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The use of various proportions of rough fish and pellets on the growth of giant trevally fish (*Caranx hippos*) in the east coast floating net cages (KJA Pantai timur), pangandaran

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Abstract
The aim of this research is to obtain the proportion of rough fish and pellets in fish feed that gives survival rate, daily growth rate and the best feeding efficiency to giant trevally fish (*Caranx hippos*). Aquaculture of 25 fish per net with a net size of 1.5 m x 1.5 m x 1.5 m in the East Coast floating net cages, Pangandaran and were treated with a combination of rough fish and pellets as their feed. The research method used was Completely Randomized Design (CRD) and consisted of 4 treatments and 3 replications: A (100% rough fish), B (75% rough fish: 25% pellet), C (50% rough fish: 50% pellet), and D (25% rough fish: 75% pellets). Data analysis with the F test continued with Duncan's Multiple Range Test. The results of the research showed that the provision of proportion of rough fish and pellet feed could have an effect on increasing growth rate (LPH) and feeding efficiency (EPP). Treatment A (100% trash) gave the best LPH value of 2.57%, and treatment C (50% trash: 50% pellet) gave the best value for EPP of 19.01%. For the survival of the giant trevally fish for each treatment gives a value of 100%, namely the absence of death.

Keywords: Giant trevally fish, rough fish, pellets, life sustainability, growth

1. Introduction
Pangandaran Regency has considerable marine biological potential. The condition of waters directly related to the Indian Ocean affects the oceanic characteristics of these waters. The potential of marine fish resources in Pangandaran waters should be utilized optimally to increase the income of fishermen, open jobs, increase fisheries productivity and preserve biodiversity [1].

Giant trevally fish (*Caranx sp.*) is an economically valuable marine fishery commodity. Giant trevally fish is a fish that has a bright prospect for aquaculture development because its nursery technology has been mastered. Cultivation activities in the floating net cages have developed especially in several areas such as Riau Islands, Lampung, Thousand Islands, Nusa Tenggara, Sulawesi, Maluku, North Maluku, Ambon, Papua and West Irian Jaya.

According to Irianto [2], Giant trevally fish is one type of reef fish that is very potential to be developed because it has several comparative advantages including being able to live in conditions of high density (150 fish/m2), has a high growth rate, is very responsive to the addition of rough fish feed, feed conversion is quite efficient and favored by consumers.

In fish cultivation 60-70% of production costs are used for feed cost [3]. The availability of sufficient, timely and nutritious feed is an important factor in fish farming business [4]. Excessive feeding results in leftover feed that is not eaten so that it can reduce the quality of water maintenance media, thus affecting the survival and production of fish that are cultivated [5]. If the feed given does not match the needs of the farmed fish, it will cause fish growth and production to decrease. In addition to pellets, fish can be given rough fish, which besides being cheap, also has an amino acid pattern similar to that of fish kept; it also contains digestive juices that accelerate the metabolic processes of the fish's body.

The types of rough fish that are usually given, namely fish float, petek, anchovies, selar, kuri-Kuri, Sardinella. The nutritional content of steamed rough fish in optimum temperature

condition are 50.95% protein, 7.70% fat, 17.72% ash, 4.22% fiber and 7.51% water content [6]. The availability of rough fish as the main food for giant trevally fish always fluctuates according to catching season, both in number and type [7]. The effort that can be done is to add pellets, but the exact composition between rough fish feed and pellets must be sought, so that the amount of the combination of these feeds can meet the food needs of pet Giant trevally fish.
The purpose of this research is to obtain the appropriate proportion of rough fish and pellets in feed that can result the best survival and growth in giant trevally fish.

2. Materials and Methods

2.1 Tools and Materials

This research was carried out for 60 days from May 2019 - July 2019 in the East Coast Floating Net cages, Pangandaran. The tools used in this research were, nets, drains, buckets, scales, scissors, thermometers, pH, DO meters, stationery, and camera. While the material used was 5g fish seeds (*Caranx hippos*) from farmers in the Bojong Salawe area, rough fish, Megami GR commercial feed.

