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Effect of Addition of Curcuma's Extract (*Curcuma xanthorrhiza*) to Artificial Feed on Growth and Survival of Cobia Fish (*Rachycentron canadum*)

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Abstract

Seftika Tri Hidayanti, Suryadi Saputra, Tita Elvitasari, Vivi Endar Herawati, Pinandoyo. 2021. Effect of Addition of Curcuma's Extract (*Curcuma xanthorrhiza*) to Artificial Feed on Growth and Survival of Cobia Fish (*Rachycentron canadum*). The advantage of kobia is that it grows fast, can adapt to the cultivation environment and contains nutrients especially omega 3, EPA and DHA. In cultivation activities, feed functions as an energy supplier to support growth. The addition of curcuma's extract to feed is an effort to increase feed efficiency. This study aims to examine the effect of adding curcuma's extract and to assess the best dose on the growth and survival of kobia. The results showed that the addition of curcuma's extract had an effect on TKP, growth of biomass weight, growth of body length, SGR, FCR, EPP and PER but had no effect on SR. TKP value, growth of biomass weight, growth of body length, SGR, FCR, EPP and PER the highest in treatment D (15 ml / kg feed) with successive values (893,33 g), (42 g), (10,22 cm), (2,01%/day), (1,27), (79,10%) and (1,65%). While the SR value of each treatment was 100%. The highest nutritional content was found in treatment D (15 ml / kg of feed) with a protein content of 47,45%, 14,23% fat, 1,53% crude fiber, 10,22% ash and 9,37% moisture content. Water quality during the study ranged still in optimal conditions for the growth and survival rate of cobia fish, namely the DO 4,66 mg/l, temperature 28,7-29,1^{0}C, salinity 32 ppt and pH 7,69-7,76. Based on the research that has been done, the following conclusions are obtained: The addition of curcuma's extract (*C.xanthorrhiza*) to kobia fish (*R.canadum*) feed has a significant effect (P <0,05) on the growth of kobia (*R.canadum*) but does not affect survival Kobia fish (R.canadum) and the best dose was treatment D with the addition of curcuma's extract (*C.xanthorrhiza*) as much as 15 ml / kg of feed.

Keywords: *R.canadum*, Curcuma's Extract, Growth, Survivale Rate

Introduction

Kobia fish (*Rachycentron canadum*) is a fish that is popular in various parts of the world. Recently, kobia farming has become popular due to its success in larval production (Chou *et al*., 2001). Kobia has the characteristics fast growth, can adapt to environmental conditions, has quality meat and can grow to a size of 3-4 kg in one year and 8-10 kg in two years (Gopakumar *et al*., 2012). Kobia meat contains nutrients, especially omega 3, EPA and DHA (Setianingsih *et al*., 2019). Kobia meat is white in color and has a delicious taste so it is suitable for use in the sashimy industry (Nguyen *et al*., 2019). In fish farming activities, feed is one of the factors that influence for growth performance(Pinandoyo *et al*., 2014). So that the quality and quantity need to be developed (Pinandoyo *et al*., 2016). According to pinandoyo *et al*. (2020), the total

production cost of 50-70% is used for feed. The addition of supplements in feed is an effort to increase feed efficiency. The benefits of adding supplements to feed are increasing fish imunity, smoothing the digestive system, efficient use of feed and increasing fish appetite (Prastito *et al*., 2018). Curcuma is a natural ingredient that contains curcumin and essential oils. curcumin and essential oils function to increase fish appetite, increase the work of the digestive organs, stimulate the bile walls to release fluids and stimulate the release of pancreatic sap which contains digestive enzymes such as amylase, lipase and protease(Ardiansyah and Achmad 2020). Curcumin levels in curcuma are 1,26-2,01g / 100g dry weight of curcuma(Susilowati *et al*., 2014). The curcumin contained in ginger is 2.617% of 20 g of curcuma powder (Anggoro *et al*., 2015). Sukaryo (2016) states that 40 g of curcuma powder produces curcumin levels of 0.4273 g. From 10 g samples of curcuma powder, a total curcumin was produced of 30,87 mg / g (Amelinda *et al*., 2018).

