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Effect of Administration og the Ovaspec Hormone with Different Doses on the Reproduction of Dumbo Catfish (*Clarias gariepinus*)

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Abstract: African catfish are freshwater fish that have long been cultivated in Indonesia. African catfish grow quickly, are highly resilient to environmental conditions, and reproduce rapidly. The critical phase in producing fish fry is the larval stage, during which the fry reach the post-larval stage (fry) and measure 1-3 cm. Fish spawning can be accelerated by manipulating conditions, such as injecting hormones into the fish. Therefore, when conducting artificial spawning, it is important to know the correct hormone type and dosage. The aim of this research was to determine the effects of different ovaspec injection doses on spawning time, egg hatchability, and survival of African catfish (Clarias gariepinus) larvae. This research used a Completely Randomized Design (CRD) with 4 treatments repeated 3 times. The treatments in this study used different doses of Ovaspec. The ovaspec dose is 0 ml/kg, the ovaspec dose is 0.4 ml/kg, the ovaspec dose is 0.6 ml/kg, and the ovaspec dose is 0.8 ml/kg. The parameters calculated are spawning latency, fecundity, egg hatchability, larval survival and water quality. The results of this study show that the ovaspec hormone can influence the latency to spawning, egg hatchability and survival of African catfish larvae. The best dose in this study was 0.4 ml/kg, which resulted in an average fastest spawning latency of 521.33 minutes, egg hatchability of 84.47%, and larval survival of 77%.

Keywords: Dose; Dumbo Catfish; Reproduction; Ovaspec.

Introduction

The population of Indonesia is increasing from year to year. The increase in population has increased the need for fish. This increase must be supported by the availability of fish to meet market demand, including African catfish. The development of catfish cultivation at the national level has not led to increased production over the last 4 years. This can be seen from the 2017 national cultivation production of 1,125,526.33 tons, the 2018 national production of 944,778.93 tons, the 2019 national production of 1,086,637 tons, and the 2020 national production of 993,768.29 tons [1].

Dumbo catfish is one of the best catfish species, known for rapid growth and cultivation in Indonesia. In general, the African catfish is a hybrid produced by crossing the African catfish species with the Taiwanese catfish species C. fuscus. After the introduction of high-quality catfish from Taiwan, catfish cultivation in Indonesia experienced rapid development. This catfish, which was rapidly developed under the name African catfish, was welcomed by cultivators. There are 3 main strategies to accelerate national catfish production and develop the catfish cultivation industry, namely expanding the scale of the cultivation business into an industry based on sustainable technology, increasing product competitiveness, and improving production efficiency [2].

African catfish is a freshwater fish that has been cultivated in Indonesia for a long time. African catfish can grow quickly, exhibit high environmental tolerance, and reproduce rapidly. Apart from that, this fish has thick flesh and a distinctive taste, so it is in great demand in a short time. The availability of high-quality, sustainable seeds that meet market demand is one of the steps to developing the African catfish cultivation business. The most critical phase in producing fish seeds is the larval-to-postlarval stage, measuring 1-3 cm [3].

The spawning of African catfish can be accelerated by injecting a stimulating hormone into the broodstock; the recommended hormone is ovaspec. When injecting Ovaspec, it is recommended to give an optimal dose to obtain the best results. Therefore, for artificial spawning, it is necessary to determine the optimal hormone dose. There are several products on the market used to stimulate fish spawning, such as Ovaprim, Oodev, Ovagold, and Ovaspec. Ovaprim is a hormone that functions to stimulate and stimulate the release of eggs in female sires and sperm production in male sires. The Oodev hormone stimulates the maturation of fish gonads. The Oodev (Oocyte development) hormone is a combination of the pregnant mare serum gonadotropin (PMSG) hormone and antidopamine. PMSG contains more follicle-stimulating hormone (FSH) compared to luteinizing hormone (LH). FSH is needed to induce vitellogenesis and to accelerate gonad maturation [4].

