Differences size of *Channa striata* broodstock and the number of eggs produced in natural spawning

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**Abstract.** Snakehead fish (*Channa striata*) is a type of freshwater fish that has the potential to be developed because of its high economic value. Information about the reproductive biology of *Channa striata* is still limited, so it is necessary to carry out reproductive studies for its future development. Research on the aspects of reproductive biology such as the comparison of the weight of the broodstock (female) to the number of fecundities was carried out descriptively in December - January 2020. This study used three categories of broodstock parent size with different weights, namely (P1): 155-350 grams, (P2): 400-700 grams, (P3): > 700-1200 grams. The results showed that the number of eggs produced sequentially, namely (P1): 75,62.57 ± 1,106 eggs, (P2): 9,821.17 ± 628 eggs, (P3): 11,103.80 ± 2,307 eggs. This study concludes that the number of eggs produced increases with the larger size of the broodstock used. However, it was found that a consistent number of eggs were found at the parent size between 400 - 700 grams.

1. **Introductions**

Snakehead fish (*Channa striata*) is one of the endemic fish in Indonesian waters which was popular in several areas, it was called haruan fish (Banjarmasin), *kocolan* fish (Betawi), and on the island of Java under the name *Bogo* fish, *bayong* fish, or *Kuthuk* [1]. The level of consumption of snakehead fish continues to increase, wherein 2016 the utilization of world cork fish from aquaculture ponds amounted to 21,721 tons, and from natural catches amounted to 70,802 tons [2]. The consumption of these fish in Indonesia was quite high, especially in South Sumatra, as a regional specialty [3]. In the health sector, this fish is used to accelerate the healing of surgical scars and burns due to its albumin content [4]. *C. striata* were contained protein and albumin of 17.28 - 18.12%, and 63 - 107 mg/g, and contains Cu, Ca, Fe, and Zn [5,6]. So far, fishing activity is the biggest contributor to meeting the demand for this consumption. However, several rearing activities have been carried out, both relying on seeds from natural products and seedlings [7].

On the other hand, many efforts to domesticate snakehead fish have been carried out to prepare them as prospective broodstock. However, information regarding the ideal parent criteria for seed productivity is still limited. Spawning productivity can be seen from the total number of maturing eggs produced [8]. One of the factors that influence the number of eggs produced is the Gonad Somatic Index (GSI),
where it was correlated with the size or weight of the broodstock [9]. This study aims to determine the number of eggs produced from different sizes of broodstock in natural snakehead fish spawning.

2. Material and Method

2.1. Preparations

This research was carryout using 34 of *C. Striata* broodstock and spawned in a concrete pond with an area of 4 x 4 m, from December to January 2020 at the Pandaan Aquaculture Installation Pasuruan Regency, East Java. Pond preparation begins by scrubbing the walls and bottom of the pond using a brush and rinsing with clean water to remove food residue and water plants. Furthermore, filling the water with a height of 30-40 cm, and the addition of water plants (*Ipomoea aquatica*) as much as 50% of the surface area of the pond. This is done to create a suitable habitat and stimulate spawning [10,11]. The hatching pond is set at a temperature of 25 - 28 °C, and a pH of 7.5 - 8.1.

2.2. Broodstock Applications

The spawning process was carried out naturally in a 16 m² pond with a male and female parent ratio of 1:1 during the rainy season. The parent stock used was the mature gonads characterized by a reddish-colored genital hole (male parent) and a soft stomach for the female parent, more than 1-year-old with a length of 30-40 cm (Figure 1). Furthermore, the parent stock was grouped into three groups based on weight, namely (P1): 150 - 300 grams, (P2): 350 - 650 grams, and (P3): 700 - 1200 grams.

2.3. Feed Management

The type of feed used was in the form of artificial feed with diameter 2 mm (pellets 781-2 series) which contains 31 - 33% protein and was combined with natural food (*Pomacea canaliculata*) at intervals of every three days. The frequency of feeding fish every morning and evening by ad libitum.

2.4. Collect and count eggs

Characteristics of snakehead fish eggs are floating and clustered on the surface of the water around water plants, and stay around parents stock. After the spawning process was complete, the egg harvesting process was carried out using a scoop net and then placed into the tub and the egg counting was done manually using an egg collector. Furthermore, the calculation of the number of eggs produced using the graph metric method refers to the calculation formula [12]:

\[
\text{Fecundity (eggs)} = \frac{\text{Weight of gonad (gr)}}{\text{egg weight(gr)}}
\]

Where:
- Gonad weight: Differences in the weight of the female broodstock before and after spawning

![Figure1]( attachment)

**Figure1.** (A) *C. striata* male broodstock, (B) *C. striata* female broodstock
3. Result and discussions
The number of eggs produced in this study showed a different value, where the bigger the size of the broodstock was directly proportional to the number of eggs produced (Table 1). This is consistent with the statement of [13] that fecundity was influenced by several factors such as body weight and body length of the fish. The average eggs produced by the parents in this study were high, ranging from seven thousand to eleven thousand eggs. According to the result of the experiment [14], showed that the fecundity value in snakehead fish spawning ranged from 1,141-16,484 grains. Furthermore, following the result of [15] has the value of fecundity was 1,282-20,035 grains.

| Broodstock          | Average Fecundity (±SD) |
|---------------------|-------------------------|
| P1: 155-350 gr      | 7562.6 ±1106.8          |
| P2: 400-700 gr      | 9821.2 ±628.0           |
| P3: >700-1200 gr    | 11103.8 ±2307.2         |

We suspect that the number of eggs produced is influenced by the addition of the natural feed used (Pila ampullacea and Pomacea canaliculata). The golden apple snail (Pomacea canaliculata) contains saturated fatty acids (63.96%) and monounsaturated fatty acids (21.61%) in the oven method, while the smoking method for plural unsaturated fatty acids was 31.68% [16]. Omega-3 or unsaturated fats have an important role in the process of making egg cells (embryogenesis) and larval development [17]. Zebrafish which are fed with a content of 1% omega-3 and 2% omega-6 shows the highest level of fecundity [18].

Interestingly, the fecundity at the parent size between 400 - 700 grams resulted in a uniform number of eggs. On the other hand, the fecundity was also influenced by climate or weather, where successful spawning is generally found in the rainy season. We do this research also in these seasons. Even though, these fish can spawn throughout the year, both the dry season and the rainy season. The fish will spawn in the rainy season and will stop producing eggs in the dry season [19], and only one side of the gonads is ripe and it is not uncommon for the snakehead fish gonads to not be filled [13].

4. Conclusion
The fecundity of snakehead fish is influenced by the weight of the broodstock used and the type of feed given. Also, several things that influence include the type of feed used, the weather, and the season.

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