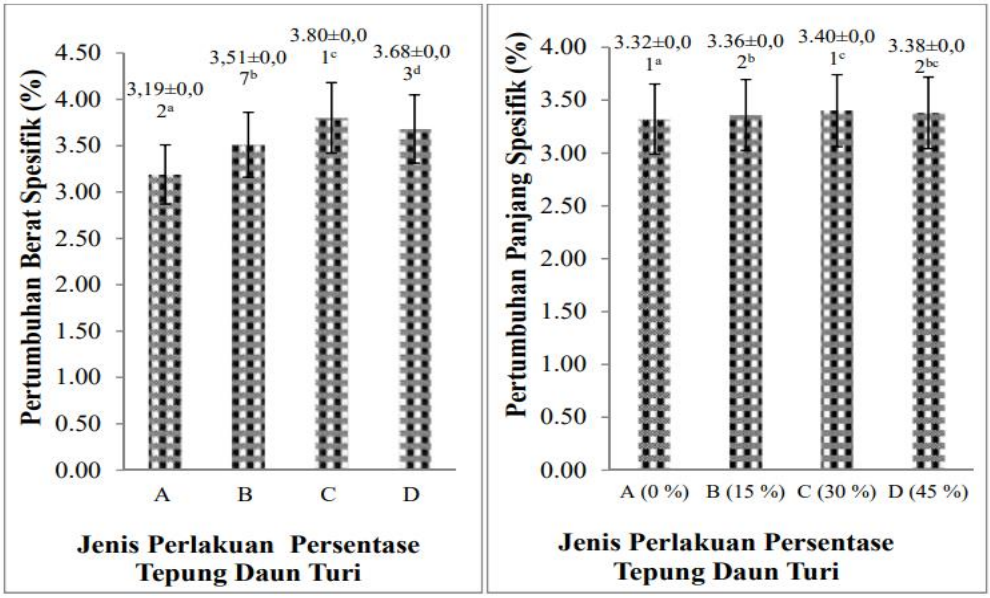

Figure 1. Growth of Specific Weight and Length of Gurami Seeds

Based on the figure presented above, it is known that the growth in specific weight in treatment C (use of 30% turi leaf meal) resulted in the highest fish weight of 3.80%, followed by treatment D (use of 45% turi leaf meal) of 3.68%, treatment B (use of 15% turi leaf meal) was 3.51%, and the lowest was treatment A (used 0% turi leaf meal) of 3.19. There was a difference in the weight gain of gouramy fry indicating that the fish really took advantage of the feed given. during research. Differences in the composition of the feed given resulted in differences in the average weight gain of the gouramy. Meanwhile, the growth yield of specific length of gouramy seeds ranged from 3.32-3.40%. The average growth rate of specific length of gouramy seeds in treatment A was 3.32%, treatment B was 3.36%,

3.1.2 Feed Conversion (FCR)

The results of the research conducted for sixty days on gourami by giving turi leaf flour on artificial feed, the FCR values for each treatment were obtained in the following graphic:

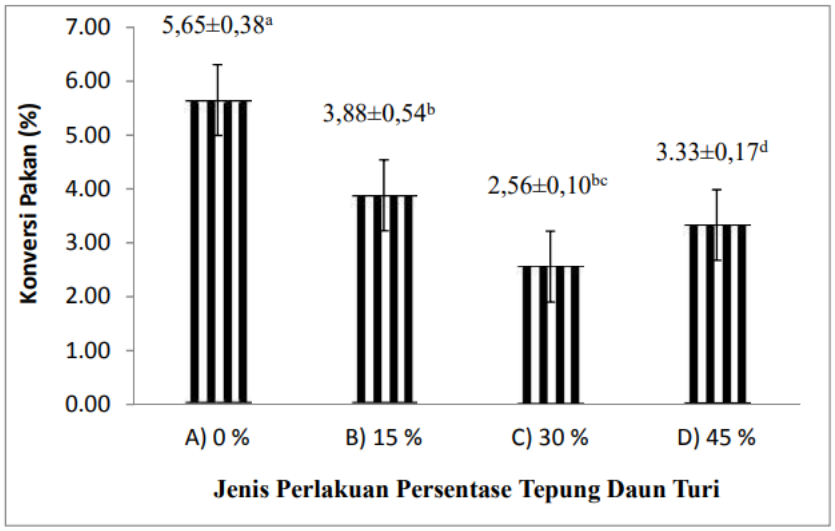

Figure 2. Gouramy Feed Conversion during Research.

