EVALUATION OF THE NUTRITIONAL CONTENT OF BIOSLURRY AS A FERTILIZER FOR SOME NATURAL FEED

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ABSTRACT

Natural food is the initial food for the life of cultivated fish, shrimp and shellfish larvae, because it has good nutritional content for seed growth. Natural feeds that are often used in fish farming are Artemia sp., Daphnia sp., Spirulina sp., Chlorella sp., Chaetocheros, Tertraselmis and Tubifex sp.. The advantage of natural feed is that it has a size that fits the mouth opening of the fish fry. The growth of natural feed requires nutrient content consisting of macro and micro nutrient content. Utilization of biogas waste produced from animal husbandry can be used as fertilizer for natural feed culture activities. The nutritional content contained in bioslurry is able to meet the needs of natural feed for its growth. The purpose of this study is to determine the benefits of bioslurry nutritional content that can be used in natural feed cultivation. The method used is the study of literature. The results obtained are that the application of bioslurry fertilizer in natural feed culture is proven to increase the productivity of cultivated natural feed. The use of bioslurry fertilizer in natural feed cultivation such as Chaetoceros gracilis, at a dose of 19 ml resulted in the highest density of 73 × 104, besides that the use of bioslurry in Daphnia sp. The optimal concentration obtained was 3.06 gr/L. Evaluation of the nutritional content of bioslurry in natural feed cultivation can be a recommendation for farmers to carry out natural feed cultivation by utilizing biogas waste, as well as the nutrient content contained in bioslurry that is suitable for the needs of natural feed cultivation.

Keyword : - *Bioslurry, Natural Feed, Nutrient Content, Cultivation*

1. INTRODUCTION

The high demand for fish encourages cultivators to increase fish production. One of the important factors in aquaculture activities is natural food to support the nutritional and calorie needs of fish, especially the seed phase (Boroh et al., 2019). The problem often faced by fish and shrimp farmers is the mortality rate of larvae (Rosyadi et al., 2021). To deal with this problem, the availability of natural food must be adequate with the right and continuous culture time. Availability of feed is important in aquaculture, namely for the maintenance of larvae which play a role in growth, survival, and disease resistance in the early development of fish larvae (Sontakke et al., 2019). Natural food, namely organisms that live and are maintained in shapes and conditions similar to conditions in nature and are used as feed in the process of aquaculture (Sartika et al., 2021). Natural food is available in aquatic environments with various types such as zooplankton and phytoplankton (Kaseger et al., 2019). Natural feed contains good nutrients such as proteins, lipids, carbohydrates, vitamins, minerals, amino acids, fatty acids, and carotenoids (Simhachalam et al., 2015). Natural food has criteria, namely having high nutritional value, non-toxicity and cell walls that are easily digested to obtain available nutrients (Hemaiswarya et al., 2011). In its growth, natural food requires nutrient content consisting of macro and micro nutrient content. The nutrients contained in cow manure are 0.11% phosphorus, 0.13% potassium, 0.33% nitrogen and 0.26% calcium. Organic fertilizers have good micronutrients for plant growth (Indriyani et al., 2022). Bioslurry is an organic material that is anaerobic as a by-product of the biogas process derived from cow dung. Through a series of anaerobic processes or fermentation in a biogas digester. The residue from the fermentation comes out as sludge or in the form of a slurry and is called

bioslurry (Kabir et al., 2017). Biogas is a great opportunity as a renewable energy which has great potential coming from household waste, manure from chicken, cow, pig farms, as well as organic waste, the food industry, and others. There are many benefits to be gained from using biogas, namely the use of methane gas which can be used as fuel for cooking and saving the use of LPG gas (Mishra & Singh, 2015);(Wang et al., 2014). There are many studies regarding the use of bioslurry as a fertilizer used in natural feed cultivation. The purpose of this study is to determine the benefits of bioslurry nutritional content that can be used in natural feed cultivation.

2. RISEARCH METHOD

The method used is a literature study related to the nutritional content of bioslurry in natural feed cultivation which is relevant to the keywords nutritional content, bioslurry, natural feed, cultivation, from various sources such as: Google Scholar, Elsevier, Springer and Research Gate.