Research conducted by Prastito *et al*. (2018) that the doses of curcuma extract 6 ml/kg of feed resulted in the highest absolute weight of catfish at 8,03 ± 0,35 g. Prabowo *et al*. (2017) state that the best dose is 12 g/kg feed and produces an average weight of milkfish seeds of 1.97 g. The addition of 15 ml / kg of feed curcuma extract produced the best growth in white snapper (Ivandari *et al*., 2019). Based on the description above, it is necessary to research the effect of adding ginger extract (*C. xanthorrhiza*) to artificial feed on the growth and survival of kobia (*R. canadum*).

The purpose of this study was to examine the effect of adding curcuma extract (*C. xanthorrhiza*) on the growth and survival of kobia (*R. canadum*) and to assess the best dose of ginger extract (*C.xanthorrhiza*) for growth and survival of kobia fish (*R. canadum*).

Materials and methods

The tools used in the study were net (40x40x50 cm), digital scales, milimeterblock, aeration hose, WQC, refractometer, sipon hose, measuring cup, jar, sprayer and tray. The materials used in the study were kobia D-40 (with a size of 4 ± 0,12 g and a length of 10 cm), pellets, ethanol, curcuma extract and aquadest. This study used 4 treatments and 3 replication. Where the treatment used is 0 ml/ kg feed, 5 ml/kg feed, 10 ml/kg feed and 15 ml/kg feed. Referring to the research of Amelinda et al., (2018), that the curcumin content of curcuma is 30.87 mg / g, the results of the curcumin levels in each treatment are A (0 mg), B (154,5 mg), C (309 mg) and D(463,5 mg).

Making curcuma extract is using fresh curcuma then washed and cut into thin strips and then dried in the sun, after drying it is mashed using a blender and then sieved to get ginger powder (Anggoro *et al*., 2015). Weighing 500 g of ginger powder then macerated using 70% ethanol at room temperature for 3 x 24 hours, then filtered using filter paper. Cendrianti *et al*.,

(2014) stated that the maceration extraction can be carried out using 70% ethanol solvent for 3x24 hours. The filtrate obtained is collected in a bottle using a funnel then the filtrate is separated from the solvent using a rotatory vacuum evaporator at a temperature of 40 ^{0}C, a speed of 100 rpm and a pressure of 0,7 bar to obtain a pure extract (Amelinda *et al*, 2018, modified). Then the curcuma extract is first mixed with aquadest according to the treatment, after which it is sprayed onto the test feed until it is evenly distributed and aerated (Prastito *et al*., 2018

The containers used for maintenance were 12 nets with a size of 40x40x50 cm. The container to be used is cleaned and sterilized first, after the tub is clean, water is filled with 70% of the volume of the container. The cultivation container uses the aquaculture recirculation system (RAS). Before starting, the test fish rearing is acclimatized for 3 days to adjust to the environment or the new rearing media. During the acclimatization, the kobia fish were fed with the brand Megami GR 2. The frequency of feeding was 3 times a day, namely 08.00 WIB, 12.00 WIB and 16.00 WIB using the at satiation method.

1. Total Feed Consumption (TKP)

Total feed consumption is how much feed is consumed by farmed fish. According to Weatherly (1972), the level of feed consumption can be calculated using the formula:

$$F = C - S$$

Information :

F: Feed consumption (g)

C: Feed given (g)

S: Leftover feed (g)

2. Biomass Weight Growth

Fish biomass weight growth is the difference from fish biomass at the end of maintenance with fish biomass at the beginning of rearing and is expressed in grams. According to Effendie (1997), biomass weight growth can be calculated using the formula:

$$W = Wt - Wo$$

Information :

W: Growth of biomass weight (g)

Wt: Fish biomass at the end of maintenance (g)