Feed conversion is the ratio of consumed feed to the weight gain produced during the study. High and low feed conversion is an illustration of the efficiency of feeding used in research. If the feed conversion value is high, the efficiency level is not good, conversely the higher the feed conversion value is low, the efficiency level will be better. According to Djajasewaka (1995), feed conversion can be calculated by dividing the amount of feed given during one rearing and divided by the total increase in fish biomass kept. Figure 5 shows the best feed conversion value with the lowest feed conversion value found in treatment C (30% turi leaf flour use). This shows that the treatment is an appropriate percentage in the use of turi leaf flour, where the feed given can be utilized and digested properly by gouramy seeds. According to Anggraenia (2010) a good feed conversion value is <3, while the feed conversion for gouramy kept in ponds is 1.5-2, meaning that to produce 1 kg of fish meat requires as much as 1.5 kg to 2 kg of feed. . Bad feed conversion with the highest value was obtained in feed treatment A which contained 0% turi leaf powder. This is because treatment A (control) used is feed without the use of turi leaf flour with poor quality feed, so the fish's ability to absorb nutrient content in the feed is not optimal. According to Afrianto and Liviawaty (2005) for nutritional balance in feed,

Based on the results of the feed conversion analysis of variance (anava) test, it was found that F count was 43.16, which was greater than F table 5% (4.07) and F table 1% (7.59), which meant that between treatments showed a very significant difference in the value feed conversion. Feed with the appropriate use of turi leaf flour can increase the efficiency of feed utilization because the feed can be utilized and digested by the body properly, this is supported by Rosidah et al., (2012) the use of turi leaf powder can increase the digestibility of fish so that it can accelerate growth. Firmani, (2006) said that turi leaf flour produces a fairly high protein of 29.6%. Besides that, turi leaves also contain 5% fat, 42.5% carbohydrates, 15.6% crude fiber, vitamins and minerals needed for fish growth.

3.1.3 Survival (SR)

Survival is expressed as the percentage of the number of fish that live during the maintenance period divided by the number of fish stocked (Effendie, 1978). The value of survival will be high if the factors of quality and quantity of feed and environmental quality are supportive. Survival is expressed as the percentage of the number of fish that survive the maintenance period divided by the number of fish stocked, and the survival rate is the inverse of the mortality rate. Data on the survival of gourami fry during the 60-day study period can be seen in the image below:

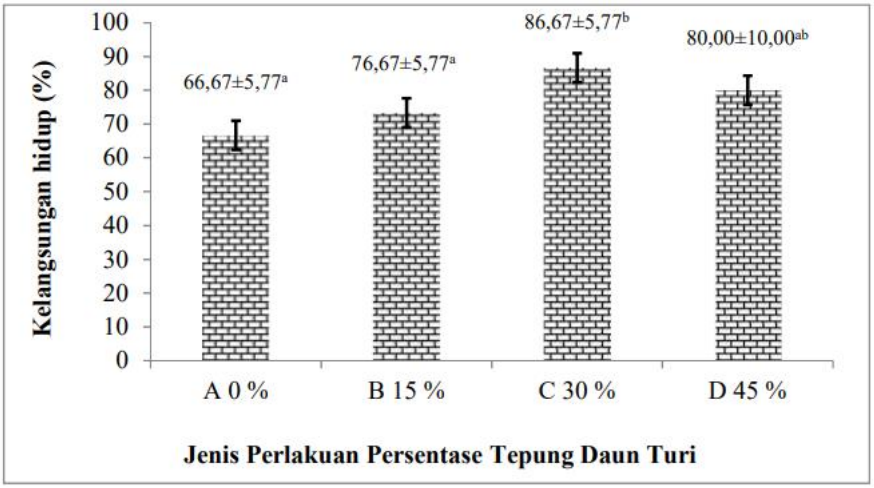

Figure 3. Gourami Survival during Research

Figure 3 shows the percentage survival rate of gouramy fry during the study. The highest treatment was in treatment C with 30% (86.67%) turi leaf flour and then followed by treatment D and treatment B, while the lowest treatment was in treatment A (granting flour). turi leaves 0 %) with a survival value of 66.67 %. Based on the results of the survival analysis of variance test (Anava) it was found that the F count was 4.44 which was greater than the F table 5% (4.07) and the F table 1% (7.59) which means that between the treatments showed a very significant difference in survival live gouramy seeds.

