INVESTMENT FEASIBILITY IN GOLD FISH (Carassius auratus)

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ABSTRACT

Production of *Carassius auratus* in many parts of the world except Nigeria is a very profitable business with some operational techniques and specialization. Natural propagation (in Hapas and Aquaria tanks) and monitoring of survival rate was conducted for a period of seven weeks. The cost of broodstocks acquisition, breeding facilities, estimated net income, return on sales and total invested capital shows that investment in Gold fish production could be a major source of billions of dollars through exportation being the second most popular ornamental fish after Angelfish. Paired broodstocks spawned the third day and eggs hatched after seven days of incubation. Optimum water qualities were 4.4mg/l for DO_2, 6.7 for pH and 30°C for H_2O temperature. After rearing of hatchlings for seven weeks, they had attained a mean weight of 28.2gm (10.5cm) that is ideal for sale in both local and foreign markets. Two production media were used in this experiment, the results obtained indicated that hapas in earthen ponds produced the best results in terms of weight and increase in length. Specifically, the cash flow, the depreciation profit and loss account, loan repayment schedule if the loan is sought from the bank or any other financial institutions and the viability indicators of Net Present Value (NPV) and internal Rate of Return (IRR) were considered over a period of 5 years. Three viability indicators namely Net Present Value (NPV), Internal Rate of Return (IRR) and Payback Period (PRP) were assessed. Any one of the these indicators or combination of them are the key viability determinant of a bank funded projects. In the case of Gold Fish Venture, the Net Present Value is positive at N473726.8; the IRR 179.5% and the PBP at 6 months all indicated the project is feasible and viable. The IRR is far higher than the interest rate of 30 35% currently obtainable from most of the banks.

INTRODUCTION

Many ornamental species are native of Africa for which we have little understanding of their breeding techniques. The species includes *Carassius auratus* (Plate 1) *Epiplatys bifasciatus,* (Plate 2) *Tricogaster tricopterus* (Plate 3) etc. Ornamental fish trade is flourishing world wide yet Nigeria's share of the trade is very meager. According to Ninawe (1997), the estimate of global trade in ornamental fish is worth about $1.7 billion per year. Singapore, Malaysis, Honh Kong, Taiwan and Japan control about 60% of this huge sum. 30% is controlled by South Africa, while Africa, Caribbean and other countries contribute 10%. Odunaiye (1986) has reported that Nigeria contribute about 20% of the African market share.

Nigeria has a vast species of tropical aquatic life and the right climate to breed them for export. Major importers of ornamental fishes are United State of America (US), Japan, Germany, United Kingdom (U.K) and Netherlands. US alone accounts for 54% of the estimated wholesale trade in ornamental fish.

The aims of this work were to see the possibility of breeding *Carassius auratus* in controlled environment and the profitability of investing in its production

MATERIALS AND METHODS

BREEDER'S COLLECTION

This experiment was carried out in (i) three (3) sets of hapas measuring 1m x 1m x 1m suspended in the experimental earthen pond measuring $4m^2$, (ii) two (2) glass aquaria tanks of dimensions 60cm x 30cm x 30cm were used. Each of the aquaria tanks had portable air pump (aerator) for aeration.

Broodstocks used for this experiment were collected from Ibadan and transported live to experimental site in an open Jeri can and acclimatized for three (3) weeks in ponds.

PAIRING OF BROODSTOCKS AND SPAWNING

After acclimatization, the broodstocks were separated into sexes and their weight, total length and standard length were taken. Gravid broodstocks were paired for spawning in ratio 1:1, that is 1 male to 1 female, in (1) an already mounted nylon net hapas with kakabans which serves as eggs collector. The hapas were labeled H1, H2 and H3 (2) Glass aquarium tanks of dimension $1m X 1m X 1m^3$

After spawning, the broodstocks were removed from the hapas and aquaria tanks and kept in the holding tanks. This is to avoid the broodstocks from eating up the eggs that were spawned. After three weeks of separation, the broodstocks were paired again the second time.

DETERMINATION OF WATER QUALITY PARAMETERS

The water quality parameters taken were the temperature, dissolved oxygen, pH. All the parameters were determined as described by Boyd (1977).