Wo: Fish biomass at the end of rearing (g)

3. Body Length Growth

Body length growth is the growth in fish body length that occurs from the beginning of rearing to the end of rearing. Body length growth can be calculated by the formula according to Effendi (1997):

$$L = Lt - Lo$$

Information :

L: Growth length (cm)

Lt: Length of fish at the end of rearing (cm)

Lo: Length of fish at the beginning of rearing (cm)

4. *Specific Growth Rate* (SGR)

Specific Growth Rate or Specific Growth Rate is daily growth expressed in% per day. According to Takeuchi (1988), the daily growth rate can be calculated using the formula:

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

Information :

SGR: Daily growth rate (% / day)

Wt : Total weight of fish at the end of rearing (g)

Wo : Total fish weight at the beginning of rearing (g)

T : Maintenance time (days)

5. Food Convertion Ratio (FCR)

Food conversion ratio is the amount of feed given to produce 1 kg of meat. According to Effendie (1997), the Food conversion ratio can be calculated using the formula:

$$FCR = \frac{F}{Wt - Wo}$$

Information :

FCR : Food conversion ratio

Wt : Fish biomass weight at the end of the study (g)

Wo : Fish biomass weight at the beginning of the study (g)

F : Amount of feed consumed (g)

6. Feed Efficiency (EP)

Feed efficiency is feed that can be used by fish for growth. According to Zonneveld *et al*. (1991), the efficiency of feed utilization can be calculated using the formula:

$$EPP = \frac{Wt - Wo}{F} \times 100\%$$

Information :

EP : Feed efficiency (%)

Wt : Weight of fish biomass at the end of the study (g)

Wo : Weight of fish biomass at the beginning of the study (g)

F : The amount of feed given during the study (g)

7. Protein Efficiency Ratio (PER)

Protein efficiency ratio is the protein content used for growth. According to Tacon (1987), the protein efficiency ratio can be calculated using the formula:

$$PER = \frac{Wt - Wo}{Pi} \times 100\%$$

Information :

PER: Protein efficiency ratio (%)

Wt : Weight of fish at the end of rearing (g)

Wo : Fish weight at the beginning of rearing (g)

Pi : Weight of feed consumed x% of feed protein (g)

8. Survival Rate (SR)

Survival rate is the number of fish that live until the end of rearing. According to Effendie (1997), fish survival can be calculated using the formula:

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

Information :

SR : Fish survival rate (%)

Nt : Number of fish at the end of maintenance (ind)

No : Number of fish at the beginning of maintenance (ind)

9. Water Quality

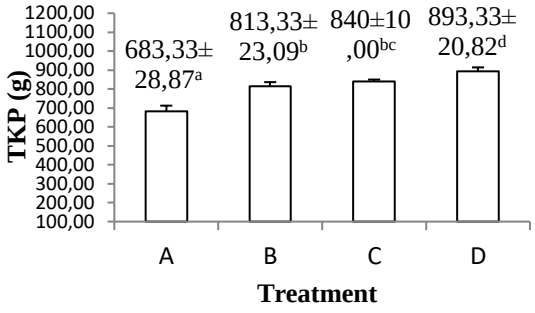
Water quality parameters measured are salinity, dissolved oxygen (DO), temperature and pH. Salinity is measured using a refractometer, DO and temperature are measured using WQC, the pH test in the laboratory. Water quality was measured at the start and end of the study.

The results of the data obtained during the study were statistically analyzed using Microsoft Excel 2010. The data were tested by normality test, homogeneity test and additivity test. If the data is normally distributed, homogeneous and additive, then analysis of variance is continued. Data were analyzed for variance (F test) at the 95% confidence level. If the analysis of variance obtained significantly different results (P <0.05), then the Duncan multiple region test was performed to determine the difference in the mean between the treatments. Water quality data and proximate test values were analyzed descriptively.

