Latest trends in tilapia production and market worldwide

Kevin Fitzsimmons, Ph.D.

University of Arizona, Professor of Environmental Science

World Aquaculture Society, Past-President

Aquaculture without Frontiers, Past-Chairman

American Tilapia Association, Sec. Tres.

Rio de Janeiro, Brasil

16 September 2013

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

- 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)

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: The Most Important Aquaculture Species of the 21st Century

Kevin Fitzsimmons

Environmental Research Lab
University of Arizona
2601 E. Airport Dr.
Tucson, AZ 85706
Kevfitz@ag.arizona.edu

ABSTRACT

In the 1900'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 worlds largest aquaculture crop.

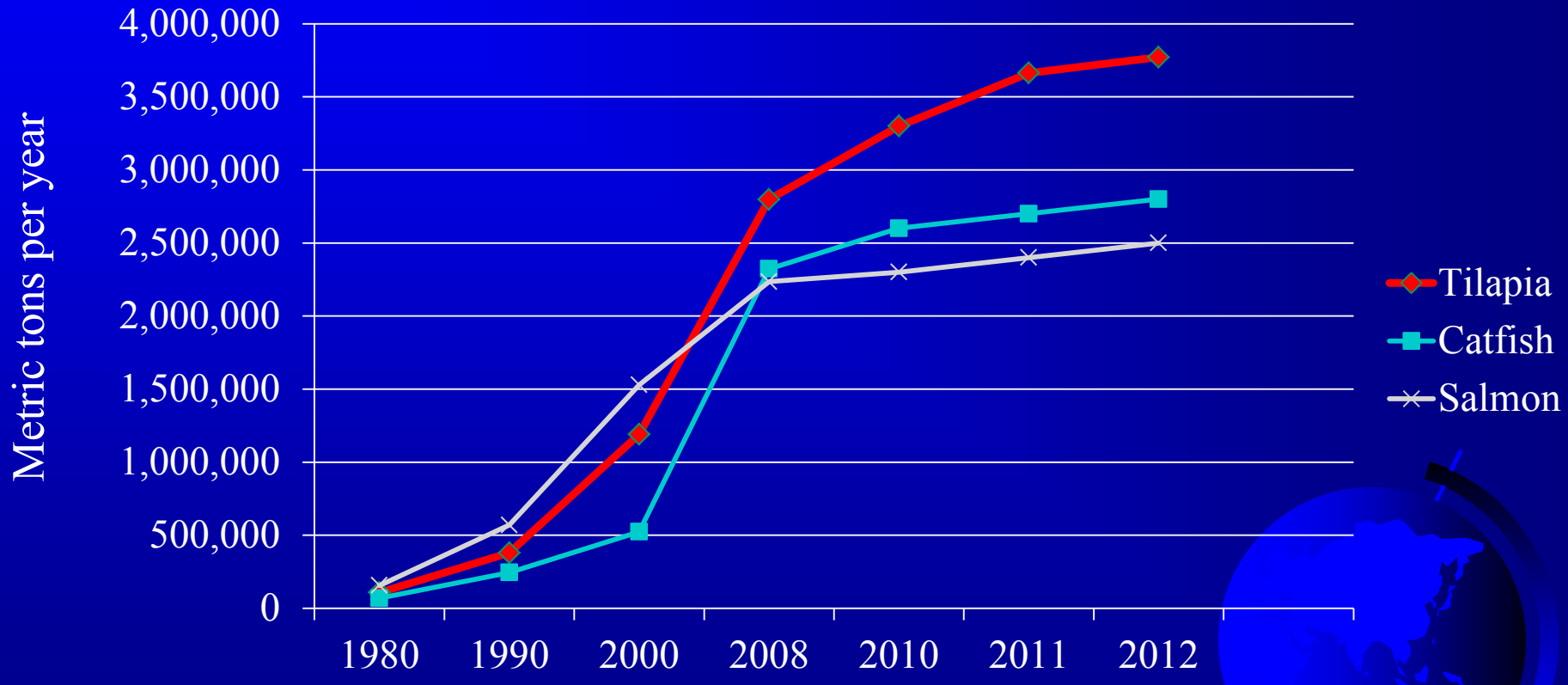
INTRODUCTION

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 and

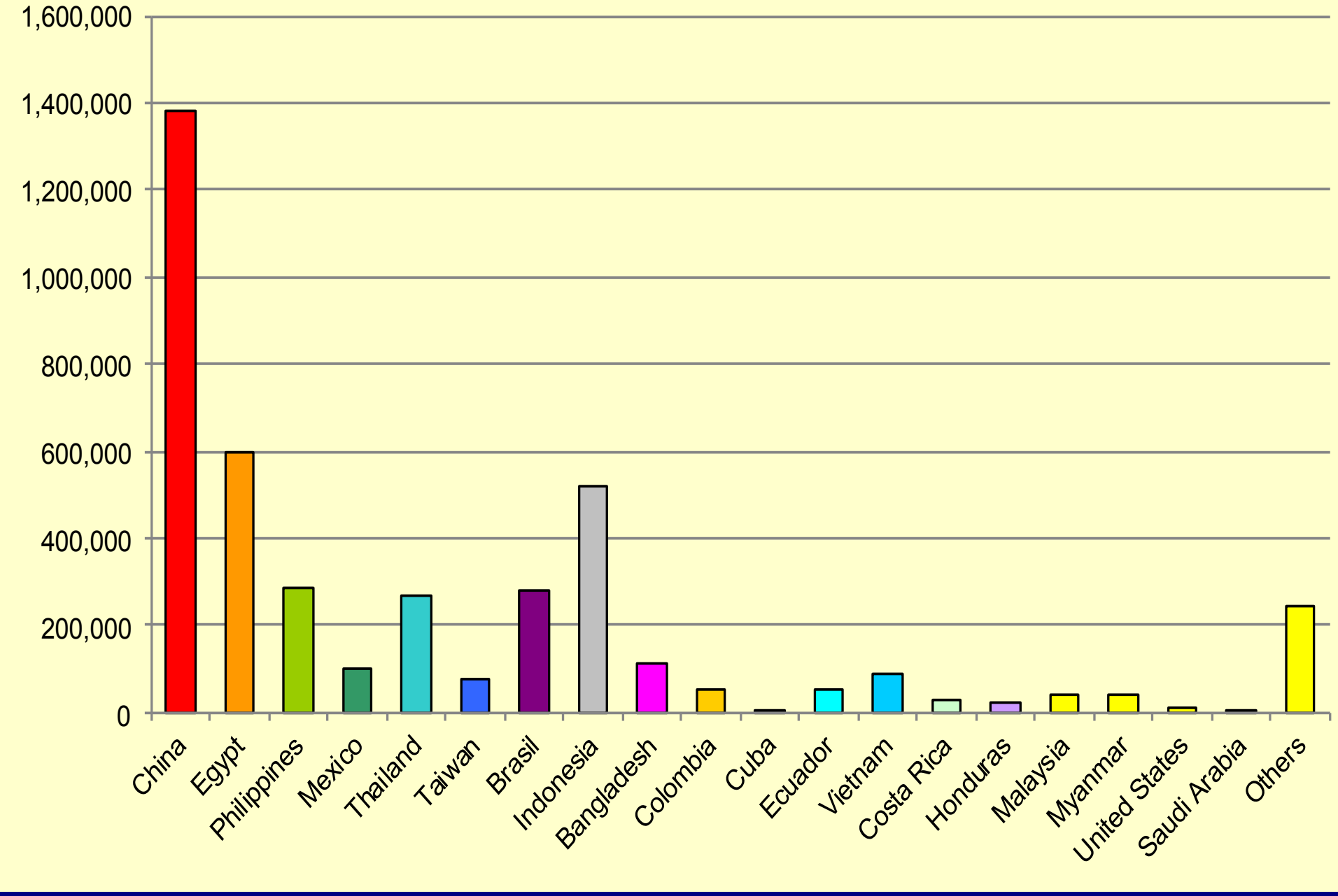
Tilapia: the most important aquaculture species of the 21st century

