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ANALYSIS OF THE ECONOMIC AND FINANCIAL PROFITABILITY OF THE EXPERIMENTAL BREEDING OF HETEROTIS NILOTICUS (CUVIER, 1829) UNDER THE CONDITIONS OF KISANGANI (TSHOPO, RD. CONGO)

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ABSTRACT

The economic and financier profitability of experimental farming of Heterotis niloticus fry was analyzed under the conditions of Kisangani. One hundred twenty (120) fly with an initial weight of 6.75±0.24 g to 7.05±0.19g an initial size of 4.27±0.16 to 29±0.07 cm were used. They were fed with two isoproteic diets, in two meals a day (8:30 AM and 4:30 PM), for 6 weeks. Weight and size were monitored at the end of each week from a sample of 40 individuals selected randomly, with 10 specimens per trap. The results obtained reveal that the fry show reduced growth in both experimental diets, meaning that the species grows more in length than in weight. The physic-chimical parameters of water are shaped by the breeding of the species, and certain physico-chimical parameters of water such as temperature, PH, dissolved oxygen and transparency influence the growth of Heterotis niloticus fry. The experimental regimes used are economical and financially viable for the farming of H. niloticus under the conditions in Kisangani.

Keywords: profitability, economic, financial, regime, fry, Kisangani

1.0 INTRODUCTION

Scientists and actors involved in the development of the aquaculture sector are increasingly concerned about the question of the profitability of Congolese production. To address this issue, it is necessary for scientists to explain to aquaculture farm promoters how to keep accounts of all activities carried out up to date (Almeida et al., 2014). In the Democratic Republic of Congo (DR Congo), fishing and fish farming play a crucial role in food, the economy and employment for the well-being of the population (Akonkwa et al., 2017). Indeed, DR Congo is the leading producer of fish in Central Africa, producing about 707,000 tons, while the demand for fish is estimated at 450,000 tons per year (FAO, 2025). To make up for this shortfall, the DRC has resorted to importing fish estimated at 200,000 tons of fish each year (FAO, 2025), and the majority of Congolese (nearly 90%) consume imported fresh fish for five (5) days a week (Mavinga, 2008). To increase production by using aquaculture as a driving force, the government has initiated several projects, including the Sustainable Aquaculture Development Strategy Plan, the objectives of which were focused on three areas: (a) improving the efficiency of production systems, (b) improving services, and (c) improving the management of the estate (Minagri, 2008a), the Action Plan for Aquaculture 2010-2015, the objectives of which were to specify the fish species targeted for farming, to set the quantity of fish to be produced and to adjust the number of fish farmers, specify the needs and fix the consumption of fish (Minagri, 2008b), and the Strategic Plan for Fisheries and Farming 2020-2022 (Minpe, 2021). Despite the multiple initiatives undertaken, production is not able to meet the population's demand for fish. In addition, two groups of species dominate aquaculture production, including Cichlidae (Tilapia and O. niloticus) and Clariidae, which have still not been able to meet the demand for fish (FAO, 2017). To meet the needs of the population, it is necessary to increase domestic production and to close the gap that is covered by imports. To increase production, it is possible to diversify locally cultivable fish species (Ogunji, 2021; Oboh, 2022; Faturoti, 1993). This is why we opted for the species H. niloticus, which is renowned for its strong aquaculture potential. H. niloticus is a fascinating freshwater fish species of economic importance with high commercial and economic value (Wikondi et al., 2022; Adite, 2012; Adite et al., 2017). It is a fish that is expensive in African markets (Monentcham, 2009). In Côte d'Ivoire, it is the second species of farmed fish after O. niloticus (Lithimonier et al., 2022; FAO, 2020). In Gabon, it is used for aquaculture purposes because of the good quality of its meat, especially when smoked and salted (Monentcham, 2009). In Nigeria, it has become an important commercial product due to its high protein content and robust flesh (Mustaph, 2010). In terms of consumer acceptability, H. niloticus is the third most valued fish species in Nigeria, after African catfish and Tilapia (Aminie-Adjei, 2022). It has the qualities that make it an excellent candidate for tropical aquaculture: the high growth rate, the short food chain; double breathing; good resistance to handling and transport; its delicious quality of fresh or smoked flesh and the relatively high selling price (Oswald et al., 2003; Monentcham, 2009). Its mixed culture with O. niloticus is satisfactory in terms of growth with good economic profitability (Kimou et al., 2016). This study aims to encourage the breeding of native species with high fish farming potential. The aim is to increase national fish production and promote fish farming in the city of Kisangani, in particular, and in the province of Tshopo in general. In this research, we are evaluating the growth performance of H. niloticus reared in happas, using diets made from local ingredients. The purpose of this study is to make an analysis of the economic and financial profitability of the experimental breeding of H. niloticus under Kisangani conditions.