Ovagold is a spawning hormone that is effective in the reproduction of various types of fish. By using Ovagold, the time of ovulation after injection of the fish broodstock becomes very predictable with high levels of fertility and hatchability, and the general dose of Ovagold is 0.5 ml/kg fish weight. Ovaspec contains the synthetic GnRHa (sGnRHa) and a dopamine barrier. This hormone can replace Ovaprim because it has almost the same composition and the same function: reproductive purposes in female fish and, in males, to help produce eggs during artificial spawning.

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Using this hormone will increase sperm production. The ovaspec hormone contains an antipsychotic, which has a positive effect on gonadotropin secretion. Gonadotropins are inhibited by dopamine; if dopamine is blocked with its antagonist, the inhibitory effect of dopamine is abolished, leading to increased gonadotropin secretion [5].

The semi-natural spawning process often used by cultivators typically employs the hormone Ovaprim. However, Ovaprim is more expensive, so cheaper alternatives should be used. One of the recommended hormones is Ovaspec. From previous studies using ovaprim conducted by [6], it was concluded that the optimal dose in his research was 0.3 ml/kg, resulting in the shortest spawning latency of 552 minutes, the highest egg hatchability of 84.16%, and larval survival. Highest 85.33%. it was concluded that the injection treatment of 0.5 ml Ovaprim/kg body weight resulted in a latency time of 6 hours, and the number of eggs resulting from stripping was 4176 eggs [7]. From these studies, it is also encouraging to conduct research on the effects of different doses of Ovaspec injection on the length of the spawning period, egg hatchability, and survival of African catfish *(Clarias gariepinus)* larvae.

Research Methods

Study Site and Period

The research was conducted over a 50-day period, from April 5, 2022, to May 26, 2022. The study was conducted at the Gontoran Freshwater Fish Seed Development Unit in Lingsar District, West Lombok.

Materials and Equipment

The materials and equipment used in this study were categorized into biological components, chemical agents, and technical apparatus. Biological and Chemical Materials The biological materials consisted of sexually mature African catfish *(Clarias gariepinus)* broodstock, silk worms *(Tubifex sp.)*, and paddy snails (Pila ampullacea) as natural feed, supplemented with Hipro-vite commercial feed. The chemical agents included Ovaspec as the inducing hormone and hand sanitizer for sterilization purposes. Freshwater was utilized as the primary media for all treatments. Research Apparatus The technical equipment was divided based on its specific function during the experiment: Rearing and Spawning Facilities: Cement tanks, fiber tanks, aquariums, and hapa nets (hapa) for fish containment. Measurement and Monitoring Tools: A digital scale for weight measurement, a ruler and measuring tape for length recording, a pH meter, and a DO meter for water quality monitoring. Surgical and Injection Tools: Syringes for hormone administration and scissors for anatomical observation. Observation and Documentation: An electric microscope for microscopic examination, scoop nets for handling the fish, and a camera for visual documentation.

Experimental Design

This study employed a Completely Randomized Design (CRD) consisting of four treatments, with each treatment replicated three times. A total of 24 sexually mature African catfish (Clarias gariepinus) broodstock were used, comprising 12 males and 12 females. The male broodstock were at least 12 months old, while the females were over 12 months old, with a body weight ranging from 1,000 to 3,000 g for both sexes. Prior to spawning and hormone injection, the male and female broodstock were housed separately in two dedicated ponds (12 individuals per pond) and underwent a fasting period (pemberokan) to clear the digestive tract. The experimental treatments involved varying dosages of Ovaspec administered per kilogram of fish body weight, as follows: Treatment 1 (P1): 0 mL/kg (Control), Treatment 2 (P2): 0.4 mL/kg, Treatment 3 (P3): 0.6 mL/kg, Treatment 4 (P4): 0.8 mL/kg.

Spawning Latency Period

The spawning latency period of African catfish (Clarias gariepinus) is defined as the time interval between the administration of the Ovaspec hormone injection and the initial egg release during the spawning process [6].