Feb 2000
ISTA 5

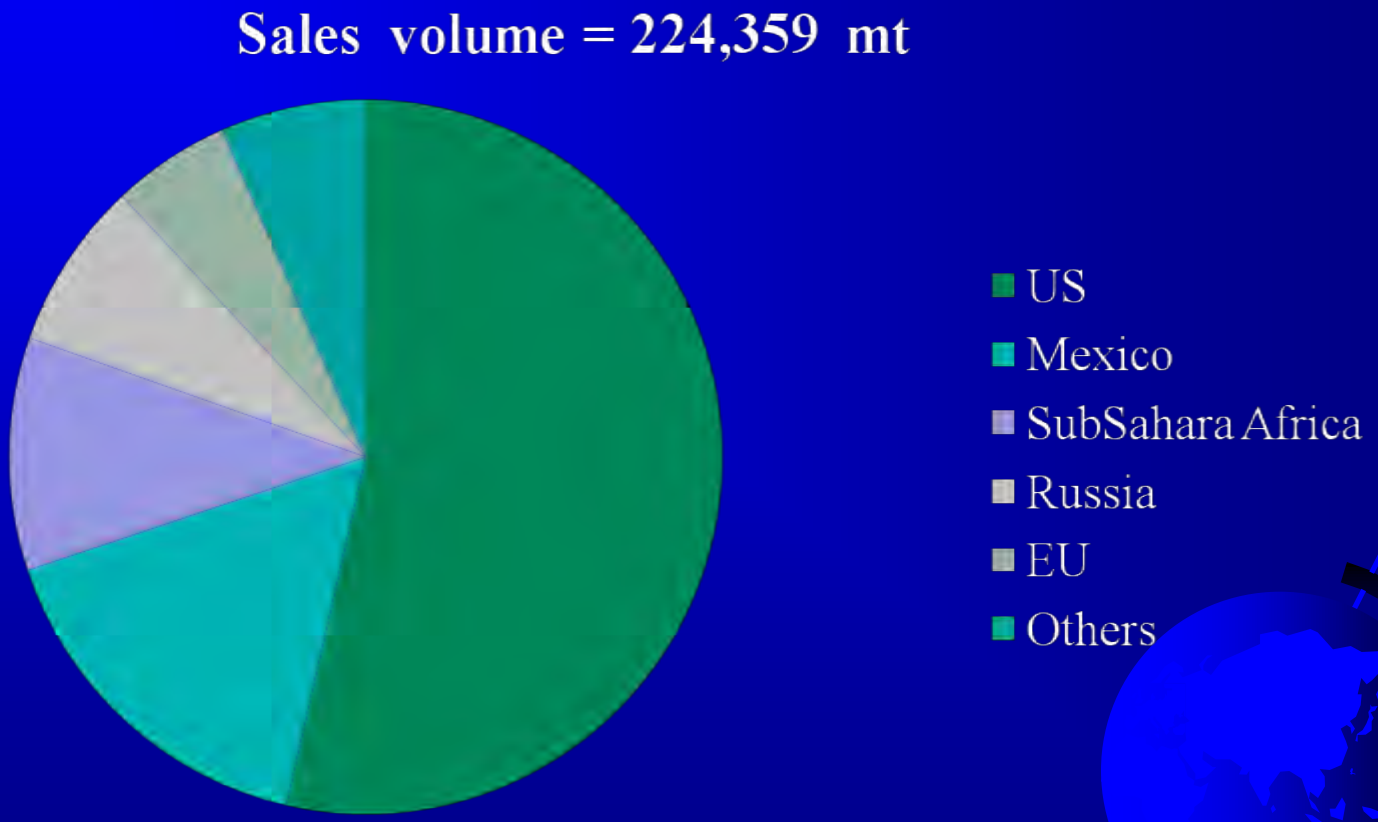
Global production of some major farmed fishes



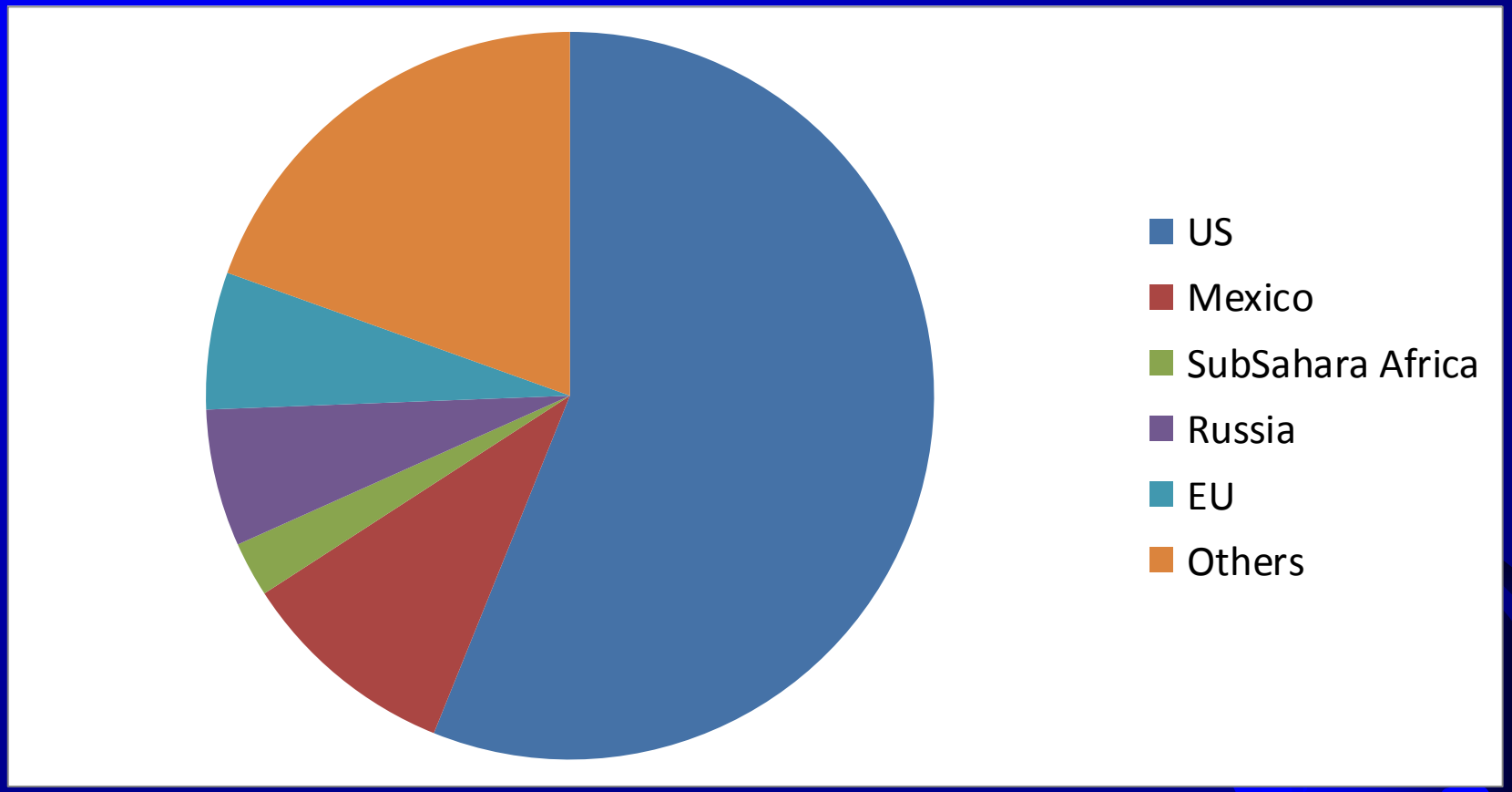
World Tilapia Production of 4,207,900 mt in 2012