2.0 MATERIALS AND METHODS

2.1 Study environment

This study was carried out in the city of Kisangani, more precisely in the Makisao Agro-Fish Development Center (CDAM) (Figure 1), Tshopo Province in the Democratic Republic of Congo.

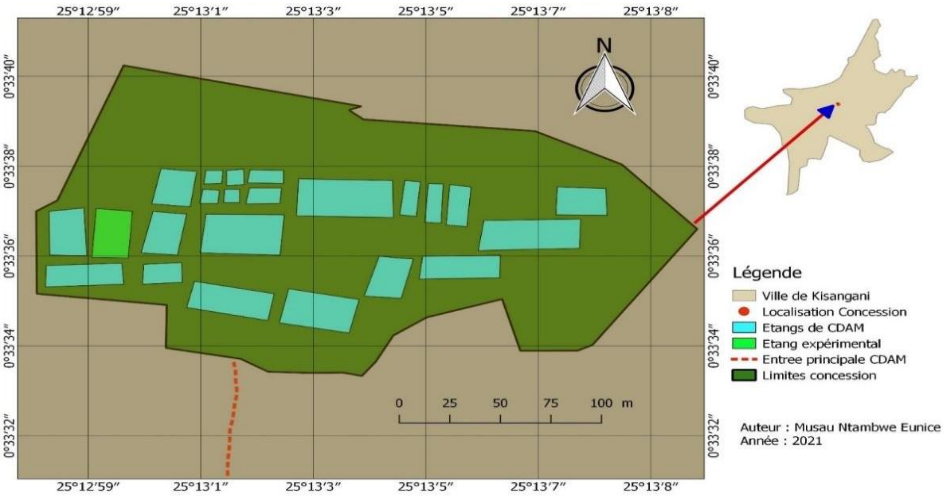


Figure 1: Map of the Makiso Agro-Fish Development Centre.

2.2 Biological material

The fry of the species Heterotis Niloticus (Cuvier, 1829), numbering 120 individuals, were used as biological material for this experiment.

2.3 Methods

In the framework of this study, we used the experimental method which consisted of sampling the physico-chemical parameters of the water in the different happas and the parameters of the fish growths.

2.3.1 Experimental structure

We used 4 woven happas made of mosquito net installed in an 800m² pond. The experimental pond is a diversion pond with an inlet and outlet of water. The happas have been installed in such a way as to allow the fish to feel comfortable as in a natural ecosystem. Apart from the 4 rectangular sides of happa, the basal part was open to create a natural environment for the fry, so the fry was in direct contact with the bottom of the pond. The water level in each happa was maintained around 70 cm.

2.3.2 Charging and powering

The stocking was done a week after acclimatization to allow the fry to adapt to a new environment. A total of 120 fry at a rate of 30 individuals per happa were randomly distributed in the four happas. After sampling (weighing and taking the total length of the fry's bodies), the bunches were distributed manually until apparent satiety, in two meals a day (8:30 a.m. and 4:30 p.m.). The rate of the ration was 5% of the weight of the fry. Two experimental diets were used to feed the fry (R1 diet with termite meal as the protein ingredient and R2 diet with soybean meal as the protein ingredient). The experiment lasted 45 days.

2.3.3 Weighing and measuring fish

Volume 06, Issue 04 "July - August 2025"

ISSN 2583-0333

Weighing and measuring of fry were performed to estimate the growth of the fry experimented in this study. The evaluation of the weight and size of the fry took place in six weeks: at the beginning of the experiment, every weekend and for 6 weeks. The weight expressed in grams was taken using a Genomsnitt electronic scale and the total length using a sliding stand.

