Fecundity and Eggs Diameter of Mullet Fish (*Moolgarda perusii*, Valenciennes, 1836) at Selotong Aquatic Langkat Regency, North Sumatera

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**Abstrak.** The aquatic area of the Selotong, Langkat Regency is an area with a good fisheries sector. Mullet fish is one of the caught fish in the Selotong. The purpose of this study was to determine the fecundity and the eggs’s diameter of Mullet fish (*Moolgarda perusii*). This research was conducted in July - September 2019 used gill net with 1.5 inch mesh size. Fecundity of Mullet fish (*M. perusii*) in GML III and IV ranges at 19.586 – 203.124 eggs with egg’s diameters ranging from 9.3-18.4 µm.

Mullet fish (*M. perusii*) is a type of partial spawner.

1. **Introduction**

Belanak fish (*Moolgarda perusii*) is a type of fish found in the waters of Selotong Village, Langkat Regency which has great potential, especially in improving the fishermen's economy because this fish is a type of consumption fish. Currently, the fulfillment of consumer demand in Selotong Village for mullet fish is still entirely dependent on the catch of fishermen. It is feared that over time, the continuous fishing activity in Selotong waters will cause the mullet fish population to decrease.

Fish population growth in nature is highly dependent on reproductive strategies and responses to environmental changes. Spawning is one of the reproduction processes of mullet fish, and other processes include sexuality, gonado maturity level (GML), gonado maturity index (GMI), and fecundity. Reproduction is one of the phases that plays an important role in the survival of the fish population with its dynamics [1].

Therefore, to maintain the survival of the Belanak (*M. perusii*) fish population, sustainable management is needed which requires observation of the aspects of fish reproduction.

2. **Materials and Methods**

2.1. **Study Site**

This research has done in the waters of Desa Selotong Kecamatan Secanggang Kabupaten Langkat North Sumatera province on July-September 2019. Sampling was conducted at 3 (three) stations with a purposive sampling method. The criteria for research stations are determined based on the location where fishermen usually catch fish.
Figure 1. Sampling sites of *M. perusii*. Station I on geographical located at 3°54'40" and 98°34'25"E. Station II at 3°55'10"N and 98°34'32"E and Station III at 3°55'33"N dan 98°35'10"E

Procedures

The tools that used in this research are gillnet, motorboat, a global positioning system (GPS), a coolbox, an analytical scale, a sample bottle, a set of surgical tools, a camera, writing tools, and a caliper. Materials on this research are belanak fish and formalin 10%.

A sampling of mullet was carried out 6 times in 3 months with a sampling interval of 2 weeks. Fish were caught using gill nets with a length of 100 meters and a height of 1 meter with a mesh size of 1.5 inches. All-female fish samples with GML III and IV were taken, their fecundity was calculated and their egg diameter was measured. The calculation of fecundity was carried out using a combined method which consists of three stages. The first stage is to remove the GML IV egg from the abdominal of the fish. The second stage was taken the posterior, anterior, and middle gonads. The third stage of the sample gonad was weighed (sample gonad weight) after that it is placed in a bottle and then diluted with 10 ml of water then 1 ml of the dilution is taken using a dropper then the number of eggs was calculated.

The calculation of fish egg fecundity was carried out using a combined method, namely gravimetric and volumetric [2]

\[
F = \frac{G \times X \times V}{Q}
\]

Where:
- \(F\) = fecundity (eggs)
- \(G\) = Gonado weight (gram)
- \(Q\) = sample eggs weight (mm)
- \(V\) = dilution volume (mm)
- \(X\) = the sum of eggs in 1 cc

The diameter of mullet fish eggs were observed by taking gonads of fish samples that had GML III and IV then each fish gonad was taken 3 parts, namely the posterior, anterior, and middle gonads.
Eggs were taken from each part of the sample gonad, with each part a total of 30 grains. A total of 90 fish egg samples were measured in diameter using an ocular micrometer (0.01 mm) brand UYCP-12.