2008 Tilapia exports from China



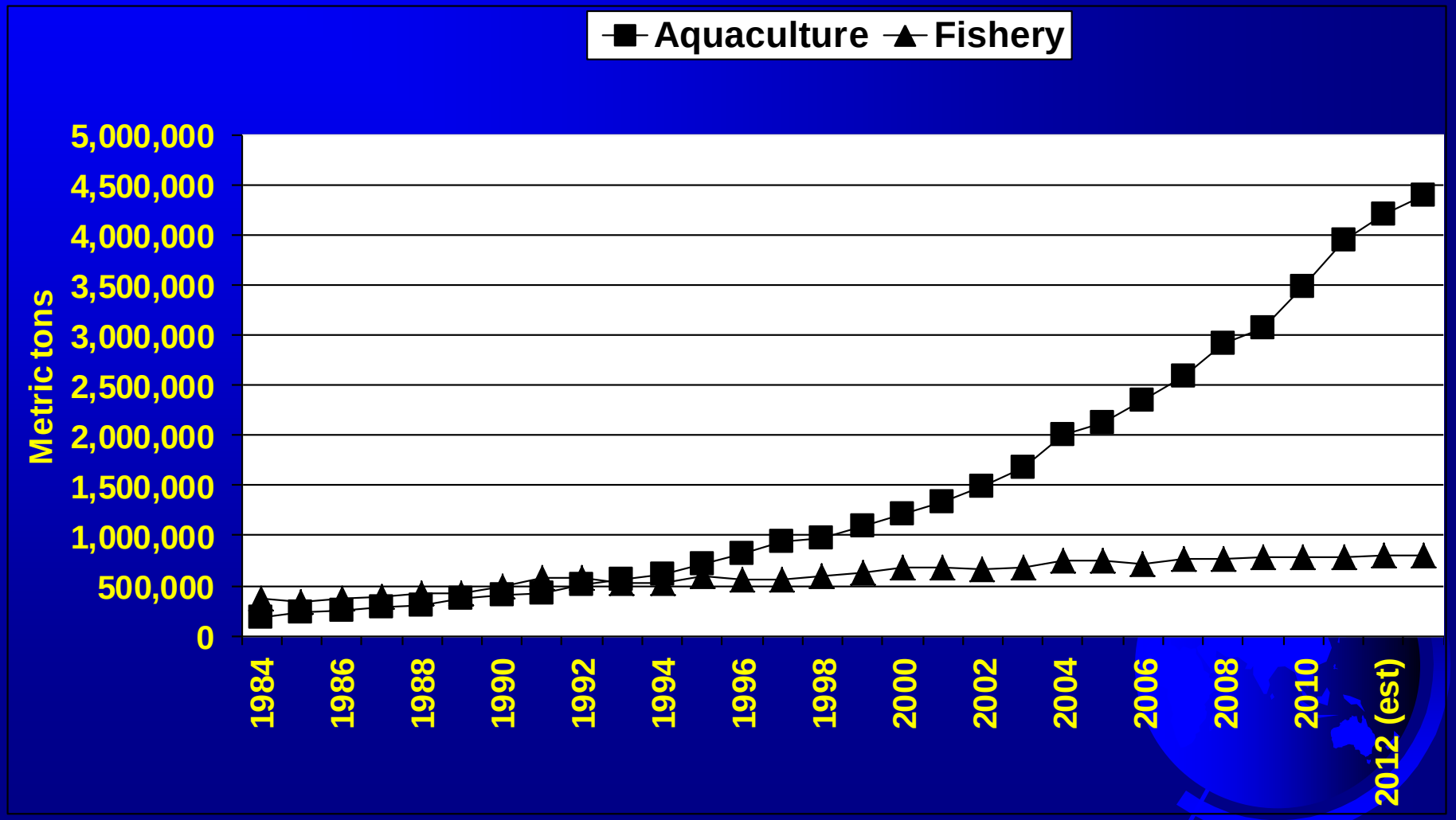
2012 Tilapia exports from China



Farm gate prices for tilapia to Chinese farmers