Result

Total Feed Consumption

Based on the data total feed consumption of kobia fish (*R.caanadum*) during study a histogram can be presented in Picture 1

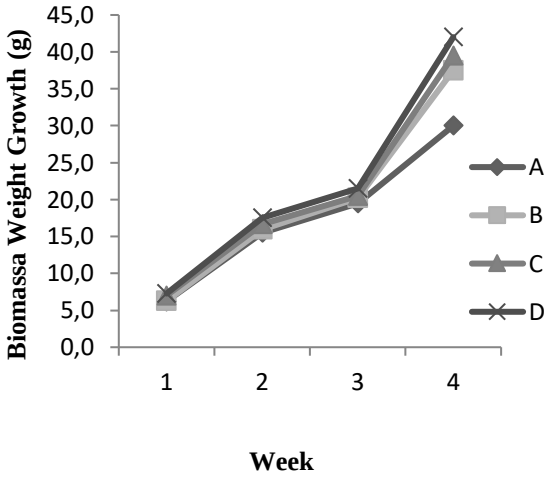


Picture 1. Histogram Total Feed Consumption Kobia Fish (*R.canadum*)

Based on the graphic above, it is known that the highest total feed consumption of kobia fish (*R.canadum*), namely treatment D (15ml/kg of feed) produces TKP of 893,33 ± 20,82 and the lowest Total Feed Consumption in treatment A (0ml/kg of feed) with TKP of 683,33 ± 28,87 g. the results of analysis of variance (ANOVA) showed a significant effect (P <0,05).

Biomass Weight Growth

Based on the data biomass weight growth of kobia fish (*R.caanadum*) during study a graphic can be presented in Picture 2.

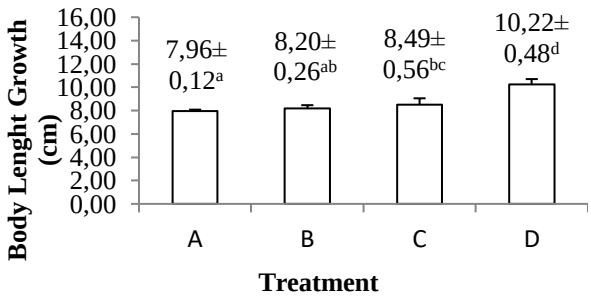


Picture 2. Graphic of Biomass Weight Kobia Fish (*R.canadum*)

Based on the graphic above, it is known that the highest of biomass weight growth of kobia fish (*R.canadum*) is in treatment D (15ml/kg of feed) of 42 g and the lowest of biomass weight growth is in treatment A (0ml/kg of feed) of 30 g.

Body Lenght Growth

Based on the data body lenght growth of kobia fish (*R.canadum*) during study a histogram can be presented in Picture 3.

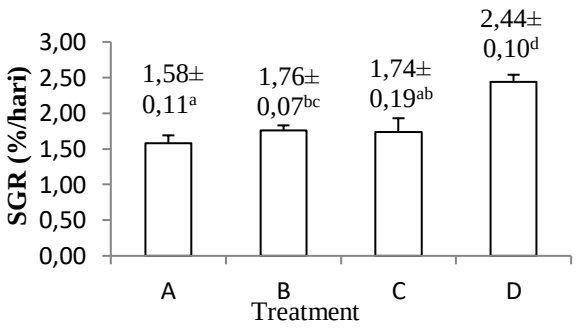


Picture 3. Histogram Body Lenght Growth Kobia fish (*R.canadum*)

Based on the graphic above, it is known that the highest body length growth of kobia fish (*R.canadum*) is in treatment D (15 ml/kg of feed) resulting in an body length growth of 10.22 ± 0.48 cm and the lowest body length growth in treatment A (0ml/kg feed) of 7,96 ± 0,12 cm. The results of analysis of variance (ANOVA) showed a significant effect (P <0,05).

Specific Growth Rate (SGR)

Based on the data specific growth rate of kobia fish (*R.caanadum*) during study a graphic can be presented in Picture 4.