3. RISULT AND DISCUSSION

3.1 Natural Feed in Cultivation

Indonesia is one of the largest producing countries in the field of fisheries. Fishery products in Indonesia are fresh water fish, brackish water and sea water. Freshwater fish farming contributes up to 1.1 million tons of fish production, the rest is contributed by fish production from ponds and the sea (Rihi, 2019). In cultivation activities, natural feeding is generally given to the seed phase. The nutritional content of natural feed is better than commercial feed (Taufiqurahman et al., 2017). In addition, the advantage of natural food is that it has a size that fits the mouth opening of the fish fry (Raharjo et al., 2015). An important factor in fish farming is feed, because feed determines the success of fish farming in the process of growth, development and increasing the body's resistance to fish (Maloho et al., 2016). Natural food is very necessary in fish farming, especially in the hatchery phase, because it can support the survival of fish seeds. Commonly used natural feeds include zooplankton, phytoplankton and benthos (Chumadi et al., 2004). Providing natural food for fish aims to get added value and increase crop yields, without feeding the yields obtained are limited. The process of cultivating fish in the seed phase requires feed to meet nutritional needs and to increase the growth of fish seeds that are ready for sale (Madinawati et al., 2011). Growth in the seed phase is determined by brood quality, egg quality, water quality and the ratio between the amount of food and the density of fish seeds (Rihi, 2019). Seed survival can be maintained by meeting the nutritional needs of the seeds from the food provided. The food given to fish is used in the growth process (Effendi, 2003). Fish feed is divided into two types, namely natural feed and artificial feed. Natural feed is good feed if used in aquaculture activities because it contains good nutrients for the growth of fish fry (Boroh et al., 2019). Feed is a source of energy used to meet the survival and growth of fish, and one of the biggest components in aquaculture is 50-70% of production costs (Yanuar, 2017). The purpose of feeding is to increase seed growth as well as added value. In cultivation activities, if the feeding is not appropriate, it will reduce crop yields. Absolute feeding if fish farming activities are intensive at high densities (Akbar, 2016). The main function of natural food is for survival and growth in fish fry. Utilization of the feed provided by the first fish is used for survival and the excess is used for growth. If the growth of the fish seed is optimal, the feed given must contain sufficient nutrition (Djajasewaka, 1985).

3.2 Nutritional Content of Natural Feed

Natural feed is one of the factors whose availability is very important in the food chain in fish farming activities, especially the seed phase. As a source of energy for the growth and survival of fish, natural food contains nutritional value (Chumadi et al., 2004; Isnansetyo, 1995; Gusrina, 2008)

Table -1: Nutritional content of natural feed

Types of Natural Feed	Nutrient content (%)				
	Water content	Proteins	Fat	Coarse Fiber	Ash content
Spirulina	5.00	55.00	6.00	2.00	6.00
Chlorella	-	30.00	15.00	-	15.00

Skeletonema	-	24.70	2.60	-	51.80
Chaetoceros	-	35.00	6.90	-	28.00
Tetraselmis	-	49.10	10.70	-	19.10
Brachionus	85.70	8.60	4.50	-	0.70
Moina	90.60	37.38	13.29	-	11.00
Daphnia	94.78	42.65	8.00	2.58	4.00

3.3 Types of Natural Feed

Natural feeds that are often used in fish farming are *Artemia* sp., *Daphnia* sp., *Spirulina* sp., *Chlorella* sp., *Chaetocheros*, *Tertraselmis* and *Tubifex* sp. (Akhyar & Hasri, 2016). Giving *artemia* to the growth of perus fish larvae (*Osteochilus* sp.) is more proliferative compared to giving natural food *Daphnia* sp., *Tubifex* sp., and *Infusoria* (Taufiqurahman et al., 2017). Feeding *Daphnia* sp. can increase the growth of parrot fish (*Anabas testudinieus*) which is better than *Artemia* sp. and *Tubifex* sp. (Esron & Sukendi, 2015). The following **Table -2** spesies natural feed that is commonly used as fish seed feed (Martosudarmo & Sabaruddin, 1980).

Table -2: Common natural feed used as fish feed

Spesies	type	Average Size (μ)
Skelotenema costatum	Diatom	15
Phaeodactylum tricornutum	Diatom	20-25
Cyclotella nana	Diatom	6-10
Monbechrysis lutheri	Flagellata	7
Chaetoceros calcitrans	Diatom	4
Chlorella sp	Alga biru	3-8
Tetraselmis chuii	Alga hijau	7-12
Nitzshia closterium	Diatom	20-4
Nannochloris sp	Alga hijau	8
Erachionus plicatilis	Rotifera	60-80
Diaphanosoma sp	Kladocera	400-800
Moina sp	Kladocera	500-1.000
Daphnia sp	Kladocera	1.000-5.000
Tigriopus sp	Kladocera	900-1.400

