WHY TILAPIA IS BECOMING THE MOST IMPORTANT FOOD FISH ON THE PLANET

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American Tilapia Association, Sec. Tres.

ISTA 9
Shanghai Ocean University
22 April 2011
Tilapia: continuing to increase in popularity globally

• Tilapias are second only to the carps as a farmed food fish.

• But tilapia have unique characteristics that will facilitate its continued growth to someday surpass carp production.
Tilapia: the most important aquaculture species of the 21st century

Feb 2000
ISTA 5

Tilapia: The Most Important Aquaculture Species of the 21st Century

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ABSTRACT
In the 1990's, tilapia species were introduced into most of the countries in the world from their original ranges in Africa and the Middle East. They are now grown in commercial farming operations in almost 100 countries. Tilapia are likely to be the most important of all aquacultured fish in the 21st century. The unique mix of tilapias' physiology, reproductive biology, genetic plasticity, development of domesticated strains, and ready marketability have put it at the forefront of aquaculture. The few detracting characteristics are rapidly being overcome by evolving culture systems, selective breeding, gender manipulation and genetic modification. A convergence of improved culture techniques, new farms, low cost diets, ecological efficiency and emerging markets will boost tilapia to be the world's largest aquaculture crop.

INTRODUCTION
Tilapia were touted as the "Aquatic chicken" by ICLARM and others more than 20 years ago. The phrase may be even more appropriate today than it was then. Like terrestrial chicken, tilapia are now grown around the world. FAO (1997) estimated that world aquaculture production of tilapia had reached 659,000 t in 1995. "Tilapia..."
Percentage of US finfish grocery sales
Feb. 2010

- Salmon
- Tilapia
- Catfish
- Other fish
- Cod
- Haddock
- Tuna
- Flounder
- Halibut
- Swordfish
- Trout
Major farmed fishes

Metric tons per year

- Tilapia
- Catfish
- Salmon
## Comparison of major farmed fishes

<table>
<thead>
<tr>
<th>Fish Type</th>
<th>Geography</th>
<th>Consumers</th>
<th>Fish meal</th>
<th>Systems</th>
<th>Freshwater or Marine</th>
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</thead>
<tbody>
<tr>
<td>Salmon</td>
<td>Regional</td>
<td>Global</td>
<td>Moderate</td>
<td>Cages</td>
<td>Requires both</td>
</tr>
<tr>
<td>Carps</td>
<td>Global</td>
<td>Regional</td>
<td>Minimal</td>
<td>Ponds &amp; cages</td>
<td>Freshwater only</td>
</tr>
<tr>
<td>Catfish</td>
<td>Global</td>
<td>Global</td>
<td>Minimal</td>
<td>Ponds &amp; cages</td>
<td>Freshwater only</td>
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<tr>
<td>Sea bass, cobia, snappers</td>
<td>Global</td>
<td>Global</td>
<td>High</td>
<td>Cages, recirc systems</td>
<td>Marine only</td>
</tr>
<tr>
<td>Tunas</td>
<td>Regional</td>
<td>Global</td>
<td>High</td>
<td>Cages</td>
<td>Marine only</td>
</tr>
<tr>
<td>Tilapia</td>
<td>Global</td>
<td>Global</td>
<td>Minimal</td>
<td>Ponds, cages, raceways, recirc systems</td>
<td>Either</td>
</tr>
</tbody>
</table>
What catfish producers should learn from tilapia producers

• Consumers are only confused when attacks are made on any farmed fish.
• Trade barriers are only temporary fixes as food is ultimately fungible.
• Investment in improved product quality and advertising is almost always profitable.
• Variety of product forms attracts more customers.
Subsistence and Export Commodity

- Tilapia is unique in its role as a small livestock animal grown by subsistence farmers in developing countries around the world.....

- And

- It is widely grown and exported to high value markets to be served in expensive restaurants and grocery stores

- Commodity or specialty crop - BOTH, like chicken
Tilapia

- Model for how aquaculture industry should develop
- Global demand, variety of production systems and geographic regions, some vertically integrated
- Environmentally sustainable – “Green Aquaculture” (no fish meal required in the diet, no antibiotics, many farms use effluents for crops)
World Tilapia Production of 3,200,000 mt in 2010
2008 Tilapia exports from China

Sales volume = 224,359 mt
Global production of tilapia

![Graph showing the global production of tilapia from 1984 to 2010 (est). The graph indicates a steady increase in production over time, with a sharp rise in the late 1990s and early 2000s. The data shows a significant increase in aquaculture production compared to fishery production.]
Global tilapia aquaculture exceeded salmon in 2004