2.2 Methods

This research was an experimental one using a completely randomized design (CRD) consisting of 5 treatments and 3 replications. The five treatments were: A: 100% rough fish, B: 75% rough fish: 25% pellet, C: 50% rough fish: 50% pellet, and D: 25% rough fish: 75% pellet.
The research was carried out through several stages including preparation of maintenance Research carried out for 60 days by giving food 2 times a day as much as 5% of the weight. The fish sampling test was carried out once every 10 days, measuring water quality.
The parameters observed were viability, daily growth rate, feed efficiency, water quality. According to Effendi [8] calculate life sustainability formula is:

$$SR = \frac{Nt}{N0} x\ 100\%$$

Where
SR = Survival rate (%)
Nt = Number of fish on t-day (Head)
N0 = Nnumber of fish day -0 (head)

Daily growth rate [8]:

$$G = \frac{\ln Wt - \ln Wo}{t} x100\%$$

Where
G = daily growth rate (%)
Wt = average fish seeds weight at t-day (g)
Wo = average fish seeds weight at day-0 (g)
t = time of fish culture (days)

Feeding efficiency can be calculated by using the formula [9]:

$$EPP = \frac{Wt - W0}{F} x\ 100\%$$

Where
EPP = feeding efficiency (%)
F = amount of feed given during the study (g)
Wt = taverage fish seeds weight at t-day (g)
Wo = verage fish seeds weight at day-0 (g)

3. Results and Discussion

3.1 Life Sustainability

Survival Rate is a comparison of the number of living organisms at the end of the study with the number at the beginning of the study expressed in terms of percentages; the greater the percentage means the more number of living organisms during the study. The survival rate of giant trevally fish during the study is 100%.
Based on observation, it shows that the survival rate of giant trevally fish seeds during the study for each treatment was 100%. Based on observation of feeding with the proportions of rough fish and different pellets did not have an influence on the survival rate of giant trevally Fish. The high graduation of giant trevally fish life in each treatment was assumed due to the availability of feed that was fulfilled and the support of water quality so that the test fish could tolerate their environment in maintaining their survival for the growth process.
Research results obtained is in accordance with widyasunu [10] (2013), where the survival rate or survival rate of giant trevally fish during the study for each treatment was higher than 93%. The high survival of giant trevally fish in each treatment was due to the availability of feed that was fulfilled, as well as the quality of waters suitable for fish so that it could tolerate its environment in maintaining its survival for the growth process. This is according to the opinion of Watanabe [11] which states that feed must contain nutrients that meet the needs of fish to maintain fish health and for the growth process. Furthermore, Hepher and Pruginin [12] (2012) states that fish growth depends on several factors, namely fish species, genetic characteristics, and the ability to use food and disease resistance and supported by environmental factors such as water quality, feed and space or density or stocking density. In addition, the availability of sufficient feed and good nutritional value will affect fish survival [8].

3.2 Growth

Based on observation, giving different proportions of rough fish and pellets could provide varied results for the growth of giant trevally fish. Giving the proportion of rough fish and pellets provides a good response for the growth of giant trevally fish. This could be seen from the increase in the average weight of the giant trevally fish every time the sample was taken (every 10 days). The average weight of the giant trevally fish in each treatment increased with the time of the study. Growth is defined as changes in fish including weight, size and volume over time. This growth is physically expressed through changes in the number or size of cells making up the body's tissues in a certain period of time. Growth occurs when energy available in feed is used for standard metabolism, digestive processes and supporting activities have been used [13].
The growth pattern of Giant trevally fish as a whole starts from day 1 to day 60 showed a logarithmic phase wherein this phase the growth goes quickly and the weights increase every day. The highest average fish weight on the 60th day was treatment A with a weight of 23.32 g/head, then treatment B was 20.98 g/head, treatment D was 20.17 g/head, and the smallest was treatment C at 20.02 g/head.
Growth in fish is influenced by internal and external factors. Internal factors include heredity, sex, and age while external factors include food and water quality [14]. In this study the

growth of treatment A of 23.32 gr/head/60 days could be considered good [15], this was caused by giving 100% rough fish. The daily growth rate served to calculate the percentage of fish growth per day.

Carnivorous fish require protein content in their diets to reach about 30% higher than protein requirements for land animals and birds [16, 17]. The high need for protein feed for fish is caused by the fact that fish tend to use protein as a source of energy compared to carbohydrates and fats [16, 18].

Treatment A had a significant difference compared to the proportion of rough fish and pellets. Based on the results obtained showed that treatment A 100% trash feed could provide a better daily growth that is equal to 2.57% when compared with other treatments with an average value of treatment namely B 2.39, C 2.31% and D 2 32%. The provision of rough fish works optimally in treatment A. In this study it is assumed that rough fish has a high enough protein which is very suitable to be used as a feed on the seeds of the Giant trevally fish stadia. The nutritional content of rough fish is very high compared to commercial feed, the fat content in rough fish (± 18%) while the fat content in commercial feed is (± 12%) [19].

High protein content in rough fish, will make the digestibility of fish increases, because in the digestive tract seed stage is not yet perfect. The digestibility of fish to feed is affected by several factors, including the chemical nature of water, water temperature, type of feed, fish size and age, nutrient content of feed, frequency of feeding, as well as the amount and type of digestive enzymes contained in the digestive tract of food [20].