Ex-farm prices for whole, live tilapia, China, 500-800 grams
Feb 2013: RMB 8.9

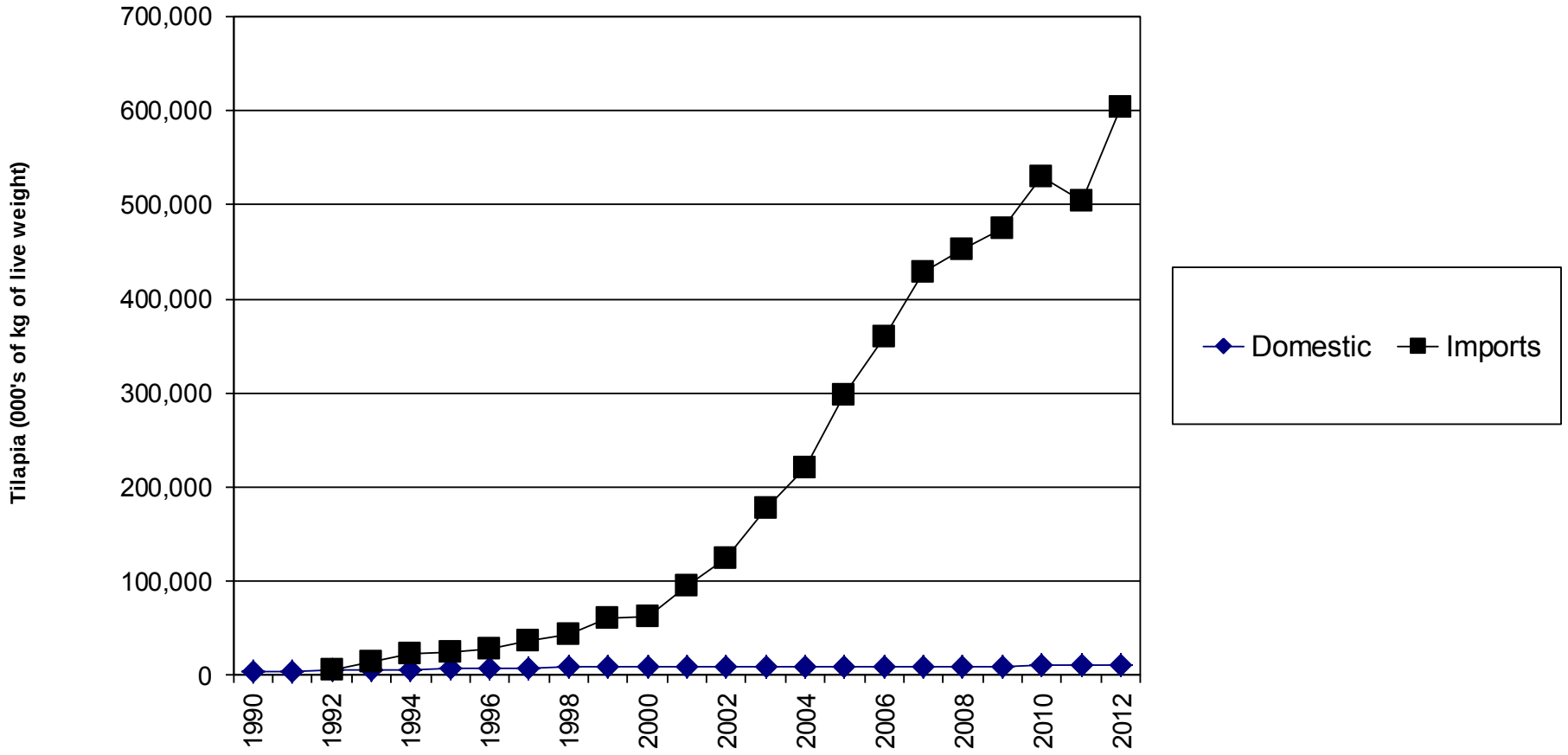
Global production of tilapia



Top Ten Seafoods (U.S.) per capita (lbs)