Picture 4. Histogram Specific Growth Rate Kobia fish (*R.canadum*)

Based on the graphic above, it is known that the specific growth rate of kobia fish (*R. canadum*) is the highest in treatment D (15 ml / kg of feed) resulting in a specific growth rate of 2,44 ± 0,10% / day and the lowest specific growth rate in treatment A (0ml). / kg of feed) of 1,58 ± 0,11% / day. the results of analysis of variance (ANOVA) showed a significant effect (P <0,05).

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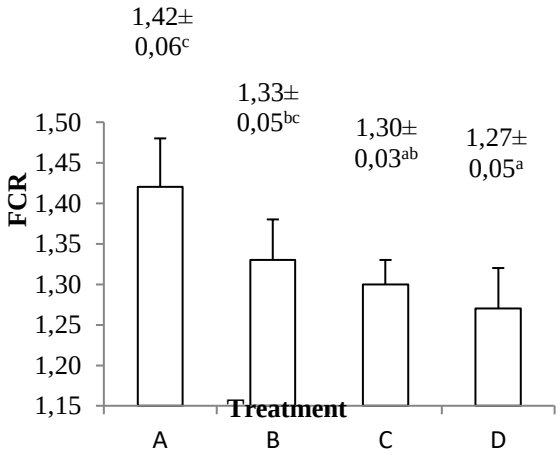
Food Convertion Ratio (FCR)

Based on the data food convertion ratio of kobia fish (*R.caanadum*) during study a graphic can be presented in Picture 5

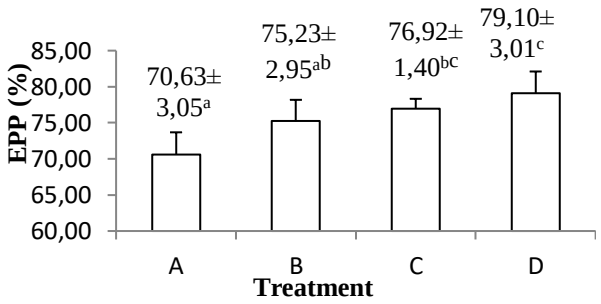


Picture 5. Histogram Food Convertion Rate (FCR) Kobia fish (*R.canadum*)

Based on the graphic above, it is known that the best food conversion ratio (FCR) of kobia (*R.canadum*) is in treatment D (15ml / kg of feed) produces an FCR of 1,27 ± 0,05 and the lowest FCR value is in treatment A (0 ml/kg feed) of 1,42 ± 0,06. the results of analysis of variance (ANOVA) significant showed a effect (P <0,05).

Food Efficiency (EP)

Based on the data food efficinecy of kobia fish (*R.caanadum*) during study a graphic can be presented in Picture 6.

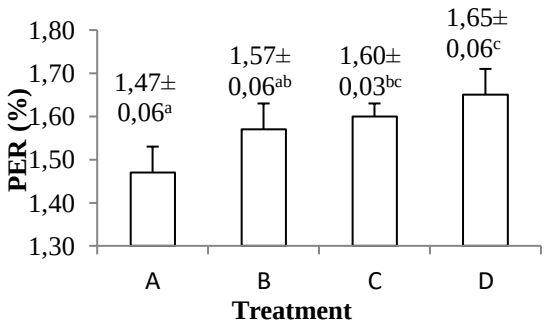


Picture 6. Histogram Feed Efficiency (EP) Kobia Fish (*R.canadum*)

Based on the graphic above, it is known that the highest feed efficiency (EP) of kobia (*R.canadum*) is in treatment D (15ml/kg of feed) produces an EP of 79, 10 ± 3,01 and the lowest EPP value is treatment A (0ml / kg of feed) of 70, 63 ± 3,05 %. the results of analysis of variance (ANOVA) showed a significant effect (P <0,05).

