# Performance, economics of tilapia cage culture in Brazil

1 December 2003 Luciane Conte Daniel Yokoyama Sonoda Ricardo Shirota José Eurico Possebon Cyrino

## Study evaluates effects of various stocking densities

Sample fish at the end of the experimental period.

Brazil has 12 percent of the world's freshwater resources, with an estimated 6 million ha of man-made reservoirs, most of which are associated with hydropower plants. The southeastern part of the country has 2.35 million ha of these large reservoirs that, if managed as proposed by Beveridge (1984) and Schmittou (1993), could yield an estimated 4.9 to 14.1 million metric tons of farmed fish and fisheries products.

Cage fish farming is an excellent way to utilize lakes and reservoirs otherwise unsuitable for conventional aquaculture. With adequate management of carrying capacity, cage fish farming can be carried out with minimal harm to the environment.

## Reservoir study

The authors recently carried out a study on the performance and economics of cage farming Nile tilapia (*Oreochromis niloticus)* in southeast Brazil. This research evaluated the influence of different stocking densities – 300-400 and 500 to 600 fish per cubic meter – under commercial production conditions. The study was carried out in the 3.3-ha, 4.0-meter-deep reservoir of Chapadao and that of Colonia Nova, an 8.8-ha, 2.6-meter-deep reservoir.

The Chapadao reservoir had nine cages with a total volume of 94.5 cubic meters, and Colonia Nova had 27 cages with a volume of 235.7 cubic meters. Feed consumption, fish survival rate, and water temperature were recorded daily during scheduled feeding from September 2001 to April 2002. Dissolved oxygen, pH, and water transparency were re-corded every 15 days.

Fish growth was evaluated monthly by weighting a 3 percent sample of the population. The caged tilapia were fed commercial floating pellets with 32 percent crude protein two times every day. Feeding rate was adjusted based on sample weight and survival rate.

## Results

The carrying capacity of both stocking densities was set to 200 kilograms per cubic meter. The 500-600 fish per cubic meter density resulted in larger accumulated biomass (Fig. 1) and better feeding efficiency than the lower density. No significant ($P > 0.05$) differences between the individual, average weight of fish of both densities (Fig. 2) were observed, suggesting the increased stocking density did not influence individual fish growth.

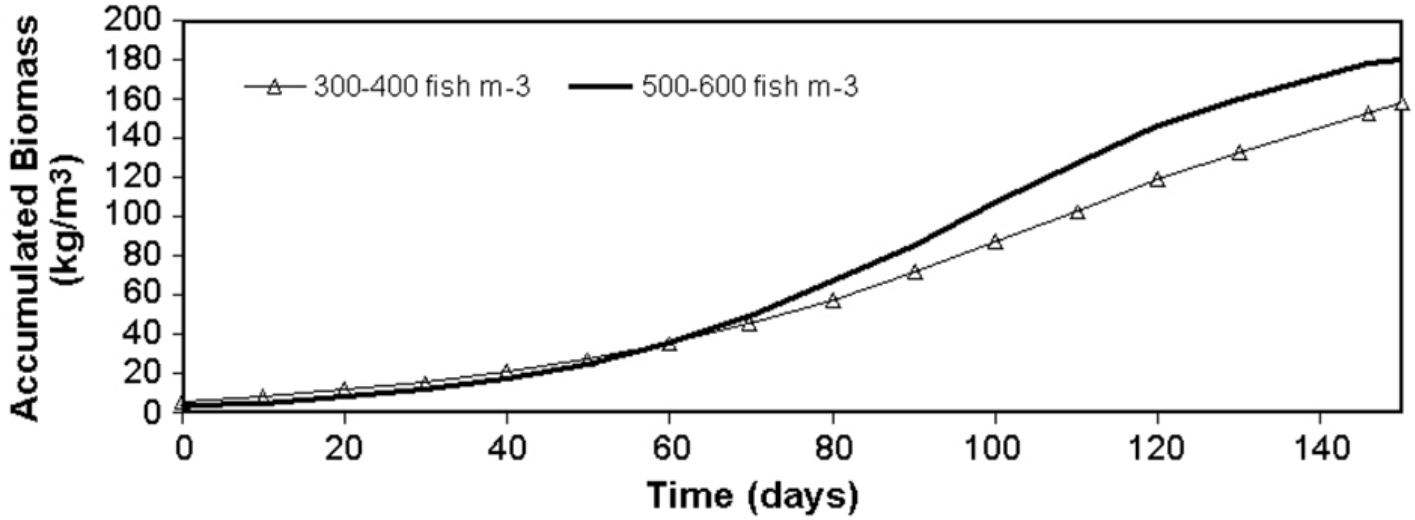



Fig. 1: Accumulated biomass versus time for two stocking densities.

