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Technical and Profitability Aspect of Blue Mosaic Guppy (*Poecilia reticulata*) in Swasti Farm, Sleman, Yogyakarta

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Abstract

The blue mosaic guppy (*Poecilia reticulata*), a highly sought-after freshwater ornamental fish, faces growing market demand. This study evaluates the technical feasibility and profitability of blue mosaic guppy production at Swasti Farm in Sleman, Yogyakarta, Indonesia. Using a case study approach, data were collected through participatory observation, direct monitoring, and semi-structured interviews. Technical performance was assessed by benchmarking farm practices against Indonesian National Standards (SNI 8228.3:2015, SNI 9308:2024) and existing literature. Profitability analysis utilized a one-year business projection model incorporating key metrics: Revenue-to-Cost (R/C), net profit (NP), Break-Even Point by sales volume (BEPs) and production units (BEPu), and Profitability Rate (PR). Production followed four stages: broodstock rearing, breeding, fry/nursery rearing, and harvesting. Rigorous water quality and fish health management ensured protocol compliance. Broodstock (aged three months at spawning) were maintained at a 1:2 male-to-female ratio, yielding 20 larvae per cycle and a 55% survival rate post-nursery. Financial analysis revealed an annual net profit of IDR 9,826,417, with R/C = 1.3, BEPs = IDR 24,419,940, BEPu = 70 fish pairs, and PR = 141%, confirming economic viability. To enhance profitability, scaling production by 75% (to ≥210 fish pairs annually) and optimizing operational efficiencies could elevate profits above Sleman, Yogyakarta's minimum wage threshold. Findings demonstrate that standardized practices and strategic scaling align guppy farming with regional economic benchmarks, offering a replicable model for small-scale aquaculture ventures.

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INTRODUCTION

The guppy fish (*Poecilia reticulata*) is a sought-after freshwater ornamental fish in Indonesia and is highly popular among ornamental fish hobbyists outside the country (Serihollo *et al*., 2024). It is one of the most beloved aquarium fish globally, known for its diverse varieties in colour patterns and ease of tank maintenance (Santiago-Arellano *et al*., 2021; Soto *et al.,* 2024; Uribe *et al*., 2018). The guppy's popularity has driven significant interest in its breeding and cultivation, presenting both technical and economic opportunities for aquaculture ventures. The blue mosaic variety is one of the most popular varieties of guppy in Indonesia. The Blue Mosaic Guppy is a selectively bred variant characterized by its striking blue mosaic pattern. This pattern results from selective breeding programs aimed at enhancing specific colour traits.

The technical aspects of breeding ornamental fish involve maintaining fish health, managing water quality, temperature, and feeding. These aspects should be considered to achieve an optimal breeding condition and consequently ensure the success in breeding fish (Akbar, 2022). Guppies are also livebearers (Ahilan and Kamalii, 2022), meaning they give birth to free-swimming fry rather than laying eggs, which impacts their breeding management strategies. Maintaining fish health is also crucial in breeding guppies (Akbar, 2022). Common health issues include tail and fin rot, ich, spinal deformities, and bacterial infections (Mecha and Gonzales-Plasus, 2023). Effective management practices include regular water changes, monitoring for signs of disease, and implementing quarantine protocols for new arrivals.

Nowadays, the ornamental fish market has shown a consistent demand for colourful and unique guppy variants, including the Blue Mosaic Guppy. Guppy fish dominate as much as 25% of the world market of freshwater ornamental fish trade (Jannah *et al*., 2023). Market trends indicate a growing interest in aquarium fish that exhibit exceptional colouration and patterns. This demand provides an opportunity for profitability in the aquaculture sector. In common, the costs associated with Blue Mosaic Guppy cultivation include initial investment in breeding stock, setup of breeding tanks, maintenance of water quality, and feed. Analyzing these costs to potential revenue can help determine the profitability of the venture (Magna *et al*., 2023). Revenue can be generated through direct sales of guppies to aquarium shops, wholesalers, and individual hobbyists. Additionally, value-added services such as customized breeding programs or premium packaging can enhance profitability. Key challenges in guppy farming include managing disease outbreaks (Alam *et al*., 2024) and fluctuations in market prices (Tarihoran *et al*., 2023). However, opportunities exist in expanding market reach, improving breeding techniques, and exploring niche markets for rare or high-quality variants.