INVESTMENTS FEASIBILITY AND COSTING

Investments and costing of a simple breeding and rearing for 7 weeks as obtained in New Bussa were calculated to show cash flow analysis, depreciation projected profit and loss account, loan repayment schedule and economic viability indicators assuming the project is to be sponsored by loan from bank.

RESULTS

Two days after pairing, spawning took place in the three hapas H1, H2 and H3; and hatchlings were observed on the seventh day. At hatchlings, the fry were just like mosquito larvae having the size of a pinpoint head, swimming towards the surface of the water. The mean temperature was 30°C.

The second and third spawning took between six to eight days after pairing at between 29^0 to 30^0C.
The first set of spent fish took five weeks to become gravid again, and when paired spawned four days after. At exactly ten (10) days after the second spawning from H1, the female was gravid again.

The length and weight measurements are presented in Table 1. The mean values of the weight and length increase of *C. auratus* in aquaria tanks and hapas suspended in experimental earthen ponds are presented in Table 1. The final mean weight and length of those raised in hapa suspended in earthen ponds were 10.5gm and 11.1cm, while those raised in aquaria tanks were 5.6gm and 6.6cm respectively. Those in earthen ponds performed better. The mean water temperature, pH, and dissolved oxygen were 29.1°C, 6.8 and 4.3mg/l for ponds and 28.1°C, 7.4 and 4.6mg/l respectively for aquaria tanks (Table 2).

Although two production media were used in this experiment, the results obtained indicated that hapas in earthen ponds produced the best results in terms of weight and increase in length. Therefore, the investment viability analysed here are those of the earthen ponds, which is the most recommended for prospective investors. The weight attained in this production medium is more attractive than the other medium.

Specifically, the cash flow, the depreciation profit and loss account, loan repayment schedule if the loan is sought from the bank or any other financial institutions and the viability indicators of Net Present Value (NPV) and internal Rate of Return (IRR) were considered over a period of 5 years. The cash flow analysis of possible income in the year 1 and the loan form bank in year 0 i.e year of setting up is shown in Table 3. Table 4 shows the depreciated value of fixed assets that will be considered operational expenses in each year. This is normally used to arrive at the Net Profit as shown in Table 5. The repayment schedule of the loan obtained from the bank over the projected period of the venture is shown in Table 6. The annual principal and interest payable to the bank are shown in Table 6. Again this is used in calculating the Net profit at the end of each year. Table 7 considers three viability indicators namely Net, Present Value (NPV), Internal Rate of Return (IRR) and Payback Period (PRP). Any one of these indicators or combination of them is the key viability determinant of bank-funded projects.

In the case of Gold Fish Venture, the Net Present Value is positive at N473726.8; the IRR 179.5% and the PBP at 6 months all indicated the project is feasible and viable. The IRR is far higher than the interest rate of 30 35% currently obtainable from most of the banks. The 6 months payback period is also short enough to remove the fear of the banks on releasing the amount requested for by the investors

CONCLUSION

The results obtained after studying the natural propagation and survival rate of *Carassius auratus* shows that with good management and conducive environment the fish could be bred naturally without any artificial inducement

Also, *C. auratus* if adequately fed under good climatic condition can spawn regularly at least every ten to fourteen days. Again *C. auratus* will thrive very well in pond. The growth rate which was determined by the increase in weight and length is effectively enhanced in the hapa suspended in earthen pond compared to other rearing medium like the aquarium tank because of extra nutrients from the pond.

FISH SHIPMENT FACT FILE
Typical income statement of a small beginner shipper
Shipment to Europe (say Belgium) of 28 boxes containing five species of ornamental fish viz: Longnose, reed, butterfly, debauwi and robertsi.
Total Sales US $1858.00
@₦100/dollar = ₦185,800.00
Packaging charges for 28 boxes = $ 168.00
@₦100/dollar = ₦16,800
Total Income = ₦202,000
Procurement Cost
Fishes ₦21,900
Packaging ₦7,750
Transport ₦4,000
Labour and Quarantine ₦5,000
Airport protocol ₦6,000 ₦44,650
Gross Margin ₦167,350
1 Repeat business bi-weekly.

