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OPTIMIZATION OF TILAPIA FISH (OREOCHROMIS NILOTICUS) EGGS HATCHABILITY WITH A FUNNEL SYSTEM

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ABSTRACT
Efforts to increase tilapia fish yields to obtain productive seeds cannot be separated from regular care and monitoring starting from the spawning process, hatching of fish eggs, and rearing of larvae until they become fish seeds. The hatching funnel is a technique for naturally hatching eggs. The research aims to analyze the hatchability of tilapia eggs in a funnel system. The research will begin in August - December 2023, which will be carried out in Beringin Village of South Kalimantan. The treatment design in this study with variations in tilapia egg stocking density in the hatching process using a funnel system, can be seen as follows: Treatment A: Stocking density 100 eggs/volume, Treatment B: Stocking density 125 eggs/volume, Treatment C: Egg density 150 grain/volume. The best value was obtained for the effect on egg hatchability in the funnel system in treatment A (33.33%) followed by treatment B (9.60%) and the lowest in treatment C (6.67%).

KEY WORDS
Tilapia fish, egg, hatchability, funnel system.

Tilapia fish with the scientific name Oreochromis niloticus is a type of freshwater fish that is commonly known. Compared to other types of fish, this fish has many advantages to develop because of its favorable biological characteristics such as fast growth, omnivorous food, broad adaptability, and high tolerance to environmental conditions (Edwin et al., 2016). Efforts to increase tilapia fish yields to obtain productive seeds cannot be separated from regular care and monitoring starting from the spawning process, hatching of fish eggs, and rearing of larvae until they become fish seeds.

Hatching funnels are engineered for natural egg hatching. According to Arif (2019), these modifications can be seen in environmental conditions, water supply for egg movement, dissolved oxygen, and so on. The hatching funnel is conical in shape and is a recirculation system in the water system. The entry of water through the hatching funnel at the top of the funnel will then result in a process of stirring the eggs at the bottom of the funnel, provided that the flow of incoming water must be regulated in such a way that the fish eggs are stirred and are still stuck at the bottom of the funnel. The upper flow section of the funnel has an exit point for the water which leads to the fish larvae reservoir.

The standard value for hatchability in tilapia is generally 80% (Prabowo et al., 2016). Hatchability is a very important factor in the process of seed cultivation. High hatchability can produce a lot of larvae so that the process of providing seeds and production runs well. Hatchability is affected by several factors such as salinity, temperature, oxygen, DO, pH and light intensity, water movement, stocking density and container surface area (Ulfani et al.,

2018). According to Fitri (2021), an increase in stocking will disrupt the behavior of fish in their movement space which can ultimately cause growth, food utilization and survival to decrease. The research aims to analyze the hatchability of tilapia eggs in a funnel system.

METHODS OF RESEARCH

The research began in August - December 2023 and was carried out in Beringin Village, Batola Regency, Alalak District, South Kalimantan. The research was carried out starting from container preparation activities such as a 19 L funnel, broodstock scoop, egg scoop, larva scoop, digital scales, ruler, horiba, basin, pipe, siphon hose, flowmeter and the materials used were tilapia, eggs, and water. Preparation for hatching eggs is to assemble a pipe to channel water into the egg hatching container. Then install the siphon hose at the bottom of the hatching funnel and tie the filter to the end of the siphon hose. Set the water flow according to the treatment and when it is finished you can add the eggs.

Tilapia fish eggs are obtained from naturally spawning tilapia fish. Eggs are harvested in the morning at 07.00 using a scoop and put in a small basin. After that, it is spread into a hatching container (funnel) that has been cleaned. Hatching tilapia fish eggs uses a funnel with a water flow of 0.2 L/second. The water discharge measuring instrument used is a flowmeter. Hatching of eggs is carried out in a funnel containing ±16 liters of water and treatment A is 100 eggs/volume, treatment B is 125 eggs/volume, and treatment C is 150 eggs/volume of tilapia fish. Egg counting is done by taking samples of eggs, namely by counting them one by one in the hatching container containing each treatment.

Hatching eggs using a hatching funnel is useful for increasing egg hatchability. The results of the egg hatching rate being quite high are thought to be influenced by several factors, one of which is water discharge. Water discharge greatly influences the hatchability of eggs in the hatching funnel. The appropriate water flow will be good for stirring the eggs in the hatching funnel. Apart from that, water discharge is useful for supplying oxygen for egg development. The treatment design in this study with variations in stocking density of tilapia eggs in the hatching process using a funnel system can be seen as follows:

- Treatment A: Stocking density 100 items/volume;
- Treatment B: Stocking density 125 items/volume;
- Treatment C: Stocking density 150 eggs/volume.