3.1.4 Protein Retention

Protein retention, namely a number of proteins from the feed given are converted into proteins stored in the fish's body. Each fish species has a different need for protein and energy. It is hoped that protein in feed will increase in body protein or growth will occur and the optimum protein requirement for several types of fish will be different (Syamsunarno, 2008). According to Rebgnatar and Tahapari (2002) feed protein that can be utilized by fish can be seen through calculations of body protein retention by comparing body protein before and after observation. Protein retention in each treatment on the percentage of turi leaf flour used as a protein source needs to be observed to see how much protein the body can absorb for adding cells and body tissues to gouramy fry.

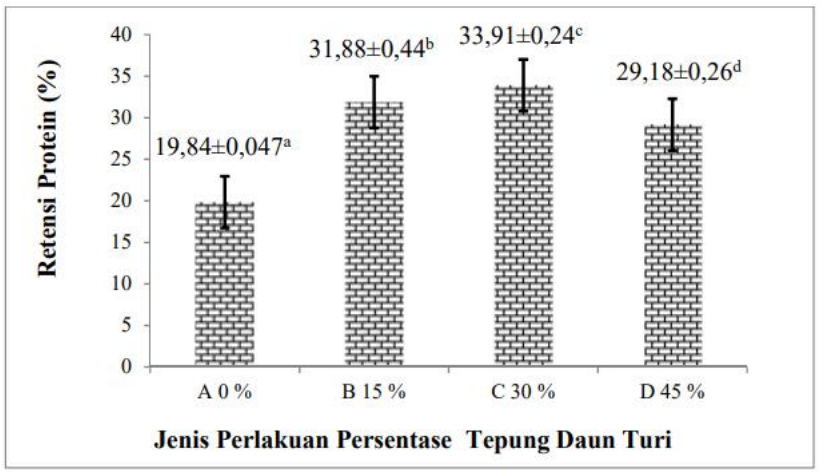

Figure 4. Gouramy Protein Retention during Research

The picture above shows the results of the highest protein retention of gouramy fry in treatment C of 33.91%, followed by treatment B of 31.88%, D of 29.18%, and treatment A (control) with the lowest value, namely 19.84 % . Based on the results of the analysis of variance (Anava) test for protein retention, the F count was 866.14, which was greater than the F table 5% (4.07) and the F table 1% (7.59), which meant that the differences between the treatments showed a very significant difference.

3.1.5 Fat Retention

Fat retention describes the ability of fish to store and utilize feed fat in addition to protein, fat is a contributor of energy for fish survival. The average value of gouramy fat retention can be seen in the graphic image below:

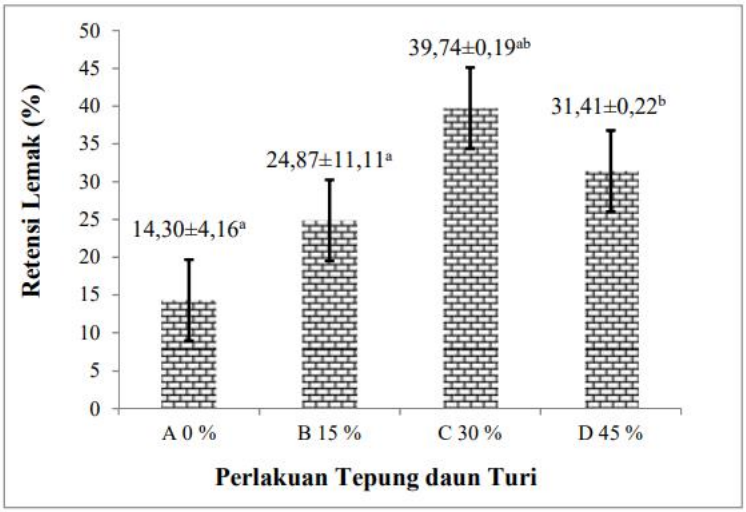

Figure 5. Gourami Fat Retention during Research

The highest fat retention was in treatment C (30% turi leaf flour) with a value of 39.74%, followed by treatment D of 31.41%, treatment B of 24.87% and with the lowest retention value found in treatment A with a retention value fat 14.305. The results of the analysis of variance test (Anava) for fat retention obtained F count of 9.84 greater than F table 5% (4.07) and F table 1% (7.59) which means that between the treatments showed a very significant difference from the results of the analysis fat retention variance.