2.3.4 Evaluation of fry growth

In order to assess the growth of the fry, the scale was used to take the weight and the caliper to take the total body length of the fry. After this operation, the data on fry growth and economic and financial profitability were analysed as follows:

• Total length-to-weight relationship

To properly control the growth parameters of the fry, it is necessary to establish the relationship between the size and weight of the fish. This is defined according to Le Cren (1951) by the following equation:

$$W = a\ Lb$$

With: W: the weight of the fish in grams; L: the length of the fish (Lt, Lf or Lst) in centimeters; a: constant corresponding to the weight of an individual of length equal to unity; b : allometry coefficient is defined as the coefficient of relative growth in weight. Three cases can be identified: if b=b theoretical, there is an isometric between the two traits, if b<b theoretical, there is a downlining allometry, and if b > theoretical b, the allometry is a plush (Mili et al., 2008).

2.3.5 Analysis of economic and financial profitability

The study of economic profitability consists of first determining the cost of rearing fry reared in happas. The estimation of these costs is the result of a correlation between variable and fixed costs and the operating account (Iga-Iga, 2008).

- **Calculation of variable costs**

In intensive aquaculture, the feed component represents a significant part of the cost of fish production. The economic interest of this type of farming is therefore very dependent on the availability and cost of the added feed.

- **Miscellaneous expenses**

They are estimated at 10% of total expenses (telecommunications, postal costs, unforeseen expenses, etc.).

- **Calculation of fixed costs**

Fixed costs include several data such as energy costs, personal salary, transport and depreciation. In addition, the structures of the station are considered to be depreciated, only major works (completed and estimated) are taken into account.

- **Calculation of total expenses (TC)**

Total expenses (CT) correspond to the sum of fixed costs (CF) and variable costs (CV), having the formula: CT = Σ (CF+CV).

- **Costing**

The cost price (P) of a fry corresponds to the ratio between the total loads and the number of fry purchased (N):

$$\text{Cost price} = \frac{Total\ load}{Number\ of\ fry\ purchased}$$

- **Calculation of financial profitability**

The financial profitability is obtained by calculating the added value and gross margin for a period of 45 days of experience. It is defined as follows:

VA =PB-CI

VA= value added

PB= Gross production = production obtained during a cycle

CI= Intermediate consumption. The value of intermediate consumption is obtained by adding up all the expenses incurred throughout the experiment or production cycle. CI= fixed costs (CF) + variable costs (CV).

- **Estimating indicators of financial profitability**

Benefit-Cost Ratio (BRI): According to Paraïso et al., (2012), it is a financial analysis indicator that expresses the total financial gain obtained by investing a monetary unit (1$ for example). Let B be the total of the profits obtained after a total investment C, the Benefit-Cost Ratio (BCR) is given by the following formula:

RBC = B/C

In agricultural economics, B is the gross product obtained in value and C is the sum total of all costs expressed in value, including labour.

Rate of return on invested capital (TMCI): The rate of return on invested capital (TMCI) corresponds to the ratio of gross income to costs expressed in value.

2.4 Statistical analysis and processing

Statistical analyses were performed using Past version 2 and Statview software. The parameters of the growth and the physico-chemical parameters of the water (R1 and R2 regimes) were compared by Student's t-test to the 5% threshold of slopes and positions of the average mass as a function of the total length per week. Shapiro to test the normality of the data to determine the effect of rearing structure on the growth of H. niloticus fry. The Fisher F test for variance comparison. Principal Component Analysis (PCA) to determine the effect of different physicochemical parameters (Temperature, Dissolved Oxygen, pH, Conductivity, Turbidity and transparency) on the growth performance of the fry. Economic and financial profitability analyses were applied to determine the economic cost of each plan and the financial gain obtained from the study investment. These analyses were calculated using Microsoft Excel 2013.

3.0 RESULTS

The results of the physico-chemical parameters of the water, the parameters of growth and the analysis of the economic and financial profitability are reported in the various tables and figures below.

Table 1 presents the physical and chemical parameters of the test pond water.

Table 1: Physicochemical parameters of the experimental pond water

Variables	N	Minimum	Maximum	Average	Standard deviation
Temperature (T°C)	6	24,8	29,1	26,9	0,385
pH	6	6,2	7,9	7,05	0,725
Oxygen (mg/l)	6	4,1	6,2	5,15	0,351
Conductivity (µs/cm)	6	18,1	20,7	19,4	0,415
Turbidity (NTU)	6	15,7	17	16,35	0,311
Transparency (cm)	6	59,1	66,3	62,7	3,353