Swasti Farm, located in Sleman, Yogyakarta, provides a practical example of guppy cultivation within a local context. The farm's approach to breeding Blue Mosaic Guppies involves a combination of technical expertise and market strategy. This study aims to examine the specific aquaculture practices implemented at Swasti Farm, including their breeding protocols, cost management, and market strategies, to assess both the technical success and profitability of their guppy breeding operations. By examining these aspects, the study aims to present a thorough picture of the technical and financial aspects affecting guppy farming's profitability, providing insights into the industry's opportunities as well as its challenges.

METHODOLOGY

Ethical Approval

All activities and procedures using guppy (*P. reticulata*) were carried out ethically and responsibly following the

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National Standardization Agency of Indonesia certification SNI 8228.3:2015.

Place and Time

The study was conducted at the Swasti Farm, Sleman, Yogyakarta, from October to December 2023. Swasti Farm's address is Jl. Mangga Kujonsari No.87, RT.07/RW.03, Tundan, Purwomartani, Kec. Kalasan, Kabupaten Sleman, Daerah Istimewa Yogyakarta 55571.

Research Materials

The blue mosaic guppy (*P. reticulata*) broodstock variant used in this study was selected from fish qualified to spawn, produced by Swasti Farm.

Research Design

This study was conducted using a case study of aquaculture activities at Swasti Farm. Direct observation during production activities was used to collect primary data. Secondary data was taken from the results of interviews and discussions with aquaculture technicians and business owners. Literature studies were also used to complement secondary data. Technical aspects observed included aquaculture practice during broodstock rearing, breeding technique, fry rearing and nursery, and fish harvest. The water quality and fish health management were also observed during fish production. The profitability aspects measured were core components such as costs (investment, fixed, and variable), sales, and pricing. Data from both aspects will be compared with the relevant literature.

Work Procedure

The technical aspects of guppy fish farming activities start from broodstock rearing, fish breeding, fry rearing and nursery, and lastly harvesting (Figure 1). Direct observation is carried out on all aquaculture practices, including techniques in container preparation, water quality management, feed management, and fish health management. During broodstock rearing, observations are made on the broodstock selection process, techniques in preparing containers, water quality management, feed management, and fish health management.

Figure 1. Work procedure of guppy fish farming operations.

When the fish is ready to spawn, the male and female fish will be moved into a spawning container until they give birth to fish larvae. During the spawning process, observations are made on spawning techniques and reproductive performance in the form of larval production. The larvae from the spawning will then be maintained in a larval maintenance container for 14 days and continued with nursery processes for up to 3 months. At this stage, observations are made on cultivation techniques, water quality management, feed management, and production performance. After that, fish that have entered the market size will be sold after the nursery period.

Data Analysis

The technical data were analyzed descriptively by evaluating compliance with Indonesia National Standards for Good Aquaculture Practice (GAP) Part 3: Ornamental Fish (SNI 8228.3:2015) and Guppy Fish (*P. reticulata*)—Quality and Handling Requirements (SNI 9308:2024) and also benchmarking results against relevant literature to assess the success of the guppy fish farming operation. The business analysis involves calculating one-year business projections based on technical data gathered during the research period at Swasti Farm. The key metrics of the profitability aspect were calculated using the following formulas:

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$$\text{Total cost (TC)} = \text{Variabel cost (VC)} + \text{Fixed cost (FC)} \quad (1)$$

$$\text{Total Revenue (TR)} = \text{Total number of sales} \times \text{price} \quad (2)$$

$$\text{Net Profit (NP)} = \text{Total Revenue(TR)} - \text{Total cost (TC)} \quad (3)$$

$$\text{Revenue} - \text{to} - \text{Cost (R/C)} = \frac{\text{Total Revenue (R)}}{\text{Total cost (TC)}} \quad (4)$$

$$\text{Break Even Point by sales volume (BEPs)} = \frac{\text{Fixed cost (FC)}}{1 - \frac{\text{Variabel cost (VC)}}{\text{Total revenue (TR)}}} \quad (5)$$

$$\text{Break Even Point by unit production (BEPu)} = \frac{\text{Fixed cost (FC)}}{\text{Unit price} - \frac{\text{Variabel cost (VC)}}{\text{Total unit production}}} \quad (6)$$

$$\text{Profitability Rate (PR)} = \frac{\text{Profit (P)}}{\text{Fixed capital (FCap)}} \times 100\% \quad (7)$$

