The Performance of Discus Fish (*Symphysodon discus*) Hatchery in Joel Nararya Farm, Sukarame, Bandar Lampung

Muhammad Browijoyo Santanumurti[1], Fikri Eka Saputra[2], Siti Hudaidah[3]*

[1]Department of Aquaculture, Faculty of Fisheries and Marine, Universitas Airlangga, Jl. Mulyorejo, Mulyorejo, Surabaya 60115, Indonesia
[2]Fisheries Program, Faculty of Agriculture, University of Lampung, Jl. Prof. Sumantri Brojonegoro, Bandar Lampung, Lampung 35141, INDONESIA
[3]Department of Fisheries and Marine Science, Faculty of Agriculture, University of Lampung, Jl. Prof. Sumantri Brojonegoro, Bandar Lampung, Lampung 35141, INDONESIA

*Corresponding Author: idahasan64@gmail.com

ABSTRAK

Indonesia memiliki keanekaragaman hayati dalam komoditas ikan hias. Salah satu ikan hias yang berpotensi untuk dikembangkan adalah ikan discus. Pembenihan ikan discus merupakan kegiatan penting dalam proses budidaya. Penelitian ini bertujuan untuk mengetahui kinerja pembenihan ikan discus di Peternakan Joel Nararya, Sukarame, Bandar Lampung. Penelitian ini mengamati dua induk produksi pembenihan, kode A (*Pigeon* betina *x Pigeon* jantan) dan B (*Pigeon* betina *x Blue Turquoise* jantan). Hasil penelitian menunjukkan bahwa fekunditas 153 telur untuk A dan 160 telur untuk B. Laju pemupukan menunjukkan nilai 73% untuk kode A dan B. Nilai tingkat penetasan menunjukkan 15% untuk kode A dan 64% untuk kode B. pembenihan ikan discus belum optimal. Peternakan harus menggunakan rasio 2: 2 jantan dan betina untuk meningkatkan produksi telur. Kode A Akuarium pembenihan juga terlalu dekat dengan tempat persilangan induk sehingga mudah stres dan mempengaruhi tingkat penetasan. Itu perlu diganti ke lokasi yang tepat

Kata Kunci: Discus; Pembenihan; Bandar Lampung

ABSTRACT

Indonesia has biodiversity in ornamental fish commodities. One of the ornamental fish that has the potential to be developed is the discus fish. The hatchery of discus fish is an important activity in the aquaculture process. This study aimed to determine the performance of discus fish hatchery in Joel Nararya Farm, Sukarame, Bandar Lampung. This study observed two broodstock of hatchery production, code A (Female Pigeon x Male Pigeon) and B (Female Pigeon x Male Blue Turquoise). This study showed that the fecundity was 153 eggs for A and 160 eggs for B. The fertilisation rate showed a value of 73% for codes A and B. The hatching rate value indicated 15% for code A and 64% for code B. The performance of discus fish hatchery was not optimum. The farm should use a 2:2 ratio of male and female to increase eggs production. The code A hatchery aquarium was also too close to broodstock's passing places so that they were easily stressed and affected the hatching rate. It needs to be replaced to the proper location.

Keywords: Discus; Hatchery; Bandar Lampung

INTRODUCTION

Indonesia is well known for the ornamental fish biodiversity. The number of marine ornamental fish is around 650 species, 480 species have been identified, and around 200 species are traded. In comparison, the number of freshwater ornamental fish species in Indonesia is estimated to be around 400 out of 1,100 species of ornamental fish worldwide (Kusrini, 2010). The previous data stated that Indonesia's ornamental fish exports were ranked 5th globally, with a total of US $ 5.24 million (Khoironi et al., 2017). One of the ornamental fish that can be developed is the discus fish (Symphysodon discus).

Discus fish is an ornamental fish that is in great demand by fish enthusiasts (Rahmati-Holasoo et al., 2020). It is because these fish have beautiful shapes and colours (Wen et al., 2018). The price of this fish is also quite high. Previous data showed that the price of 1-inch discus fish seeds was sold in the range of IDR 15,000 - 25,000/fish (Sukardi et al., 2019). Discus fish

hatchery activities are starting to be carried out to meet market needs because of their advantages.