This table shows the values of the physicochemical parameters of the water measured during the experimental period. If we look closely at this table, we see that the Min. and Max. values of the water temperature vary from 24.8 to 29.1 °C, and its mean value and standard deviation is 26.9 °C and 0.385. The water pH Min. and Max values range from 6.2 to 7.9, and its mean value and standard deviation range from 7.05 to 0.725. The Min. and Max. values of dissolved oxygen in water vary from 4.1 to 6.2 mg/l, and its mean value and standard deviation is 5.15 mg/l and 0.351. The Min. and Max. values of water conductivity fluctuate from 18.1 to 20.7 µs/cm, and its mean value and standard deviation is 19.4 µs/cm. The Min. and Max. values of water turbidity range from 15.7 to 17 NTU, and its mean value and standard deviation is 16.35 NTU 0.311. The Min. and Max. values of the water transparency fluctuate from 59.1 to 66.3 cm and its mean value and standard deviation is 62.7 cm and 3.333. The results of the recorded physicochemical parameters of the water indicate that they meet the requirements of the species H. niloticus.

The figure below reports the results of the effect of water physicochemical parameters on the growth performance of H. niloticus fry.

Volume 06, Issue 04 "July - August 2025"

ISSN 2583-0333

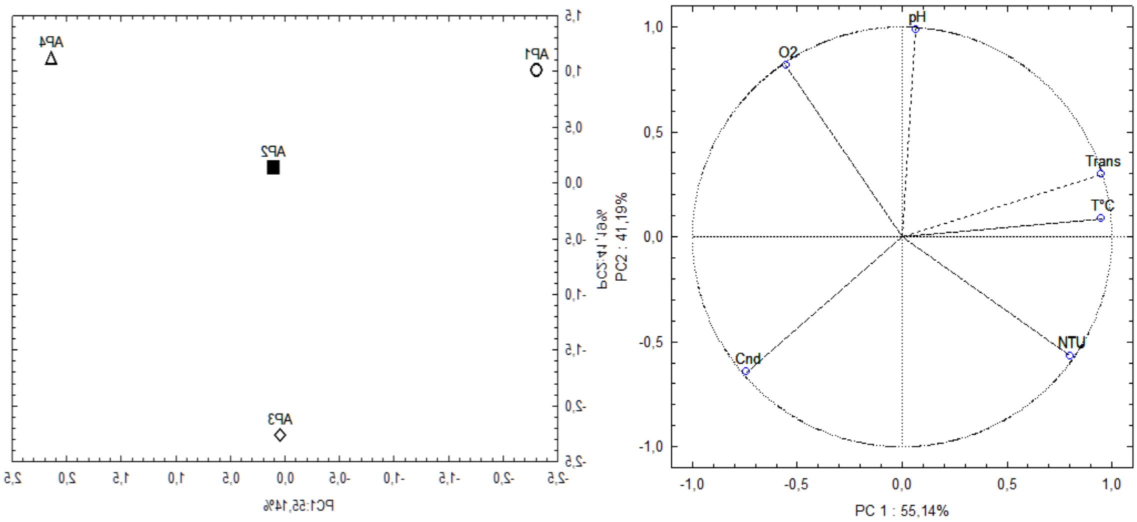


Figure 2: Graphs of the Principal Component Analysis of the effect of physicochemical parameters on the growth of H. niloticus fry.

During this phase, a follow-up of the effect of the physicochemical parameters of the water on the evolution of the total mass of H. niloticus individuals during the experimental phase was carried out. Water temperature and transparency largely influence the growth of H. niloticus individuals in the T1 treatment and pH and dissolved oxygen significantly influence the growth of H. niloticus individuals in the T2 treatment. Table 2 gives the values of abiotic factors on the growth of H. niloticus fry.

Table 2: Abiotic Factor Values on H. niloticus Fry Growth

Parameters	Diet Factor T1	T2 diet factor
Temperature (°C)	0,522238	0,054890
pH	0,035988	0,628121
Dissolved oxygen (mg/l)	-0,304743	0,519931
Turbidity (NTU)	0,440300	-0,359569
Conductivity (µs/cm)	-0,407188	-0,408509
Transparency (%)	0,522912	0,189616

Table (6) shows that the values of the abiotic factors (physico-chemical parameters of the water) that have an effect on the growth of the fry during the experimental phase in the happas. Parameters that have negative abiotic factor values reflect that these parameters had a less significant influence on fry growth. Those with positive abiotic factor values mean that these parameters influenced fry growth. As a result, the temperature and transparency of the water (i.e. 0.522238 and 0.522912) significantly influenced the growth of the fry for the diet (R1). The pH and dissolved oxygen of the water (i.e., 0.628121 and 0.519931) influenced the growth of the fry for the diet (R2).