Fecundity

Fecundity refers to the reproductive capacity of a female catfish, defined as the total number of eggs produced relative to body weight or the total number of mature eggs ready for release during the spawning process. Fecundity represents the total quantity of eggs generated from the spawning between male and female broodstock. To determine fecundity, the body weight of the female broodstock is measured before and after spawning. The difference between these weights (gonad weight) is then divided by the weight of a single egg. fecundity can be calculated using the following formula:

$$F = Bg/Bs$$

Where: F: Fecundity (number of eggs), Bg: Total weight of the gonad (g), Bs: Average weight of a single egg (g)

Hatching Rate (HR)

Hatching Rate (HR) refers to the percentage of eggs that successfully hatch into larvae. The hatching process is influenced by several factors, including egg movement, temperature fluctuations, light intensity, and dissolved oxygen (DO) levels. In addition to intensive handling, water quantity and egg quality play critical roles in suppressing egg mortality. To determine the hatching rate, the number of hatched eggs from each treatment was recorded. A sample of 700 eggs was observed for each experimental unit. The hatching rate can be calculated using the following equation:

$$HR = \{n\}/\{N\} \times 100\ \%$$

Where: HR : Hatching Rate (%), n : Number of hatched eggs (larvae), N : Total number of eggs sampled (700 eggs).

Survival Rate (SR)

The survival rate of African catfish larvae was determined by sampling 400 larvae from each treatment and rearing them for 14 days. During the rearing period, the larvae were fed silk worms (Tubifex sp.) and monitored daily. Data collection focused on the number of surviving larvae throughout the 14-day duration. The final survival rate was calculated at the end of the experiment using the following formula:

$$SR = Nt/N0 \times 100\ \%$$

Where: SR: Survival Rate (%), Nt: Number of larvae at the end of the 14-day period, N0: Initial number of larvae stocked (400 individuals).

Water Quality Monitoring

Water quality is a critical factor that significantly influences survival rates and, in turn, the overall quality of African catfish. In this study, several water quality parameters were monitored, including pH levels, dissolved oxygen (DO), and temperature. These observations were conducted every three days throughout the 50-day research period.

Data Analysis

The experimental data were collected based on a Completely Randomized Design (CRD) featuring four treatments with three replications each. The treatments consisted of varying dosages of Ovaspec. The primary parameters analyzed included spawning latency, hatching rate, and larval survival rate. Statistical analysis was performed using Analysis of Variance (ANOVA) to determine the effects of the treatments. If significant differences were detected, the analysis was further subjected to the Least Significant Difference (LSD) test at a 95% confidence level ($p < 0.05$) to identify the specific differences between treatment means.

Results and Discussion

Spawning Time Latency

Based on the research results, the ovaspec injection at 0 ml/kg had the longest latency, and the ovaspec hormone injection at 0.4 ml/kg had the shortest latency. The spawning time latency value ranges from 521.33 to 1191.33 minutes. As shown in Figure 1.

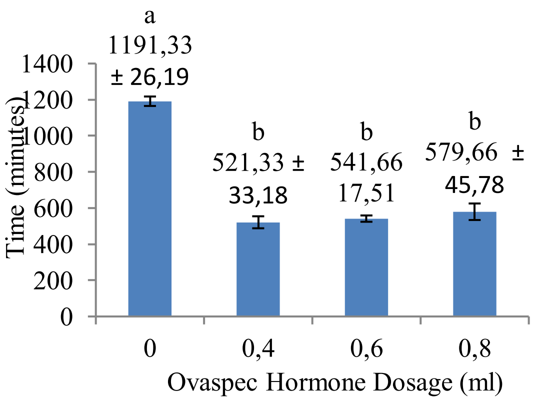

Figure 1. The spawning time latency value

Based on the results of this research, the longest average latency for spawning catfish was observed in treatment (P1), namely 1191.33 minutes, and the fastest latency for spawning African catfish was observed in treatment (P2), namely 521.33 minutes. Spawning latency values in treatments (P4) and (P3) were not significantly different from those in treatment (P2). It is known that the latency time in treatment (P3) was 541.66 minutes with 0.6 ml of Ovaspec hormone, and in treatment (P4) was 579.66 minutes with 0.8 ml of Ovaspec hormone. The results of the one-way ANOVA analysis showed that ovaspec administration produced significantly different latency values for catfish spawning time. The results of further BNT tests showed that, in the 0 ml/kg treatment, values were significantly different from those in treatments (P2), (P3), and (P4).