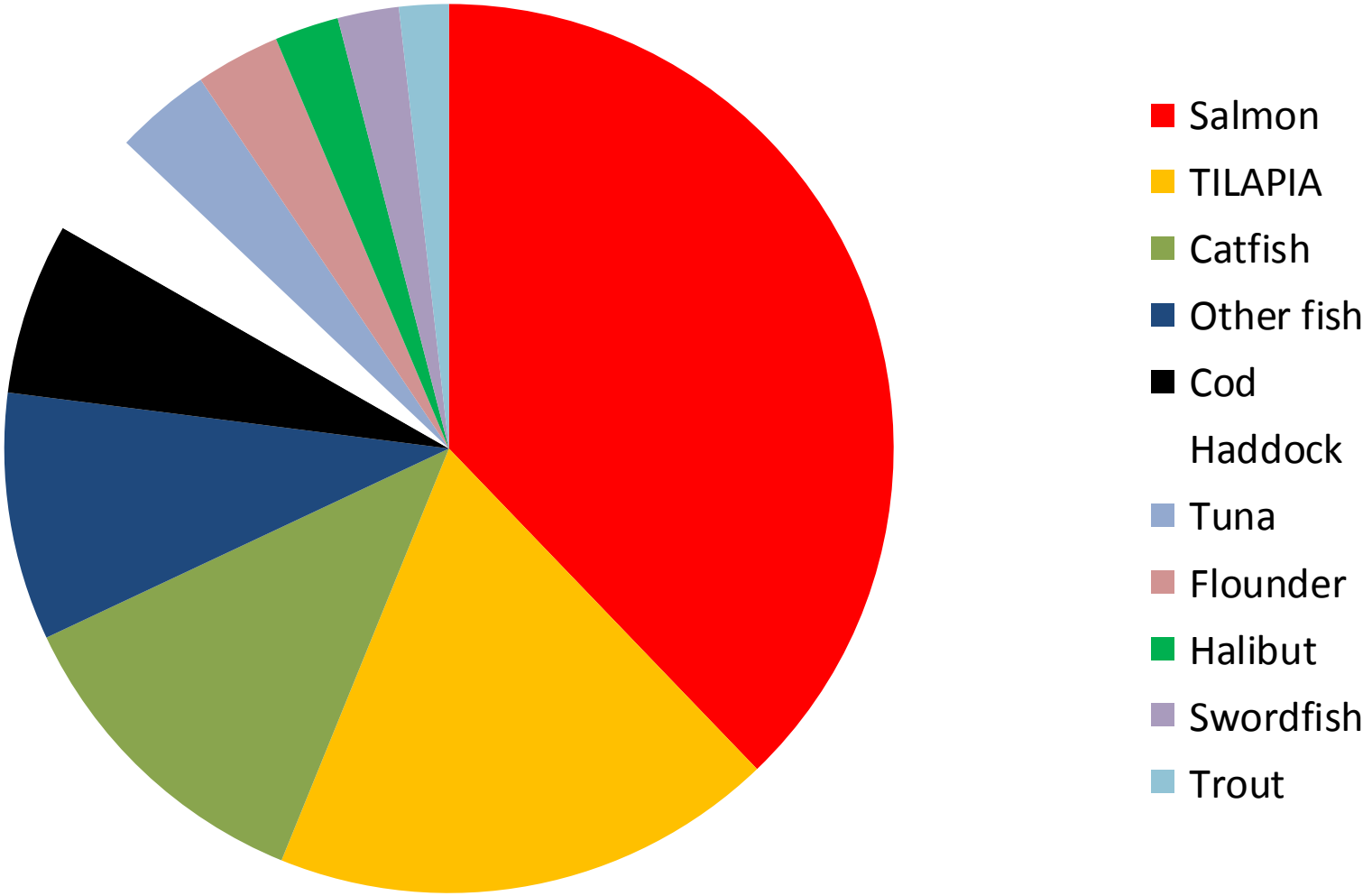
2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Tuna 3	Shrimp 3	Shrimp 3.7	Shrimp 4.0	Shrimp 4.2	Shrimp 4.1	Shrimp 4.4	Shrimp 4.1	Shrimp 4	Shrimp 4.1	Shrimp 4.0	Shrimp 4.2
Shrimp 3.2	Tuna 2.9	Tuna 3.1	Tuna 3.4	Tuna 3.4	Tuna 3.1	Tuna 2.9	Tuna 2.7	Tuna 2.8	Tuna 2.5	Tuna 2.7	Tuna 2.6
Pollock 1.6	Salmon 2.0	Salmon 2.0	Salmon 2.2	Salmon 2.2	Salmon 2.4	Salmon 2.0	Salmon 2.4	Salmon 1.8	Salmon 2.0	Salmon 2.0	Salmon 2.0
Salmon 1.5	Pollock 1.2	Pollock 1.1	Pollock 1.7	Pollock 1.7	Pollock 1.5	Pollock 1.6	Pollock 1.7	Pollock 1.34	Pollock 1.45	Tilapia 1.45	Pollock 1.3
Catfish 1.1	Catfish 1.1	Catfish 1.1	Catfish 1.1	Catfish 1.1	Catfish 1.0	Tilapia 1.	Tilapia 1.1	Tilapia 1.19	Tilapia 1.21	Pollock 1.2	Tilapia 1.3
Cod 0.8	Cod 0.6	Cod 0.7	Cod 0.6	Tilapia 0.7	Tilapia 0.8	Catfish 0.97	Catfish 0.90	Catfish 0.92	Catfish 0.85	Catfish 0.8	Pangasius 0.6
Clams 0.5	Clams 0.5	Crabs 0.6	Crabs 0.6	Cod 0.6	Crabs 0.6	Crabs 0.7	Crabs 0.68	Crabs 0.61	Crabs 0.59	Crabs 0.6	Catfish 0.6
Crabs 0.4	Crabs 0.4	Clams 0.5	Tilapia 0.5	Crabs 0.6	Cod 0.6	Cod 0.5	Cod 0.47	Cod 0.44	Cod 0.42	Cod 0.5	Crabs 0.5
Flatfish 0.4	Flatfish 0.4	Tilapia 0.4	Clams 0.5	Clams 0.5	Clams 0.4	Clams 0.4	Clams 0.45	Flatfish 0.43	Clams 0.41	Pangasius 0.4	Cod 0.5
Scallops 0.3	Tilapia 0.4	Flatfish 0.3	Scallops 0.3	Scallops 0.3	Scallops 0.3	Scallops 0.3	Flatfish 0.32	Clams 0.42	Pangasius0.35	Clams 0.35	Clams 0.3
Tilapia 0.3											