Table 3 illustrates the results of the effect of rearing structures on the growth performance of H. niloticus fry.

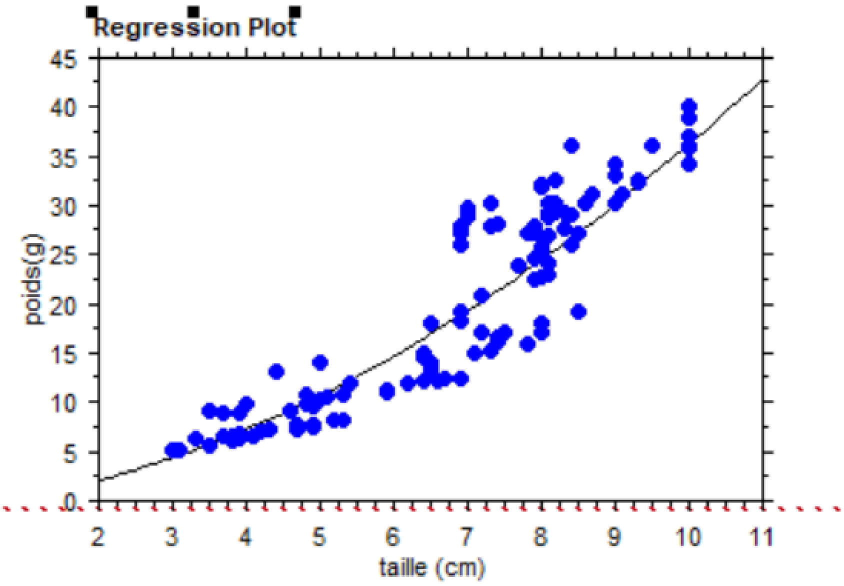
ISSN 2583-0333

Table 3: Statistical study of the effect of happas on fry growth

Structure breeding	P value Test Shapiro	P value Test F	P value Test T	Interpretation
R1 Plan	0,349	0,347	-17,132	No effect
R2 Plan	0,328	0,318	-17,237	No effect

The values obtained in this table deduce that technical factors (happas) do not have a significant effect on the growth performance of fry at the 5% threshold, however other abiotic factors such as feed and physico-chemical parameters of the water can probably influence growth.

Figures 3 and 4 present the results of the regression between the total mass and total length of H. niloticus fry.

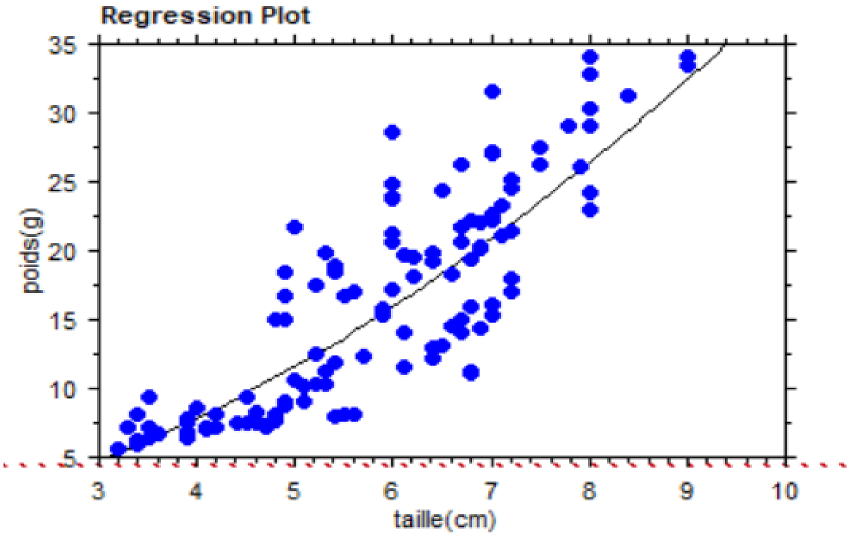


P = 0.627*LT1.764

R^2 = 0.8241

Figure 3: Regression between the total mass and total length of fry subjected to the R1 diet.

Concerning the allometry coefficient of the R1 diet, for all the fry used during the 45 days of experiment, the coefficient is less than 3 (b=1.76< 3) indicating that the allometry is decreasing between the weight and the size of this species. This clearly shows that H. niloticus gains more length than in weight.



