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Effectiveness of Using Fish Herbs in Feed toThe Growth of Catfish (*Clarias gariepinus*)

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ABSTRACT

This research aims to find out the results of the effective dose of the addition of herbs for the growth of catfish. The trial fish used was catfish with a size of 5-7 cm obtained from farmers in Selasari village, Pangandaran. The fingerlings were kept for 50 days by stocking 1 fish/Liter in an aquarium containing 20 liters of water and fed three times a day at a dose of 3% of catfish biomass. The method used in this study was an experimental method with a Completely Random Design (CRD) consisting of five treatments and three replications. The treatment given consists of treatment A (control), B (feed with 50 ml of herbal additions), C (feed with 100 ml of herbal additions), D (feed with 150 ml of herbal additions) and E (feed with 200 ml of herbal additions). Analysis of spesific growth rate, feed conversion ratio and survival rate used analysis of variance (ANOVA) with a confidence level of 95%. The results showed that giving 200 ml of fish herbs to the feed resulted in a specific growth rate of 4.75%, survival rate 83% and feed conversion ratio 0.62.

Keywords: *Catfish, fish herbs, specific growth rate, feed conversion ratio, survival rate.*

1. INTRODUCTION

Catfish (*Clarias gariepinus*) is one of the most cultivated freshwater fishery commodities in Indonesia as demand continues to increase every year, seen from data on fish consumption in 2015-2018 rising from 41.11 kg/capita to 50.65 kg/capita[1] .To meet the increasing needs of the community, an increase in the intensification of cultivation efforts is supported by the availability of adequate fingerlings. Based on data obtained from the Directorate General of Aquaculture Fisheries (2019), national production of catfish in 2017 was recorded at 1.77 million tons or up by 131 percent from 2016 which reached 764,797 tons[2].

Feed is one of the important factors in cultivation activities. Obstacles in the aquaculture business that many farmers complain about one of which is the high price of commercial feed. Andriani *et al.* (2016) states that feed is one of the components that reaches 60-70% of the total production cost[3]. Feed becomes one of the determinants of the success of cultivation efforts, so it needs effective and efficient management [4] . Feed is a component of fish cultivation that is very large role, whether or not a feed is determined from its nutritional content. Fish growth will increase if the feed provided can be digested well by fish so that the energy obtained by fish from feed can be utilized optimumly [5]. The efficiency of feed utilization is important when the cost of feed is expensive so it is necessary to find efforts to improve the efficiency of feed utilization by fish, one of which is by administering herbal supplements.

Herbal supplements for fish used in the form of fish herbs are mixed into the feed. The fish herbs used have the content of several spices in the form of turmeric, ginger, curcuma, greater galingale, noni, catappa leaf, betel leaf, molasses and yeast. Herbal ingredients contained in fish herbs contain various benefits including increasing the body's resistance to disease attacks, launching the digestive system, saving in the use of feed, increasing fish appetite and can increase the daily growth rate of fish [6]. The use of yeast (*Saccharomyces cerevisiae*) in fish herbs has a good impact on fish growth, since the nucleotide content in yeast is able to repair intestinal damage quickly [7]. Turmeric, which has been processed into a form of flour, has a chemical content in the form of curcuminoids in the form of curcumin. According to Darwis *et al*., (1992) curcumin content in herbal supplements is able to improve the digestion of fats, proteins and carbohydrates by stimulating the bile to secrete bile into the small intestine so that the absorption activity of food substances increases. In addition, essential oils contained turmeric can also accelerate the emptying of the stomach contents and prevent the excessive discharge of stomach acid so that the condition of the stomach is not too acidic and facilitate the absorption of food substances by the small intestine [8]. So based on that background, research needs to be done on the effectiveness of the use of fish herbs on feed against the growth of catfish.

2. METHODOLOGY

2.1 Research Design

The research was conducted from December 2019 to February 2020. The research was conducted at the Laboratory of Fisheries, Faculty of Fisheries and Marine Sciences, Universitas Padjadjaran. The material used during the research in the laboratory is catfish fingerlings as many as 450 fish with a size of 5-7 cm and a weight of ± 3 grams/fish. Fish herbs produced by UD. Mina Jala Satrio and commercial pellets. The design used in this research is a Completely Random Design (CRD) consisting of five treatments and three replications. The addition of fish herbs in each treatment is as follows:

Treatment A (Control) = Feed without the addition of fish herbs.
Treatment B = 50 ml/kg feed
Treatment C = 100 ml /kg feed
Treatment D = 150 ml/kg feed
Treatment E = 200 ml/kg feed

2.2 Implementation Of Research

herbs produced by UD. Mina Jala Satrio is mixed with water as a solvent with a comparison of the dosage of fish jamu to be given mixed with 500 ml of water for 1 kg of feed. Fish jamu is mixed on the feed by dilution using water and sprayed on the feed using a sprayer, then left for 12 hours at room temperature until the fish herbs permeates and the feed is ready to use.