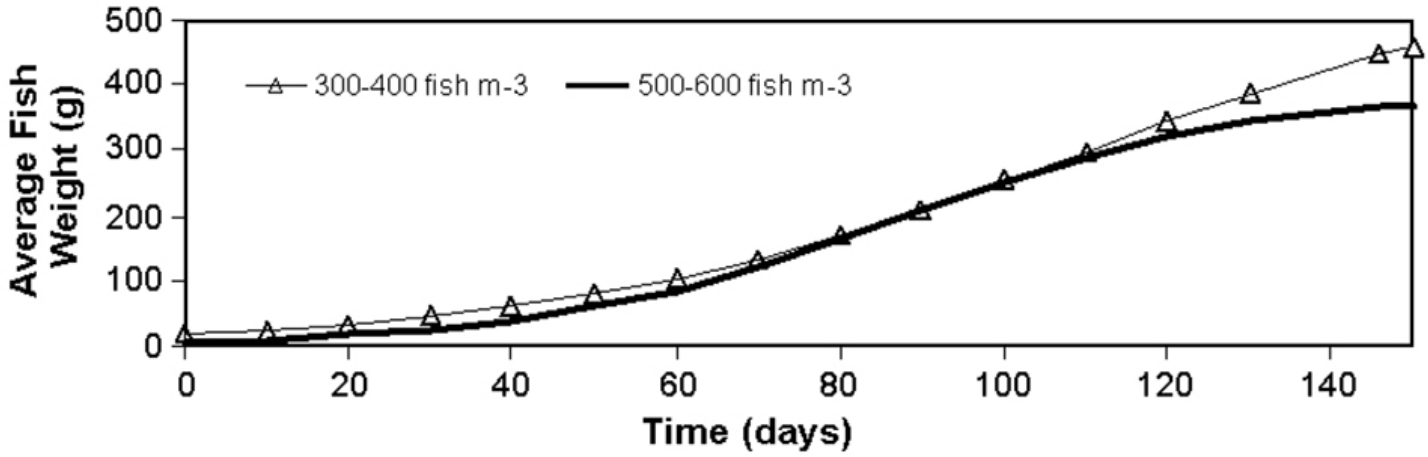



Fig. 2: Average fish weight versus time for two stocking densities.

The Logistic and Mitscherlich functions were used to estimate production functions. The estimated curves can be represented by the following equations:

$$AB_{300a400} = f(AR) = 200 \bullet (1 - 10^{(-0.001884 \bullet RA - 0,066106)})$$

$$AB_{500a600} = f(AR) = 200 \bullet (1 - 10^{(-0.002680 \bullet RA - 0,061152)})$$

where:

f(AR) = (AB) accumulated biomass (kg $m^{-3}$)
AR = accumulated consumed ration (kg $m^{-3}$).

The economic biomass, the value of accumulated fish biomass that maximizes the economic return of the production system, is reached when the harvest point maximizes profit. The profit represents the difference between the total revenues from fish sales and their production costs.

In this study, the biomass that maximized profit at a density of 500 to 600 fish per cubic meter was 145 kilograms per cubic meter (fish weight gain was 2.45 grams per day) and had the best feed conversion. The economic biomass for the 300 to 400 fish per cubic meter stocking density was 121 kilograms per cubic meter (fish weight gain was 2.35 grams per day).

A stocking density of 500 to 600 fish per cubic meter and average fish weight of 283 grams have many advantages, including the optimization of space and production time, better feed conversion, and higher fish production per cage volume. Such conditions were more profitable than the lower stocking density (Table 1).

## Conte, Economic analysis of study results, Table 1

| Item | Stocking Density 300-400 fish/$m^3$ | Stocking Density 500-600 fish/$m^3$ |
|---|---|---|
| Total Costs (U.S. $/$m^3$) | 19.07 | 21.19 |
| Economic biomass (kg/$m^3$) | 121 | 145 |
| Total Receive (U.S. $/$m^3$) | 82.37 | 98.70 |
| Profit (U.S. $/msup>3) | 22.06 | 33.37 |

Table 1. Economic analysis of study results. Currency exchange rate: U.S. $ = R $2.938

*Note: Cited references are available from the authors.*

*(Editor's Note: This article was originally published in the December 2003 print edition of the* Global Aquaculture Advocate.*)*



**Authors**


- Luciane Conte

  Luciane Conte

  Departamento de Economia
  Administração e Sociologia
  USP-ESALQ; 13418-900
  Piracicaba, SP, Brazil