P = 0.364*LT1.749

R^2 = 0.7182

Figure 4: Regression between the total mass and total length of fry subjected to the R2 diet.

Concerning the diet allometry coefficient R2, the value of all the individuals used during 45 days of experiment is less than 3 (b=1.74< 3) showing that the allometry is decreasing between the weight and the size of this species. This indicates that H. niloticus is gaining in length rather than weight.

3.2 Economic and financial profitability analysis

The economic data of this study are reported in the various tables below.

- **Economic analysis of the schemes**

The economic analysis of the experimental regimes used in this study is reported in Table 4.

Table 4: Economic Analysis of Experimental Regimes

Parameter	R1	R2
Incident cost	1,02	1,24
Profit Index	3,17	3,32

It follows from this table that the R1 regime is not significantly different from the R2 regime in terms of their incidental cost and profit index. The two experimental regimes are preferable because their incidental costs and profile index are almost similar. Thus, if you have to make the choice, the R1 regime is economical than the R2 regime because its incident cost is low and its profile index is average.

4.0 ESTIMATE OF THE COST PRICE OF A KILOGRAM OF FEED

The price of one kilogram of treatment was determined from the price of ingredients available on the local market and the rate of incorporation of experimental regimens. The approach is summarized in Table 5.

Table 5: Estimated cost price per kg of experimental regimes

The ingredients	R1 diet (1000 g)	R2 diet (1000g)
Brewer's Grains	(400×500)/1000 = 200	(260×500)/1000 = 130
Termite Meal	(540×2500)/1000 = 1,350	0
Soybean Flour	0	(600 ×2500)/1000 = 1500
Corn flour	0	(100× 100)/1000 = 10
Cassava Flour	(20×700)/1000 = 14	(20×700)/1000 = 14
Mineral Premix	(10×3000)/1000 = 30	(10×3000)/1000 = 30
Multi Vitamin	(10 ×100)/1000 = 1	(10×100)/1000 = 1
Packages (for the transport of ingredients and wear and tear of equipment)	2 000	2 000
Total	1000 g = 3,595	1000 g = 3,685

This table (5) shows that the cost price of a kilogram of diet (R1) is estimated at 3,595 FC and that of the diet (R2) is estimated at 3,685 FC. The difference in the cost price between the schemes (R1) and (R2) is 90 FC. Thus, the two experimental regimes do not have very significant differences in terms of price.

5.0 CALCULATING THE FEED COST OF PRODUCING ONE KILOGRAM OF FISH

The feed cost of producing a kilogram of fish was calculated by multiplying the price of a kg of diet by the feed conversion ratio or conversion defined as the ratio of feed consumed to weight gain.

Table 6: Estimated feed cost of producing one kg of fish

Plans	Cost price of R1 and R2	Conversion Index	Cost of production of one kg of fish (CF)
R1	3 595	1,02	3 666,9
R2	3 685	1,24	4 569,4

Table (12) shows that to produce one kilogram of fish of H. niloticus with diets (R1) and (R2), more than 3,666.9 FC ($1.286) must be spent on diet (R1) and 4,569.4 FC ($1.603) on diet (R2).

- **Calculation of financial profitability**

The analysis of the financial profitability of H. niloticus breeding is reported in Table 7.

Volume 06, Issue 04 "July - August 2025"

ISSN 2583-0333

Table 7: Financial profitability of H. niloticus breeding during 45 days of experience of the two regimes.

Designation	R1 Plan		R2 Plan	
	Cost in FC	Cost in $	Cost in FC	Cost in $
Charges Fixes (CF)				
Communication	10 000	3,504	10 000	3,504
Transport	25500	8,947	25500	8,947
Personal salary	20000	7,017	20000	7,017
Depreciation	5000	1,754	5000	1,754
TOTAL	60 500	21,222	60 500	21,222
Variable Loads (CV)				
Feeding	3 666,9	1,286	4 569,4	1,603
Fingerling purchases	30 000	10,526	30 000	10,526
Other expenses (10%)	3 366	1,181	3 456	1,212
TOTAL	37 032,9	12,994	38 021,4	13,340
CI= CF+CV	97532,9	34,222	98 521,4	34,568
Production brute (PB)				
Production brute	225 000	78,947	215 000	75,438
VA=PB-CI	127 467,1	44,725	116 478,6	40,869
VA of a 30g fry	2 832,602	0,993	2708,804	0,950