Protein Effficiency Ratio (PER)

Based on the data food efficinecy of kobia fish (*R.caanadum*) during study a graphic can be presented in Picture 7.

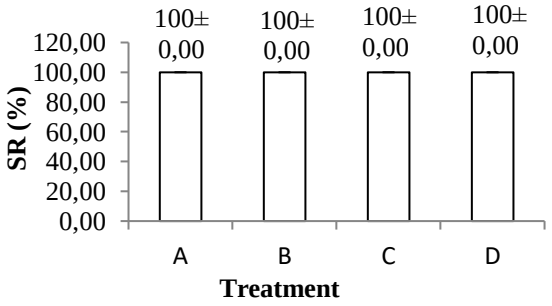


Picture 7. Histogram Protein Efficiency Ratio (PER) Kobia Fish(*R.canadum*)

Based on the graphic above, it is known that the highest Protein Efficiency Ratio (PER) of kobia (*R. canadum*) is in treatment D (15ml / kg of feed) produces PER of 1,65 ± 0,06 and the lowest PER value is treatment A (0ml/kg of feed) of 1,47 ± 0,06%. the results of analysis of variance (ANOVA) showed a significant effect (P <0,05).

Survival Rate (SR)

Based on the data food efficinecy of kobia fish (*R.caanadum*) during study a graphic can be presented in Picture 8.



Picture 8. Histogram Survival Rate Kobia Fish (*R.canadum*)

Based on the graphic above, it is known that the survival rate of kobia fish has the same value in each treatment, namely treatment A (0ml / kg of feed) with a survival rate of 100%, treatment B (5ml/kg of feed) with a survival rate of 100%. C (10 ml / kg of feed) with a survival rate of 100% and treatment D (15 ml / kg of feed) with a survival rate of 100%. There was no significant effect on the survival rate of kobia (*R. canadum*).

Tabel 1. Water Quality

No	Parameter	Value	Properness
1	DO (mg/l)	4,66 – 5,39	>4*
2	Suhu (^{0}C)	28,7 – 29,1	23,4 – 31,8**
3	Salinitas (ppt)	32	30 -34*
4	pH	7,69 – 7,76	7 – 8,5*

Informasi : * Laboratory of fish and eviromental health examination Central Of Aquaculture Fisheries (BBPBL) Lampung

**Benetti *et al*., (2008)

Based on the table above, it is found that the values of water quality parameters are as follows: the value of dissolved oxygen (DO) is 4.66-5.39 mg / l, temperature 28.7-29.1 0C, salinity 32 ppt and pH 7.69 -7.76.

Discussion

a. Growth

Based on the analysis of variance, it showed that the addition of curcuma's extract to the kobia fish feed had a significant effect (P <0,05) on weight growth, absolute length growth, SGR, TKP, FCR, EPP and PER. The best results were found in treatment D (15 ml / kg of feed). Treatment A (0ml/ kg of feed) showed the lowest yields of all treatments given the addition of curcuma extract B (5ml / kg of feed), C (10ml / kg of feed) and D (15ml / kg of feed). Growth can be seen from weight, length increase and specific growth rate. The growth in kobia is influenced by the total feed consumption (TKP)

and also the protein efficiency ratio (PER). Where the feed that is consumed contains nutrients, especially protein that is in accordance with the needs of the kobia fish so that it can provide growth. The high total feed consumption is due to the good quality of the feed seen from the taste, smell so that the kobia fish will be stimulated to consume the feed. Quality feed can increase the feed efficiency so that the feed conversion value of kobia fish is good. Rapid growth can be influenced by the amount of feed given (Purwati *et al*., 2015). The feed given must be nutritious because feed that has nutrients can accelerate growth and affect fish survival (Febrianti *et al*., 2018).