Operational assumptions for the business analysis were developed using technical observations, interview insights, and internal document reviews, integrating calculations of fixed capital (FCap), fixed costs (FC), variable costs (VC), and total revenue (TR) to evaluate profitability. Key metrics, including the Revenue-to-Cost (R/C), net profit (NP), Break-Even Point by sales volume (BEPs) and unit production (BEPu), and Profitability Rate (PR) were calculated to determine the financial viability of the venture.

RESULTS AND DISCUSSIONS

Broodstock Rearing

The blue mosaic guppy broodstock used in this study is produced by Swasti Farm. The male broodstock is three months old with a body weight of around 0.2 grams and a body length of 3.8 cm. The female broodstock is four months old with a weight of around 0.5 grams and a body length of 5 cm. The morphological characteristics of the selected male broodstock are a slender body, aggressive movement, an anal fin that has formed gonopodium, an elongated tail, and bright body colour. While the female broodstock has a fatter body, the anal fin does not form fins, has slow movement, a short tail, and body colour tends to be pale (Figure 2).

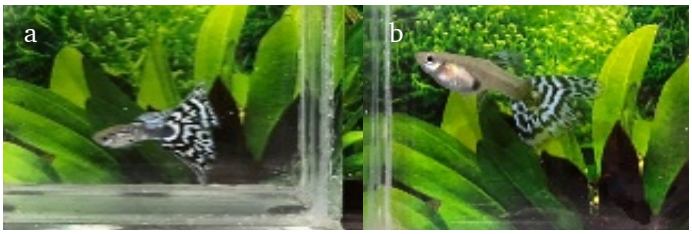

Figure 2. The broodstock of blue mosaic guppy (*P. reticulata*).
Description: (a) male fish broodstock, and (b) female fish broodstock.

The techniques and processes used in rearing broodstock guppies at Swasti Farm have met the rules recommended in SNI 8228.3:2015 and SNI 9308:2024. The selection criteria for broodstock are in accordance with García and Giraldo-Gongora (2023), who stated that guppy fish are mature and ready to reproduce at the age of three months, with a total length of 3.1-3.6 cm for males and 2.5-4.1 cm for females. The morphological characteristics of good guppy broodstock are that the male guppy has its anal fin modified into a gonopodium (sperm delivery device), its tail fin is elongated, its body shape is slender, and the colour of its body and fins has formed. While the female fish's anal fin remains the fin shape, its tail fin is short, its body shape is large (fat), its fin colour is bright, and its body is pale (Huwoyon *et al.*, 2008).

The broodstock is reared in a 20-liter aquarium before mating. Before use, the aquarium has been washed clean and dried. Broodstock that have met the criteria will be kept in the aquarium for 1 to 2 weeks with a male-to-female ratio of 1:2 (Figure 3).

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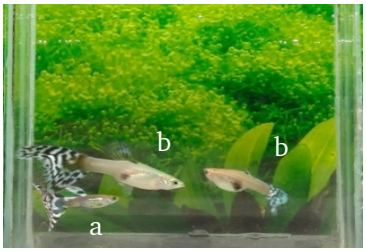

Figure 3. Sex ratio of broodstock of the blue mosaic guppy (*P. reticulata*) in the mating tank.
Description: (a) male fish broodstock, and (b) female fish broodstock.

This ratio is in accordance with Jha (2011), that a female-biased sex ratio (adult male: female, 1:2) is more effective than a male-biased or an evenly matched sex ratio for enhanced offspring production in the guppy. During the rearing period, the broodstock is fed with pellets with a protein content of 58.3%. Feed was given ad satiation with a range of 1-1.2 grams at each feeding time in the morning at 09.00 WIB and in the afternoon at 16.00 WIB. Water quality is maintained by siphoning off leftover feed and feces every day and changing 50% of the aquarium water twice a week. Water quality parameters are maintained at a temperature of 28.5-28.6 ºC, a water pH value of 8-8.3, and a dissolved oxygen level of 3-3.5 ppm.

