

# Feeding Management for Tilapia (*Oreochromis niloticus*) Seeds and Parent At Cibiru Fish Seed Center, Bandung City, West Java

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## ABSTRACT

*Tilapia (Oreochromis niloticus) is one of the freshwater fish commodities that are cultivated and consumed by the people in Indonesia. Feed is one of the important components in fish farming activities. The purpose of this research was to determine the management of feeding techniques for the seeds and broodstock of tilapia (Oreochromis niloticus) cultivated at Cibiru Fish Seed Center. The research method used is descriptive. The research procedure was carried out by observing and directly following the technique of feeding on tilapia fish culture which was carried out at the Cibiru Fish Seed Center. Based on the results of research conducted at the Cibiru Fish Seed Center, Bandung City, the management of feeding for tilapia seeds and broodstock is given twice a day at 8 am and 4 pm. Feeding for seed treatment differs depending on the size of the treated seed. Fish seeds measuring < 3 cm were fed with PSP (Hi-Pro-Vite) powder as much as 0.0094 g or 0.4725 kg per pond (30 mx 30 m) and for seeds measuring 3-5 cm were given Hi-Pro-Vite feed. Vite 781-1 as much as 0.362 g or 0.325 kg per net (4 mx 4 m). Feeding for tilapia broodstock in the rearing phase is different from the spawning phase. The breeding phase was given Hi-Pro-Vite 781 feed as much as 16,667 g or 9.6 kg per one net (7 mx 7 m) and the spawning phase was given feed as much as 16.67 g or 1,667 per net (7 mx 7 m). 4725 kg per pond (30 mx 30 m) and for seeds measuring 3-5 cm were fed with Hi-Pro-Vite 781-1 as much as 0.362 g or 0.325 kg per net (4 mx 4 m). Feeding for tilapia broodstock in the rearing phase is different from the spawning phase. The breeding phase was given Hi-Pro-Vite 781 feed as much as 16,667 g or 9.6 kg per one net (7 mx 7 m) and the spawning phase was given feed as much as 16.67 g or 1,667 per net (7 mx 7 m). 4725 kg per pond (30 mx 30 m) and for seeds measuring 3-5 cm were fed with Hi-Pro-Vite 781-1 as much as 0.362 g or 0.325 kg per net (4 mx 4 m). Feeding for tilapia broodstock in the rearing phase is different from the spawning phase. The breeding phase was given Hi-Pro-Vite 781 feed as much as 16,667 g or 9.6 kg per one net (7 mx 7 m) and the spawning phase was given feed as much as 16.67 g or 1,667 per net (7 mx 7 m).*

**Keywords :-**Tilapia, Feed Management, Seeds and broodstock

## 1. INTRODUCTION

Tilapia (*Oreochromis niloticus*) is a freshwater fish that is widely cultivated by Indonesian people. Tilapia has white and thick meat so it is very preferred to be consumed directly or made as raw material for processed products as meatballs and fish nuggets. According to Rukmana (1997), tilapia in Indonesia is important role in improving the community's economy [16].



|    |        |                                    |
|----|--------|------------------------------------|
| 3. | Net    | Fish breeding grounds              |
| 4. | Waring | Magnification maintenance site     |
| 5. | Hapa   | Place for rearing larvae and seeds |

The materials used in the feeding of tilapia seeds and broodstock at the Cibiru Fish Seed Center are shown in Table 2.