Referring to the research of Amelinda *et al*., (2018), that the curcumin content of ginger is 30.87 mg / g, the results of the curcumin levels in each treatment are A (0 mg), B (154.5 mg), C (309 mg) and D(463.5 mg). Based on the results of these calculations, treatment D (15 ml / kg of feed) had higher levels of curcumin compared to other treatments. It is suspected that curcumin found in ginger can increase fish appetite so that the total feed consumption in treatment D (15 ml / kg of feed) increases and produces the best growth. In addition, curcumin is also able to increase feed digestibility so that the feed in treatment D (15 ml / kg of feed) can be used efficiently by kobia fish to produce good growth. The higher the ginger dose given, the fish growth will increase. Curcumin and essential oils found in ginger can increase appetite in fish (Insana and Farhana, 2015). Curcumin and essential oils also function as growth boosters because they stimulate the release of pancreatic juice which contains amylase, lipase and protease enzymes. Where this enzyme can improve the digestion of carbonhydrous feed ingredients, fat and protein (Halija *et al*., 2019)

Treatment A showed a low curcumin content of 0 mg. With low curcumin content, the fish appetite in treatment A is low so that feed consumption decreases. In addition, the absence of additives in treatment A feed causes poor nutrient absorption so that the resulting growth is relatively low. According to the opinion of Prastito *et al*. (2018), lack of food and energy needed by fish can cause slow growth because the energy in feed is used to maintain body functions and movement activities in fish.

Based on the results of the proximate test, it was found that the nutritional content in each treatment, namely treatment A (0ml / kg of feed) contained 42,97% protein, 12,88% fat, 1,11% crude fiber, 10,58% ash and 7,12% moisture content, treatment B (5ml / kg of feed) contains 46% protein, 14,39% fat, 1,15% crude fiber, 10,19% ash and 8,16% moisture content, treatment C (10ml / kg of feed) contains 46,90% protein, 14,31% fat, 1,08% crude fiber, 10,22% ash and 9,65% moisture content, treatment D (15ml / kg of feed) contains 47,45% protein, fat 14,23%, crude fiber 1,53%, ash 10,22% and 9,37% moisture content.

The addition of curcuma to the feed can increase the protein content of the feed. The protein content in treatment D was higher than

treatment A, B and C. With the higher nutrient content, treatment D produced the best growth. This is because the protein contained in the feed of treatment D (47,45%) is able to meet the needs of kobia fish. According to Rajagukguk *et al*., (2017), protein plays an important role in the structure and function of fish bodies such as for growth and reproduction. In addition to growth, protein in the body is used for other activities such as moving.

The low protein content in treatment A, namely 42,97%, is thought to be insufficient to meet the needs of kobia fish. Therefore, the resulting growth is lower than the other treatments. Fish need optimal protein in their feed, which is about two to three times that of warm-blooded animals. Protein in feed must always be sufficiently available as needed, because protein deficiency can result in slow growth (Nurhuda *et al*., 2018). If there is an excess of protein, the fish cannot catabolize amino acids properly, so that the feed cannot be utilized properly (Monoarfa *et al*., 2020).

The results of the calculation of biomass weight were higher than the research conducted by Prabowo *et al*., (2017), that the addition of a solution of ginger 12 g/kg of feed resulted in weight growth in milkfish of 1,97 g. This result is also higher than the research conducted by Ardiansyah and Achmad (2020), that the addition of ginger extract 12 g / kg of feed resulted in a weight growth of tilapia of 1.423 g. The specific growth rate in this study was lower than the research conducted by Prastito *et al*., (2018), where the addition of ginger extract 6 ml / kg of feed resulted in SGR of catfish of 2.46% / day. Likewise research conducted by Ivandari *et al*., (2019), that the addition of immuno-gravito with the main content of ginger as much as 15 ml / kg of feed resulted in SGR of white snapper of 3.31% / day.

b. Survival Rate

Survival rate is the percentage of organisms that are able to survive during the maintenance period. Fish survival affects fish production during maintenance. The survival of the kobia fish during the study did not experience any difference. The survival rate of kobia fish in treatment A, B, C and D was 100%. One of the factors that affect the survival of fish is feed intake. It is suspected that the food consumed by kobia fish during the study contained nutrients that were in accordance with the needs of the fish so that it had an effect on survival. According to Herawati *et al*. (2017), fish survival is influenced by factors such as age, feed and environmental factors such as water quality. The provision of quality feed and good environmental conditions will affect the survival of the fish being kept, conversely if lack of feed and bad environmental conditions will affect health. fish that will reduce survival rate (Febrianti *et al*., 2018).