The hatchery is an important activity in the aquaculture process. Success in hatchery activities will greatly affect the next stage of aquaculture. It is because hatchery has relation with production and stability of market demand in local and foreign market (Alit & Setiadharma, 2020). Discus fish hatchery activities include broodstock maintenance, broodstock spawning, egg hatching, larvae, and seed rearing. The determining factors for the success of the hatchery process are the quality of the broodstock and water quality. If these steps are not observed, the fish seeds' quality will be poor, and their growth will be slow or even death. The fish is also prepared proper place for hatchery activity with good water quality and less noise (de Jong et al., 2018; Swain et al., 2020). This study aims to determine the performance of discus fish hatchery in Joel Nararya Farm, Sukarame, Bandar Lampung. The hatchery performance is measured using the parameters of fecundity, fertilisation rate, and hatching rate.

MATERIALS AND METHODS

Sampling Location

This research was conducted from 29 June 2020 to 28 July 2020 at Joel Nararya Farm, Sukarame, Bandar Lampung.

Sampling Method

The methods used in this study were primary data and secondary data in accordance with previous research (Putri et al., 2020). Primary data was collected data was directly from the field, research or analysis. The data obtained resulted from direct observation through interviews, following direct activities and observations (Khairunnisa & Jiwandono, 2020). Secondary data was data obtained by observation from existing sources (Purwanto & Taftazani, 2018). This study used two codes: A (Female Pigeon x Male Pigeon) and B (Female Pigeon x Male Blue Turquoise).

Data Analysis

Hatchery performance was measured by parameters of fecundity, fertilisation rate and hatching rate. The measurement of fecundity refers to previous studies using the gravimetric method. (Hudaidah et al., 2020)

Fertilisation rate measurement used the following formula (Al Ishaqi & Sari, 2019):

Fertilization Rate = (Number of fertilized eggs / Total eggs) x 100%

The hatching rate measurement used the following formula (Ningrum et al., 2019):

Hatching Rate = Number of eggs hatched: Total number of fertilised eggs x 100%

This study also measures water quality. According to previous research, the parameters measured were pH and temperature (Santanumurti et al., 2019).

RESULTS AND DISCUSSION

The performance of discus fish hatchery results in **Table 1.** The results showed that the fecundity produced was 153 eggs for code A and 160 eggs for code B. This value was low. Previous research stated that once spawning of discus fish could produce 300-400 eggs (Liveood et al., 2010). It might be due to the ratio of spawning broodstock since it used one male and one female. It was different from previous studies statement that spawning discus fish using two males and two females could produce 213-540 eggs once spawning (Önal et al., 2011). Therefore the hatchery performance was better than in Joel Naraya Farm. Proper ratio was important to get high production.

The fertilization rate showed a value of 73% for codes A and B with fertilized eggs number 118 and 112. The value was lower than previous study showed 165 eggs fertility per cycle (Din et al., 2002). Though no reports of the fertilization rate was found directly for discus fish. However, this value was better when compared to previous research of catfish (Aedyanti et al., 2018). Previous research stated that catfish's lowest fertilisation rate reached 66.12% (Aedyanti et al., 2018). The hatching rate value indicated 15% for code A and 64% for code B. The value of the hatching rate in code A was very low. It was even lower than in previous studies, which was 20% (Swain, 2020). It was probably the fish broodstock that incubated the eggs under stress condition (Radford et al., 2014). Discus eggs were not removed or separated from the broodstock since discus fish has parental care properties, nurturing and caring for the eggs (Khong et al., 2009). The hatchery aquarium of code A was too close to broodstock's passing places so that they were easily stressed and affected the hatching rate.

Table 1. Performance of discus fish hatchery in Joel Nararya Farm Sukarame, Bandar Lampung.

Code	Broodstock	Weight (g) ♂	Weight (g) ♀	Fecundity (eggs)	Fertilized eggs (eggs)	Unfertilized eggs (eggs)	Fertilization Rate (%)	Hatched Eggs (eggs)	Hatching Rate (%)
A	Pigeon	66	78	160	118	42	73	18	15
B	Pigeon x Blue Turquoise	60	75	153	112	41	73	75	64

Table 2. Water quality parameters in the hatchery discus fish

Parameter	Broodstock Selection Aquarium	Hatchery Aquarium	
		A	B
Temperature (ºC)	29.3	30	29
pH	6.4	6.5	6.7
TDS (ppm)	110	115	110

Fish were easily disturbed by noise and could affect spawning activity (de Jong et al., 2018).