**Table -2 :** Materials used for tilapia seed and brood feeding

| No. | Ingredient                                    | Information   |
|-----|---|---|
| 1.  | Tilapia Larva                                 | Larvae spawned after hatching from eggs   |
| 2.  | Tilapia Seeds                                 | Seeds start from the egg yolk to a size of 7 cm   |
| 3.  | Tilapia Parent                                | Fish to be spawned  |
| 4.  | Small size feed<br>(Hi – Pro – Vite 781-1)    | Used for seed size<br>3-7 cm  |
| 5.  | Medium size feed<br>(Hi – Pro – Vite 781)     | Used for rearing fish to brood fish   |
| 6.  | Feed Powder For Seeds<br>(Hi –Pro – Vite PSP) | Used for fish seeds after the egg yolks have run out (food reserves) up to a size of 3 cm |
| 7.  | EM 4 . Probiotics                             | Used as a decomposer of organic matter content and increase the amount of natural feed    |

The research procedure was carried a participatory way is following all existing activities at the Cibiru Fish Seed Center , Bandung City with a period of 10 days working starting from July 13, 2022 to July 26, 2022. According to Rosidi (2008) the participatory method is an activity that involves themselves directly and actively in an activity in the field [15]. This method of participatory activity can be used to obtain data and information regarding the management of seed and parent feeding of tilapia (*Oreochromis niloticus*).

This research data was obtained through interviews with field staff in charge of feeding, observation and documentation. Observations were made on pond size, tilapia seed stocking, tilapia seed mortality, tilapia seed survival, tilapia seed harvest target and feed conversion ratio. The data obtained were analyzed descriptively

### 3. RESULT AND DISCUSSION

#### 3.1 Tilapia Seed Feeding

Tilapia seeds at Cibiru Fish Seed Center were fed 2 times at 9 am and 4 pm. Feeding has its own dose depending on the size of the seeds being treated.

The feed used in seed cultivation at Cibiru Fish Seed Center is the Hi-Pro-Vite brand. In feeding the seeds themselves, there are 2 types of sizes, namely small floating feed (781-1) size 2.0 – 2.3 mm and powder (PSP). The composition contained in the seed feed itself is as shown in table 3.

**Table -3 :** Spesifikasi, nutrisi, dan dosis

| No. | Content       | Amount  | Feeding Rate | Fish Size |
|-----|---------------|---------|--------------|-----------|
| 1   | Crude protein | Min 31% | Adlibitum    | 2 – 5 g   |
| 2   | Fat           | Min 5%  |              |           |
| 3   | Coarse Fiber  | Max 8%  |              |           |
| 4   | Water Content | Max 12% |              |           |
| 5   | Ash           | Max 13% |              |           |

Fish seeds measuring < 3 cm are usually fed psp (Hi-Pro-Vite) in powder form according to the fish's mouth opening size. For seeds measuring 3-5 cm, they are usually given Hi-Pro-Vite 781-1 feed, which is the smallest size floating feed that adjusts the mouth opening of the fish fry.

In its natural habitat, tilapia belongs to the omnivorous fish group. Morphologically the shape of the mouth of the tilapia is in a terminal position or has the same length of the lower and upper jaws. Similar to the statement of Susanto et al (2020), tilapia has an elongated and slender body shape with the mouth in a terminal position [20]. Based on this, the use of floating feed is good choice in tilapia cultivation. In addition, the use of floating feed makes it easier for farmers to control the amount of feed given and the feed that is not eaten.

Fish feed is said to be good if it has a complete composition of nutrients such as protein, fat, minerals, vitamins, and carbohydrates. Mudjiman (2004) states that the growth of fish requires energy, living and breeding activities [11]. Protein is used by fish as the main energy source, after fish protein requires fat as a second energy source, while carbohydrates become the third energy source. The quality requirements of tilapia according to (SNI 01-7242-2006) are in Table 4 below.

**Table -4 : Persyaratan Mutu Pakan Ikan Nila SNI**

| No | Jenis Uji         | Satuan | Persyaratan Mutu |            |
|----|-------------------|--------|------------------|------------|
|    |                   |        | Pendederan       | Pembesaran |
| 1  | Air, maks         | %      | 12               | 12         |
| 2  | Abu, maks         | %      | 13               | 13         |
| 3  | Protein, min      | %      | 30               | 25         |
| 4  | Lemak, min        | %      | 5                | 5          |
| 5  | Serat Kasar, maks | %      | 6                | 8          |

The feed is processed in the body of the fish by absorbing the nutritional elements or nutrients which will later be used as tissue and meat builders. The speed of the fish growth rate is influenced by the type and quality of the feed given[9]. Feeding that is of poor quality or has poor nutritional value can reduce fish survival. In addition, this can slow down the growth of fish (growing stunted), and can even cause diseases caused by malnutrition [7].