US Consumption of tilapia from domestic and imported sources



Percentage of US finfish grocery sales Feb. 2010

% of sales



US Tilapia consumption (imports and domestic)

437,000 mt of live weight (equivalent) - 2007

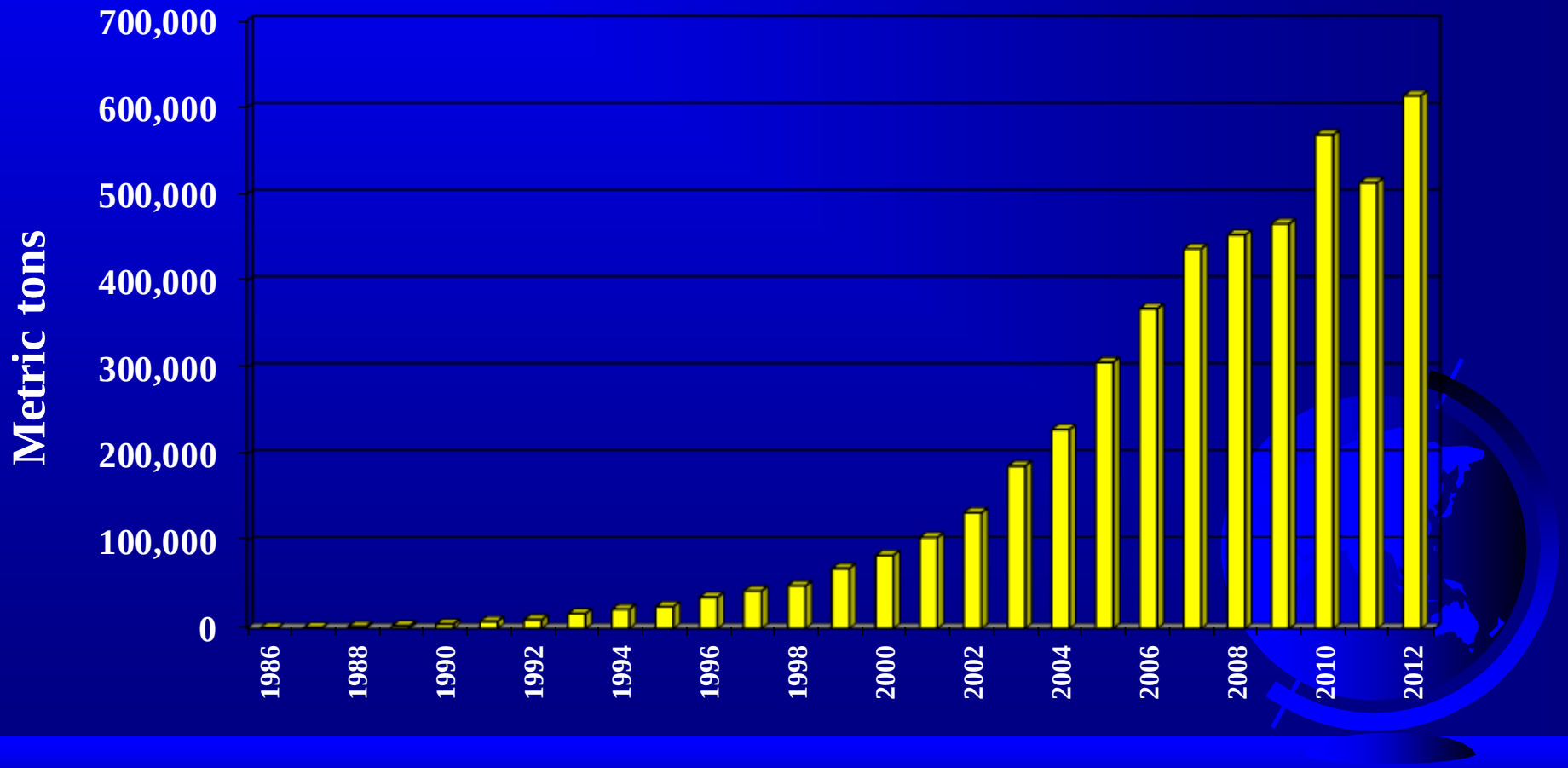
453,264 mt of live weight (equivalent) – 2008