TABLE 2: MEAN TEMPERATURE, (^{o}C), DISSOLVED OXYGEN (DO_2) AND PH OF REARING MEDIA.

Weeks	Mean Temperature (^{o}C)		Mean $D0_2$ (mg/1)		Mean pH	
1	30	*28	4.2	* 4.8	6.4	*7.2
2	30	*26	4.4	*4.7	6.7	*7.3
3	31	*27	4.2	*4.6	6.9	*7.4
4	30	*30	4.7	*4.5	7.6	*7.5
5	29	*29	4.2	*4.6	6.4	*7.4
6	26	*28	4.2	*4.6	6.7	*7.6
7	28	*29	4.4	*4.8	6.7	*7.4
Mean	**29.1**	***28.1**	**4.3**	***4.6**	**7.2**	***7.4**

* Figures asterisked were readings from aquaria tanks

TABLE 1: MEAN VALUES OF WEIGHT AND LENGTH INCREASE OF *C. AURATUS* IN AQUARIA TANKS AND HAPAS SUSPENDED IN EXPERIMENTAL EARTHEN PONDS FOR SEVEN WEEKS

Rearing media	*WEEK 1*		*WEEK 2*		*WEEK 3*		*WEEK 4*		*WEEK 5*		*WEEK 6*		*WEEK 7*	
	Wt(g)	Lth(cm)	Wt(g)	Lth(cm)	Wt(g)	Lth(cm)	Wt(g)	Lth(cm)	Wt(g)	Lth(cm)	Wt(g)	Lth(cm)	Wt (g)	Lth (cm)
HAPA	3.3	3.2	4.1	6.6	7.5	7.4	8.3	8.6	8.6	9.8	9.9	10.7	10.5	11.1
TANK	3.4	1.0	3.5	2.6	3.9	3.7	4.1	4.7	4.9	5.2	5.4	5.5	5.9	6.6

TABLE 3: CASH FLOW ANALYSIS – GOLD FISH VENTURE

S/n	Particulars	Year 1 ₦	Year 2 ₦	Year 3 ₦	Year 4 ₦	Year 5 ₦
A	**Loan from Bank**	100,000	---	---	---	---
	Sales from Pond	405,000	405,000	405,000	405,000	405,000
	Total	**505,000**	**405,000**	**405,000**	**405,000**	**405,000**
B	**Fixed Capital Cost**					
i.	Earthen Pond	2,500	---	---	---	---
ii.	1 Hapa Net	15,000	---	---	---	---
iii.	Aerator	1,000	---	---	---	---
	Sub Total	**18,500**	---	---	---	---
C.	**Operating Cost**					
i.	5 pairs of Broodstock at ₦600/pair	3,000	3,000	3,000	3,000	3,000
ii.	Electricity consumption	4,000	4,000	4,000	4,000	4,000
iii.	Feed (45% CP. of 50kg) at 20,000	20,000	20,000	20,000	20,000	20,000
iv.	Labour (1 OND) at ₦10,000/month for 3 months	30,000	30,000	30,000	30,000	30,000
v.	Miscellaneous	24,500	---	---	---	---
	Sub Total	**81,500**	**57,000**	**57,000**	**57,000**	**57,000**
D.	**Loan Repayment plus interest at 30%**	50,000	44,000	38,000	32,000	26,000
E.	**Personal Drawings**	100,000	100,000	100,000	100,000	100,000
F.	**Total Cash Outflow**	225,500	201,000	201,000	201,000	201,000
G.	**Expected Cash Inflow**	279,500	204,000	204,000	204,000	204,000

TABLE 4: DEPRECIATION – GOLD FISH VENTURE

			Annual Depreciated Value				
Equipment	Value (₦)	Life Span (Yrs)	*Year 1* (₦)	Year 2 (₦)	Year 3 (₦)	Year 4 (₦)	Year 5 (₦)
Earthen Pond	2,500	10	250	250	250	250	250
Hapa Net	15,000	5	3,000	3,000	3,000	3,000	3,000
Aerator	1,000	3	333.33	333.33	333.33	333.33	333.33
		TOTAL	**3583.33**	**3583.33**	**3583.33**	**3583.33**	**3583.33**

