SMALL SCALE COMMERCIAL PRODUCTION OF TILAPIA FINGERLINGS IN FLOATING BAMBOO NET-HAPAS

by

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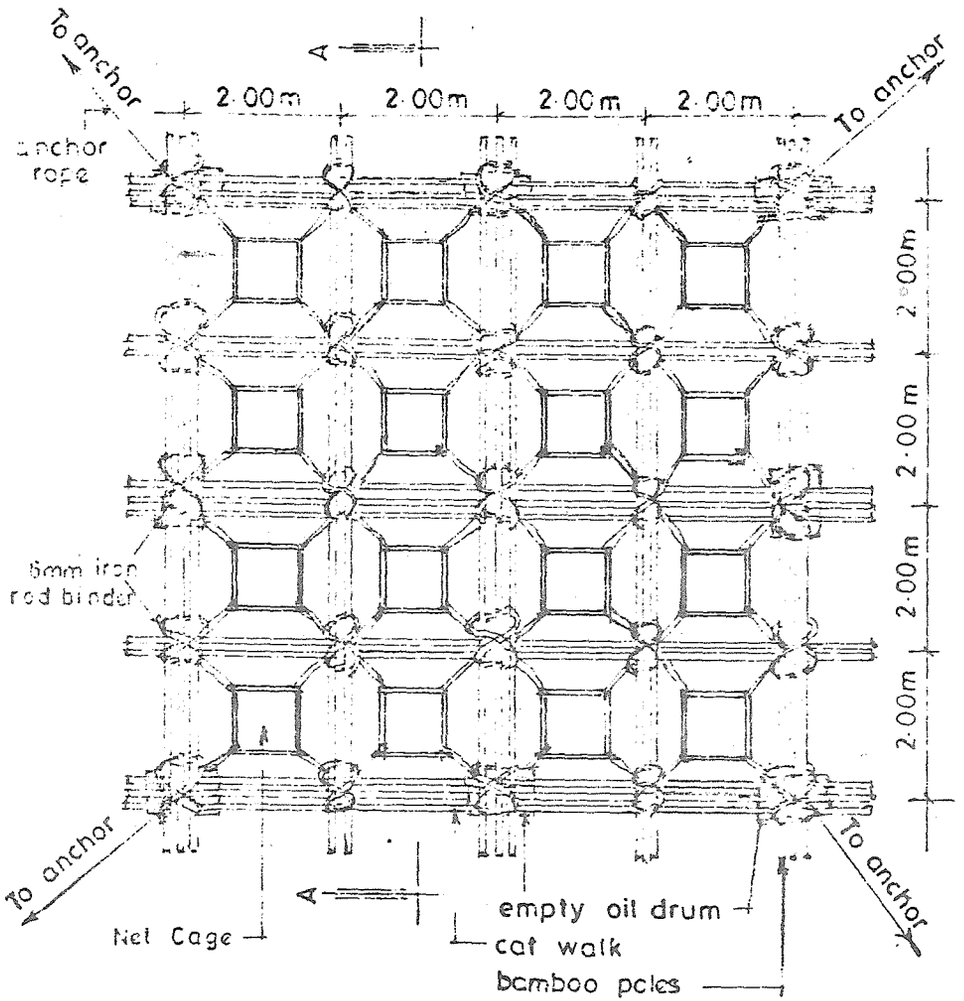
ABSTRACT

The inadequate supply of tilapia seed is considered as one of the major present constraints to the development of the culture industry. The floating bamboo net-hapa hatchery/nursery system was observed to be very efficient in the mass production of tilapia fry and fingerlings at Kainji Lake Research Institute. This system was therefore, recommended for small-scale (artisanal) commercial operators consisting of fishermen families in order to increase their productivity and hasten development of rural communities. The economic analysis of this system showed that loan obtained for the recommended scale of operation can be amortized within two years of the project. It was emphasized that the operational and managerial skills of the fish farm operators account largely to the production cost and profitability of the enterprise.