3.1.6 Water quality

Factors related to water quality and which need to be considered include water temperature, oxygen level (DO), degree of acidity (pH), and ammonia. Water quality data in this study are presented in table 1.

Table 1. Water Quality Parameters during Research

Parameter Observation	Treatment			
	A	B	C	D
Temperature (0C)	27-28	27-30	27-30	27-30
pH	5.0-6.0	5.0-6.5	5.5-6.5	5.0-6.5
Do (ppm)	4.0-4.5	4.0-4.5	4.0-4.5	4.0-4.5
Ammonia (ppm)	0.25-0.65	0.25-0.50	0.25-0.50	0.25-0.50

Based on the results of measuring the water temperature of the gouramy seed rearing media during the study, the temperature in each treatment ranged from 27-300C. At the beginning of the study, there was a decrease in temperature, causing gouramy seeds to be susceptible to fungal diseases and followed by other treatments. However, this problem can be overcome by providing a heater so that the temperature increases until it can be stable from the initial temperature of only 27-280C, rising to 29-30 0C. the opinion of Cholik et al (1986) stated that fish can grow well in the temperature range of 25-32ºC. According to Yandes et al., (2003), the optimal temperature for gouramy growth is 29-300C. Hardjodjo (2005), added that temperature is a very important physical factor in water. An increase in temperature in water will cause a decrease in the amount of dissolved oxygen in water, increasing chemical reactions,

During the research period, the degree of acidity (pH) of water was 5.0–6.5. There was a decrease in pH at the beginning of the observation with a pH value of 5.0 however, after the observation took place the pH value increased to 6.5 and was stable until the end of the study. The pH value in each of these treatments is good enough for fish life. Sarwono (2007) states that good water for fish farming is a neutral range with a pH of 6.5-8.0. This is in line with the opinion expressed by Nirmala (2010) which states that the pH that is lethal to fish is less than 4 and more

than 11. At a pH of less than 6 and more than 9.5 for a long time it affects the growth and reproduction of fish.

3.2 Discussion

All treatments with the use of turi leaf flour in feed for gourami research can increase growth. Feed consisting of 30% turi leaf flour showed better growth than other feeds. This is because the percentage of giving turi leaf powder of 30% is quite good in the composition of making gouramy feed. According to Listyawati (2005), the composition of artificial feed ingredients from turi leaf flour has a higher nutritional value, which is approximately 27% protein. Murtidjo (1987) added that turi leaves have the potential to be used as an alternative fish feed ingredient for herbivorous and omnivorous fish because they contain 31.7% protein and 1.9% fat.

Growth also occurs when there is an excess of energy after energy is used for body maintenance, basal metabolism, and activity (Subandiyono and Hastuti (2010). According to Sudarman (1988), that the speed of growth depends on the amount of feed consumed, water quality and other factors such as lineage, age, endurance and the ability of these fish to use feed, then Supratno and Kasnadi, (1999) added that the amount of feed consumed must be more than the amount used for body maintenance and activity so that fish can continue their growth.Conversely, the amount of feed given is very important because if it is too little it will result in slow fish growth and there will be competition for feed which results in variations in fish size and vice versa if too much feed will cause environmental pollution and inefficiency (Boyd, 1988).

According to Sumeru (1995) which states that the smaller the conversion value of the feed given means the feed given is almost completely eaten and used for growth. As also stated by Tamburaka (2001) that the lower the feed conversion value the better the feed because the less amount of feed needed to produce a certain weight.

The smaller the feed conversion value, the more efficient the level of feed use in producing growth (Rosidah, 2012). NRC (1993), explained that the size of the feed conversion ratio is influenced by several factors but the most important are the quality and quantity of feed, species, size and water quality. This is supported by Kordi (2005) that farmed fish have different feed conversions depending on the type, age, fish size, feed and environmental conditions.

Based on the results of the above study, it means that treatment C (Use of 30% turi leaf flour) is a good feed conversion, because in addition to providing the highest growth of each treatment it also provides the lowest feed conversion value. This is economically very profitable compared to fish fed with large numbers but only provide low growth.

