

Feed and Feeding Management of Eel (*Anguilla bicolor*) at PT Unagi Jogja

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ABSTRACT

Anguilla bicolor or eel is a commodity that have very high demand in the global market. Eel production has increased every year the year. Feed is a very influential factor in the cultivation of eel. Sufficient feed will help growth and immunity disease or parasites, and the quality of eel meat, as well as the taste of eel meat. Good condition of feed for eel that is still fresh and comes from fish or crustaceans. Feed in cultivation of eel have form pasta feed. The purpose of implementing this field work practice is to study feed and feeding management activities on growing of eel and knowing the obstacles during the eel cultivation period at PT UNAGI JOGJA. PKL activities were carried out on January 2024 until February 2024 at PT UNAGI JOGJA, Yogyakarta. Data collection method carried out during field work practice activities, namely the direct interview method and direct observation. Feed management activities include, container preparation, monitoring cultivation water, feeding frequency, feed dosage, and growth performance of eel. Water quality is measured every day at 07:00 WIB and 16:00 WIB. Feed is given twice a day at 07:15 WIB and 17:00 WIB. The results of data analysis obtained ABW, FCR, SGR, and SR in first pond were respectively 32.03 g, -1.08, -2.42%/day, and 86.16% which this means that first pond has decrease in weight. Second pond has value ABW, FCR, SGR, and SR respectively 84.98 g, 0.59, 2.86 %/day, and 92.75% which it can be interpreted that second pond is experiencing very rapid growth.

Keywords: Feed, Eel, Cultivation, Management.

INTRODUCTION

Eel (*Anguilla bicolor*) or in Indonesia we call it “Sidad” or in Japan they called “Unagi” is fish product that have high price in international market. Japan is a country with the largest market demand for eel at 120,000 tons/year, while the production of eel in Japan is only 21,800 tons. Indonesia can only meet 500 tons per month or 6,000 tons per year (1). Unagi can have price rate from 700,000 until 900,000 IDR/kg. With that price, Unagi have high potential to be export.

The eel is classified as a catadromous fish, hatching in marine environments and subsequently migrating to freshwater during the elver stage (pre-juvenile) until reaching adulthood (2). The growth rate of the eel is relatively slow, primarily due to low digestibility. Additionally, the availability of eel larvae is limited by their migratory behavior, as they return to saltwater for spawning. Eel larvae typically enter river estuaries at night,

aligning with high tides and decreased salinity levels (3).

Eel production in Indonesia mostly produce by catch from nature. The abundance of eel in nature will be decreased and the condition at IUCN Red List is at nearly threatened. To address this issue, cultivation represents a preventive strategy aimed at reducing the capture of eels from natural habitats. But we cannot have cultivation from spawning, in case of cultivation we now can only enlargement the nature catches of Unagi. The enlargement of Unagi have problems mostly in feed cost, because Unagi feed has high price to purchased. Making feed formulation from local ingredients can be solution. Making pasta feed does not use complicated technology because it is made by hand, so the cost of producing feed depends on the ingredients used. Local ingredients have low price, therefore production cost can be low (12).

MATERIAL AND METHODS

Research held at Januari until February 2024 at Unagi Jogja Company in Jogjakarta. The research data obtained from Field Work Practice in Unagi Jogja Company. Data collection consist of observation and directly interview while Field Work Practice go on. The Samples consist of two pond that has different size of eel and two different of feed formulation. First pond has small size average 50 gram weight. Second pond has bigger size average 80 gram weight. Data analysis for this research used descriptive that explain the effect of different feed formulation on enlargement of eel on the growth performance and survival rate. Feeding of eel using at satiation method with two times frequency of feeding. The first feeding in the morning between 6:00-8:00 WIB and in the afternoon between 16:00-18:00 WIB.

RESULT

Feed formulation at Unagi Jogja Company was have not liked by eel. Unagi Jogja's Feed formulation not liked by eel, because the ingredients have no fishy smell. The formulation consists of cornstarch, soy bean flour, and unidentified flour. The unidentified flour has few of protein, because eel have no appetite for eat the feed and the flour is have no fishy smell. New feed formulation be form by fish meal, Fengli Flour, cornstarch, Soybean flour, and adhesive. Quantity of the ingredients determined by cheapest feed formulation and most liked by eel.

Table 1. Composition of local ingredients for feed formulation

Ingredients	Composition	Protein
Fish meal	55	60 ^a
Fengli flour	20	40 ^b
Cornstarch	5	10 ^c
Soybean flour	5	44 ^d
Adhesive	15	-

^a(4), ^b(5), ^c(6), ^d(7).

Table 2. Proximate analysis feed formulation

Nutrients	Composition	Standard*
Protein	26.22%	>40%
Fengli flour	4.95%	>7%
Cornstarch	7.76%	<4%
Soybean flour	8.80%	<12%
Adhesive	15.93%	<13%

Source: * = SNI 01-4413-2006 (8)

The nutrient levels obtained from sample tests are inadequately low and non-compliant with established standards. This is postulated to result from the proximate calculations in the laboratory, which exhibit diminished accuracy due to incongruence with the flour content incorporated in the feed formulation, specifically fish meal containing 60% protein and fengli flour containing 30-40% protein. According to the formulation, the total protein content in the feed should range between 40-50%.

Table 3. Growth performance of eel

Parameters	First Pond		Second Pond	
	BF	AF	BF	AF
SGR (%/d)	2.11	-2.42	0.13	2.86
FI (g)	1535	2395	4295	5925
SR (%)	96.25	86.16	98.35	92.74
ABW (g)	58.25	32.03	85.00	84.97
ADG (g)	85.50	-11.84	13.50	623.85
FCR	1.60	-1.07	15.62	0.59

BF = before formulation, AF = after formulation, SGR = Specific Growth Rate, FI = feed intake, SR = survival rate, ABW = average body weight, ADG = average daily growth, FCR= feed conversion ratio.