Fish Breeding

Guppies breed in the same aquarium used for broodstock rearing. To maintain water quality, the tank is equipped with aeration. Mating occurs when males aggressively pursue females. Observations confirm that Swasti Farm's guppy breeding protocols adhere to the Indonesian National Standards SNI 8228.3:2015 and SNI 9308:2024. Successful mating is indicated by a visible enlargement of the female's abdomen and a darkening/expansion of the gravid spot (the pregnancy marking), as shown in Figure 4. Guppies are live-bearing fish that retain fertilized eggs within ovarian follicles throughout gestation (Martyn *et al*., 2005). After successful spawning, females nearing parturition are transferred from the breeding tank to an acrylic maternity enclosure.

Figure 4. Female fish with darker gravid spot after successful mating.
Description: (a) side view of female fish, and (b) upper view of female fish.

The post-spawning gestation period is 21-30 days (Meizanu *et al*., 2022). Female guppy fish that are about to give birth have the following characteristics: a box-shaped gravity spot, a black or very dark gravity spot, looking for a hiding place to give birth, and changes in eating habits by refusing food or being more greedy for food. The neonate fry was pushed by the female with her head to learn swimming, and they floated and moved around the aquarium. The fries were born with developed jaws on the mouth, and they could easily take food immediately. Each newborn fry was capable of swimming, eating, and avoiding danger (Shahjahan *et al*., 2013). To prevent the fry

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from being eaten by the guppy fish, a net partition is provided (Figure 4). Guppy fish are classified as cannibalistic fish (Barki *et al.,* 2014).

The fry produced in the spawning activity in this study is 20 fish. According to Jha (2011), the fry per brood ranged from 16-26. The number of fry produced varied by the size of a female fish; larger females produce a larger number of offspring than smaller fish (Shahjahan *et al*., 2013).

Fry Rearing and Nursery

The aquarium used for rearing guppy fry has a capacity of 4.5 liters. Before use, it is thoroughly cleaned and dried. The fry-rearing period lasts 14 days, during which the fish are fed Artemia larvae at a rate of 10 larvae per fish per feeding. Feeding occurs twice daily: at 09:00 WIB in the morning and 16:00 WIB in the afternoon. Water quality parameters are maintained within the following ranges: temperature 28.4–28.6°C, pH 8.0–8.4, and dissolved oxygen levels 3.0–3.2 mg/L. The guppy fry rearing protocols at Swasti Farm adhere to the Indonesian National Standards SNI 8228.3:2015 and SNI 9308:2024. After 14 days, the production performance of fry rearing, namely growth and survival rate (SR), was measured (Table 1).

Table 1. Summary of productive performance of the blue mosaic guppy (*P. reticulata*) fry after 14-day rearing.

No.	Parameter	Unit	Observed Value	Reference
1.	Initial fry count	Ind	20	16-26 per female[a]
2.	Final fry count	Ind	18	-
3.	Initial weight	gr	0.017	0.006[b]
4.	Final weight	gr	0.034	0.015-0.021[b]
5.	Initial length	cm	0.7	0.8[b]
6.	Final length	cm	1.4	1.27-1.45[b]
7.	Survival rate	%	90	82-90[c]

Footnote: [a]Jha (2011), [b]Sahin *et al*. (2012), and [C]Kitshiri *et al*. (2010).

The fry produced in the breeding activity were 20 fry. This value is aligned with the research by Jha (2011) that found that fry production by female guppy broodstock ranged around 16-26 fry. The weight of larvae from the spawning process was 0.017 grams for the initial weight and 0.034 grams for the weight after 14 days of rearing. This value is higher when compared to the research by Sahin *et al.* (2012), which shows the initial weight of the fry was 0.006 grams, and the weight after 14 days of rearing was between 0.015-0.021 grams. The difference in these values could be caused by the different sizes of the broodstock used. The initial length of the fry was 0.7 cm, and the length after 14 days of rearing was 1.4 cm. The initial length of the larvae was around 0.8 cm, and the length after 14 days of maintenance was around 1.27-1.45 cm. The survival rate was achieved up to 90% at the end of 14 days of rearing. Kithsiri *et al.* (2010) also found fry SR for guppy is around 82-90%.