### 3.1.1 Perhitungan Pakan Benih Ikan Nila

The feeding at Cibiru Fish Seed Center saw the number of fish in the pond and in the net with a water level of 80 cm. Based on observations at Cibiru Fish Seed Center, there are 2 ponds that are used as a place for tilapia seed care, each pond has an area of 30 mx 30 m. According to Soleh et al (2020) the initial weight of tilapia larvae is 0.009 - 0.015 g [18]. So to find out the number of fish seeds measuring < 3 cm and the amount of feed given, several calculations are needed, this can see on bellow:

#### Volumes:

$W \times L \times t$

$$30 \times 30 \times 0.8 = 720 \text{ m}^3$$

#### Estimated density of seeds in the pond:

$V \text{ pond} \times \text{stocking density (m}^3)$

$$720 \times 100 = 72,000 \text{ seeds}$$

#### Maximum mortality:

Total seed x maximum mortality according to field observations

$$72,000 \times 30\% = 21,600 \text{ head}$$

#### SR (Survival Rate):

Number of initial fish stocked – number of dead fish

$$72,000 - 21,600 = 50,400 \text{ seeds}$$

#### Seed harvest target:

Number of live fish / number of target harvest (kg)

$$50,400 / 80 = 630 \text{ kg}$$

**Estimated total weight of larvae:**

$$630,000 \times 0.009 = 5,670 \text{ g or } 5.67 \text{ kg}$$

**Maximum feeding:**

$$5.67 \times 5\% = 0.2835 \text{ kg/day}$$

**Feeding per fish**

$$283.5 \text{ g} / 50,400 = 0.005625 \text{ g}$$

Based on the above calculation, the estimated density of live fish is 50,400 fish with a daily feeding of 0.4725 kg for 1 pond measuring 30 mx 30 m. Feeding for 2 months of seed treatment was 28.8225 kg. If the total feeding for 2 ponds is 0.567 kg for 1 day and 57.645 kg for 2 months of treatment.

Tilapia seeds measuring 3-5 cm are in 2 nets with a net area of 4 mx 4 m. According to Nasution et al (2014), tilapia (*O. niloticus*) seeds measuring 3 - 5 cm have a weight of 0.58 g [12]. So to find out the density of the net and the amount of feed that must be spread, several calculations are carried out

**Volumes:**

$$4 \times 4 \times 0.8 = 12.8 \text{ m}^3$$

**Estimated density of seeds in the pond:**

$$12.8 \times 100 = 1,280 \text{ seeds}$$

**Maximum mortality:**

$$1,280 \times 30\% = 384 \text{ heads}$$

**SR (Survival Rate):**

$$1,280 - 384 = 896 \text{ seeds}$$

**Seed harvest target:**

$$896 / 80 = 11.2 \text{ kg}$$

**Estimated total seed weight:**

$$11.200 \times 0.58 = 6.496 \text{ g or } 6.496 \text{ kg}$$

**Maximum feeding:**

$$6.496 \times 5\% = 0.325 \text{ kg/day}$$

**Feeding per fish**

$$325 \text{ g} / 896 = 0.362 \text{ g}$$

Based on the above calculation, the density of fish fry measuring 3-5 cm are estimated to live as many as 896 fish with feeding per day as much as 0.325 kg for 1 net measuring 4 mx 4 m. Feeding for 2 months of seed treatment was 19,825 kg. If the total feeding for 2 nets is 0.65 kg for 1 day and 39.65 kg for 2 months of treatment. Estimated feed requirements for various sizes of tilapia fry based on the above calculations are as shown in Table 5.