- Farmed Tilapia
- Farmed Salmon

Metric tons (000)

Year
1990
2000
2008
2009
2010 (est)
## Top Ten Seafoods (U.S.) per capita (lbs)

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
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<tbody>
<tr>
<td>Tuna</td>
<td>3.5</td>
<td>Shrimp</td>
<td>3.4</td>
<td>Shrimp</td>
<td>3.7</td>
<td>Shrimp</td>
<td>4.0</td>
<td>Shrimp</td>
<td>4.2</td>
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<tr>
<td>Shrimp</td>
<td>3.2</td>
<td>Tuna</td>
<td>2.9</td>
<td>Tuna</td>
<td>3.1</td>
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<td>3.4</td>
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<tr>
<td>Pollock</td>
<td>1.6</td>
<td>Salmon</td>
<td>2.0</td>
<td>Salmon</td>
<td>2.2</td>
<td>Salmon</td>
<td>2.2</td>
<td>Salmon</td>
<td>2.4</td>
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<tr>
<td>Salmon</td>
<td>1.5</td>
<td>Pollock</td>
<td>1.2</td>
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<td>1.1</td>
<td>Pollock</td>
<td>1.7</td>
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<td>1.6</td>
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<tr>
<td>Catfish</td>
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<tr>
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<td>0.7</td>
<td>Cod</td>
<td>0.6</td>
<td>Cod</td>
<td>0.7</td>
<td>Cod</td>
</tr>
<tr>
<td>Clams</td>
<td>0.5</td>
<td>Clams</td>
<td>0.5</td>
<td>Crabs</td>
<td>0.6</td>
<td>Crabs</td>
<td>0.6</td>
<td>Crabs</td>
<td>0.7</td>
<td>Crabs</td>
</tr>
<tr>
<td>Crabs</td>
<td>0.4</td>
<td>Crabs</td>
<td>0.4</td>
<td>Clams</td>
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<td>0.6</td>
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<tr>
<td>Flatfish</td>
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<tr>
<td>Scallops</td>
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<tr>
<td>Tilapia</td>
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<td>Flatfish</td>
<td>0.3</td>
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<td>0.3</td>
<td>Scallops</td>
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<td>0.3</td>
<td>Flatfish</td>
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</tr>
</tbody>
</table>
Tilapia widely recognized as a healthy food item
US Consumption of tilapia from domestic and imported sources

Tilapia (000's of kg of live weight)

Domestic
Imports

0 50,000 100,000 150,000 200,000 250,000 300,000 350,000 400,000 450,000 500,000

- Domestic
- Imports
US Tilapia consumption (imports and domestic)

368,295 mt of live weight (equivalent) – 2006
437,000 mt of live weight (equivalent) - 2007
453,264 mt of live weight (equivalent) – 2008
465,953 mt of live weight (equivalent – 2009)
579,443 mt of live weight (equivalent – 2010)
Value of Tilapia product forms imported to the U.S.

US Sales of tilapia

- Imports in 2010 were $842,866,006
- US production of 25,000,000 lbs at farm
- 2010 US tilapia farm-gate sales were over $75,000,000
- 2010 US Tilapia Sales estimate —
  - $842,866,006 + $75,000,000 = $917,866,006
Selective breeding and genetic improvements

- Excellent breeding programs
  - G.I.F.T. - Malaysia
  - Genomar - Brazil and Norway
  - Chitralada – Thailand
  - TabTim – Thailand (CP Group)
  - GIFT Excell – Philippines
  - Molobicus - Philippines
  - GIFT Bangladesh
- YY Supermale - Philippines and Swansea, Egypt and Indonesia
Genetic improvements in tilapia

(From: Mair, G., 2002)
Tilapia Genome Project

- March 2011 - First assembly of the tilapia genome
- Oreochromis niloticus – Nile Tilapia
- Matching many segments to those known from other fish
- Publically available and freely accessible
- Next frontier of genetic program for tilapia
The YY male technology

Normal crosses produce equal proportion of males and females

YY males produce only male progeny (GMT®)
Continued growth globally

Taal Lake, Philippines, 2007

Taal Lake, Philippines, 2009
Regions of rapid production growth

- Vietnam – conversion of catfish cages to tilapia in Mekong, and culture in all regions
- Indonesia – cage culture, polycultures, rice culture
- Malaysia – government support and private sector investment
- Bangladesh – government support and private sector investment
- Brazil – lots of available water, labor, land, feed
- Thailand – better reporting, shrimp polyculture
- Egypt – continued intensification
- Sub-Saharan Africa - commercialization
Integrated Farming Systems