After 14 days, the fry is transferred into a nursery tank with a water volume of 20 liters equipped with aeration. During the nursery period, the fish were given artificial feed with a protein content of 56.3% using the ad satiation feeding method in the morning at 09.00 WIB and in the afternoon at 16.00 WIB. The water quality in the nursery period is maintained at a temperature of 27.6-30.5 ºC, water pH 7.9-8.6, dissolved oxygen levels of 3-3.4 mg/l, ammonia levels of 0-0.25 ppm, nitrite levels of 0-0.5 ppm, and nitrate levels of 0-4 ppm. Water quality management is carried out by siphoning off uneaten feed and feces every morning, as well as changing 50% of the water volume twice a week.

The nursery phase lasts for three months. During the sixth week, fish are sorted by sex (male and female) and selected for quality. Selection criteria include proper body shape (absence of deformities), the

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vibrancy of colouration in males versus females, and the presence of graphite spots in females. Observations confirmed that Swasti Farm's nursery practices comply with the Indonesian National Standards SNI 8228.3:2015 and SNI 9308:2024. The performance of fish production during the nursery period in the form of growth and SR values was measured (Table 2).

Table 2. Summary of productive performance of the blue mosaic guppy (*P. reticulata*) 3-month fry nursery.

No.	Parameter	Unit	Observed Value	Reference
1.	Initial fry count	Ind	18	-
2.	Final fry count	Ind	10	-
3.	Initial weight	gr	0.034	0.015-0.021[a]
4.	Final weight	gr	0.143	0.16-0.51[b]
5.	Initial length	cm	1.4	1.27-1.45[a]
6.	Final length	cm	3.7	3.5-5[c]
7.	Survival rate (SR)	%	55	>50[a]

Footnote: [a]Sahin *et al*. (2012), [b]Syahrizal *et al.* (2023), and [c]Puspitha *et al*.(2023).

After a 3-month nursery period, the final weight and length were 0.143 grams and 3.7 cm, respectively. The weight of guppy fish at the age of 3-4 months ranges from 0.16-0.51 cm (Syahrizal *et al*., 2023), and body length at 3.5-5 cm (Puspitha *et al*., 2023). These results indicate that the guppy breeding activities carried out have good growth. The survival rate achieved at this nursery stage was 55%, and it is classified as a good criterion. Survival above 50% for guppy fish production activities is valuable (Sahin *et al*., 2012). Despite the achieved SR value being quite good, action is needed to increase it. A high SR value will determine the success of a fish commodity production business with economic potential (Uribe *et al*., 2018). Several things that affect the survival rate of guppy fish seeds include the success of managing the cultivation environment (Serihollo *et al*., 2024), food availability (Nurlina and Zulfikar, 2016), and disease attacks (Alam *et al*., 2024).

Common diseases that attack guppy fish generally come from viral, bacterial, fungal, and parasitic infections (Deacon, 2023). During the study, a fungal secondary infection caused by *Ichthyophthirius multifiliis* parasitic attacks and fin rot disease caused by *Flexibacter* sp. were found (Figure 5).

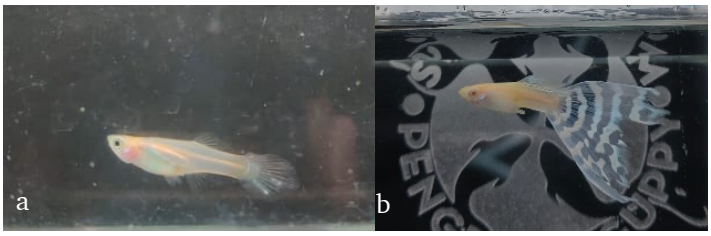

Figure 5. Guppy fish infected with disease
Description: (a) secondary fungal infection, and (b) fin rot disease.

