Analysis of food habits and length-weight relationships (LWRs) of java barb (Barbonymus gonionotus Bleeker) in Reubee River, Pidie, Aceh

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Abstract. The purpose of this study was to examine the food habits and length-weight relationship of java barb (Barbonymus gonionotus Bleeker) in Reubee River, Pidie. This study was conducted in August – September 2017. Ten samples fish were collected using purposive sampling method from the fisherman's landing sites along Reubee River. The digestive tract investigation showed that as many as 8 from 10 total fish sample were filled by food. Then, the food was examined and resulted in 6 types: moss liver (Antheceroptopsida sp.), bamboo roots pentung (Dendrocalamus asper), bilis fish (Mystacoleucus sp.), fig leaf (Ficusracemosa), jerbung shrimp (Penaeus merguiensis), and worms (Lumbricusrubellus). The highest percentage of occurrence frequency and index of propenderence found on Moss respectively 100% and 57%, while the highest percentage of volumetric value obtained on shrimp (35%). The analysis of food habits indicated that Java barb (Barbonymus gonionotus) in Reubee River is a group of omnivores that tend to be herbivorous fish with a ratio of 3:1 gut length. The result of calculation of length-weight relationship on 50 fish samples depicted an average of 127.42 mm with an average weight of 56.46 grams. While the result of growth pattern calculation was allometric negative with b value equal to 0.938 which means long growth was faster than weight fish body. The condition factor gave a normal pattern with a value of 107.16.

1. Introduction
Java barb is the potential fish with consists of the high protein and has the delicious taste, it is resulting in the consumption of these species increasing and affected toward their sustainability of species in nature. There were several of fish that lived in Reubee River compriseel, mystus, anchovy, tilapia, channa, sepat, catfish, java barb and anabas. However, Java barb (Barbonymus gonionotus) has a high abundance among of them. Java barb as known as Groe or Iet by people around the location. According to the survey result, most of the residents around the river held the catching activities with netting, fishing and using the poison in traditionally. The high utilization of these fish is thought to later experience a decline in the population in nature, so cultivation efforts must be made so that there
is a need for a domestication process. One of the factors that need to be studied in the domestication process is the parameters of fish's growth and feeding habits, namely as an indication of obesity, health, productivity and physiological conditions including gonadal development [1,2]. For anticipating the decreasing of their population, the domestication process could be held. Domestication is the process which is conducted to protect the extinction of the population of species [2].

Knowledge of fish feeding habits can help in the selection of appropriate food in cultivated areas so that it can utilize potential food in water bodies without competition [3, 4, 5]. Other important information needed in fisheries assessment studies is the relationship between length-weight of fish and condition factors because these parameters can describe fish growth, fish fitness and physical and bio ecological aspects of fish by interaction between food conditions, parasite infections and fish physiological factors [6, 7, 8]. Thus, research on bio-ecology of java barb is important, one of which is by reviewing the feeding habits and the length-weight relationship of freshwater fish in the Reubee River.

2. Research Methods
2.1 Sampling
The research was conducted from August to September 2017 in Reubee River at Pidie district. The samples of java barb fish were analyzed in Biology Laboratory of Marine and Fisheries Faculty Syiah Kuala University.

The collecting of the sample was held directly through the fish catch from the fishermen. Furthermore, the samples were measured on their length and weight with the fishing experimental method. Besides, it also was identified their feed behavior. The samples were caught by using the set gillnet with size 1-1.5 inch which was conducted from 8 am to 4 pm. The measurement of the length of the sample was divided on total length and standard length with used the gauge. The total length was measured from the tip of the snout to the tip of the longer lobe of the caudal fin. Meanwhile, the standard length was measured from the tip of the snout to the posterior end of the fish. The weight of the sample was measured by digital scales with accuracy 0.01 gram. The samples were preserved by formalin 10 percent. The samples were washed out by clean water and be splinted with scissor which
started from anus across abdominal until lineal literalist and operculum. The muscle of the sample was opened until the digestive organs appear. Furthermore, the digestive waste to be taken out with the needle. The waste was placed on the Petri dish, and be diluted by 10 mL of water. For determined the type of feeds, the waste to be observed under the microscope directly [9, 10].

2.2. Data analysis

Frequency of Feed Probability (FKM)
The method for measures the frequency of feed probability in percentages was referred to [11]:

\[ FKM(\%) = \frac{\text{number of type food}}{\text{number of stomach containing food}} \times 100 \]

Index Of Preponderance (IP)
The observation of feeding habits parameters used the Index of Preponderance (IP). This index was merged of the method of frequency probability and volumetric method [9]

\[ IP = \frac{\sum (\text{Vi} \times \text{Oi})}{\sum (\text{Vi} \times \text{Oi})} \times 100 \]

Note: Vi = Percentages of volume one type of feed (%), Oi = Percentages of probability frequency for one type of feed (%), \( \sum \text{ViOi} \) = Number of Vi × Oi all type of feed

Based on value of IP, Nikolsky (1963) divided the feed of fish on three classified:

a. The main feed, if the value of IP > 40%

b. The complementary feed, if the value of IP 4-40%, and

c. The additional feed, if value of IP<4%

Volumetric Method
The measurement of volumetric method refer to [12]

\[ v = \frac{\text{vi}}{\text{vt}} \times 100\% \]

Note: V = Percentages of one type of feed (%), vi = Volume of one type of feed (mL), vt = Total volume all of type feed (mL)

Relative Intestinal Length (RLG)
According to [13] the relative intestinal length, was measured with the equation:

\[ RLG(\%) = \frac{\text{panjang usus (mm)}}{\text{panjang tubuh total (mm)}} \]

The relationship between length and weight of fish
Based on [14], the relation between length and weight of fish could be analyzed with Linear Allometric Model (LAM):

\[ W = (al^b) \]

Note: W: Weight of fish (gram), L: Length of fish (cm), a: Intercept of linear regression, b: Coefficient of regression
Coefficient $K$ (Condition factor of Fulton) was analyzed based on [15], with the equation:

$$K = \frac{W}{L^3} \times 100$$

Note : $K$: Condition factor of Fulton, $W$: Weight of sample fish (g), $L$: Length of fish sample (cm), $-3$: Coefficient of length or correction factor.