**Table -5 :** Estimasi kebutuhan pakan pada berbagai ukuran benih ikan nila

| No | Seed Size | Net/Pond Size    | Estimated Feed Needs |            | Time period |
|----|-----------|------------------|----------------------|------------|-------------|
|    |           |                  | Per Pool             | Per Tail   |             |
| 1. | < 3 cm    | 30m x 30m (pool) | 0.4725 kg            | 0.009375 g | 1.          |
| 2. | < 3 cm    | 30m x 30m (pool) | 28.8225 kg           | 0.571875 g | 2.          |
| 3. | 3 – 5 cm  | 4m x 4m (net)    | 0.325 kg             | 0.362 g    | 3.          |
| 4. | 3 – 5 cm  | 4m x 4m (net)    | 19,825 kg            | 22,082 g   | 4.          |

Feeding fish seeds measuring less than 3 cm as much as 0.0094 g for 2 times of feeding per day. The calculation measures 5% of body weight. Tilapia measuring less than 3 cm is still using powdered feed. The feed is adjusted to the fish's mouth opening size so that the feed can be eaten properly.

Feeding fish seeds at Cibiru Fish Seed Center with a size of 3-5 cm was 0.362 g for 2 feedings per day. In accordance with the statement of Bokau et al (2014), rearing tilapia with (FR) 5% [5]. So it can be said that the estimation of feeding at the Cibiru Fish Seed Center managed to get a high Survival Rate (SR)

The amount of feeding on tilapia seen from the size and capacity of the fish stomach. So in the calculation of the estimated feeding, the amount of feed given is measured from 5% of the body weight of the fish. This is related to the capacity and rate of gastric emptying of the fish. The faster the gastric emptying time, the higher the frequency of feeding required [8]. Appetite for some types of fish will increase again after a reduction in gastric contents.

Feeding 2 times in the morning and evening is done because the level of fish appetite is high. The highest appetite occurs at 07.00 am – 09.00 am in the morning and 03.00 pm – 04.00 pm in the afternoon. In accordance with the statement Djajasewaka and Djajadireja (1990) stated that the optimum temperature that affects the appetite of fish is at a temperature of 25–27°C [6]. Generally, this optimum temperature will be reached in the morning and evening.

### 3.1.2 Pemberian Pakan Induk Ikan Nila

Tilapia broodstock at Cibiru Fish Seed Center were fed 2 times at 9 am and 4 pm. Feeding has its own dose - each depending on the conditions of parental maintenance in the pond.

The feed used in broodstock care at Cibiru Fish Seed Center is the Hi-Pro-Vite 781 brand with a size of 3.2 – 4.0 mm. The nutritional composition of the parent feed is shown in Table 6.

**Table -6 : Nutrient Content and Specifications of Tilapia Parent Feed**

| No. | Content       | Amount  | Feeding Rate | Fish Size  |
|-----|---------------|---------|--------------|------------|
| 1   | Crude protein | Min 31% | 3 – 4%       | 20 - 150 g |
| 2   | Fat           | Min 5%  |              |            |
| 3   | Coarse Fiber  | Max 8%  |              |            |
| 4   | Water Content | Max 12% |              |            |
| 5   | Ash           | Max 13% |              |            |

The Cibiru Fish Seed Center has 2 ponds that are used as tilapia brood care and spawning sites, each pond has an area of 30 mx 30 m with a depth of 80 cm. The parent treatment pond has 4 large nets and in the spawning pond there are 8 large nets with a net size of 7 mx 7 m each. To determine the density and amount of feed given to the treatment and spawning ponds, some data that need to be known to be calculated include pond volume, broodstock density, maximum mortality and survival rate. Based on the calculations obtained as follows: pond volume = 39.2 m<sup>3</sup>, broodstock density = 1,176 fish/m<sup>3</sup>, mortality (30%) = 353 fish and survival rate (live tilapia broodstock) = 823 fish.

