Utilization Of Hydrilla Verticillata Fermented Meal As Alternative Sources Of Protein In Feed Formulation For Tilapia (Oreochromis Sp.) Growth

Rini Rafika Dhamayanti, Happy Nursyam, Anik Martinah Hariati

Abstract: This study was conducted to determine of use Hydrilla verticillata fermented meal which optimize growth and digestibility in Tilapia. This study based on completely randomized design (CRD) with three replications. Four treatments using Hydrilla verticillatafermented meal into feed formulation: P0 (0%), P1 (10%), P2 (20%), P3 (30%) and P4 (40%). The main parameter is absolute growth rate, feed conversion and digestibility of Tilapia (Oreochiomis sp.). The results showed that utilization of Hydrilla verticillata fermented mealhas been significant effect on the rate of growth and digestibility parameters. P1 treatment has given the best results with an absolute growth of 1.56% BW / day ± 0.03, 1.61 ± 0.03 feed conversion and digestibility of 79.46% ± 0.53.

Keywords: Hydrilla verticillata fermented meal. Tilapia, digestibility.

1. INTRODUCTION

Tilapia is the third leading commodity production achievement of the year 2010 amounted to 464 191 tonnes increased to 912.613 tonnes in 2014 with a percentage increase of 19.03% (KKP, 2014). Feed is a very important thing to consider in fish farming activities, both intensive and semi-intensive, because feed is a component of the highest production costs of around 35-70% of operating costs. This is due to the high price of feed raw materials (Webster and Lim, 2002). One way that can be done to reduce the price of feed is by utilizing materials that have very abundant existence but has not been utilized well. Hydrilla verticillata is a water plant has growthrapidly so that its existence is abundant and often cause blooming on the waters.One of the advantages that can be done used as a raw material for feed because it contains nutrients carbohydrates 20.15%, 32.12% crude fiber, 2.92% fat, 17.82% protein and 28.82% ash (Uktolseja, 2013). Nutrient contained in Hydrilla verticillata needs totesting the advantage of Hydrilla verticillata fermented meal in tilapia feed formulations. The results are expected Hydrilla verticillata fermented meal can give the best level of growth and digestibility parameters.

2. MATERIALS AND METHODS

The material used fish such as Tilapia seed measuring 5-7 cm with an average weight of 2.4 grams. Media trial used in the form of fresh water derived from well water. Water placed in the aquarium experiments amounted to 15 pieces with volume of 20 liters each. Water quality is optimal for growing cultivated fish test. This research used four different experiments feed containing 30% protein feed. Proteins composed of fish meal as animal protein and Hydrilla verticillatameal as a substitute protein, soybean meal as vegetable protein. Research tools used in this study is an aquarium, aerators, hose, skimmer, airstones, hitters, scales, proximate analysis equipment, and water qualityequipment. Feed materials used as a constituent feed proximate analysis, the nutritional composition of feed material can be seen in Table 1. The method used experimental method. This study used a completely randomized design (CRD). Treatment determined / obtained from the formulation of feed, each treatment was repeated in 3 times.

Tabel 1. *Nutritional Composition of Feed Ingredients*

Basic material	Nutritional Composition						
	Dry Matter (%)*	Protein (%)*	Fat(%)*	Crude fiber(%)*	Ash(%)*	BETN**	DE(kkal/kg)***
Fish meal*	94,77	58,56	6,12	8,60	17,61	9,11	325,76
Hydrilla verticilla*	92,00	44,13	0,38	8,14	9,05	38,30	333,14
Soy meal*	85,14	19,23	1,20	16,23	21,29	42,05	255,92
Corn meal*	90,00	12,00	3,25	11,33	8,82	64,60	335,65
Bran meal*	90,13	5,60	4,73	7,58	18,33	63,76	342,18
Tapioka meal*	89,34	0,25	0,03	0,43	0,09	99,20	400,79

Tabel 2. Tilapia Feed Formulation Trial

Basic material	Feed formulations				
	A (0)	B (10)	C (20)	D (30)	E (40)
Fish meal*	30,00	30,00	30,00	30,00	30,00
Hydrilla verticilla*	0,00	10,00	20,00	30,00	40,00
Soy meal*	23,00	20,00	17,00	14,00	10,00
Corn meal*	14,00	12,00	9,00	7,00	4,00
Bran meal*	11,5	8,5	5,00	3,00	0,00
Tapioka meal*	10,00	8,00	7,50	4,50	4,50
Cr2o3	0,50	0,50	0,50	0,50	0,50
Fish Oil	4,00	4,00	4,00	4,00	4,00
Vitamin and mineral	4,00	4,00	4,00	4,00	4,00
CMC	3,00	3,00	3,00	3,00	3,00
Total materials (gram)	100,00	100,00	100,00	100,00	100,00
Nutrition composition oftest feed (%)					
Protein (%)	30,50	30,50	30,50	30,60	30,20
Fat (%)	7,40	7,20	6,90	6,70	6,50
Ash (%)	17,00	18,40	19,50	20,90	22,10
Crude fiber (%)	7,00	7,30	7,30	7,80	7,90
BETN (%) **	37,60	36,20	35,40	33,40	32,90
De (kkal/gram)***	3,60	3,47	3,35	3,23	3,11

Notes

* *: Result Analysis by Laboratory of Food Safety, Faculty of Agricultural technology, University of Brawijaya*

* * *: BETN = 100-Protein-Fat-Ash-Fiber*

*** *: Energy = (4 x % Protein) + (9 x % Fat) + (4 x % BETN)*

Test variables measured were absolute growth (Effendie, 1997), protein digestibility (D) method Chromix Oxide (Zonneveld, 1991), and feed conversion ratio (Zonneveld, 1991). Data were analyzed using analysis of variance (ANOVA).