The amino acid content in rough fish has an important role in growth. According to the results of Assem *et al.* [21] (2005), mature carangidae fish contain arginine amino acid 3.249%, histidine 1.351%, isoleucine 1.976%, lysine 3.988%, methionine 1.213%, phenylalanine 2.154%, leucine 2.922%, threonine 3.722% and valine 2.008%. Essential amino acids needed for fish growth are arginine, lysine and histidine. Arginine and. Histidine is an essential amino acid for what is needed for seed growth [22]. Lysine functions as a basic ingredient of blood antibodies, strengthens the circulatory system, and maintains the growth of normal cells, while leucine and valine have the same function of repairing organ damage and normal functioning of all tissues [23].

3.3 Feeding Efficiency

Efficiency of feed illustrates the effect of feeding on fish that consume it as well as a description of the utilization given so as to increase fish growth [24]. The greater the value of feed efficiency, the better the fish use the feed consumed so that the greater the weight of the meat produced. The high feed efficiency also means the better quality of feed and the efficient feed is converted into meat so that the cheaper production costs for feed needed to produce fish meat [25].

Based on the results of the conducted research, the best results were obtained in treatment C where the combination of 50% trash feed and 50% artificial feed produces efficiency value of individual feed of 19.01%. While the lowest value of feed efficiency was treatment D where the combination of 25% trash feed and 75% artificial feed produces an efficiency value of individual feed of 15.56%. This value was obtained from the final fish biomass minus the initial fish biomass expressed in grams divided by the amount of feed given during the study.

In treatment C with the combination of 50% trash + 50% pellet had the highest value of feeding efficiency of 19.01%. It was assumed that fish could utilize the protein in feed properly and efficiently so that the amount of protein broken down into amino acids was more and could be used by the body of the fish. The lowest efficiency was obtained by treatment D with a combination of 25% + 75% pellet trash. It was assumed that fish were difficult to digest pellets and only slightly absorbed protein from rough fish feed.

According to Marzuqi *et al.* [26] (2012), feed efficiency shows how much feed can be utilized by fish. Low feed efficiency values indicate that fish need more feed in order to increase their weight. Only a small portion of the energy from the feed given is used for fish growth. Not all food eaten by fish is used for growth. Most of the energy from food is used for maintenance, the rest for activity, growth and reproduction.

Treatment C (50% trash: 50% pellet) showed the highest percentage value compared to other treatments. This was thought to be related to the amino acid and fatty acid content of the 50% trash mixture: a 50% pellet is a composition suitable for giant trevally fish. The other three treatments also had amino acids but in general the amount or percentage value of these amino acids was lower. Djarijah (1995) in Hariyadi *et al.* [27] (2005) states that the high and low efficiency of feed is influenced by the type of source of nutrition and the amount of each component of the source of nutrition in the feed.

3.4 Water quality

Water quality observations were used as supporting parameters throughout the study. Water quality parameters measured during the study were temperature, degree of acidity (pH), and dissolved oxygen (DO) each. The measurement results show that water quality during the study still meets the feasibility of maintenance for giant trevally fish.

Water temperature during the study ranged from 28 ºC-30 ºC. According to Akbar and Sudaryanto (2002) [28], changes in high temperatures in a sea waters will affect the metabolic processes, body activities, and fish nerves and the optimal temperature for the growth of giant trevally fish is 27 ºC-29 ºC.

Oxygen levels (DO) on the East Coast of Pangandaran have an average of 6.8 mg/L, this is in accordance with quality standards for fish maintenance with DO more than 4 mg/L. Temperature is a factor that can affect the level of dissolved oxygen (DO) in waters. Low temperatures can increase the dissolved oxygen content (DO) which will then increase the metabolic rate of aquatic organisms [29]. Dissolved oxygen is a factor that is needed for fish to breathe and metabolism in the body that will produce movement, growth and reproduction. According to Kordi [30] (2001) if the oxygen content is low, it can cause fish to lose their appetite, so they are susceptible to disease and can cause stunted growth.

The degree of acidity or water pH during the study was 8.0. According to Akbar and Sudaryanto [28] (2002) that the cultivation of Giant trevally fish is very good growth when cultivated in the pH range of 8.0 to 8.2 which is the general range of pH of sea water. Thus the pH with a range of 8.0 still meets the requirements for raising giant trevally fish seeds during the study. A water with low pH can result in decreased growth activity or fish become weaker and more susceptible to disease and are usually followed by high levels of fish mortality [31].

4. Conclusion

The proportion of rough fish and pellet feed can increase the daily growth rate (LPH) and feed efficiency (EPP). Providing 100% of rough fish feed gives a Daily Growth Rate of 2.57%. Provision of 50% proportion of rough fish feed + 50% of pellets provides the highest value of feed efficiency which is equal to 19.01%.

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