Infection by Ichthyophthirius multifiliis can cause white spots on fish (Jørgensen, 2017) and cause very severe infections in fish raised on farms, which spread rapidly in dense populations and cause extensive morbidity and mortality (Dickerson and Findly, 2014). *Flexibacter* sp. infection induces high mortality in fish (Dong *et al.,* 2016). The method of fish health management carried out at Swasti farm in handling fungal infections uses in-house medicine containing malachite green and formalin, with a dose of 0.05 ml for 20 liters of fish maintenance water. For fin rot disease, the infected fish will be removed from the container and separated into a

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quarantine container. This fish will not be sold to consumers.

Harvesting of guppy fish is conducted when the guppy fish is 2.5 to 3 months old and in good condition. Harvesting time is when the guppy fish has entered market size and has an attractive colour. The selected fish will be sold to buyers either through online stores or directly at display stores.

Business Analysis

Business analysis is used to evaluate the profitability aspect of guppy fish farming activities. The assumption model is used in business analysis with several fish broodstock of as many as 6 pairs, with 4 spawning cycles for one year. The survival rate achieved per cycle is 55%, and the fish will be harvested at market size with a selling price of IDR. 350,000. The fixed capital (FCap) calculation is displayed in Table 3. The annual variable cost (VC) calculation is displayed in Table 4. The annual fixed cost (FC) calculation is displayed in Table 5. The total revenue (TR) calculation is displayed in Table 6. Annual business analysis for the blue mosaic guppy farming activity is displayed in Table 7.

Table 3. Fixed capital for the blue mosaic guppy fish farming.

No.	Component	Volume (Unit)	Price per unit (IDR)	Total Value (IDR)
1.	Aquarium	10	120,000	1,200,000
2.	Aquarium shelf	1	400,000	400,000
3.	Air blower	1	1,300,000	1,300,000
4.	Water pump	1	550,000	550,000
5.	Reserve water tank	1	1,000,000	1,000,000
6.	Neon lamp	3	30,000	90,000
7.	Aeration stone	10	5,000	50,000
8.	Spons	1	20,000	20,000
9.	Aeration hose	5	1,500	7,500
10.	Fish scope	3	2,500	7,500
11.	Water filter	1	1,850,000	1,850,000
12.	Water pipe PVC	2	100,000	200,000
13.	pH meter	1	30,000	30,000
14.	Digital scales	1	30,000	30,000
15.	Digital thermometer	1	50,000	50,000
16.	Acrylic breeding box	10	20,000	200,000
Total value of fixed capital (FCap)				6,985,000

Table 4. Fixed cost (FC) for the blue mosaic guppy fish farming.

No.	Component	Volume (Unit)	Price per unit (IDR)	Total Value (IDR)
1.	Monthly worker salary	12	1,000,000	12,000,000
2.	Monthly electricity	12	35,000	420,000
3.	Depreciation value	1	1,229,583	1,229,583
Total value of fixed cost (FC)				13,649,583

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Table 5. Annual variable cost (VC) for the blue mosaic guppy fish farming.

No.	Component	Volume (Unit)	Price per unit (IDR)	Total Value (IDR) per cycle	Total Value (IDR) per year
1.	Fish bloodstock	6	350,000	2.100,000	8,400,000
2.	Fish pellet	1	565,000	565,000	2,260,000
3.	Artemia	1	650,000	650,000	2,600,000
4.	Salt	7	28,000	196,000	784,000
5.	Fish medicine	3	40,000	120,000	480,000
6.	Paper tape	10	7,000	70,000	280,000
7.	Scissors	5	9,000	45,000	180,000
8.	Marker	3	5,000	15,000	60,000
9.	Packing cardboard	20	5,000	100,000	400,000
10.	Packing plastic	2	10,000	20,000	80,000
11.	Styrofoam	150	5,000	750,000	3,000,000
Total value of fixed cost (FC)					18,524,000

Table 6. Total revenue (TR) for the blue mosaic guppy fish farming.

No.	Component	Unit	Value
1.	Production per cycle	Fish pair	30
2.	Production per year	Fish pair	120
3.	Price per unit	IDR	350,000
4.	Revenue per cycle	IDR	10,500,000
5.	Total revenue per year	IDR	42,000,000

Table 7. Annual business analysis for the blue mosaic guppy breeding activity.