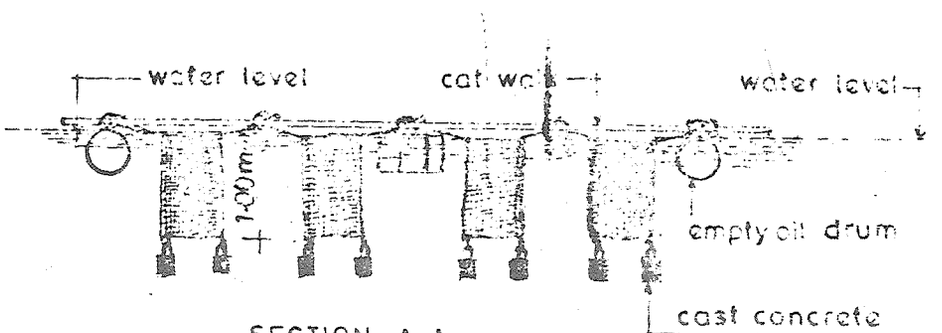
INTRODUCTION

Development of and assistance to small-scale fisheries is a policy of very high priority in countries in South and South-east Asia. Within recent years, some breakthroughs in certain aspects of aquaculture, which are of small-scale nature, were achieved. One of these is the operation of shrimp/prawn hatcheries in some countries in the region (FAO, 1982). In some countries such as Taiwan, Philippines and Thailand, there are several "backyard hatcheries" managed by experienced small farmers contributing significantly to the national total fish seed supply.

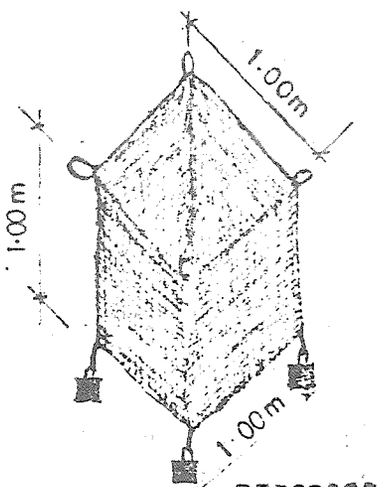
Economically productive fish culture, like in terrestrial animal husbandry like livestock and poultry production, is heavily dependent upon an adequate supply of good quality and quantity seed with which to stock aquaculture systems like cages, ponds, raceways, enclosures etc. One of the major constraints to increased fish production through aquaculture in Nigeria has been identified to be inadequate supply of fish seed. It is surprising to observe that the supply of the "common" Tilapia (known to be very prolific) fingerlings for stocking the existing aquaculture systems is inadequate. The floating bamboo net-hapa hatchery/nursery system developed at Kainji Lake Research Institute,



PLAN



SECTION A-A



PERSPECTIVE VIEW

Fig 1 16 Units Bamboo Floating Cages

has been found to be very efficient for the production of high quality Tilapia fish seeds for stocking ponds, cages, enclosures etc. Tilapia which used to be called "poor man's fish", now ranks first in importance as a cultured fish and a highly priced food fish in many developing countries.

In capture fishery, the artisanal (small-scale) is, however, still the most important sub-sector consistently accounting for well over 90%of the total domestic production in Nigeria (West, 1986). The vast unpolluted inland water bodies of Nigeria provide great opportunities for the establishment of small scale floating hatchery/nursery. While the body of literature on the biological and technological aspects of aquaculture in the tropics is steadily increasing, little information on economic aspects is available (IDRC, 1982). The aim of this paper, therefore, is to provide information on the economics (input-output) of operating a small-scale commercial Tilapia fingerlings production in floating bamboo net-hapas.

BACK GROUND

Fish cage culture can be described as the husbandry of fish stocks, generally from juvenile to market size, in a totally enclosed water volume through which a free water circulation is maintained.

In the floating bamboo hatchery/nursery system, fine mesh nylon or "mosquito" net cages commonly referred to as hapas are used to breed Tilapia. In Kainji Lake Research Institute, successful breeding was observed using Sarotherodon (= Tilapia) galilaeus, Oreochromis (= Tilapia) niloticus and combination of the two in hybridization studies. In this paper, only the breeding of Oreochromis niloticus will be discussed since much work has been done on this species at the Institute (Otubusin and Opeloye, 1985).

Fry and Fingerling Production in Net-Hapas

This activity was carried out in a freshwater reservoir (Kigera III) built for domestic water supply to the KLRI Estate. This reservoir is already described in Otubusin (1985).