The latency of African catfish spawning in this study showed significant differences. From the observation results, it was found that the latency time for African catfish spawning in treatment (P1) was 1191.33 minutes, in treatment (P2) was 521.33 minutes, in treatment (P3) was 541.66 minutes and in treatment (P4) was 579.66 minutes. From the observation results, it was discovered that the concentration of gonadotropin hormones in the blood increased as a result of giving 0.4 ml/kg of Ovaspec, as a result of which the broodstock stimulated egg development and accelerated the spawning process, so that the fastest spawning latency time was 521.33 minutes. An increase in the concentration of gonadotropin hormones in the blood was also observed in the 0.6 ml treatment, with a latency to spawning of 541.66 minutes. Injecting ovaspec at a dose of 0.8 ml/kg of fish body weight experienced a slight decrease in gonadotropins, and in the treatment of 0 ml/kg or no dose there was no increase in gonadotropins, it is suspected that there was no external stimulation in the form of ovaspec hormone injections and the gonadotropin content in the body was not yet enough for ovulation to occur, although there will be a delay in the spawning process in the broodstock. Ovaspec contains a GnRH analogue that physiologically stimulates the pituitary to release gonadotropins, and, under natural conditions, gonadotropin secretion can be inhibited by dopamine. If dopamine is blocked by its antagonist, dopamine signalling will stop, and gonadotropin secretion will increase, which will then reach the gonads, accelerating oocyte maturation and ovulation [7].

From the explanation above, it can be seen that the use of the Ovaspec hormone can speed up the spawning latency time because Ovaspec is a hormone that contains stimulating substances for male and female broodstock. This proves that injecting a dose of Ovaspec into the back of African catfish breeders who are more than 12 months old can stimulate ovulation, because the fastest latency value was obtained at an Ovaspec dose of 0.4 ml/kg. Based on these results, the other 3 doses are considered optimal, and the dose with the potential to stimulate ovulation more quickly during the spawning process is the one that shows the greatest increase in ovulation rate. The fastest latency was obtained with an injection dose of 0.3 mL/kg parent (11.16 hours), followed by 0.6 mL/kg parent (11.97 hours) [8]. The longest latency was achieved when injecting 0.9 mL/kg parent, namely 12.10 hours. The results of this research are also in line with those of [6]: the latency for the fastest spawning time at the lowest injection was 0.3 ml/kg, with a time of 552 minutes. The acceleration of ovulation in this study was caused by the dose of Ovaspec given to the body of African catfish broodstock, where Ovaspec contains GnRH-analogue, which plays a role in stimulating the pituitary to release gonadotropins. The Ovaspec hormone also contains anti-dopamine, which has a positive effect on gonadotropin secretion. Gonadotropins are inhibited by dopamine; if dopamine is blocked with its antagonist, the inhibitory effect of dopamine is abolished, leading to increased gonadotropin secretion [9].

The Ovaspec hormone can stimulate spawning in male and female broodstock, reduce latency, increase egg hatchability, increase larval survival, and reduce mortality rates. It turns out that the liquid-filled Ovaspec hormone can yield very significant differences between broodstock injected with Ovaspec and those not injected with Ovaspec. It was obtained that the broodstock that was injected was the fastest at a dose of 0.4 ml, with a time of 521.33 minutes, while the broodstock that was not injected had a time of 1191.33 minutes. Broodstock that received an injection of 0.4 ml/kg Ovaspec had the shortest spawning latency, with the spawning process proceeding quickly and gonadotropin hormone being stimulated first. Likewise, with a dose of 0.6 ml/kg, but when the Ovaspec dose was increased to 0.8 ml/kg, it turned out to have less effect, and it was seen that at this dose, the value had started to decrease in the spawning latency parameter; it is suspected that the injection of this Ovaspec dose was too high. Meanwhile, the Ovaspec dose of 0 ml/kg showed that Ovaspec at this dose had no effect on latency to spawning time, as this treatment did not provide Ovaspec; the broodstock therefore did not receive external stimulation, and egg release was delayed. To obtain the best quality catfish seeds, both in terms of quality, quantity and time, it is best to inject a stimulating hormone into the body of the parent whose gonads are confirmed to be mature and can speed up the spawning process [10].