2.3 Parameters

a. Specific Growth Rate (SGR)

The specific growth rate is calculated using the formula[9]:

$$SGR = \frac{\text{Ln Wt} - \text{Ln Wo}}{t} \times 100\%$$

Description:

SGR = Spesific Growth Rate

Wt = Average weight of fish at the end of maintenance (g)

Wo = Average fish weight at the start of rearing (g)

t = Maintenance time (days)

b. Survival Rate (SR)

The survival rate is expressed as a percentage of all the number of catfish during the research period, calculated using the method presented by Effendi (2004) with the following formula [9] :

$$SR = \frac{Nt}{No} \times 100\%$$

Description:

SR = Survival rate (%)

No = Number of fish at the beginning of research (fish)

Nt = Number of fish at the end of research (fish)

c. Feed Conversion Ratio (FCR)

The feed conversion ratio can be called the ability of a type of feed to add one unit weight of fish meat, the following formula is used[10]:

$$FCR = \frac{F}{((Wt+D)-Wo)}$$

Description:

FCR = Feed conversion ratio

F = amount of feed given (grams)

Wt = final weight of fish (grams)

Wo = initial weight of fish (grams)

D = total weight of dead fish (grams)

3. RESULTS AND DISCUSSION

3.1 Specific Growth Rate

The specific growth rate serves to determine the percentage of fish weight growth per day during a given maintenance time. Observations conducted over 50 days obtained various average weight results showing that the addition of fish herbs to feed with different doses had a different influence on the growth of catfish. The specific growth rate value of each treatment can be seen in Table 1.

Table 1. Specific growth rate of catfish

Treatments	Specific growth rate (%)
A (Control)	4,1 ± 0,0017 [a]
B (50 ml/kg of feed)	4,0 ± 0,0024 [a]
C (100 ml/kg of feed)	3,9 ± 0,0018 [a]
D (150 ml/kg of feed)	3,9 ± 0,0031 [a]
E (200 ml/kg of feed)	4,6 ± 0,0029 [b]

Description: The value followed by the same letter did not differ manifestly based on Duncan's multiple distance test at 95%

Table 1 shows the highest growth rate occurring in the treatment E (200 ml/kg of feed) of 4.6%. Duncan's multiple distance test results at a 95% confidence level showed the treatment E (200 ml/kg feed) provided the highest specific growth rate and differed noticeable from other treatments, but the B, C and D treatments made no real difference to treatment A. These results showed that the dose of the herbs was in accordance with the needs of the fish so that the various active substances present in the fish herbs were able to improve the quality and digestibility of the feed. In general the content of active substances in fish herbs that are able to spur the digestion of feed are curcumin derived from turmeric and curcuma, essential oils derived from greater galingale, ginger, curcuma, and betel leaves, as well as flavonoids derived from chewing and curcuma.

The results of the study were obtained in accordance with the results of Puspitasari research, where the administration of a dose of herbal supplements consisting of turmeric, curcuma, greater galingale and lactobacillus bacteria with a dose of 200 ml/kg of feed produced the best weight growth for catfish[6], while in Arifin *et al*. (2015), carp that consume feed contained 0.15% turmeric extract with a specific growth rate of 3.04% does not provide any noticeable results between treatments [11]. This may show that supplement administration as a result of mixing some herbal ingredients has more effect on fish growth rate than single herbal supplement administration.

Artificial feed that is given additional fish herbs containing turmeric, ginger, curcuma, greater galingale, betel leaves, noni, catappa leaves, molasses and yeast contains many metabolite compounds that act as antioxidants and maintain fish health by increasing immunity, as well as improving fish appetite. The yeast contained in fish herbs contains several types of microorganisms including *Rhizopus sp*, *Saccharomyces cerevisiae* as well as *bacillus sp* bacteria. *Bacillus sp* bacteria. is a proteolytic acid bacteria that can decipher proteins into amino acids [12]. The more protein absorbed the more protein that will affect fish growth with increasing weight [13]. Estriyani's research shows that the addition of turmeric solution as much as 20 mL in feed can increase the average weight growth by 130 g/fish in catfish (*Clarias gariepinus*) [14].

3.2 Survival Rate

The results of calculating survival rate during the research can be seen in Table 2.

Table 2. Survival rate of catfish

Treatments	Survival rate (%)
A (Control)	75 ± 8,7[a]
B (50 ml/kg of feed)	78 ± 10,4[a]
C (100 ml/kg of feed)	90 ± 5,0[a]
D (150 ml/kg of feed)	92 ± 7,6[a]
E (200 ml/kg of feed)	83 ± 10,4[a]

Description: The value followed by the same letter did not differ manifestly based on Duncan's multiple distance test at 95%

Table 2 shows survival rates ranging from 75% to 92% and shows no noticeable differences. This is similar to Pranata et al. research (2019) that the administration of fish herbs as much as 25-100 ml /kg of feed shows the survival value

of Bonylip barb fish in the range of 73%-83% and does not produce any noticeable differences between treatments [15]. However, based on observations of catfish that were given fish herbs resulted in a higher survival rate compared to the controls. The highest survival rate is in treatment D, which is 92%.