The results showed that the survival rate of gouramy was quite good, there was a small number of deaths at the time of the study which was influenced by the condition of unfavorable water quality, namely the low water temperature at the time of the study made the fish susceptible to fungus. Fungal infections in fish are caused by changes in the environment or season and lack of attention to water quality (Fadaeifard et al., 2011). According to Post (1987) which states that aquatic fungi can grow optimally at temperatures of 15-30oC.

The high protein retention in treatment C was due to the fact that the protein content contained in the feed given could be utilized and absorbed properly by gouramy fry. The composition of these feed ingredients is probably suitable for gouramy so that they can be efficiently used to increase body protein. According to Dani et al, (2005) that the speed of fish growth is determined by the amount of protein that fish can absorb and use as a building material. Therefore, in order for fish to grow properly, the feed given must have sufficient energy content to meet metabolic energy needs and have a protein content that is high enough to meet the needs of building new body cells. According to Djuanda (1981) some of the food eaten turns into energy used for life activities and some leaves the body. So, not all of the food protein that comes in is converted into meat. In addition, the formation of meat protein also depends on the physiological abilities of fish. Whereas the low protein retention value in treatment A (control) was due to the feed in the treatment having low digestibility so that the fish were not optimal in digesting and absorbing the feed given so that the meat produced was not optimal.

Body fat composition is strongly influenced by fish feed which contains fat (Gusrina, 2008). The high fat consumed by fish and which is not used as an energy source is then stored as body fat. The relatively same level of fat retention is suspected because the fat content in the feed is still within the appropriate range and is sufficient to meet the fat requirements of gourami.

The value of fat retention tends to increase with increasing the percentage of turi leaf powder used. This is due to the high fat content in turi leaf flour so that the fat content in feed and body fat

also tends to increase. The high levels of fat can be stored or used as a source of energy. This is in accordance with the opinion of Aslamyah (2008) which says that one of the functions of fat or lipid is to produce energy, each gram of lipid produces around 9 – 9.3 calories, excess energy in the body is stored in adipose tissue as potential energy. Most energy is obtained from fat. The amount of fat used to produce energy is likely to be much greater than that stored in the body, resulting in low fat retention.

Dissolved oxygen is one of the limiting factors in fish farming, but some types of fish can still survive in waters with concentrations below or above normal. However, the minimum concentration that some species can still accept for life is 5 ppm. According to Lingga (1985) states that dissolved oxygen is very important for the life of fish and other animals for breathing and metabolic processes. Furthermore Effendi (2007) added that the concentration of oxygen in the waters is influenced by diffusion from the air, inflows of water, rain, assimilation processes of green plants and the presence of chemical oxidation in the waters.

The results of ammonia measurements during the study ranged from 0.25-0.50 mg/l in treatments B, C and D and in treatment A it had a high ammonia value because a lot of feed had accumulated on the bottom of the water 0.25-0.65. Haryanti (1995), stated that the growth of gouramy fry was still good where the ammonia level in the water was still below the appropriate tolerance limit of 0.50 mg/l, so it did not cause disturbance to the test fish.

According to Boyd (1982), ammonia in non-ionized form (NH3) is toxic to fish. From the measurement results, the concentration of NH3 in the rearing medium was <0.20 mg/L. Ammonia level < 1 mg/L NH3 is still feasible for fish farming. Ammonia poisoning in fish will result in increased oxygen consumption, damage to the gills, and reduced blood ability to transfer oxygen. (Boyd, 1988).

4. CONCLUSION

Based on the results of research regarding the percentage of use of turi leaf flour that is the best and appropriate in the composition of artificial feed to increase the growth and survival of gourami which was carried out for 60 days, the following conclusions were obtained: Treatment C with a percentage of use of turi leaf flour 30% gave growth value the best specific weight and length with each value of 3.80% and 3.40%. The best feed conversion value is found in treatment C, which is 2.56. The best survival value in treatment C is 86.67%. The best protein and fat retention values in treatment C were 33.91% and 39.74%.

ACKNOWLEDGEMENTS

Based on the results of the discussion and conclusions that have been put forward, the author's suggestion is to use turi leaf flour as a good source of protein, namely with a percentage of use of 30% turi leaf flour in the preparation of artificial feed formulations on the growth and survival rate of fish and the highest feed conversion for fish gouramy.

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