Fecundity

The results of African catfish spawning showed that the lowest fecundity was obtained at an injection dose of 0 ml/kg. Meanwhile, giving a dose of 0.8 ml/kg obtained the highest fecundity value. Based on calculations from this research, the average fecundity of catfish ranges from 5000 to 31250 eggs, as shown in Figure 2.

Based on the display in Figure 2, the fecundity value was obtained in treatment (P1), namely 5000 eggs treated with 0 ml/kg ovaspec hormone. The treatment with the highest egg number (31,250) was P4, with an ovaspec dose of 0.8 ml/kg. The fecundity values in (P2) and (P3) are not significantly different from (P4). Where the fecundity value obtained in treatment (P2), namely 25,000 eggs with treatment giving 0.4 ml/kg ovaspec, and treatment (P3), namely 27,000 eggs with treatment giving 0.6 ml/kg ovaspec hormone. The one-way ANOVA showed that administering the ovaspec hormone significantly affected catfish fecundity. The results of further BNT tests showed that, when administering 0.8 ml/kg of ovaspec hormone, values were very significantly different from the treatment (P1). Giving 0.6 ml/kg Ovaspec resulted in a value that was very significantly different from the treatment (P1), and giving 0.4 ml/kg Ovaspec resulted in a value that was also very significantly different from the treatment (P1). As well as treatment without a dose (0 ml/kg), the values obtained were very significantly different from (P4), (P3), and (P2). Female broodstock that have just started laying eggs generally have low fecundity, while male sperm quality is still poor. Thus, the spawning results of young broodstock are also not good, so larvae production is generally still low [11].

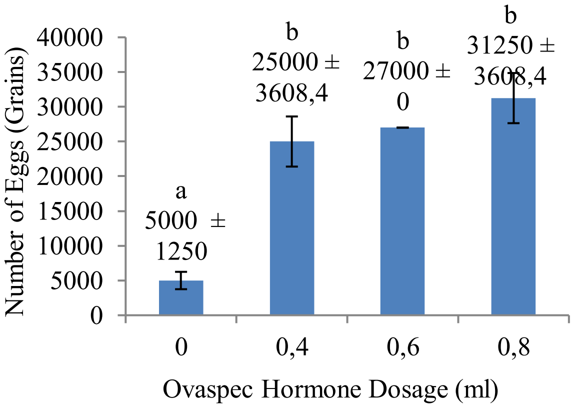

Figure 2. The fecundity values

Based on the fecundity values obtained, the broodstock that received an injection of 0.8 ml/kg of ovaspec had the highest fecundity values. This study also found no significant differences in fecundity across injection doses of 0.4 ml/kg, 0.6 ml/kg, and 0.8 ml/kg. The results of this study are in line with the results of research by [12] that the results of calculating the fecundity of treatments with different doses of HCG and ovaprim show that there is no real difference between the treatments of 0.8 ml/kg, 1 ml/kg and 1.2 ml/kg on fish egg fecundity. The type, size, and age of the broodstock are several factors that can influence the number of eggs, apart from giving ovaspec. From the explanation above, it can be seen that using Ovaspec can stimulate African catfish broodstock, especially female broodstock, to ovulate and help them produce as many eggs as possible. Fecundity is determined by several factors, including fish length and age. When eggs are ovulated in the same species, they can be influenced by the environment, body size and age. Fecundity is greatly influenced by the weight and length of the fish, where the heavier and longer the body of the fish, the more likely the number of eggs contained in the fish's stomach will be [13].

Egg Hatchability

The results of this study showed that the highest egg hatchability was obtained with 0.4 ml/kg ovaspec hormone injection, and the lowest with 0 ml/kg ovaspec injection. The values obtained for this parameter range from 60% to 84.47%, as shown in Figure 3.