Table (7) shows the structure of expenses by plan. The cost of fixed costs is estimated at 60,500 FC ($21.22) for the two schemes. The cost of variable charges is estimated at 37,032.9 FC ($12.99) for the plan (R1) and 38,021.4 FC ($13,340) for the plan (R2). The cost of intermediate consumption is estimated at 97,532.9 FC ($34.22) for the plan (R1) and 98,521.4 ($34.56) for the plan (R2). The cost of gross production is estimated at 225,000 FC ($78.94) for the plan (R1) and 215,000 FC ($75,438) for the plan (R2). The value-added or gross margin cost obtained is 127,467.1FC ($78.94) for the plan (R1) and 116,478.6FC ($40.869) for the plan (R2). The added value of an H. niloticus fry reared for 45 days is estimated at 2,832.602 FC ($0.99) for the diet (R1) and 2708.804 FC ($0.95) for the diet (R2).

Table 8 gives the indicators of the financial profitability of the breeding of Heterotis niloticus

Table 8: Indicators of financial profitability

Indicators	R1 Plan	R2 Plan
Benefit-Cost Ratio	3,26	2,11
Rate of return on invested capital	1,5	0,99

It can be seen in this table that the Benefit-Cost Ratio (BRI) is greater than 3 for the R1 diet (3.26), while the Benefit-Cost Ratio is less than 3 for the R2 regime (2.11). The same trend can be observed for the rate of return on invested capital, which is higher for the R1 plan (150%) than for the R2 plan (99%).

6.0 DISCUSSION

The physicochemical parameters of the water measured during the experimental period are within the limits recommended for the rearing of H. niloticus. The measured temperature varies from 27.21 to 27.40°C from one regime to another. The measured dissolved oxygen in the water varies from 4.90 to 4.98 mg/l from the R1 diet to the R2 regime. The water pH of 6.9 is close to neutral for both regimes. The conductivity of the water fluctuates from 18.20 to 19.66 µs/cm in both regimes. The transparency of the water varies from 61.81 to 62.39 cm from one regime to another. The conductivity of the water wobbles slightly from 16.79 to 16.85 NTU from R1 to R2. These results are consistent with the results obtained by our predecessors on the breeding of H. niloticus. Amon et al., (2021) indicate that they found that dissolved oxygen varied from 4.90 to 4.91 mg/l in the two tanks, the pH was 6.90 to 7.01 from one tank to the other, the temperature fluctuated from 29.91 to 30.04°C in the different tanks. They concluded by saying that the physico-chemical parameters of the water had an influence on feed consumption, energy processing efficiency, growth and logically on the survival of fish. They argued that high temperatures affect all their biochemical and physiological activities, and therefore their growth. On the other hand, low temperatures (< 24 °C) lead to a reduction in metabolism to maintenance activity. In this study, the temperature averages were 27.9°C to 27.40°C in the two experimental regimes. They were not able to have a negative effect on the growth of the fry. In addition, studies have shown that this species is able to tolerate low temperatures up to 15 °C and high temperatures exceeding 35 °C (Moreau, 1982; Adite et al., 2006). The dissolved oxygen values recorded from (4.90 to 4.98 mg/l) in this study correspond to the requirements of the breeding of the species. Indeed, according to Adite et al. (2006) and Arantes et al. (2013), deoxygenated water of 0.4 to 4.5 mg/l is suitable for this species because of its ability to breathe oxygen from the air. As far as pH is concerned, the average value obtained is in agreement with those of Sène (2007) who showed good growth of this species at a pH between 6.9 and 7.5. In addition, Adite et al. (2006) indicate that this species can tolerate neutral pH waters.

On the basis of principal component analysis performed, the results obtained show that temperature and transparency condition the growth of H. niloticus fry for the R1 diet. pH and dissolved oxygen influence the growth of H. niloticus fry for the R2 diet. Thabet (2017) found that temperature, dissolved oxygen and water pH conditioned the growth of pre-magnified O. niloticus fry in both freshwater and geothermal waters. This allows us to conclude that the physicochemical parameters of the water influence the growth of H. niloticus fry in the Kisangani rearing conditions.

For fry growth, the relationship between total mass and total length of fry is used. The results of the analyses of the allometry coefficient of the two experimental regimes R1 and R2 show that the fish show a lower allometry between the weight and the size of the species. This indicates that the species H. niloticus grows more in length than in weight. A similar study was conducted on the species Oreochromis niloticus by Thabet (2017), he had obtained the allometry coefficient less than 3 ($b=2.75<3$) indicating that the allometry was minor between the weight and the size of the species O. niloticus. This means that the species O. niloticus gained more length than in weight. These results are consistent with those obtained by Thabet (2017) in Tunisia, but they differ from those found by Coulibaly (2003) at the Lebna dam in Tunisia, where he obtained an isometric allometry between fish weight and size.

