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by Maria Goreti E.k

Submission date: 05-Apr-2023 01:38PM (UTC+0800)
Submission ID: 2056365530
File name: Maria_Goreti_s_full_paper.docx (46.48K)
Word count: 2383
Character count: 11753

THE USE OF FERMENTED VEGETABLES IN CATFISH (*Clarias gariepinus*)

Maria Goreti E.K[1*]

[1] Department of Aquacuture, Jakarta Fisheries University
*Jl. AUP-Pasar Minggu, Jakarta 12520 Telp.(021)7806874,Fax.(021)7805030
e-mail: eny.kristiany@gmail.com

Abstract

This study focussed to assess the effect of feeding fermented vegetables on the growth and Survival Rate (SR) of catfish. Vegetables are fermented for 7 days and14 days. Dose of feed pellets for catfish is 5% of the weight of biomass. Catfish size for experiment was 7 cm±0,5 (2,5 g) to measure consumption (100-120 g) test container used is concrete tank volume 1 m^3 for 130 days.The highest response of fish to feed vegetables fermented for 14. The vegetables fermentedfor 7 days results of these experiments had proximate composition of water, ash, fat, and protein content 48.15%, 0.5%, 0.65% and 1.65% and the vegetables fermented for 14 days results of these experiments had proximate composition of water, ash, fat, and protein content of 46.8 %, 0.5%, 1.15% and 2.3%. The results showed that the growth of catfish in the experiment 3 (treatment combined with pellet and vegetables fermented for 14 days) is 128 grams better than the experiment 1(treatment only pellets) is 111.4 grams compared with experiment 2 (treatment combined with pellet and vegetables fermented for 7 days) is 105.4 grams . Accordingly,the survival rate of experiment 3 is the highest (84.6%), than other experiment (79.3% (experiment 2) and 54% (experiment 2).

Keyword: catfish, fermented, growth, survival rate

INTRODUCTION

The one commodity that is popular in the community is catfish (Clarias gariepinus). This fish comes from the African Continent and was first brought to Indonesia in 1984. It's having many advantages, including most easily accepted by society. The advantages include rapid growth, has the high ability to adapt to the environment, it's good taste and high nutritional content. The public interest to cultivate catfish.

Catfish classified as omnivores. It is able to eat whatever earned, including the remains of the cook. To growth catfish need pellets which containing 35-40% protein. Of course, the price of pellets with high protein content is most expensive (Kordi, 2010). The problem is often a constraint that requires the provision of artificial diets relatively high cost even reach 60-70%. (Sahwan, 2002).

Catfish habits eating at the night, but to be cultivated can adjust to eat during the day. Catfish are cannibals if the lack of feed so will eat other smaller size. Feed will be pass through the digestive system. The feed is ingested through physical and chemical mechanisms in order to easily absorbed, then will be circulated to the body via the blood circulatory system. Feed will be digested fisrt in the mouth, oral cavity, esophagus, stomach, colon and rectum. Intestine's catfish shorter than the body, while the stomach is relatively large and long.

The process of digestion is accelerated by the secretion of digestive which found in the liver and bile. Gastrointestinal can also gland that produces digestive enzymes that are useful in the process of destruction of food. Digestive glands of catfish produce protein enzymes. (Mahyuddin ,2011) Commonly feed of catfish farming is artificial feed (pellets) are easily obtained. But the problem is artificial feed costs are relatively high even reach 60-70% (Sahwan, 2002). The economic crisis, have an impact prices in the market. While the cost of feed and the

sale is not significant. For it is necessary to study other types of feed that can be used as an alternative feed so can rapidgrowth and provide financial benefits.

METODE

This research was conducted at the Laboratory of Jakarta Fisheries University, which consists of 3 types of treatment (given feed pellets and vegetables fermented for 1 week, pellets and vegetables fermented for 2 weeks and pellets only). Each treatment consisted of three replications. Catfish measuring 7 ± 0.1 cm are stocked in concrete tank 1x1x1m^3 and the stocking density is 240 fish per tank.

RESULT

Fermented vegetables consist a fresh or rotten yet of lettuce, mustard greens, Chinese cabbage, pockcoy, cabbage and carrots and then cut into pieces with a size of ± 5 mm. It's put in a plastic which given 8 ml of a mix of molasses and dissolved probiotics in the water. Comparisons vegetables : molasses : probiotics is 1 kg : 5 ml : 10 ml. The fermentation process is assisted by the presence of *Bacillus* sp contained in probiotic.

Feed given is pellets and fermented vegetables. Fermented vegetables are given in the morning and afternoon. Pellete was given in the afternoon. However, the third treatment remain pellet in the morning, noon and evening. Response of feed and it's residual were observed. Pellet's nutrient composition and fermentation of vegetables are in Table 1 and 2.