The survival rate value in this study is said to be good because it is> 50%. In accordance with the opinion of Wijaya *et al*. (2018), the fish survival value can be said to be good if> 50%, while the fish survival value <30% is said to be not good. Fish survival is also affected by

handling. Where if the handling is wrong it can cause stress for fish so that the health condition of the fish is disturbed and can cause death (Mustofa *et al*., 2018).

The high survival rate value of kobia fish is also due to the addition of supplements from curcuma extract to the feed, so that it can provide a direct immune response of kobia fish to pathogens. According to Putri *et al*. (2017), curcuma contains antibacterial compounds such as flavonoids, saponins and tannins. Flavonoids function to inactivate bacterial cell membrane proteins, causing the protein structure to be damaged and the bacterial cell wall unstable. Saponins function to lyse bacterial cell walls. Meanwhile, tannins function to damage bacterial cell walls and inactivate enzymes and decstruction of genetic material from bacteria. curcuma contains vitamin C and minerals, where vitamin C and minerals, apart from playing a role in supporting growth, also acts as a supplement to increase the immune system of fish (Ardiansyah and Ahmad, 2020).

c. Water Quality

Water is a living medium for fish and other aquatic organisms. Water quality is one of the factors that support the growth and livelihood of cultivated fish. During maintenance, water quality is maintained because it uses a recirculation system and uses filter bags. To maintain the water quality of the culture media, water is carried out by siphoning, changing water as much as 70% of the volume of the container after feeding in the afternoon the goal is to break down the remaining feces and ammonia. According to Zulpikar *et al*. (2018), water quality parameters are one of the most important factors to support the success of fish farming activities. Indirectly, water quality affects the growth and health of fish, therefore the quality needs to be maintained and considered. One of the efforts to maintain water quality is to carry out regular water supply and change (Herawati *et al*., 2015).

Water quality affects the physiological balance of the fish body. Water quality in the maintenance medium was measured at the beginning and end of the study. Water quality parameters measured include salinity, temperature, dissolved oxygen (DO) and pH. The measured salinity was 32 ppt, temperature ranged from 28.7 to 29.10 C, dissolved oxygen ranged from 4.66 - 5.39 mg / l, pH 7.69 - 7.76. According to Benetti *et al*., (2008), water quality in cobia fish is salinity 26-34 ppt, pH 7.92-8.16. The temperature of the live medium in grouper fish is around 24-310C, dissolved oxygen ranges from> 4.9 ppm (Annisa *et al*., 2018). The factors that influence the water quality of the culture media are water temperature, dissolved oxygen, degree of acidity, alkalinity, ammonia, nitrite, nitrate, carbon dioxide and organic matter such as fecal waste and feed residue. The remaining feces and feed residue that settles on the bottom of the water can affect the chemical and physical parameters of the cultivation media (Islami *et al*., 2017).

Conclusions and suggestions

Based on the research that has been done, the following conclusions are obtained: The addition of curcuma extract (*C.xanthorrhiza*) to kobia fish (*R.canadum*) feed has a significant effect (P <0,05) on the growth of kobia (*R.canadum*) but does not affect survival Kobia fish (R.canadum) and the best dose was treatment D with the addition of curcuma extract (*C.xanthorrhiza*) as much as 15 ml / kg of feed.

Based on the research that has been done, the following suggestions can be given as a dose of 15 ml / kg of feed for the cultivation of kobia fish and it is advisable to carry out research that the addition of curcuma extract can increase growth, survival and the body's defense system in kobia.

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