ISSN 2250-3153

The Effect Of Different Doses Snails As A Source Of Protein Feed On The Growth And Eel Fish Survival *(Anguilla sp.)*

Andi Puspa Sari Idris*, Achmar Mallawa, Haryati***, Edison Saade*****

*Andi Puspa Sari Idris. *Doctorate Programme of Agricultural Sciences, Postgraduate, Hasanuddin University*, Makassar Indonesia.
**Achmar Mallawa, *Faculty of Marine* Science and *Fishery, Hasanuddin University*, Makassar Indonesia
***Haryati , *Faculty of Marine* Science and *Fishery, Hasanuddin*, Makassar Indonesia
****Edison Saade, *Faculty of Marine* Science and *Fishery, Hasanuddin*, Makassar Indonesia

Abstract: This study aims to determine the effect of the use of snails as a source of protein on the growth of eels and feed FCR values. The study lasted for 6 months in rearing eel in State Agricultural Polytechnic Pangkep. The study design used a completely randomized design and consists of three treatments and three replications that treatment A 100% 0% fish meal and snails; treatment B 75% fishmeal and 25% snails; and C 50% fishmeal and 50% snails. Fish samples used are eel with sizes ranging from 20-30 g weight were maintained at a density of 20 fish per tub. Variables measured covers growth, survival rate and FCR. The data collected are then analyzed by analysis of variance. The results showed that all treatments in this study provide a 100% survival rate. The highest growth was obtained in treatment C (50% fishmeal and 50% snails), followed by treatment B (75% fishmeal and 25% snails) and treatment A (100% and 0% fish meal snails). Instead highest feed FCR values obtained in treatment A, following treatment B and treatment C.

Index Term: *Snails, eels, feeding, growth, and survival*

I. INTRODUCTION

Eel fish farming has grown in several regions in Indonesia, including South Sulawei. Eel (*Anguilla bicolor*) it serves as the type of fish that have high economic value and the export of fishery commodities (Purwanto, 2007).

Problems faced by farmers include eel relatively slow growth (size of 600-800 g consumption reached within 16-18 months) (Tanaka, 2006). Eel aquaculture production rate is determined by the rate of growth and survival of fish (Handoyo, *et al*., 2012). Eel is purely carnivorous fish that require another form of feed animals (Matsui, 1970). In the spur growth, high-protein feeding is one alternative.

Until now, the main protein source and the best in the production of artificial fish feed is fish meal. The problem is the availability of fish meal fluctuate and the price is relatively expensive, it is because Indonesia is still importing fish meal (Director General of the Ministry of Maritime Affairs and Fisheries, 2010). Therefore, it is necessary to find a new protein source material that has the quality and quantity as well as fish meal. To replace fish meal must have requirements that are high in protein, have similar amino acid fishmeal, abundant and cheaper than fish meal. According Suprayudi (2010), a condition that must be met as a raw material is fish contain nutrients needed for growth, not compete with humans, abundance, and does not contain a material hazard.

Eel is a group of farmed fish belonging to carnivorous fish. This fish group using fish meal in amounts higher than the group of herbivorous fish. One way to overcome this problem is to substitute fish meal with other protein sources that are cheaper and good quality. Alternative feed given to the fish should be of good quality according to the needs of fish, is available at all times, and it's cheap (Suprayudi 2010).

II. RESEARCH PURPOSES

This study aims to determine the effect of the use of snails as a source of protein to the growth of eels and feed FCR values.

III. RESEARCH METHOD

The study lasted for 6 months ie November 2013 to May 2014 in a rearing eel in State Agricultural Polytechnic Pangkep. Manufacture of feed, feed nutrient content analysis carried out in the State Agricultural Polytechnic Pangkep. The study design used a completely randomized design and consists of three treatments and three replications that treatment A 100% 0% fish meal and snails; treatment B 75% fishmeal and 25% snails; and C 50% fishmeal and 50% snails.

Fish samples used are eel with sizes ranging from 20-30 g weight were obtained from the district of Poso, Central Sulawesi. Test fish reared at a density of 20 fish per tub. Container maintenance using 15 fiber tub with a volume of 1 ton which is equipped with aeration and water circulation system. The fish were sampled adapted for 10 days before being given a test feed.

During the maintenance period fish were fed according to treatment and were satisfied (at satiation) twice a day is at 06.00, and 18.00. Weight measurements performed at the beginning and end of the study. At the time of weighing, the fish first anesthetized using 2-phenoxy ethanol 0.5 mg / liter to reduce the stress on the fish. Before weighing is done, the fish first fasted for 24 hours. Weight measurement is performed to determine the growth rate of growth measured by using the formula (Huisman,1976) :

$$\alpha = \left(\sqrt{\frac{Wt}{Wo}} - 1 \right) x\ 100\%$$

Remarks:
α = Daily growth rate (%)
t = experiment time (day)
W_t = The mean weight of the individual at the end of the experiment (g)
W_0 = The mean weight of the individual at the beginning of the experiment (g)