3.4 Bioslurry Fertilizer

The results of this biogas waste (Figure 1.) can be used as a substitute for NPK fertilizer containing organic matter and assisting in the process of plant growth, because the content of this biogas waste is CO2 and methane. The biogas reactor produced in bioslurry is liquid and tends to be semi-solid. Its characteristics are clay and sticky texture, odorless, green in color which tends to be dark and does not contain gas (Singgih & Yusmiati, 2018). The abundance of biogas production activities can be utilized to increase bioslurry production. The final process of fermentation in this closed space produces bioslurry. The content of bioslurry Table 3. is determined by the handling activities during the process, both input and output (Syaflan, 2018). Bioslurry contains hydrolase enzymes, organic acids, amino acids, B vitamins and antibiotics. Another advantage of bioslurry is that it contains many microbes such as cellulotic microbes which function to break down cellulose, nitrogen microbes as providers of nitrogen needs for plants and phosphate microbes (Syaflan & Ngatirah, 2016). Biogas waste can be directly used by spraying it into the plants. The use of bioslurry fertilizer does not need to add other ingredients or carry out fermentation (Indriyani et al., 2022). The use of bioslurry as fertilizer can stimulate the growth of bacteria, phytoplankton and zooplankton better than unfermented cow dung (Fallahi et al., 2013). Bioslurry contains organic matter **Table -3** (Syaflan & Ngatirah, 2016). and "probiotic" microbes which help in fertilizing the land and adding nutrients and controlling diseases in the soil. The soil becomes more fertile and healthier so that the productivity of plants is better. Microbes contained in bioslurry include:

- Cellolytic microbes which are useful for composting,
- Nitrogen-fixing microbes that are useful for taking and providing Nitrogen from the atmosphere,
- Phosphate dissolving microbes that are useful for dissolving and providing Phosphorus which is ready to absorb and
- Microbes Lactobacillus sp which play a role in controlling soil borne disease attacks

Table -3: Nutrient content of Bioslurry

Parameter	Unit	Liquid *Slurry*	Solid *Slurry*
C/N		55.64	9.34
C-Organic	%	1.67	2.99
Ca	%	0.17	0.11
Cu	ppm	0.59	1.78
Fe	ppm	15.74	134.95
K_2O	%	0.33	0.41
Mg	%	0.01	0.04
Mn	ppm	0.40	14.44
N	%	0.03	0.32
P_2O_5	%	0.02	0.06
Zn	ppm	0.79	13.19

3.5 Productivity of Bioslurry in Various Natural Feed Cultivations

Various studies have been conducted to explore bioslurry fertilizers that can be used in natural feed cultivation. The following are the results of the literature on bioslurry productivity in various natural feed cultivations.

Table -4: Productivity of bioslurry in various natural feed cultivation

Type	Treatment	Results	Reference
Chaetoceros gracilis,	Biogas Liquid Waste Concentration 0 ml/L, 3 ml/L,7 ml/L, 11 ml/L, 15 ml/L, 19 ml/L	The treatment of giving biogas liquid waste (slurry) had a very significantly different effect on the abundance of *Chaetoceros gracilis*, the highest population abundance was obtained in treatment E (19 ml/L) which was 73 x 10^4 cells/ml which was the best treatment	(Suweni, 2016)
Tetraselmis chuii	The treatments used were 1.0 ml/L, 3.0 ml/L, 5.0 ml/L, 7.0 ml/L and 9.0 ml/L	The dose treatment of bio-gas waste liquid fertilizer has a very significant effect on the growth of the *Tetraselmis chuii* population both at the 0.05 level (95% confidence level) the highest relative growth rate is found in treatment E = 9.0 ml/L, namely 0.707.104 cells/ml.	(Wilis, 2012)
Daphnia sp.	The treatments given were chicken manure 2.5gr/L as a control, bioslurry 2.5 gr/L, 2.75 gr/L, 3gr/L and 3.25 gr/L	The results showed that the optimum concentration of bioslurry as feed for *daphnia* was 3.06 gr/L for growth rate and 3.25 for reproduction rate.	(Puspitasari, 2022)
Spirulina Platensis	Addition of biogas liquid waste with concentrations of 0 ml/L, 18 ml/L, 31 ml/L, and 44 ml/L	The total population of *spirulina platensis* to the treatment of addition of biogas liquid waste (slurry) was highly significant. the highest population was in the 31 ml/L treatment of 53.1+12 x 104 ind/ml with a growth rate of 0.041/day	(Noucana, 2014)

4. CONCLUSIONS

Based on the results obtained from various literature regarding the evaluation of the nutritional content of bioslurry in natural feed cultivation, it can be a recommendation for farmers to carry out natural feed cultivation by utilizing biogas waste, as well as the nutrient content contained in bioslurry which is suitable for the needs of natural feed cultivation.

5. ACKNOWLEDGEMENT

The author would like to thank many parties who have helped the author in completing writing this journal. On this occasion the author would like to thank Dr. Yuli Andriani, S.Pi., MP. as chairman of the supervising commission, Prof. Dr. Ir. Zahidah, M.S. as supervisor and Fittrie Meyllianawaty Pratiwy, S.Pi., M.Sc, M.IL, Ph.D. as a reviewing lecturer.

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