Based on **Table 2.** the pH and temperature were in accordance with the discus fish environment. According to previous discus fish research, a good pH ranges of 6.6 and temperatures range 28ºC (Swain et al., 2020; Wen et al. 2018).

CONCLUSION

The performance of discus fish hatchery was not optimum and code A hatchery aquarium was also too close to broodstock's passing places so that they were easily stressed and affected the hatching rate. We recomended using 2:2 ratio of male and female to increase eggs production. We also recommended the hacthery aquarium need to be replaced to the proper location with less or no sound to reduce the stress level.

REFERENCES

Al Ishaqi, A. M., Sari, P. D. W. (2019). The Spawning of Koi (Cyprinus carpio) using Semi-Artificial Method: The Observation of Fecundity, Fertilization Rate and Hatching Rate. *Jurnal Perikanan dan Kelautan*, 9(2), 216-224. http://dx.doi.org/10.33512/jpk.v9i2.6862

Alit, A. A., Setiadharma, T. (2020). Evaluasi Analisis Kelayakan Finansial Pembenihan Ikan Bandeng Pada Hatchery Skala Rumah Tangga. *Prosiding Seminar Nasional Perikanan dan Kelautan*, 8(1), 1-8. http://prosiding-semnas.fpik.ub.ac.id/index.php/prosemfpik/article/view/2

Ardyanti, R., Nindarwi, D. D., Sari, L. A., Sari, P. D. W. (2018). Manajemen Pembenihan Lele Mutiara (Clarias sp.) dengan Aplikasi Probiotik di Unit pelayanan Teknis Pengembangan Teknologi Perikanan Budidaya (UPT PTPB) Kepanjen, Malang, Jawa Timur. *Journal of Aquaculture and Fish Health*, 7(2), 84-89. https://e-journal.unair.ac.id/JAFH/article/viewFile/11254/6335

Hudaidah, S., Aziz, M. I. A., Santanumurti, M. B. (2020). The role of HCG in jelawat fish (Leptobarbus hoevenii) breeding in Indonesia. *EurAsian journal of Biosciences*, 14, 5279-5284. http://ejobios.org/download/the-role-of-hcg-in-jelawat-fish-leptobarbus-hoevenii-breeding-in-indonesia-8222.pdf

de Jong, K., Amorim, M. C. P., Fonseca, P. J., Fox, C. J., Heubel, K. U. (2018). Noise can affect acoustic communication and

subsequent spawning success in fish. *Environmental Pollution*, 237, 814-823. https://doi.org/10.1016/j.envpol.2017.11.003

Din G. Y., Zugman, Z., Degani, G. (2002). Evaluating innovations in the ornamental fish industry: case study of a discus, Symphysodon aequifasciata, farm. *Journal of Applied Aquaculture*, 12, 31-50. https://doi.org/10.1300/J028v12n02_02

Khairunnisa, K., Jiwandono, I. S. (2020). Analisis Metode Pembelajaran Komunikatif Untuk PPKN Jenjang Sekolah Dasar. *ELSE (Elementary School Education Journal): Jurnal Pendidikan dan Pembelajaran Sekolah Dasar*, 4(1), 9-19. http://dx.doi.org/10.30651/else.v4i1.3970

Khoironi, F. E., Saskara, I. A. N. (2017). Analisis pengaruh kurs dollar, inflasi, dan produksi terhadap ekspor ikan hias di provinsi bali. *E Jurnal EP Universitas Udayana*, 6(3), 337-361. https://ojs.unud.ac.id/index.php/eep/article/download/28039/17654

Khong, H. K., Kuah, M. K., Jaya-Ram, A., Shu-Chien, A. C. (2009). Prolactin receptor mRNA is upregulated in discus fish (Symphysodon aequifasciata) skin during parental phase. *Comparative Biochemistry and Physiology Part B: Biochemistry and Molecular Biology*, 153(1), 18-28. https://doi.org/10.1016/j.cbpb.2009.01.005

Kusrini, E. (2010). Budidaya ikan hias sebagai pendukung pembangunan nasional perikanan di Indonesia. *Media Akuakultur*, 5(2), 109-114. http://dx.doi.org/10.15578/ma.5.2.2010.109-114