TABLE 5: PROJECTED PROFIT AND LOSS ACCOUNT – GOLD FISH VENTURE

Particulars	Year 1 (₦)	Year 2 (₦)	Year 3(₦)	Year 4 (₦)	Year 5 (₦)
Income from sale of Gold Fish	405,000	405,000	405,000	405,000	405,000
Less Annual Operating Cost	57,000	57,000	57,000	57,000	57,000
Operating Profit	348,000	348,000	348,000	348,000	348,000
Less Depreciation	3583.33	3583.33	3583.33	3583.33	3583.33
Gross Profit	344416.67	344416.67	344416.67	344416.67	344416.67
Less Interest on loan at 30%	30,000	24,000	18,000	12,000	6,000
Profit before Tax	314416.67	320416.67	326416.67	332416.67	338416.67
Less Company Tax at 45%	141487.5	144187.5	146887.5	149587.5	152287.7
Net Profit	172929.17	176229.17	179529.17	182829.17	186129.17
% of Net profit to Total investment	172.9%	176.2%	179.5%	182.8%	186.1%

TABLE 6: LOAN REPAYMENT SCHEDULE – GOLD FISH VENTURE

Year	Annual Repayment (₦)	Principal (₦)	Interest at 30% (₦)	Outstanding Balance (₦)
0	---	---	---	1000,000
1	50,000	20,000	30,000	80,000
2	44,000	20,000	24,000	60,000
3	38,000	20,000	18,000	40,000
4	32,000	20,000	12,000	20,000
5	26,000	20,000	6,000	---

TABLE 7: ECONOM IC VIABILITY INDICATORS – GOLD FISH VENTURE

Year	Income		Expenditure		Benefit	
	Actual ₦	Discounted Value at 30%	Actual ₦	Discounted Value at 30%	Actual ₦	Discounted Value at 30%
0	---	---	18,500	18,500	-18,500	-18,500
1	405,000	311526	207,000	159224.4	198,000	152301.6
2	405,000	239638.5	201,000	118931.7	204,000	120706.8
3	405,000	184356	201,000	91495.2	204,000	92860.8
4	405,000	141790.5	201,000	70370.1	204,000	71420.4
5	405,000	109066.5	201,000	54129.3	204,000	54937.2

Net Present Value (NPV) = 473726.8

Internal Rate of Return (IRR) = 179.5%

Payback Period (PBP) = 6 Months

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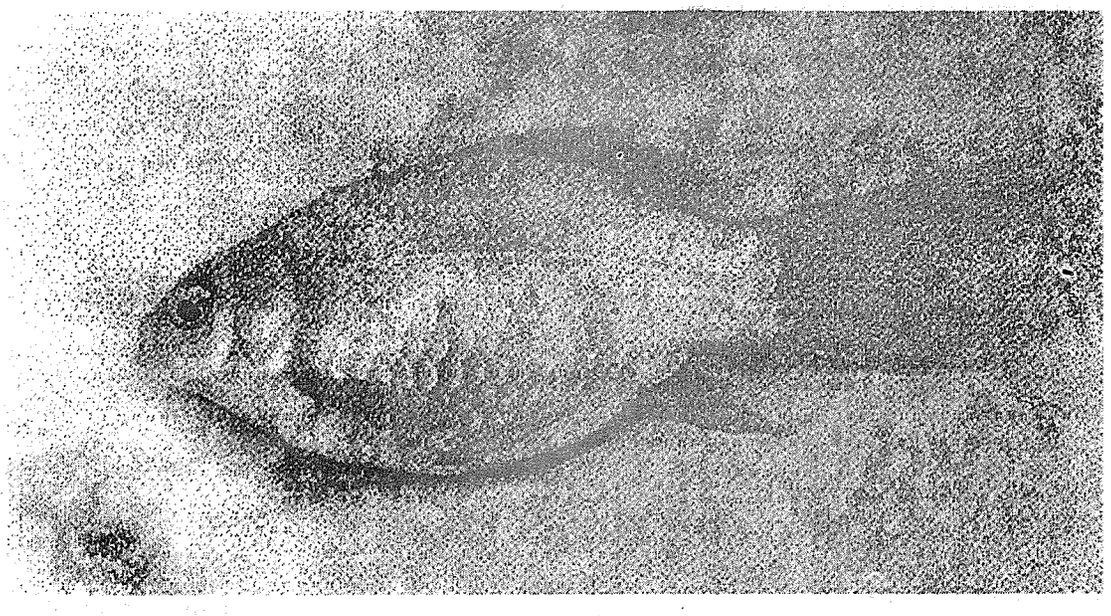