Based on the results of this study, it shows that the highest average egg hatchability value was found in treatment (P2), namely with an average value of 84.47% with treatment giving 0.4 ml/kg ovaspec hormone. The lowest egg hatchability value was found in treatment (P1) with an average value of 60%, with treatment giving 0 ml/kg ovaspec hormone. Egg hatchability values in treatments (P4) and (P3) were very significantly different from (P2) and (P1). It is known that the egg hatchability value obtained in treatment (P3) was 73.71% with 0.6 ml/kg ovaspec hormone, and in treatment (P4) was 68.76% with 0.8 ml/kg ovaspec hormone. The results of the One-Way ANOVA analysis showed that administration of the ovaspec hormone significantly affected egg hatchability. The results of further BNT tests showed that the 4 treatments differed significantly.

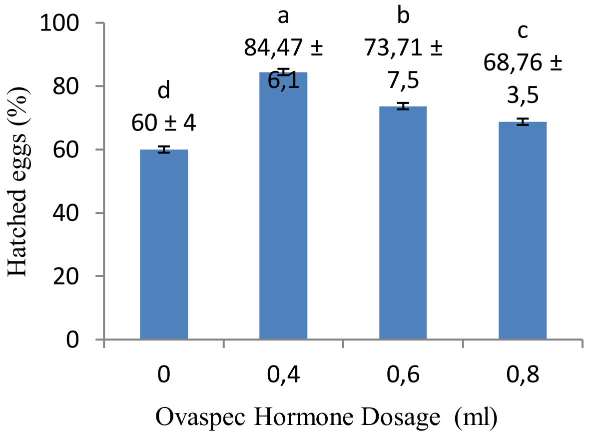

Figure 3. Average egg hatchability value

Egg hatchability differed significantly among the 4 treatments. Hatchability is determined by counting the larvae that hatch and the eggs that do not, which are characterised by a milky-white colour. The results of the egg hatchability observations showed that the values for treatments (P1), (P2), (P3), and (P4) were 60%, 84.47%, 73.71%, and 68.76%, respectively. Injecting different doses of Ovaspec can affect the percentage value of egg hatchability parameters. Fish injected with an ovaspec dose of 0.4 ml/kg showed the best results in stimulating gonadotropin hormones in speeding up the hatching process, followed by a dose of 0.6 ml/kg. However, when the dose was increased to 0.8 ml/kg of the ovaspec hormone injected into the broodstock, this parameter was said to be an excess dose or overdose because it did not affect the egg hatchability value, and it could be seen that the value decreased; it is suspected that the movement of spermatozoa slowed down in fertilizing the egg. Meanwhile, giving 0 ml/kg of Ovaspec is known to have less effect, presumably because there is no Gnrha content in the Ovaspec given to the broodstock.

Giving 0.4 ml/kg Ovaspec to the broodstock is considered optimal, followed by the 0.6 ml/kg dose used in this study, which is considered the maximum dose. Thus, it can be determined that the ovaspec hormone at 0.4 ml/kg can increase egg hatchability, resulting in an average hatching rate of 84.47% across spawning trials. This is also in accordance with the results of research by [14] entitled The Effect of Sgnrha Domperidon with Different Administration Doses on Ovulation of Goldfish (Cyprinus Carpio L.) Punten Strain, which stated that the optimal hatching degree was obtained at a treatment dose of 0.4 ml/ kg/bb and 0.5 ml/kg/bb. This is also in line with the research results of [15] entitled The Effectiveness of Using Ovaprim with Different Doses in Spawning Carp (Cyprinus Carpio), " which showed that the highest hatchability rate was a dose of 0.4 ml of Ovaprim per one kilogram of fish. Excessive doses of stimulants can reduce egg hatchability. An increase in hormones in the mother's body can reduce their biological potency because the hormonal mechanism functions normally or optimally at certain hormone levels. The increase in hatchability of catfish eggs treated with hormones is due to the increase in the Follicle Stimulating Hormone (FSH) content, so that the follicles develop and the hatchability of the eggs also increases [16].