Based on the above estimates, it can be said that the fish that survive and will become broodstock with a mortality of 30% are 576 fish per net. Feeding brood fish is 3-5% of body weight. Parent tilapia counted 1 kg equal to 3 fish. So, feeding for 1 net is 9.6 kg per day. If the total feeding for 4 nets is 38.4 kg per day.

The spawning grounds in the Cibiru Fish Seed Center pond are divided into 8 nets, each of which contains 75 female and 25 male fish. Each one of the net contains 100 broodstock. Feeding brood fish is 3-5% of body weight. Parent tilapia counted 1 kg equal to 3 fish. The estimated total weight of broodstock per net is = 100 / 3 = 33.34 kg and maximum feeding is 33.34 x 5% = 1.667 kg / day. So, feeding for 1 net is 1,667 kg per day. If the total feeding for 8 nets is 13,336 kg per day. Estimated feed requirements for tilapia broodstock based on the above calculations are as shown in Table 7.

**Table -7:** Estimasi kebutuhan pakan pada Induk Nila

| No | Multiple Parent | Net Size                   | Estimated Feed Expenditure |          | Time period |
|----|-----------------|----------------------------|----------------------------|----------|-------------|
|    |                 |                            | Per Pool                   | Per Fish |             |
| 1. | 576 fish        | 7 m x 7 m<br>(Maintenance) | 9.6 kg                     | 16,667 g | 1.          |
| 2. | 100 fish        | 7 m x 7 m<br>(Spawning)    | 1,667 kg                   | 16.67 g  | 2.          |

Estimated feeding in broodstock maintenance is considered to be able to reduce the mortality rate or it can be said to have a survival rate (SR) of 70% considering the needs of brood fish . Feeding 3-5% twice a day is said to be good for the maintenance of brood fish. Feeding 2 times a day at 08.00 am and 04.00 pm aims to get a large fish appetite time, so that the maximum feed consumption.

Adi (2015), stated that the nutrient elements that must be present in the parent fish feed include fatty acids and vitamins [1]. Fat is one of the important components to increase energy and is needed by fish for basic functions, including reproduction, growth, and tissue maintenance including cell membrane function, enzyme function, and vitellogenesis [4]. So it can be said that the fat in the parent feed given is appropriate or able to meet the needs of the parent fish with a minimum of 5% fat. According to SNI 6139:2009, the fat required for tilapia broodstock is 6%.

Feeding the broodstock that will spawn is estimated at 16.67 g per head or equivalent to 1.667 kg per pond with a feed calculation of 3-5% of the broodstock biomass. The type of feed used by Hi-Pro-Vite 781 is considered to meet the protein needs of the broodstock during the spawning process with a minimum protein amount of 31%. In accordance with Sumarni's statement (2018), the feed given during the spawning process must contain enough protein as much as 28-30% [19].

#### 4. CONCLUSIONS

Based on the results of research that has been carried out at the Cibiru Fish Seed Center , Bandung City, it can be concluded that the management of feeding for tilapia seeds and broodstock is given twice a day at 8 am and 4 pm. Feeding for seed treatment differs depending on the size of the treated seed. Fish seeds measuring < 3 cm were fed with PSP (Hi-Pro-Vite) powder as much as 0.0094 g or 0.4725 kg per pond (30 mx 30 m) and for seeds measuring 3-5 cm were given Hi-Pro-Vite feed. Vite 781-1 as much as 0.362 g or 0.325 kg per net (4 mx 4 m). Feeding for tilapia broodstock in the rearing phase is different from the spawning phase. The breeding phase was given Hi-Pro-Vite 781 feed as much as 16.667 g or 9.6 kg per one net (7 mx 7 m) and the spawning phase was given feed as much as 16.67 g or 1,

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