Table 1. Nutrient Compossition of Pellet

No.	Content	781-1	781-2
1	Proteins	31-33 %	31-33 %
2	Fat	3-5 %	3-5 %
3	Fiber	4-6 %	4-6 %
4	Ash	10-13 %	10-13 %
5	Water Content	11-13 %	11-13 %
6	Stability in water	5-7 hours	5-7 hours

Tabel 2. The Proximat Result of Vegetables Fermented

No	Content	Treatment 1	Treatment 2
1	Water Content	48,15 %	46,8 %
2	Ash	0,5 %	0,5 %
3	Fat	0,65 %	1,15 %
4	Proteins	1,65 %	2,3 %
5	Carbohidrat	49,05%	49,25%

Table 3: Number of Vegetables, Molasses and Probiotics Used

Age	Dose one time feeding (gram)	Number of fermented vegetables (kg)	Dose of molasses (ml)	Dose of Probiotic (ml)
D1-D20	100	24	120	240
D21-D40	150	36	180	360
D41-D60	200	48	240	480
D61-D70	200	30	150	300
Total amount	-	138	690	1380

The content of protein and fat in the pellets is higher than vegetables fermented for 7 and 14 days (Table 1 and 2). Pellet also has a distinctive aroma. This can be seen response of fish at the

time of feeding at the third treatment. In the first and second treatment catfish will consume the pellets first. The fish's response to vegetables have been fermented for 14 days better than the 7 days because it has softer texture so catfish more easier to digested it. The longer time of fermentation resulted softer texture and uniqe smell so attracts the fish to consume, although vegetables fermented for 7 days have more better nutritional composition. Dosage of vegetables fermented are shown in Table 3. Pellet dose given on the all treatment can be seen in Table 4, 5 and 6.

Table 4 Dose of Pellet in The First Treatment

DOC	ABW (g/ekor)	Biomassa (g)	FR (5%) (g)	Dose (%)	F/D (g)	Amount (g)
D1-D10	2,5	250	12,5	50	6,25	62,5
D11-D20	9.1	910	45,5	50	22,75	227,5
D21-D30	22.5	2.025	101,25	40	40,5	405
D31-D40	39.8	3.582	179,1	40	71,64	716,4
D41-D50	51.2	4.608	230,4	40	92,16	921,6
D51-D60	78.6	6.288	314,4	40	94,32	943,2
D61-D70	91	7.280	364	30	109,2	1.092
Total amount of feed	**4.368,2**					**4.368,2**

Table 5. Dose of Pellet in The Second Treatment

DOC	ABW (g/ekor)	Biomassa (g)	FR (5%) (g)	Dose (%)	F/D (g)	Amount (g)
D1-D10	2,6	260	13	50	6,5	65
D11-D20	8,7	870	43,5	50	21,8	218
D21-D30	20	1.800	90	40	36	360
D31-D40	37,3	3.357	167,9	40	67,1	671
D41-D50	54,6	4.914	245,7	30	98,3	983
D51-D60	81	6.480	324	30	97,2	972
D61-D70	88,3	7.064	353,2	30	106	1.060
Total amount of feed						4.329

Table 6. Dose of Pellet in The Third Treatment

DOC	ABW (g/ekor)	Biomassa (g)	FR (5%) (g)	F/D (g)	Amount (g)
D1-D10	2,5	250	12,5	12,5	125
D11-D20	10,2	1.020	51	51	510
D21-D30	24,6	2214	110,7	110,7	1.107
D31-D40	41,9	3771	188,55	188,55	1.885,5
D41-D50	56,2	5058	252,9	252,9	2.529
D51-D60	83,8	6704	335,2	335,2	3.352
D61-D70 (10 hari)	97,3	7784	389,2	389,2	3.892
Total amount of feed					13.400,5

Monitoring of Growth

Monitoring of growth was conducted in order to determine the development and growth of catfish. Monitoring of growth is done by sampling of weight and length. Sampling is done every 10 days with a sample of 10% of the population. This is in accordance Zaenal (2010) which

states that the sampling can be done once a week or 10 days. The observation of the growth of catfish during the study shown in Table 7.

Table 7. Observations Weight During Research

NO	AGE	Treatment 1	Treatment 2	Treatment 3
1	D10	9,1g	8,7g	10,2g
2	D20	22,5g	20,0g	24,6g
3	D30	39,8g	37,3g	41,9g
4	D40	51,2g	54,6g	56,2g
5	D50	78,6g	81,0g	83,8g
6	D60	91,0g	88,3g	97,3g
7	D70	**111,4g**	**105,4g**	**128,0g**

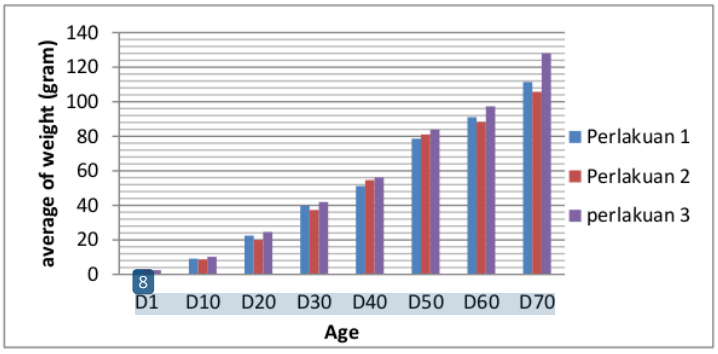

Figure 1. The Graph of Catfish Added Weight

Figure 1. is known that the third treatment resulted in the most growth than first treatment but the second treatment resulted better growth than third treatment. The third treatment showed weight bigger than first and second treatment. So it's known that response of feed is will affect the amount of feed, which it's will affect the final weight of the fish.