- Tilapia → Grapes, wheat, olives, barley, sorghum, cotton, melons, peppers

Safford, AZ

Marana, AZ
Tilapia and citrus in Hainan, China
Desert Springs Tilapia, Hyder AZ
Gila Farms, AZ
Tilapia-shrimp-halophytes  Eritrea

Salicornia
Mangroves
Salicornia
Mangroves
Shrimp and tilapia ponds
Tilapia – shrimp – seaweed polyculture in Indonesia
Pathways in the use of tilapia as biomanipulator in shrimp farms

Promotion of *Chlorella* dominance

Feeding on organic waste

Bioturbation of sediment

Production of natural antimicrobials

**IMPROVED SEDIMENT QUALITY**

**IMPROVED WATER QUALITY**

**SUPRESSION OF GROWTH OF *V. harveyi***
Improvements in packaging
IQF Fillets in re-sealable packages
These images show various packages of Filoveya, a brand of frozen fish products. The packages are labeled with different types and flavors, such as Lemon Dill and Boneless & Frozen Fresh Tilapia Fillets. The packaging also includes graphics of cooked fish and associated recipes, emphasizing health benefits and sustainability. The text on the packages highlights the brand’s commitment to offering quality, nutritious, and ethically sourced seafood options.
Value added meals
ONE-STEP SEAFOOD FILLETS

Tarragon Butter Tilapia
Deep skinned tilapia fillets glazed with a delicate tarragon butter marinade. Individually vacuum packed. 12 oz. bag.

4 OZ. RETAIL BAGS

These Grab & Go bags are a great addition to any seafood program!

SAVORY Grab & Go!

Savory Seafood Grille Mahi & Tilapia in 4 oz. bags are A Fresh New Way to create sales-driving, price-point promotions that your customers will love!

5 FOR $5 - OR- 10 FOR $10!

GREAT SALES ITEM!

Mahi Mahi	Tilapia

Cajun Creole TILAPIA

Our tender Tilapia is slow cooked in delicious Cajun Creole seasonings, and made easy to cook & serve, putting an irresistible meal on your table in less than ten minutes!
New product forms

Smoked tilapia

Sashimi grade tilapia
Tilapia and food service

- On almost all cruise ships
- Starting to appear on airlines
- Increasingly with schools, hospitals and prisons
- Several prisons have their own tilapia farms

Courtesy: Eric Roderick

American Airlines 14 Jan 2011 - Chicago - Delhi
Tilapia in Long John Silver's and other fastfoods could double tilapia global demand
Byproducts - Tilapia Leather
Health and Beauty Products
**Tilapia Orange Juice**

Ingredients: 100% Pure pasteurized orange juice and MEG-3®* (fish oil and fish gelatin). Contains tilapia, sardine and anchovy.

*Ingredient not found in regular orange juice.

MEG-3®

MEG-3® and trust the source® are...
Tilapia pedicures

Fish Encounter

Price: RMB68/person
价格：人民币68元/每位

Location: First floor swimming pool
地点：酒店一层泳池旁
Global Tilapia Market Trends

Prices have been constant, only fresh fillets have increased significantly, will not see increases beyond inflation.
Global Aquaculture Tilapia Sales

- For year 2000 = US $ 1,744,045,000 (FAO FishStat 2007)
- 2005 sales = $ 2,457,312,000 (FAO FishStat 2007)
- 2010 sales > $ 5,000,000,000
Bangladesh tilapia aquaculture
Future global tilapia aquaculture

Metric tons (000)

2002 2003 2004 2005 2006 2007 2008 2009 2010 (est) 2011 (est)
Conclusions

• Global tilapia production exceeded 3,200,000 metric tons in 2010.
• Constantly improving farming, processing and packaging for food safety, quality assurance, traceability, and environmental safeguards (with little, if any, increase in price).
• Other aquaculture species will follow the tilapia model.
Conclusions

- Tilapia has long been called the aquatic chicken.
- Instead......

- The "terrestrial tilapia"
Tilapia: the most fun aquaculture species of the 21st century

http://www.youtube.com/watch?v=Bh2673ncWJg
Buy TILAPIA

Thank you!

Questions?