- Daniel Yokoyama Sonoda

  Daniel Yokoyama Sonoda

  Departamento de Economia
  Administração e Sociologia
  USP-ESALQ; 13418-900
  Piracicaba, SP, Brazil

- Ricardo Shirota

  Ricardo Shirota

  Departamento de Economia
  Administração e Sociologia
  USP-ESALQ; 13418-900
  Piracicaba, SP, Brazil

- José Eurico Possebon Cyrino

  José Eurico Possebon Cyrino

  Departamento de Zootecnia
  USP-ESALQ
  Piracicaba, SP, Brazil


[114,98,46,112,115,117,46,113,108,97,115,101,64,110,105,114,121,99,112,101,106]

- Share on LinkedIn

**Tagged With**

Luciane Conte José Eurico Possebon Cyrino Ricardo Shirota Daniel Yokoyama Sonoda

**Related Posts**

Intelligence

## Commercial implementation of in-pond raceway system

An in-pond raceway system in Alabama was utilized to supply various niche markets, including Asian grocery store chains that desired fresh live fish, recreational pond stocking businesses, private pond owners and fee fishing operations. In many cases, a higher price was achieved.

Responsibility

## Addressing safety in Latin America's tilapia supply chain

Over the last decade, the experience gained by many tilapia farmers combined with proficient programs implemented by local governments have significantly improved tilapia production in various Latin American countries like Colombia, Mexico, Ecuador and other important tilapia producers in the region.

Responsibility

## Egypt's success with tilapia a blueprint for all Africa

Egypt is the third-largest tilapia producer globally, after China and Indonesia, and accounts for about 80 percent of African production of farmed tilapia. Many of the reasons for Egypt's successful development of its important tilapia industry could be applied to the rest of African continent.

Intelligence

## Food safety, quality control in tilapia products

The most important quality issue for tilapia is the presence of off-flavors that derive from cyanobacteria and actinomycetes, which can be addressed by depuration.

**About The Advocate**

The Responsible Seafood Advocate supports the Global Seafood Alliance's (GSA) mission to advance responsible seafood practices through education, advocacy and third-party assurances.

Learn More

Search Responsible Seafood Advocate Search Search

**Advertising Opportunities**

2022 Media & Events Kit

**Categories**

Aquafeeds Health & Welfare From Our Sponsors Innovation & Investment Intelligence Intelligence Responsibility Fisheries Artículos en Español

**Don't Miss an Article**

**Featured**

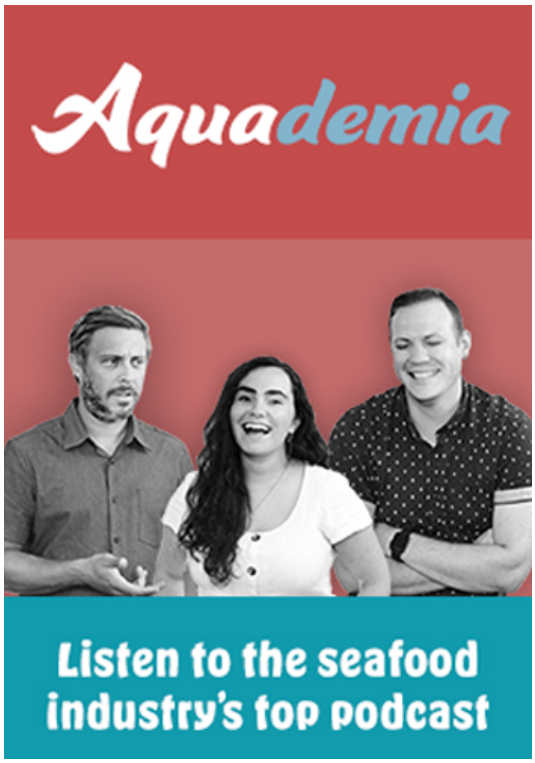
- Health & Welfare An update on vibriosis, the major bacterial disease shrimp farmers face
- Intelligence A seat at the table: Fed By Blue team says aquaculture needs a stronger voice
- Responsibility Quantifying habitat provisioning at macroalgae cultivation locations

**Popular Tags**

All Tags

**Recent**

- Fisheries Second Test: Another filler for the fisheries category
- Fisheries Test: This is filler for the fisheries Category
- Aquafeeds Test Article
- Responsibility Study: Climate change will shuffle marine ecosystems in unexpected ways as ocean temperature warms
- Health & Welfare Indian shrimp researchers earn a patent for WSSV diagnostic tool





- About
- Membership
- Resources
- Best Aquaculture Practices (BAP)
- Best Seafood Practices (BSP)
- GOAL Events
- Advocate Magazine
- Aquademia Podcast
- Blog
- Contact


**Stay up to date with GSA**