Fish herbs has the content of scopoletin substances from noni that are able to reduce the hormone serotonin in catfish. The hormone serotonin is a hormone that is influential in controlling fish cannibalism. The increase in the hormone serotonin is thought to reduce the tendency of catfish's aggressive properties to its cannibalism, so that the concentration of this serotonin hormone can be triggered by the addition of scopoletin substances, one of which is found in noni [16].

External factors in fish such as temperature, dissolved oxygen and water pH have an influence on the survival of catfish fingerlings. Temperature, dissolved oxygen and water pH in the research are still classified in the normal range based on the Indonesian National Standard. The temperature on fish maintenance media has a range of 25.0°C-28.1°C. Dissolved oxygen content in maintenance media shows values ranging from 3.0-3.6 mg/L. Potential hydrogen (pH) in fish maintenance media during the research was worth 8. The value indicates temperature, dissolved oxygen and water pH are still within the normal range and can be tolerated by catfish fingerlings.

3.3 Feed Conversion Ratio

The results of Duncan's multiple distance test analysis at a 95% trial level obtained the best feed conversion ratio results in treatment E (50 ml/kg of feed) which is 0.62. The results of the calculation of feed conversion rate during the study can be seen in Table 3.

Table 3. Feed conversion ratio

Treatments	Feed conversion ratio
A (Control)	$0,88 \pm 0,03^{bc}$
B (50 ml/kg of feed)	$0,92 \pm 0,08^{c}$
C (100 ml/kg of feed)	$0,83 \pm 0,06^{bc}$
D (150 ml/kg of feed)	$0,73 \pm 0,07^{ab}$
E (200 ml/kg of feed)	$0,62 \pm 0,16^{a}$

Description: The value followed by the same letter did not differ manifestly based on Duncan's multiple distance test at 95%

Based on Table 3 it can be seen that the value of feed conversion in treatment E (addition of 200 ml of fish herbs/kg feed) differs manifestly from the treatment A, B and C, while the treatment E does not differ materially from the treatment of D. The best FCR value occurs in the treatment E (200 ml of fish herbs/kg of feed) of 0.62. This indicates that the compounds contained in fish herbs used as additives in feed cause fish to digest and absorb feed better and impact the low value of feed conversion. The effect of addition fish herbs at the highest dose (200 ml) is thought to be due to the better absorption of fish herbs in feed compared to lower doses, according to Pranata *et. al* (2019) the higher the addition of fish herbs can make the texture of pellets softer, making the pellets easier to digest [15].

The addition of fish herbs in feed has a real effect on research conducted by Pranata *et al.* (2019) by producing a conversion value of Bonylip barb fish feed of 0.51 with a dose of 50 ml/kg of feed [15], while in Ismayanti's research (2018), the addition of herbal supplements in the form of turmeric, greater galingale, curcuma, ginger with the bacterial content of *Bacillus sp.* and yeast (*Rhizopus oligosporus*) in feed as much as 25ml/kg of feed produces a tilapia feed conversion value of 1.12 [12].

Fish herbs containing yeast, turmeric, ginger, curcuma, greater galingale, betel leaves, noni, catappa leaves, molasses and yeast a role in improving feed digestion, so that the absorption rate of nutrients by the gastrointestinal

tract can be more optimum. Yeast is one of the microbial agents commonly used as a probiotic [17]. The addition of probiotics containing *Saccharomyces cerevisiae* in feed may increase growth [18]. In addition, feed containing *Saccharomyces cerevisiae* may increase the activity of enzymes in the digestive system of fish [19]. Turmeric found in fish herbs complains of curcumin compounds and essential oils. Curcumin contained in herbal supplements can stimulate the walls of the gallbladder to secrete bile into the small intestine to improve the digestion of fats, proteins, and carbohydrates so that the absorption activity of food substances increases. In addition, essential oils serve to prevent the excessive exit of stomach acid so that the condition of the stomach is not too acidic and facilitate the absorption of food substances by the small intestine [8]. Physiologically, curcumin compounds and essential oils can stimulate the secretion of large amounts of diluted bile fluid, making the flow to the intestine smaller and feed absorption in the small intestine easier, as well as working in the process of emptying the gallbladder. Bile fluid is a compound that affects the fat emulsion process and facilitates the process of feed absorption in the small intestine [20].

CONCLUSION

The results showed that the addition of fish herbs to the feed at a dose of 200 ml/kg of feed (treatment E) produced the highest specific growth rate and the lowest feed conversion ratio, each of 4.75% and 0.62. The highest survival rate was obtained at a dose of 150 ml/kg of feed (treatment D) with a value of 92%.

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