Livengood, E. J., Ohs, C. L., Chapman, F. A. (2010). Candidate species for Florida Aquaculture: Discus Symphysodon spp., a profitable but challenging species for Florida aquaculture. *EDIS*, 2010(2). 1-8. https://journals.flvc.org/edis/article/view/118440

Ningrum, D. R. K., Budi, D. S., Sulmartiwi, L. (2019). Induksi pemijahan ikan wader pari (Rasbora argyrotaenia) menggunakan Ovaprim TM dengan dosis berbeda. *DEPIK Jurnal Ilmu-Ilmu Perairan, Pesisir dan Perikanan*, 8(2), 117-124. https://doi.org/10.13170/depik.8.2.14076

ÖNal, U., Celik, I., Tokşen, E., Sepil, A., Caydan, E. (2011). Early infection of discus Symphysodon aequifasciatus altricial larvae by Sciadicleithrum variabilum (Monogenea). *Journal of fish biology*, 78(2), 647-650. https://doi.org/10.1111/j.1095-8649.2010.02841.x

Purwanto, A., Taftazani, B. M. (2018). Pengaruh jumlah tanggungan terhadap tingkat kesejahteraan ekonomi keluarga pekerja k3l Universitas Padjadjaran. *Focus: Jurnal Pekerjaan Sosial*, 1(2), 33-43. https://doi.org/10.24198/focus.v1i2.18255

Putri, T. A., Maya, S., Santanumurti, M. B. (2020). Nile tilapia (*Oreochromis niloticus*) fish hatchery technique: the survival rate evaluation in IBAT Pandaan, Pasuruan, East Java. *IOP Conference Series: Earth and Environmental Science*, 441 (1), 012052. doi:10.1088/1755-1315/441/1/012052

Radford, A. N., Kerridge, E., Simpson, S. D. (2014). Acoustic communication in a noisy world: can fish compete with anthropogenic noise?. *Behavioral Ecology*, 25(5), 1022-1030. https://doi.org/10.1093/beheco/aru029

Rahmati-Holasoo, H., Shahbazi, M., Ebrahimzadeh, H. A., Mousavi, S., Pourmortazavi, M., Bahambari, A., Mokhatari, A. (2020). Polycystic kidney disease in discus (*Symphysodon aequifasciatus*) and Siamese fighting fish (*Betta splendens*): A histopathological study. *Bull. Eur. Ass. Fish Pathol*, 40(1), 39.

Santanumurti, M. B., Hanifah, S., Nindarwi, D. D. (2019). Water quality in the North Madura: is it suitable for vannamei shrimp farming or not?. *Jurnal Ilmu Perikanan dan Sumberdaya Perairan*, 8(1). 753-758. https://pdfs.semanticscholar.org/f9ff/f603188bbcc93ba501e70c8d717eb2471280.pdf

Sukardi, Sukarman, Mustahal, Syamsunarno, M. B. (2019) Pemanfaatan keong mas (*Pomacea canaliculata*) untuk pertumbuhan dan memacu warna benih ikan diskus red melon (*Symphysodon aequifasciata*). *Jurnal Perikanan dan Kelautan p-ISSN*, 9(1), 35-43. https://core.ac.uk/download/pdf/291655502.pdf

Swain, S., Sawant, P. B., Chadha, N. K., Sundaray, J. K., Prakash, C. (2020). Effect of water pH on the embryonic development of Discus, Symphysodon aequifasciatus, Pellegrin. *Journal of Entomology and Zoology Studies*, 8(3), 1656-1662. https://www.entomoljournal.com/archives/2020/vol8issue3/PartZ/8-3-193-993.pdf

Wen, B., Chen, Z., Qu, H., Gao, J. (2018). Growth and fatty acid composition of discus fish Symphysodon haraldi given varying feed ratios of beef heart, duck heart, and shrimp meat. *Aquaculture and fisheries*, 3(2), 84-89. https://doi.org/10.1016/j.aaf.2018.01.002

Wen, B., Jin, S. R., Chen, Z. Z., Gao, J. Z., Liu, Y. N., Liu, J. H., Feng, X. S. (2018). Single and combined effects of microplastics and cadmium on the cadmium accumulation, antioxidant defence and innate immunity of the discus fish (Symphysodon aequifasciatus). *Environmental pollution*, 243, 462-471. https://doi.org/10.1016/j.envpol.2018.09.029