No.	Component	Unit	Value
1.	Fixed capital (FCap)	IDR	6,985,000
2.	Fixed cost (FC)	IDR	13,649,583
3.	Variable cost (VC)	IDR	18,524,000
4.	Total cost (TC)	IDR	32,173,583
5.	Total revenue (TR)	IDR	42,000,000
6.	Net Profit (NP)	IDR	9,826,417
7.	Revenue/Cost (R/C)		1.3
8.	Break-Even Point by sales volume (BEPs)	IDR	24,419,940
9.	Break-Even Point by unit production (BEPu)	Fish pair	70
10.	Profitability Rate (PR)	%	141

The total cost (TC) required per unit of production of blue mosaic guppy fish in one year is IDR 32,173,583, with total revenue (TR) from sales of IDR 42,000,000. The profit status of a business could be evaluated with profitability analysis (Ariadi *et al.,* 2021). The analysis shows that the net profit (NP) value of the blue mosaic guppy fish breeding business is in the form of one production unit, according to the assumptions used within a year, reaching IDR 9,826,417, or if calculated per month, it is IDR 818,868. The projected profit is only about one-third of the minimum wage of the Sleman district/city in 2023, IDR 2,159,519. Increasing the number of production units is needed to achieve profits matching the minimum wage in Sleman. However, the R/C of the business is valued at 1.3. This value indicates that the income obtained is 1.3 times the costs incurred (Diatin and Kusumawardany, 2010).

The BEP value shows the break-even point of the business, where the company does not suffer losses or gain profits if the sales volume or number of units produced reaches this value (Vinasyiam *et al*., 2022). The break-even point by sales volume (BEPs) from the business projection calculation is IDR 24,419,940, while the break-even point by unit production (BEPu) is 70 pairs of fish. Both BEPs and BEPu values can be used as a benchmark for sales targets and production targets that must be

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achieved by the production activities of the blue mosaic guppy variant so that the business can continue to run. Surpassing those values will be an indicator of the feasibility of the business to continue.

The analysis of this business model's profitability rate (PR) indicates a value of 141% (Ningtyas, 2021). This means that for every IDR 1 invested, the business generates a 141% return, equivalent to IDR 1.41 per rupiah of capital. Notably, this rate exceeds the interest rates offered by traditional bank savings or investment products. Consequently, blue mosaic guppy fish farming proves more financially rewarding than depositing funds in banks, as supported by comparative studies (Sugiarto and Pertiwi, 2024).

The results of the profitability analysis show that the blue mosaic guppy business is feasible, as recognized from business aspects such as the R/C and profitability rate. Although some profits were gained, the value is below the Sleman minimum wage. This business activity has the potential to operate for a long time. Increasing productivity by increasing production units and optimizing the performance of aquaculture production (reproductive performance and production performance) could be an option to increase profits.

CONCLUSION

The production of blue mosaic guppy fish at Swasti Farm follows four key stages: broodstock rearing, breeding, fry rearing and nursery, and harvesting. Throughout the process, water quality management and fish health management are prioritized to ensure production success. Broodstock are three months old at the time of spawning, with a male-to-female ratio of 1:2. Each spawning cycle yields 20 larvae, and the survival rate at the end of the three-month nursery phase is 55%. Observations confirm that Swasti Farm's guppy production protocols comply with the Indonesian National Standards SNI 8228.3:2015 and SNI 9308:2024.

The business generates an annual profit of IDR 9,826,417, with an R/C of 1.3 and a profitability rate (PR) of 141%, demonstrating the venture's profitability. These metrics confirm that blue mosaic guppy fish production is a profitable venture. However, maximizing returns requires scaling production units and optimizing operational efficiencies in the cultivation process. For example, increasing annual output by 75% to achieve a minimum of 210 fish pairs per year could raise profits to levels marginally exceeding the minimum wage benchmark in Sleman, Yogyakarta. Such measures would strengthen financial sustainability while aligning returns with regional economic standards

CONFLICT OF INTEREST

The authors declare there is no conflict of interest upon writing and publishing the manuscript.

AUTHOR CONTRIBUTION

Diah Ayu Satyari Utami: principal researcher, data analyst, and manuscript writer. Wahyu: corresponding author, data analyst, and manuscript writer. Ayudya Wildiani: collecting data and data analysis.

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