### 3. Results and Discussion

The result of the research showed that there were six types of feed in the digestive system of eight from ten samples of java barb fish. The types of feeds comprise *Anthocerotopsida sp*, *Dendrocalamus asper*, *Mystacoleucus sp*, *Ficus racemosa*, *Penaeus merguiensis* and *Lumbricus rubellus*. The highest preponderance index and frequency value were on *Anthocerotopsida sp* with the values 57.14 % and 100 % respectively. Meanwhile, based on volumetric method it was obtained the highest value on *Penaeus merguiensis* with the proportion value 35 %.

**Table 1.** Frequency, Volumetric and Preponderance Index each type of feeds inside of the digestive system of samples fish in Reubee River, Pidie District.

| Type of Feed      | Probability frequency | Volumetric | Indeks of Preponderance |
|-------------------|-----------------------|------------|-------------------------|
|                   | Probability | FKM % | Volume | Proportion % | Vi x Oi | IP%    |
| *Anthocerotopsida*| 8          | 100   | 6      | 30          | 3000     | 57.14  |
| *Dendrocalamus asper*| 2          | 25    | 2      | 10          | 250      | 4.76   |
| *Mystacoleucus sp*| 1          | 12.5  | 1      | 5           | 62.5     | 1.19   |
| *Ficus racemosa*   | 3          | 37.5  | 3      | 15          | 562.5    | 10.71  |
| *Penaeus merguiensis*| 3          | 37.5  | 7      | 35          | 1312.5   | 25     |
| *Lumbricus rubellus*| 1          | 12.5  | 1      | 5           | 62.5     | 1.19   |

**Table 2.** Relative intestinal length of Java barb fish (*Barbonymus gonionotus* Bleeker) in Reubee River, Pidie District.

| Number of samples | Range of fish length (mm) | Range of intestinal length (mm) | Average of fish length (mm) | Average of intestinal length (mm) | Ratio of intestinal length/ total length (mm) |
|-------------------|---------------------------|--------------------------------|-----------------------------|----------------------------------|-----------------------------------------------|
| 10                | 100.7 – 162.4             | 359.3 – 489.2                   | 132.17                      | 400.48                           | 3.1                                           |

The composition of type of feeds in the samples was shown in Table 1, the *Anthocerotopsida sp* were the feed that dominated than others, and with the percentages of feed probability frequency reached 100 percent. It means the most of java barb fish in Reubee River were the herbivore, it was related to [16] which categorized the java barb as the omnivore and tend to be the herbivore. In the other research by [17], she observed the largest java barb in Linggahara was the omnivore, due to in their stomach it was discovered eleven types of food, particularly on the length of fish 64 – 80mm.

Tawes in the Reubee River were categorized as omnivorous fish which were more likely to be herbivorous because almost 72.61% of the amount of food were analyzed in the plant category which is also strengthened by the results of measuring the length of Tawes intestine with a ratio of 3:1, which means that the length of the intestine was 75% longer his body. In the Reubee River, the river conditions are still classified as very good because there are many plants that are the main food for Tawes that live around the river, one of which is liverworts so that the availability of food is still maintained and the low level of competitors.
**Length and Weight of Java barb fish**

Based on the results of the study, 50 samples of Java barb (*Barbonymusgonionotus* Bleeker) were caught in the Reubee River had an average of length 127.42 mm and weight 56.46 gram. The samples were divided into 7 classes based on the length. The range of smallest classes is 45.75 – 66.23 mm. While the range of highest classes is 168.64 – 189.11 mm. The most of interval classes on a range of classes is 148.16 – 168.63 mm, namely 17 of fish.

![Figure 2](image1.png)

**Figure 2.** The relationship of the length- weight of Java barb (*Barbonymusgonionotus* Bleeker) in Reubee River, Pidie district.

Interval classes 148.16 – 168.63 mm dominated the long class interval because the results obtained at the time of the study were classified as being above 100 mm. The results of the regression analysis showed that there were variations in the growth pattern of the tawes growth pattern which was negative allometric where the value of b in the Tawes fish was 0.938, which means that the length growth pattern was faster than the weight gain of the fish or the fish looked slim [11]. The results also showed the coefficient of determination (R2) 0.421. Tawes have a negative allometric growth pattern, this is also the same as the results obtained [18] in the waters of Simpoe Bireun, which are negative allometric in Groe fish with a value of b = 2.505.

The condition factor is assessed based on the average count of the relative magnitude [19]. The results showed that the condition factor of Tawes fish (*Barbonymus gonionotus* Bleeker) caught in Reubee River, DelimaSubdistrict, Pidie with a value of 107.16, showed that the survival rate of the Tawes was still high and the waters were still good. This is consistent with the statement [20] that if the condition factor is in the range of 100 then the waters are still in a balanced state. [21] reported that the factor condition of the Tawes fish in the Nagan Raya river was in good condition with a value of 100.59.
4. Conclusion
Tawes that live in the Reube River are a group of omnivorous fish which tend to be herbivores with the dominance of food eaten is moss (Antheceroptopsida sp). The growth pattern is negative allometric which means that the long growth is greater than the increase in body weight, while the condition factor is still in the normal range with a value above 100, which means the Reubeeriver is still good for the growth of the Tawes.

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