Electron microscopy revealed that the unhatched eggs still contained embryos. However, the embryo is attached to the shell, and the head is reddish and black. Some unhatched eggs have abnormal embryo shapes and are smaller and less developed than healthy eggs. Temperature and the type of fish are among the factors that influence the egg-hatching process. If the aquarium temperature is higher, the egg hatching time will be shorter. In this research, the hatching process was conducted in 12 aquariums in a closed, warm room. Eggs that do not hatch will have characteristics such as being milky white in color and will rot within 48 hours. If they are not moved or cleaned, they will have an adverse effect on the water. And the catfish parent's eggs will develop into embryos, which hatch into larvae; the larvae are nurtured until the post-larval phase.

Egg hatching in this study was relatively high, especially in treatment (P2). This was due to the quality of the water used. One factor that determines catfish egg hatching is temperature. If the water temperature is low, hatching time will be long; if it is high, it will be short. The differences in egg hatchability are thought to be caused by erratic fluctuations in room temperature due to unpredictable local weather conditions. In this study, a dose of 0.4 ml/kg was found to increase egg hatchability. The water quality at the time of hatching in the aquarium container had an average temperature of 28.43 °C; from these results, it can be considered optimal. The optimal temperature range for egg hatching is 27 °C – 30 °C [17]. Temperatures outside the optimal range can cause the death of fish eggs and larvae [18].

Larval Survival

The results of this study showed that the highest survival rate for catfish larvae was achieved with Ovaspec at a dose of 0.4 ml/kg. Giving Ovaspec at a dose of 0 ml/kg was found to be the lowest value. Larval survival values range from 46.08% to 77%, as shown in Figure 4.

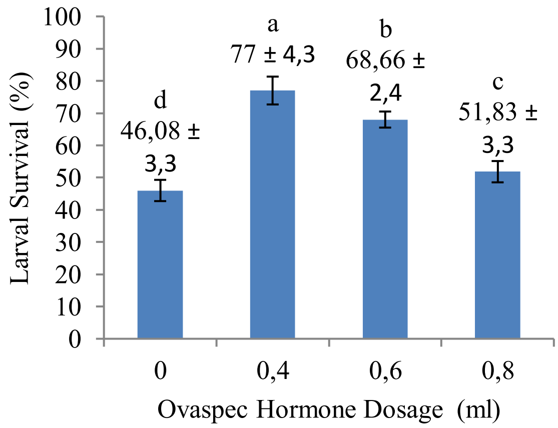

Figure 4. Larval survival values

Based on the results of this study, the highest average larval survival was observed in treatment (P2), with an average of 77%, and the treatment received 0.4 ml/kg Ovaspec hormone. The lowest larval survival value was observed in treatment (P1), with an average of 46.08%, and treatment received 0 ml/kg of Ovaspec hormone. Larval survival values in treatments (P4) and (P3) were very significantly different from (P2) and (P1). It is known that the larval survival value obtained in treatment (P3) was 68.66% with treatment giving 0.6 ml/kg Ovaspec hormone, and treatment (P4), namely 51.83% with treatment giving 0.8 ml/kg Ovaspec hormone.