A module of 16-units consisting of floating bamboo raft[1] (9 x 9 m) and 16, 1 x 1 x 1 m hapas was used in the production of Oreochromis (= Tilapia) niloticus fingerlings (Figure 1). Tilapia breeders (60.0 to 72.0g for females and 106.0 to 150.0g for males) were stocked at the rate of 12/hapa and were fed with 50% blood meal pelleted feed as described in Otubusin (1985). School of fry was first observed 18 days after stocking. Male : female breeders ratio of 1 : 3 was found to be the most advantageous sex ratio. The average monthly prcduction of O. niloticus fry was 1,000/cage.

[1] Nine 100L plastic kegs (Tate & Lyle KWALIPIPE) adequate as floats for a module

To produce Tilapia fingerlings, these fry are further reared in hapas at a higher density (1,000/m^3) feeding supplementally with fine corn bran until transfer to grow out cages after 1 to 2 months. Corn bran was observed to give the best feed conversion ratio, highest average final weight and the fastest growth rate in raising Tilapia fry to fingerlings at Kainji Lake Research Institute (Otubusin and Opeloye, 1985).

INVESTMENT PROSPECTS

Based on the above information, investment prospects in small scale commercial Tilapia fingerling production in floating hapas will be analyzed economically.

4 modules of 16-unit hapas 1 x 1 x 1m (hatchery) and another 4 modules of 16-unit hapas 1 x 1 x 1m (nursery) will be the least requirements for this small-scale commercial venture. The other details are as in Table 1.

DISCUSSION

From Table 1, it can be observed that a small-scale operator utilizing the specified number of modules (hatchery/nrsery) can surely amortize the loan he takes for the venture under two years of operation. It is pertinent to note that the site to be selected for this system must meet the requirements for good growth, production and safety of the infrastructure and the fish stock. The basic principles considered in site selection are good water quality, adequate water exchange and freedom from predators and natural hazards.

Since the demand for good quality fish fingerlings for stocking aquaculture systems is high, the operation of many small scale commercial floating hatchery/nursery will be a reliable and regular source of supply to meet this demand. This fingerling production systems has the following advantages:-

- involves low capital outlay
- uses an existing water body
- ensures total harvest of clean, high quality stock (fingerlings) unlike beach seining in the pond which is not total, injures the fish resulting in high mortality and the fingerlings are often not mud-free
- The highest recoverable number of fingerlings (Tilapia) has been observed in this system (Otubusin and Opeloye, 1985)
- harvesting of fingerlings from the hapa is fast and requires only one person unlike pond seining which requires many hands.

Table 1 - Annual operating and maintenance costs and prospects for modules of floating bamboo hatchery/nursery in small-scale commercial Tilapia fingerling production*

	Item	Amount (₦)
I	4 Modules of 16-unit hapas (Hatchery)	₦4,000.00
II	4 Modules of 16-unit hapas (Nursery)	4,000.00
III	Tilapia breeders (220/module) ₦1 each (3 sets)	2,640.00
IV	Feed (from agric & ind. wastes)	800.00
V	Maintenance/Repairs	400.00
VI	20% annual depreciation on infrastructure	1,600.00
VII	Miscellaneous	1,344.00
	Total	₦14,784.00
	Cost/Benefit Analysis:	
(i)	Total Annual Receipts from Fish sales 80,000 fingerlings/module at 10k each	32,000.00
(ii)	Total operating and maintenance cost	14,784.00
(iii)	- Net Profit (1st Year)	17,216.00
	- Return on Investment = 116.5%	
	- Net Profit (2nd Year)	25,216.00
	- Return on Investment = 371.7%	

* Based on the following assumptions:

1. Production period: 10 months
2. Expected life span of hapas is 5 years
3. Stocking density: 12 Breeders/hapa and 1,000 fry per hapa and 62.5% survival from fry to fingerlings
4. Labour will be supplied by members of the family of the small-scale operator.

Overall, the success of this small-scale industry, assuring that the project will be readily funded by a loan from a financial institution, depends on the careful management of this semi-intensive culture system.

The prospects from this small-scale commercial Tilapia fingerling production are quite high. This system is therefore, recommended for small-scale operators at fishermen (farmers) family level in order to increase the productivity of these peasants and enhance the development of rural communities.

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