The economic analysis of the schemes used shows that the scheme (R1) is not significantly different from the scheme (R1) in terms of their incidental costs and profit index. As a result, if we had to make the choice, the regime (R1) appears better and more economical than the regime (R2), because the incident cost is low and its profit index is average compared to the regime (R2). This result is consistent with the result obtained by Ngalya (2022). In his study, he indicated that food (T1) was not very different from food (T2) in terms of their incidental costs and profit index. It concluded by saying that the food (T1) was preferable and economical than the food (T2) because the incident cost was low and the profit index was average while the food (T2) was not.

Regarding the estimation of the cost price of a kilogram of bunch, the results indicate that the cost price is estimated at 3,595 FC ($1,261) for the bunch (R1) and 3,685 FC ($1292) for the bunch (R2). This result is not consistent with the result obtained by Iga-Iga (2008). He had obtained the cost price of a kilogram of feed which varied widely from diet (R1) to (R2) and the SMAG control diet (100, 192.5 and 410 CFA francs). He noted a price difference between diets formulated with local products and the SMAG control food produced and marketed by the Société Meunière et Avicole du Gabon. This leads to the conclusion that food produced from local ingredients is less expensive than processed food. And that it is preferable to feed the fish food produced from local ingredients to minimize the cost of their feed.

As for the calculation of feed cost to produce a kilogram of fish of H. niloticus. Analyses indicate that to produce a Kilogram of fish, at least 3,666.9 FC ($1.28) must be spent on the diet (R1) and 4,569.4 FC ($1.60) on the diet (R2). Iga-Iga (2008) obtained the result that to produce one kg of fish, it was necessary to pay 257 CFA francs for the diet (R1), 300.3 CFA francs for the diet (R2) and 578.10 CFA francs for the SMAG control feed. He found that the SMAG control food cost almost twice as much as the (R1) and (R2) feeds.

Speaking of the calculation of financial profitability, the results show that the cost of fixed costs is 60,500FC ($21.22) in the two experimental regimes. The cost of variable expenses is estimated at 37,032.9 FC ($12.99) for the plan (R1) and 38,021.4 FC ($13.34) for the plan (R2). The cost of intermediate consumption is estimated at 97,532.9 FC ($34.22) for the plan (R1) and 98,521.4 ($34.56) for the plan (R2). The gross production obtained is estimated at 225,000 FC ($78.94) for the plan (R1) and 215,000 FC ($75.43) for the plan (R2). The total value added generated in this study is estimated at 127,467.1FC ($78.94) for the plan (R1) and 116,478.6FC ($40.86) for the plan (R2). The added value of a 30g fry is estimated at 2,832.602 FC ($0.99) for the diet (R1) and 2,708.804 FC ($0.95) for the diet (R2). The results are not consistent with the results obtained by Kongbo et al., (2024). They indicate that they had found the cost of fixed costs estimated at 660,900 FC for ponds without periphyton and 640,020 FC for ponds with periphyton. Variable loads are estimated at 459,500 FC for ponds without periphyton and 429,500 for ponds with periphyton. The value of intermediate consumption is estimated at 1,120,400 FC for ponds without periphyton and 1,069,520 FC for ponds with periphyton. The gross production of 650,000 FC for ponds without periphyton and 1,615,000 FC for ponds with periphyton. The added value was 470,400 FC for ponds without periphyton and 545,480 FC for ponds with periphyton.

7.0 CONCLUSION

Volume 06, Issue 04 "July - August 2025"

ISSN 2583-0333

This study made it possible to analyze the economic and financial profitability of the experimental breeding of H. niloticus fry (Cuvier, 1829) under Kisangani conditions. The results obtained led to the following conclusions: (1) The physicochemical parameters of the pond water were in line with the requirements of the species' rearing and certain physicochemical parameters of the water such as temperature, pH, dissolved oxygen and transparency significantly influenced the growth of H. niloticus fry. (2) The fry of Heterotis niloticus showed a decrease in growth in the two experimental regimes used. (3) The experimental regimes used are economical and financially profitable for the rearing of H. niloticus under Kisangani rearing conditions.

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