3. RESULTS AND DISCUSSION

Based on the research results obtained value growth and digestibility of tilapia feed throughout the study presented in Table 4 below;

Tabel 3. *Growth rate and digestibility during maintenance.*

Parameter	Treatments				
	A (0%)	B (10%)	C (20%)	D (30%)	E (40%)
SR (%)	100±0[a]	100±0[a]	100±0[a]	100±0[a]	100±0[a]
SGR (%BW/ day)	1,25 ±0,07[b]	1,56 ±0,03[c]	1,33 ±0,05[b]	1,27 ±0,08[b]	0,94 ±0,06[a]
FCR (g/g)	2,06 ±0,13[b]	1,61 ±0,03[c]	1,92 ±0,09[b]	2,02 ±0,13[b]	2,77 ±0,19[a]
Digestibility (%)	74,30 ±1,41[b]	79,46 ±0,53[c]	75,30 ±0,59[b]	74,90 ±0,52[b]	70,67 ±0,93[a]

From the table above results showed that the substitution of feed containing 10% Hydrilla verticillata fermented meal in feed formulation delivered value The specific growth rate (SGR) high of 1.56 ± 0.03 compared with other treatments. Handajani (2011), food has good nutrition and appropriate to the nutritional needs of fish can accelerate the growth rate. The nutritional quality of feed given Hydrilla verticillata fermented meal will be increased so that the feed is easily digested and increase the growth rate of fish. Feed containing 10% substitution of Hydrilla verticillata fermented mealin feed formulations also provide conversion of the feed value ratio (FCR), the highest is 1.61 ± 0.03 compared with other treatments. According to NRC (1993), the size of the conversion of the feed is influenced by several factors, among others: the quality and quantity of feed, species, size and quality of the water. Feed conversion has low value indicated a better feed utilization and feed absorbed by body used to promote growth while feed conversion of high value due to its high nutrient feed that is not utilized optimally by body or wasted because of a lack of appetite in fish. As for the value of digestibility of feed containing 10% substitution of Hydrilla verticillata fermented mealin feed formulations provided the highest digestibility value was 79.46 ± 0.53 compared with other treatments. Handajani (2011), digestibility of protein in fish influenced by the protein contained in the fish feed and the ability to digest protein in feed. Water quality was supporting parameter in this study because water is the medium of live fish. Water as a medium of live fish should always be conditioned in optimum condition during the research.

Tabel 4. *Water quality during maintenance*

Water Quality Parameter	Result	Normal	Pustaka
pH	7,7 – 7,95	5 – 9	Boyd (2004)
Temperature (^{0}C)	28 – 30	25 – 30	Boyd (2004)
DO (ppm)	6,17 – 6,57	> 4,0	Elsayed (2006)
Ammonia (ppm)	0,07 – 0,11	< 0,6	Webster and Lim (2002)

4. CONCLUSION

Hydrilla verticillata fermented substitution of 10% fish feed can increase productivity of Tilapia with the results of the absolute growth of 1.56% BW / day ± 0.03, 1.61 ± 0.03 feed conversion and digestibility of 79.46% ± 0.53.

REFERENCE

[1] Boyd, E.C. 2004. Farm Level Issuesin Aquaculture Certification. The Haworth Press: New York. 29 pp.

[2] El-Sayed, A.F.M. 2006.Tilapia culture is salt water: enviromentalre quirement nutritional implicationand economic potentials. Jurnal Aquaculture. 970(694) : 95-106. ISBN : 979-587-395-4

[3] Handajani. 2011. Optimalisasi substitusi tepung azolla terfermentasi pada pakan ikan untuk meningkatkan produktifitas ikan nila gift. Jurnal Akuakltur Indonesia.12 (2) : 177-181.

[4] KKP (Kementrian Kelautan dan Perikanan). 2014. Kelautan dan Perikanan dalam Angka 2014. Kementrian Kelautan dan Perikanan. DJPB: Jakarta. 212 hlm.

[5] Uktolseja, Jacob L.A. Nurwijayadi dan Sunar Wibowo. 2013. Campuran Tepung Hidrila (Hydrilla verticillata, (L.f) Royle) Terfermentasi Mikroba Biofad dan Tepung Udang Rebon Air Tawar (Caridina laevis, Heller) sebagai Pengganti Tepung Ikan untuk Pakan Katak Lembu (Rana catesbeina, Shaw. Konferensi Akuakultur Indonesia 2013

[6] NRC (National Reaseach Counsil). 1993. Nutrient Requirement of Fish. National Academy Press: Washington D.C. 124pp.

[7] Webster, C.D. and Lim C. 2002. Nutrient Requirementsand Feeding of Finfish for Aquaculture.The Haworth Press: New York. 364pp.