According to Putra et al. (2020) egg hatchability (Hatching Rate) is calculated using the formula:

$$\text{Hatching Rate (HR)} = \frac{\text{number of eggs hatched}}{\text{Number of fertilized eggs}} \times 100\%$$

RESULTS AND DISCUSSION

The hatchability of eggs is one indicator in determining the success of a hatching. The results of data on egg hatchability for 3 days can be seen in Table 1.

Table 1 – Hatchability of Funnel System Tilapia Eggs

Test	Treatment		
	A	B	C
1	80,00	24,00	0,00
2	0,00	4,80	20,00
3	20,00	0,00	0,00
Amount	100,00	28,80	20,00
Average	33,33	9,60	6,67

Source: Processed Primary Data, 2023.

Hatchability using a hatching funnel system can produce 33.33%–6.67%. Tilapia eggs will hatch after 3 days. It can be seen in Table 1 that the hatchability of tilapia eggs is highest in treatment A (33.33%), followed by treatment B (9.60%), and the lowest in treatment C (6.67%).

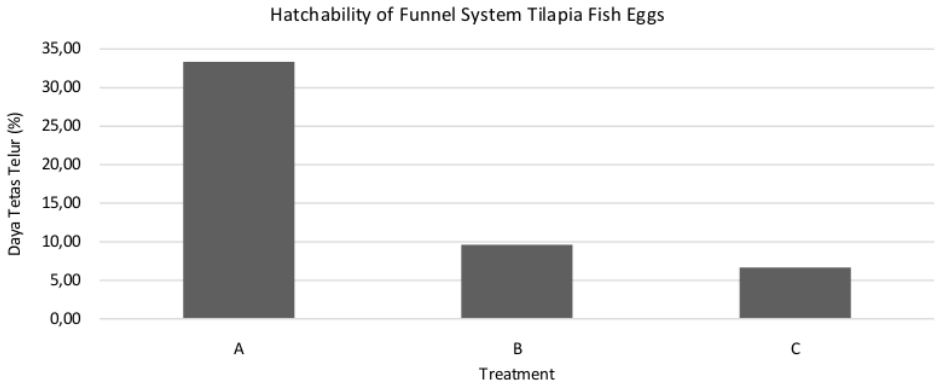

Figure 1 – Hatchability of Tilapia Fish Eggs with Funnel System (Processed Primary Data, 2023)

Figure 1 shows that the hatchability of tilapia eggs ranges from 33.33% - 6.67%. The best mean egg hatchability was in treatments A, B, and the lowest was treatment C. Treatment A produced 33.33%, treatment B produced 9.60%, and treatment C produced 6.67%. The results of the normality test show that the data is normally distributed. The homogeneity test shows that the data is homogeneous. An anova test was carried out showing that the data were significantly different, then the next stage was carried out by a Duncan test showing that treatment A was not significantly different from treatment B, treatment A was not significantly different from treatment C, and treatment B was not significantly different from treatment C.

Hatchability is a number that shows the high or low ability of an egg to hatch. Hatching of fish eggs is influenced by several factors, namely internal factors (egg quality and hormones) and external factors (temperature, alkalinity, salinity, ammonia, lighting and pH) (Putra et al., 2020).

Egg hatchability during the research was highest in treatment A (33.33%) which had the best percentage of light entering and was able to spread to each egg so that the eggs could hatch quickly, followed by treatment B (9.60%), and the lowest in treatment C (6.67%) suspected that the light entering the egg is too high and can result in slow hatching, low density causes light to directly shine on the egg and can result in the development of the embryo being hampered, so the egg needs to be shaded so that it can hatch completely. The standard value for hatchability in tilapia is generally 80% (Prabowo et al., 2016). In this study, it was less than 80% due to internal factors, namely hampered embryo development due to poor quality of spermatozoa and eggs and external factors, namely the environment in it includes water temperature, dissolved oxygen, pH and ammonia (Ayer et al., 2015).

The seeding process begins with caring for the broodstock, spawning, caring for the eggs until they hatch, caring for the newly hatched seeds, and then caring for the seeds until they reach a certain size. The stages of embryonic development up to the hatching of fish eggs are said to increase the mortality rate (Prihartini et al., 2023).

CONCLUSION

The best value on the hatchability of eggs in the funnel system was obtained in treatment A (33.33%) followed by treatment B (9.60%) and the lowest in treatment C (6.67%).

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