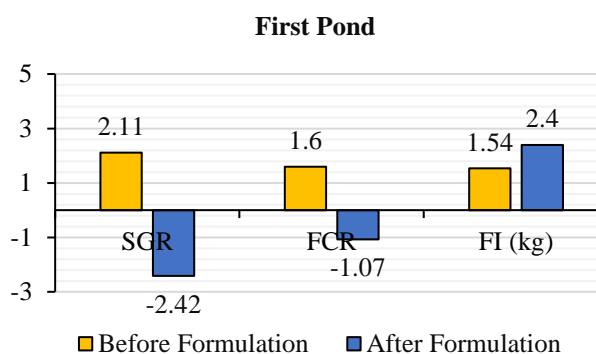


Figure 1. Growth Performance of Eel at First Pond

Growth performance of first pond have good value while before formulation, but after formulation have negative value of growth performance. After formulation, first pond has negative result, because have lot diseased of eel and mortality was increased. Negative value at after formulation caused by a lot of eels was diseased, therefore eels did not utilize the feed for growth and focuses on treating diseases in the body.

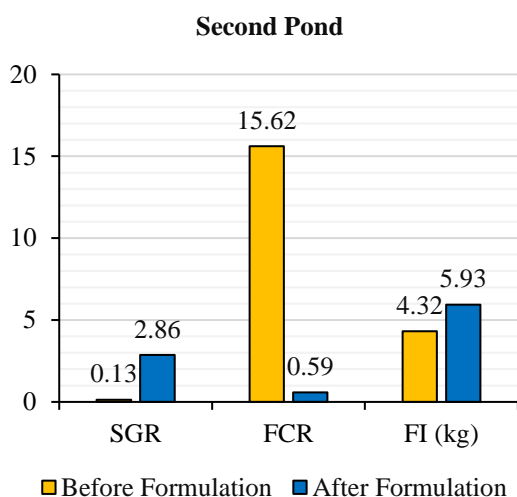


Figure 2. Growth Performance of Eel at Second Pond

The opposite of first pond, second pond have low result while before formulation and after formulation get good result. High feed conversion ratio at before formulation caused by feed that given was not digested well by eel. Before formulation, the feed has few of nutrient therefore eel do not have more nutrients for growth.

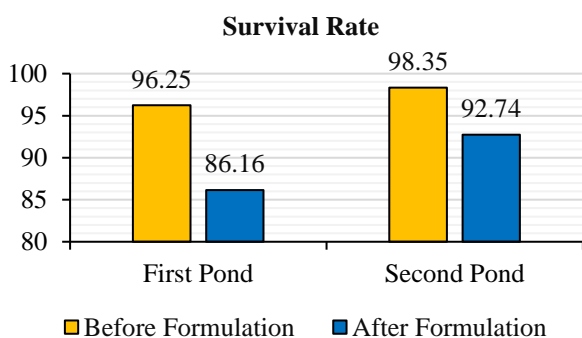


Figure 3. Survival Rate of Eel

Survival rate value of first pond have good result while before formulation, but after formulation was decreasing because a lot eel was diseased. Second pond have high survival rate, but also decreasing while after formulation.

DISCUSSION

The SGR value of first pond during the before feed formulation was calculated to be 2.11%, accompanied by an average body weight (ABW) of 58.246 g, categorizing this result as favorable. This is further corroborated by the FCR value of 1.6. However, a decline in both SGR and average weight was observed in the after feed formulation. This reduction can be attributed to the introduction of new eels into the maintenance pond, which were of a smaller size than those present prior to this addition. The average weight of the newly introduced eels was 31.66 g, comprising a total of 238 individuals. Consequently, the average weight at the conclusion of the maintenance period was lower than that recorded at the outset. Additionally, the new eels exhibited difficulties in consuming the provided feed, thereby impairing their growth. Compounding this issue, the older eels transmitted diseases to the newcomers, leading to a daily incidence of mortality. The diseases affecting the eels included tail rot, mouth rot, and skin peeling. The manifestation of these diseases resulted in a decrease in feeding behavior, preventing the eels from obtaining the necessary nutrients for recovery and ultimately resulting in their demise. The protein requisite for growth is derived from residual protein associated with metabolism, energy, and survival (9). Furthermore, absolute weight loss in fish may occur in the absence of external energy sources, such as feed; under such conditions, fish will deplete their stored fat reserves for sustenance. Lipid levels during

periods of fasting or when feed is not provided will be decrease (10).

Second pond exhibited suboptimal growth performance, as evidenced by specific growth rate (SGR) and feed conversion ratio (FCR) values of 0.13% per day and 15.62, respectively. This inadequate growth performance can be attributed to disease outbreaks within the pond. The identified diseases included mouth rot, tail rot, and peeling skin. Fish growth may be significantly impaired when individuals are afflicted by disease or are in the process of acclimatization to their new environment. Following the before feed formulation, the eel demonstrated markedly improved growth performance, achieving an SGR of 2.86% per day and an FCR of 0.59. This enhanced growth performance can be characterized by an increased appetite for the provided (11). Which indicate that eels exhibiting a positive response to feed typically present a lower FCR and improved growth outcomes.

CONCLUSION

In summary, feed and feeding management of eel with feed formulation can increasing the growth performance by second pond, but decreasing growth performance by first pond. Decreasing growth performance caused by diseased eel.

ACKNOWLEDGEMENT

The authors would like to thank Unagi Jogja company which is the place of research and field work practice.

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