The third treatment showed the growth were significant, one of the factors influence is the higher protein content of pellets than vegetables fermented. The first treatment showed better growth compared the second teatment which will respond fish pellets first than vegetables fermented. Vegetables are fermented for 14 days more favored of fish than 7 days.

Monitoring of water quality parameters during the study include temperature, pH, phosphate, nitrite and ammonia were compared with the standard requirements. Temperature is done three times a day at 06.00 am, 12:30 am and the 16.30 pm. pH measurement is done every day in the morning and afternoon using the pH paper which scale 1-14. Phosphate, ammonia and nitrite is done each 3 days in the morning using test kit. The result water quality parameters observed as shown in Table 8 .

The Results of water quality measurement on first and second treatment is same and still within the optimum range (Table 8). However, the results of water quality measurement in the third treatment, Phosphate and amonia value higher than optimum range. In the third treatments was known that the residual pellets were not consumed so much. The response of fish to pellet is larger than vegetables fermented but organic material making up these pellets which causes high values of ammonia and phosphate. Substitution of water is done when the water is dark color due to the amount of organic matter in the maintenance medium. It is done 2-3 weeks as much as 50%, according to the statement of Hernowo and Rachmatun (2002).

Table 8. The Results of Water Quality

NO	PARAMETERS	RESULT			OPTIMUM
		Treatment 1	Treatment 2	Treatment 3	
1	Themperature	27-30 °C	27-30 °C	27-30 °C	28-32°C (Kordi and Andi, 2007)
2	pH	6-7 mg/l	6-7 mg/l	6-7 mg/l	6,5-8 (Prihartono et.al.,2000)
3	Phospate	0-5 mg/l	0-5 mg/l	0-1 mg/l	0,051-0,1 mg/l (Effendi,2003)
4	Nitrite	0-0,6 mg/l	0-0,6 mg/l	0-0,6 mg/l	0,25 mg/l (Prihartono et.al. ,2000)
5	Amonia	0-1 mg/l	0-1 mg/l	0-1,5 mg/l	0,1 mg/l (Kordi, 2010)

Harvesting is done when the catfish measuring 117 ± 11 grams each (70 days of age maintenance). It was done in the afternoon by harvesting the whole fish is in the pond. Catfish feed was not given the day before so as not to stress during harvest in order to catfish do not remove the feces at the momment of delivery which will be affect to water quality. The first is removing water level on the pond to a height of 5 cm and then the fish has dragnet and stored in the baskets for weighing it is in accordance Puspowardoyo and Abbas (2002) that catfish can be harvested after the age of 3 months, with an average weight of 1 to 1.2 ounces (100-120 grams). This is also confirmed by Kordi (2010) that the catfish should be fasted beforehand. Survival rate calculations done at the time of harvest. It's highest of third treatment (84.6%). While the survival rate of second and fisrt treatment is 79.3% and 54%.

Analysis of financial is needed to determine finansial feasibility including calculated Profit / Loss, Break Event Point ,Benefit / Cost Ratio, Payback Period analysis (Table 9).

Table 9 Analysis of Financial Catfish Culture for 1 Year

No.	Analysis of Financial	Treatment 1	Treatment 2	Treatment 3
1.	Variable Cost	Rp 50.723.600,00	Rp 50.019.600,00	Rp 102.540.000,00
2.	Income	Rp 88.550.000,00	Rp 123.381.200,00	Rp 159.399.200,00
3.	Profit/Loss	Rp 1.541.000,00	Rp 37.076.600,00	Rp 20.574.200,00
4.	B/C Ratio	1,02	1,4	1,1
5.	BEP unit	3.693,1 kg	2.653,4 kg	4.422,3 kg
6.	*Payback Period*	5 cycle	1 cycle	1 cycle

Note :

Financial analysis is based on the following assumptions:

1. 1 year consists of 4 cycles with a selling price of Rp 23000.00 per kg
2. Use of the facility is calculated on a lease per year.
3. Operating costs are assumed equal, just different of feed costs
4. Revenue is calculated based on the biomass produced

CONCLUTION

1. The third treatment resulted in the highest weight of catfish harvested that followed second and first treatment, but second treatment is more profitable by analysis of financiall under the same assumptions.
2. The results of measurements for the three treatment was in the range of optimal.

SUGGESTION

1. Should be used to feed like the second treatment, but it also must be supported by catfish farms are near to the traditional market that would be more profitable.

2. We recommend further research on vegetable fermentation for 3 to 4 weeks and added the amount and variety of vegetables.

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