PLATE 1: Photo macrograph of *Carassius auratus*

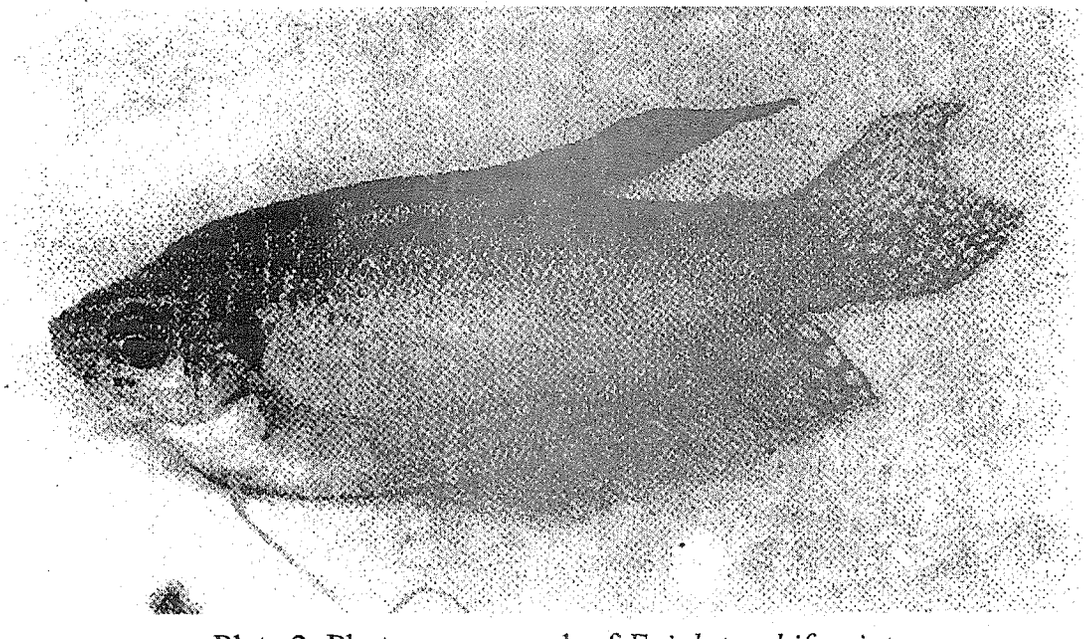

Plate 2: Photo macrograph of *Epiplatys bifasciatus*

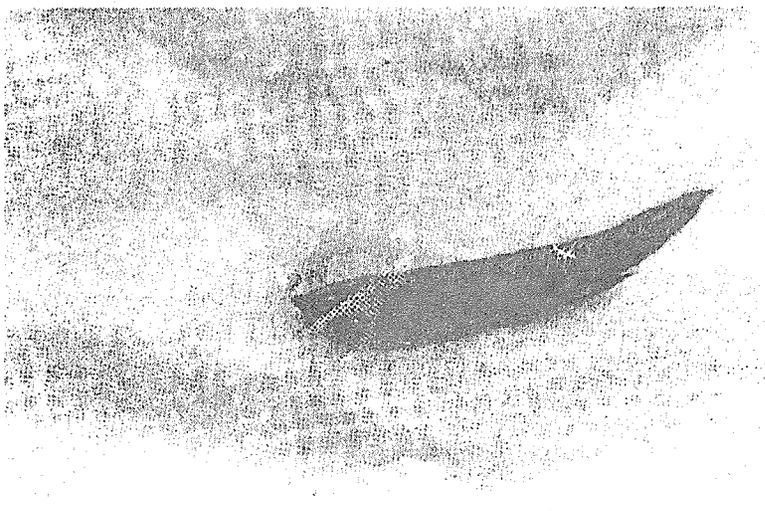

Plate 3: Photo macrograph of *Tricogaster tricopterus*