3. Results and Discussion

There were 167 fish caught during the research, consisting of 107 female fish and 60 male fish. The fecundity results of mullet at GML III and IV obtained during the study were determined by taking the sample gonads in the anterior, posterior, and middle part.

The regression equation between the fecundity value and total length of female fish based on the fecundity relationship curve with a total length of mullet fish, the coefficient of determination (R²) is 0.87. The determination value which showed the relationship between fecundity and length-weight of mullet can be seen in Figure 2.

![Figure 2. The Relationship between length with fecundity](image)

Fecundity is the number of mature eggs before being released at the time of spawning fish. Results fecundity of the GML III and IV ranged from 19,586-203,124 eggs. The minimum number of eggs was obtained in fish measuring 123 mm with a fecundity of 19,586 eggs, while the maximum number was obtained in fish measuring 201 mm as many as 203,124 eggs. In contrast to the fecundity results in mullet fish (*Mugil cephalus*) in India, which amounted to 0.4 - 5.2 million eggs with a length range of 14 - 30.5 cm [3]. Mullet in Suez-Egypt with eggs ranging from 42,312 – 95,419 eggs [4], but lower than that in Ujung Pangkah with 27,117 – 323,200 eggs [5]. This usually happens due to many factors that influence the amount of fecundity of a fish, including the size and weight of the fish, and the availability of food in their habitat.

![Figure 3. The Relationship between weight with fecundity](image)
The regression equation between fecundity and weight of female fish, based on the correlation curve between fecundity and mullet fish length, the coefficient of determination ($R^2$) is 0.23. This means that the relationship is influenced by the fecundity of 0.23 and 0.77 is influenced by other factors such as other parts of the fish body. This is because the weight of the fish is not all the weight of the eggs when the gonads are mature, but also the weight of other parts of the fish's body. or A correlation value of $r = 0.47$ between length and weight. Its mean, there is relationship between length and weight of mullet fish with value 0.47.

Mullet fish egg diameter measurement have done by taking part in the anterior, posterior, and middle of the gonads, each totaling 30 items then their diameters measured using a microscope eyepiece with a magnification of 40 x. The results of diameter measurements on mullet eggs GML III and IV were dominated by the highest size 13.3-14.3 µm and the lowest 9.3-10.3 µm. The diameter distribution of Mullet fish eggs can be seen in Figure 4.

![Figure 4. The distribution of eggs diameter of Mullet fish (M. perusii)](image)

The results of the observation of the diameter distribution of Mullet fish eggs at GML III and IV carried out during the study ranged from 9.3-18.3 µm. The value of the distribution mode of fish egg diameter is in the range of 13.3-14.3 µm. The frequency of spawning can be estimated from the spread of egg diameter in the mature gonads by looking at the modus of spreading the diameter of the eggs [6]. Based on the value of uniformity in the size and distribution of egg diameter, it showed that the mullet (M. perusii) has a total spawner type. So, Mullet fish spawn little by simultaneously during the spawning season. Its mean the mullet fish releasing eggs by total in the short time at one spawning season [5, 6, 7, 8].

Fish have different sizes and numbers of eggs, depending on their behavior. Fish have a lot of eggs but their size is small, consequences of low survival rates, and fish having few eggs have a larger egg size [7]. Fish fecundity was influenced by egg diameter and gonad maturity. Fecundity will be higher if the gonad maturity is also higher so that the range of egg diameter is higher too.

4. Conclusion
Female mullet (M. perusii) obtained during research in Selotong waters at GML III and IV ranged from 123 mm - 201 mm. Fecundity of mullet fish ranged from 19.586 – 203.124 and the diameter distribution of fish eggs ranged from 9.3 - 18.4 µm, this indicates that mullet (M. perusii) is a type of partial spawner with a gradual spawning pattern.

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