Survival rate is calculated based on the equation (Effendie, 2002) :

$$SR = \frac{N_t}{N_o} \times 100\%$$

Remarks :
SR = The survival of fish
N_t = The number of fish at the end of experiment
N_0 = The number of fish in the early experiment

The amount of feed given during the study was calculated to determine the level of feed intake (FCR) using the formula proposed by the NRC (1983) as follows :

$$FCR = \frac{F}{(W_t + D) - W_o)}$$

Remarks :
FCR = Feed conversion
F = Weight of feed given during the experiment (g)
Wt = The weight of the fish at the end of the study (g)
Wo = The weight of the fish at the start of the study (g)
D = Total weight of fish that died during the study (g)

IV. RESULTS AND DISCUSSION

Growth

The results showed the highest growth was obtained in treatment C (50% fishmeal and 50% snails) which is an average of 913.44 after treatment B (75% fishmeal and 25% snails) and final treatment A (100% flour 0% fish and snails). This suggests that higher doses of snails as a protein source providing the best growth compared with lower doses and without snails (Table 1). Lovel (1989) mentions the growth or formation of new tissue most affected by the energy balance of protein and protein feed.

Table 1. Growth of fish eel during the study (g)

Time Measurement	A	B	C
1	764,48	784,90	840,21
2	843,05	874,38	931,92
3	849,37	899,97	968,18
Average	818,97	853,08	913,44

The high growth rate in treatment C eel allegedly caused by the high content of protein feed, which serves as a building block of proteins that form new tissue for growth, replacement of damaged tissues, reproduction, as regulators in the formation of enzymes and hormones as well as guards and regulatory processes metabolism in the body and serves as oxygen for carbon element therein can be used as a source of energy when energy needs are not met by carbohydrates and fats (Sahwan, 2003).

Protein feed can be used efficiently for the formation of new tissue and fat while karbihidrat used as an energy source (Mahi, 2000). Shimeno *et al*., (1995) stated that the increase in energy due to the use of the fat feed the more will hit the catabolism of amino acids so that less amino acids are used as an energy source. While Nematipour *et al*., (1992) stated the high energy in the feed led to the accumulation or high fat deposits in the body of the fish anyway. The high accumulation of fat in the fish's body is expected to affect the metabolism of amino acids (Lovell, 1989).

Survival

In this study the survival rate obtained was 100% for all treatments, treatment treatment A (100% and 0% fish meal snails), treatment B (75% fishmeal and 25% snails) and treatment C (50% fish meal and 50% snails).

This is presumably due to the quality and quantity of feed given enough to sustain the basic needs of the fish and the environment is well preserved during maintenance (Sabariah, 2010).

Food Convertion Ratio (FCR)

FCR values associated with the parameters of the successful management of eel feeding program also indirectly related to the management of water quality and condition / quality eel. While the financial value of FCR will affect the level of profits in a period of cultivation because of eel feed is the largest contributor to the cost in an eel farming.

The results showed that feeding on the morning of FCR value lower than feeding at night for all treatments. Furthermore, the lowest FCR values obtained in treatment A (100% and 0% fish meal snails) by an average of 3.75, followed by treatment B (75% fishmeal and 25% snails) average of 4.17 and FCR highest in treatment C (50% fishmeal and 50% snails) by an average of 4.32.

Sarwono (2003) states that the highest eel feeding activity occurs at night because it is nocturnal. Protein is a nutrient that is essential for normal tissue function, for body maintenance, replacement of body tissues are damaged and for growth. Fish protein needs are influenced by various factors such as fish size, water temperature, feeding rate, quantity and quality of natural food, feed energy content and quality of protein (Watanabe, 1988).

Table 2. Value Food Convertion Ratio (FCR)

Treatment	Morning	Night	Average
A	3,34	4,17	3,75
B	3,55	4,79	4,17
C	3,67	4,97	4,32

The high feed intake indicates the more protein feed consumed, causing excess protein in the body. Excess protein is thought to stimulate the metabolic system eels to synthesize proteins in the body into ammonia. The more proteins are synthesized by the body, the more energy is used (Yudiarto et al., 2007). This leads to a protein that should be saved will more be converted into energy to synthesize excess protein into ammonia. This is in line with the results Prawesti (2011) which states that excess protein will feed catabolized which eventually excreted into ammonia. According to Lan and Pan (1993) when the excess protein in the feed, the fish will experience 'excessive protein syndrome', so that the protein is not used for growth but will be disposed of in the form of ammonia.

It is indicated that the energy content of the feed consumed mostly from protein causing the stored energy should however be used to help synthesize excess protein in the body. This is in line with the opinions Prawesti (2011) which states that the more protein catabolized it will increase the energy to oxidize excess amino acids that will ultimately improve the ammonia produced. Villee and Barnes (1988) in Prawesti (2011) also states that the stored energy is used in the synthesis of cell components and used as fuel in the production of cellular energy.

V. CONCLUSION

The results showed that all treatments in this study provide a 100% survival rate. The highest growth was obtained in treatment C (50% fishmeal and 50% snails), followed by treatment B (75% fishmeal and 25% snails) and treatment A (100% and 0% fish meal snails). Instead highest feed FCR values obtained in treatment A, following treatment B and treatment C.