The results of the One-Way ANOVA analysis showed that administration of the Ovaspec hormone resulted in significantly different larval survival. The results of further BNT tests showed that when administering the Ovaspec hormone at a dose of 0 ml/kg, very significantly different values were obtained compared with treatments (P2), (P3), and (P4). Giving the Ovaspec dose at 0.4 ml/kg resulted in values that were very significantly different from those of treatments (P1), (P3), and (P4). Giving an Ovaspec dose of 0.6 ml/kg resulted in values that were very significantly different from those of treatments (P1), (P2), and (P4). As well as administering the Ovaspec hormone at a dose of 0.8 ml/kg, very significantly different values were obtained from treatments (P1), (P2), and (P3). From the results of this research, it is known that the best larval survival percentage value was found in (P2) with a dose of 0.4 ml/kg with a value of 77%, then followed by treatment P3 with a dose of 0.6 ml/kg with a value of 68.66%, and treatment P4 at a dose of 0.8 ml/kg with a value of 51.83%, while treatment P1 with a dose of 0 ml/kg with a value of 46.08%. Based on analysis of variance, Ovaspec had a significant effect on differences in the yield of surviving larval tilapia. The results of the Least Significant Difference (BNT) analysis for the 0.4 ml/kg treatment showed a significant difference from the 0.8 ml/kg, 0 ml/kg, and 0.6 ml/kg treatments. This research found that African catfish broodstock that received Ovaspec injections and those that did not could influence the value of this parameter. Broodstock injected with Ovaspec at 0.4 ml/kg showed the best values for larval survival parameters. This was followed by a dose of 0.6 ml/kg; however, when Ovaspec was increased to 0.8 ml/kg or omitted, the dose of Ovaspec or 0 ml/kg was known to reduce larval survival. This occurs because there is no external stimulation from the ovaspec hormone, and because an excess dose of 0.8 ml/kg was administered; it is suspected that this was an excess. Based on the research, when administering Ovaspec at a dose of 0.4 ml/kg, the best value for larval survival parameters was 77%. It can be stated that the ovaspec dose of 0.4 ml/kg is the best ovaspec dose for the survival parameters of African catfish larvae. This is in line with the research results: the highest survival rate was with treatment three (0.4 ml/kg), while a dose of 0.2 ml/kg had a moderate survival rate, and a dose of 0 ml/kg had the lowest survival rate [15]. The process of feeding catfish larvae using silk worms, using a spoon, then putting or throwing them into the aquarium. The feeding method is to give as much food as possible. A change in feed is carried out to adjust the size and nutritional requirements for larval growth [19]. Changing the right feed also increases fish growth and survival.

Water Quality

During the maintenance period, water quality measurements are carried out every 3 days. This parameter is guaranteed to be present in research worldwide, especially in studies on fish farming, because it plays a very important role in supporting the life and growth of fish. Therefore, the importance of knowledge regarding water quality management is emphasised. In this research, larvae were reared in 12 aquariums, and water quality was a factor that must be understood to ensure the biota could grow and develop well during the rearing period.

Table 1. Water quality parameters

Parameter	Average	Tool	Reference
Temperature (°C)	28.43	Thermometer	25-30ºC [20]
DO (mg/L)	5.68	DO meters	5.3-6.6 [21]
pH	7.79	pH meter	6.6 – 8.6 [20]

Water quality parameters are important to understand, especially during spawning and larval rearing. As water is the main ingredient in cultivation, it directly affects catfish health and growth. Poor water quality poses serious problems for fish in the fish biota, including poisoning or oxygen depletion, as seen in catfish. Only 3 parameters were observed in this study: temperature, DO, and pH. The average temperature during the research was around 28.43 ˚C, which falls within the optimal range for catfish life. This means that the temperature in this study supports catfish life; a stable temperature not only improves the fish's life but also plays a very important role in the success of cultivation activities. [22] 25-30 ˚C is the ideal temperature for keeping catfish.

Dissolved Oxygen (DO) plays an important role in fish metabolic processes; the average DO value obtained during catfish rearing is around 5.68. The DO value obtained is in the normal category, so that dissolved oxygen can increase the survival of catfish. When rearing catfish seeds, it should be maintained at 5.3-6.6, as this is a good range for African catfish [21-23].

The degree of acidity (pH) obtained during the research was around the average (7.79); it was quite optimal for the life of catfish. This was confirmed that a pH of 6.5-8.5 is optimal for cultivating catfish [24-25]. From this presentation, it can be seen that if the pH is too high or too low, it can cause young fish to become stressed, experience health and physiological problems, and even die. Therefore, it is very important to stabilize and manage water quality.

Conclusion

Based on the research results, the following conclusions can be drawn: The use of the ovaspec hormone significantly affects spawning latency, fecundity, egg hatchability, and larval survival. A dose of 0.4 ml/kg resulted in egg hatchability of 84.47% and larval survival of 77%. Meanwhile, a dose of 0.8 ml/kg produced a fecundity value of 31,250 eggs, and a dose of 0 ml/kg produced the longest spawning latency value of 1191.33 minutes.

Author's Contribution
A. Diansyah: conceptualization, methodology, investigation, data curation, formal analysis, writing-original draft. M. Junaidi: supervision, validation, resources, writing-review and editing. B. D. H. Setyono: visualization, statistical analysis, interpretation of results, writing-review and editing.

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