REFERENCES

1. Effendi, M. I. 2002. Fisheries Biology. Nusatama Library Foundation, Yogyakarta. 163 p.

2. Dirtjen P2HP-CTF, 2010. Striving for Export. forum.pusjui.dkp.or.id/.../252- demand -ikan-sidat-

3. Handoyo, B., Alumuddin., N. B. P. Utamo. 2012. Growth, Feed Conversion and Retention, and Proximate body BenihIkan eels were given recombinant growth hormone Giant grouper fish by immersion. Indonesian Aquaculture Journal 11 (2), 132-140.

4. Huisman, E. A. 1976. Food Convertion Efficiencies Manitenance and Production Level for Carp (*Cyprinus carpio* L) and Rainbow trout (*Salmo gairdneri* R) Aquaculture 9 : 259-273

5. Lan, C.C. dan B.S. Pan. 1993. Invitro Ability Stimulating The Proteolysis of Feed Protein in The Midgut Gland of Grass Shrimp (*Pennaeus monodon). Aqua-culture* 109:59-70.

6. Lovell, R. T. 1090. Nutrition and Feeding of Fish. Van Nostrand Reinhold, New York. P. 11-91.

7. Mahi, I. I. 2000. Pengaruh kadar protein dan imbangan energi protein pakan berbeda terhadap retensi protein dan pertumbuhan benih ikan sidat (*Anguilla bicolor bicolor*). Program Pascasarjana Instutut Pertanian Bogor. Bogor.

8. Matsui, l. 1970. Theory and practice of eel culture. Ameriind Publishing Co.PVT. Ltd. 132p.

9. Nematipour, G. R., M. L. Brown and D. M. Gatin III. 1992. Effect of Dietary Energy protein ratio on Growth Charasteristics and Body Composition of Hybrid Sriped Bass, Morone Chrysops x M. Saxatilis. Aquaculture, 107: 359-368.

10. NRC. 1983. Nutrient requirements of domestic animals. Nutrient requirements of warm water fihes and shellfishes. National research council, national academic press, washington, DC. 102 pp.

11. Prawesti, M. 2011. pemberian kombinasi pakan buatan dan pakan alami berupa cacing sutera (*Tubifex tubifex*) dengan persentase yang berbeda terhadap retensi protein, lemak dan energi pada ikan sidat (*Anguilla bicolor*). Program Studi Budidaya Perairan. Fakultas perikanan dan Kelautan Universitas Airlangga. Surabaya. 63 Hal.

12. Purwanto, J. 2007. Pemeliharaan Benih Ikan Sidat (*Anguilla bicolor*)dengan Padat Tebar yang Berbeda. Balai Besar Pengembangan Budidaya Air Tawar. Sukabumi. Bul. Tek Lit. Akuakultur Vol. 6 No.2 Tahun 2007.

13. Sabariah. 2010. Selection of probiotic bacteria from the digestive tract to improve fish growth performance Leptobarbus hoevenii (*Leptobarbus hoeveni* Blkr). Thesis. Graduate School of IPB, Bogor.

14. Shimeno, S., D. Kheyyali and T. Shikata. 1995. Metabolic Response to Dietary Lipid to Protein Ratics in Common Carp. Fiheries Science, 61 (6) : 977-980

15. Sahwan, FS 2003. Fish and Shrimp Feed: Formulation, Manufacturing, Economic Analysis. Spreader Organization. Jakarta

16. Sarwono, B. 2003. Raising eels and eel revised edition. PT.Penebar Organization: Jakarta. It 18-73

17. Suprayudi, MA 2010. Local Raw Materials: Challenges and Future Expectations Aquaculture. Abstract. National Symposium on Biotechnology Aquaculture III. IPB International Convention Center, Bogor, October 2010. p. 31

18. Tanaka, H. 2006. Development of Artificial fry Production Technology of Japanese eel (Special Article). Farming Japan 40:26-30

19. Watanabe,T. 1988. Fish Nutrition and Mariculture. Department of Aquatic Bio-sciences, Tokyo University of Fisheries. JICA, 233p.

20. Yudiarto, S., M. Arief., and Agustono. 2012. Effects Of Addition Different Attractants In Pasta Feed Against Retention Of Protein, Fat And Energy Eel Fish Seed (Anguilla Bicolor) Stadia *Elver*. Scientific Journal of Fisheries and Marine Vol 4 No. 2 November 2012.

AUTHORS

First Author : Andi Puspa Sari Idris, Doctorate Programme of Agricultural Sciences, Postgraduate, Hasanuddin University, Makassar. State Agricultural Polytechnic Pangkep.
Email : andipuspa_sariidris@yahoo.co.id
Second Author : Achmar Mallawa, *Faculty of Marine* Science and *Fishery*, *Hasanuddin*, Makassar Indonesia
Third Author : Haryati , *Faculty of Marine* Science and *Fishery*, *Hasanuddin*, Makassar Indonesia
Four Author : Edison Saade, *Faculty of Marine* Science and *Fishery*, *Hasanuddin*, Makassar Indonesia