465,953 mt of live weight (equivalent – 2009)

579,443 mt of live weight (equivalent – 2010)

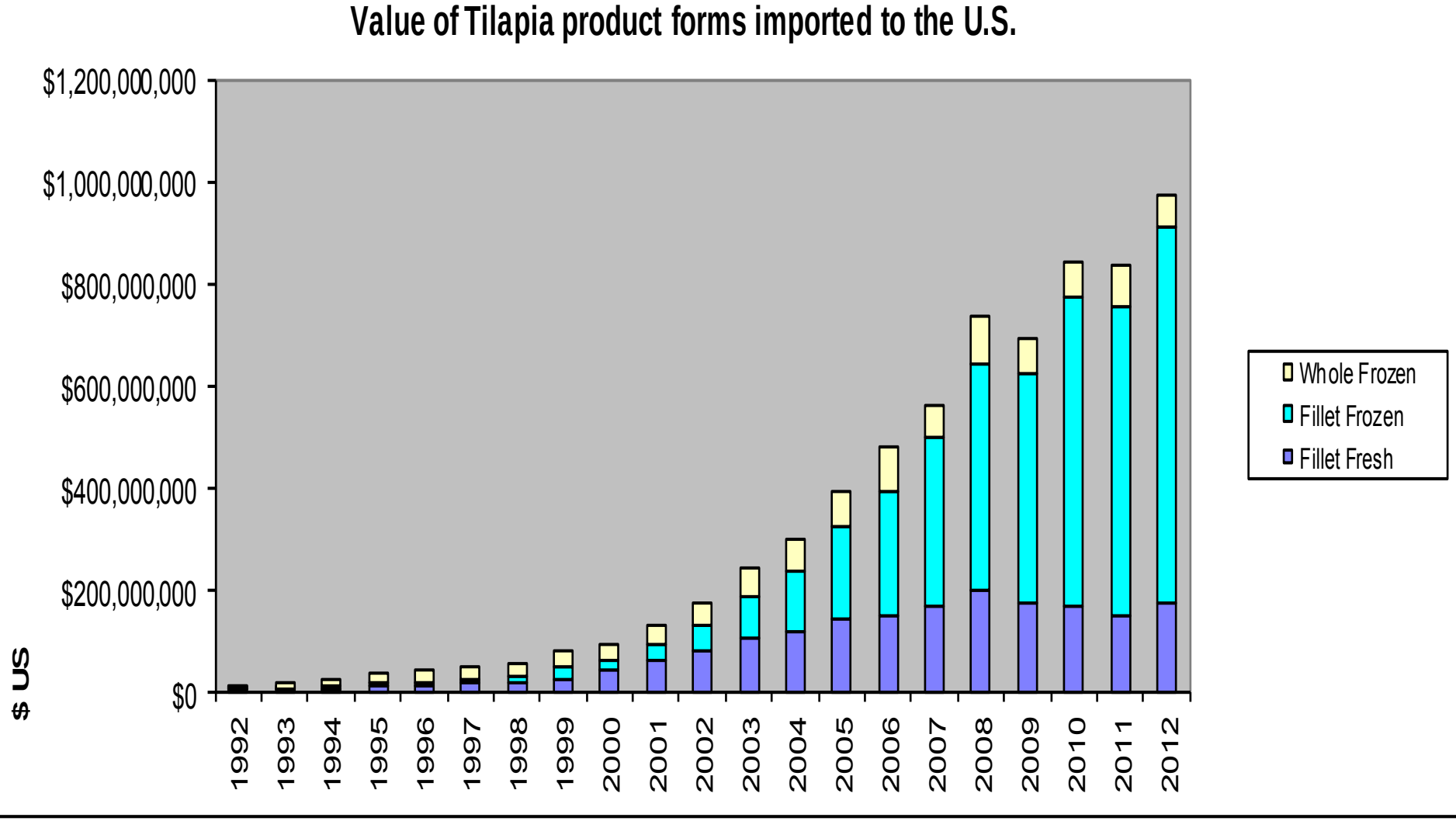
513,361 mt of live weight (equivalent – 2011)

613,406 mt of live weight (equivalent – 2012)



$696,085,981(2009) $842,866,006(2010), $838,349,634 (2011)

$986,127,852 (2012)



US Sales of tilapia

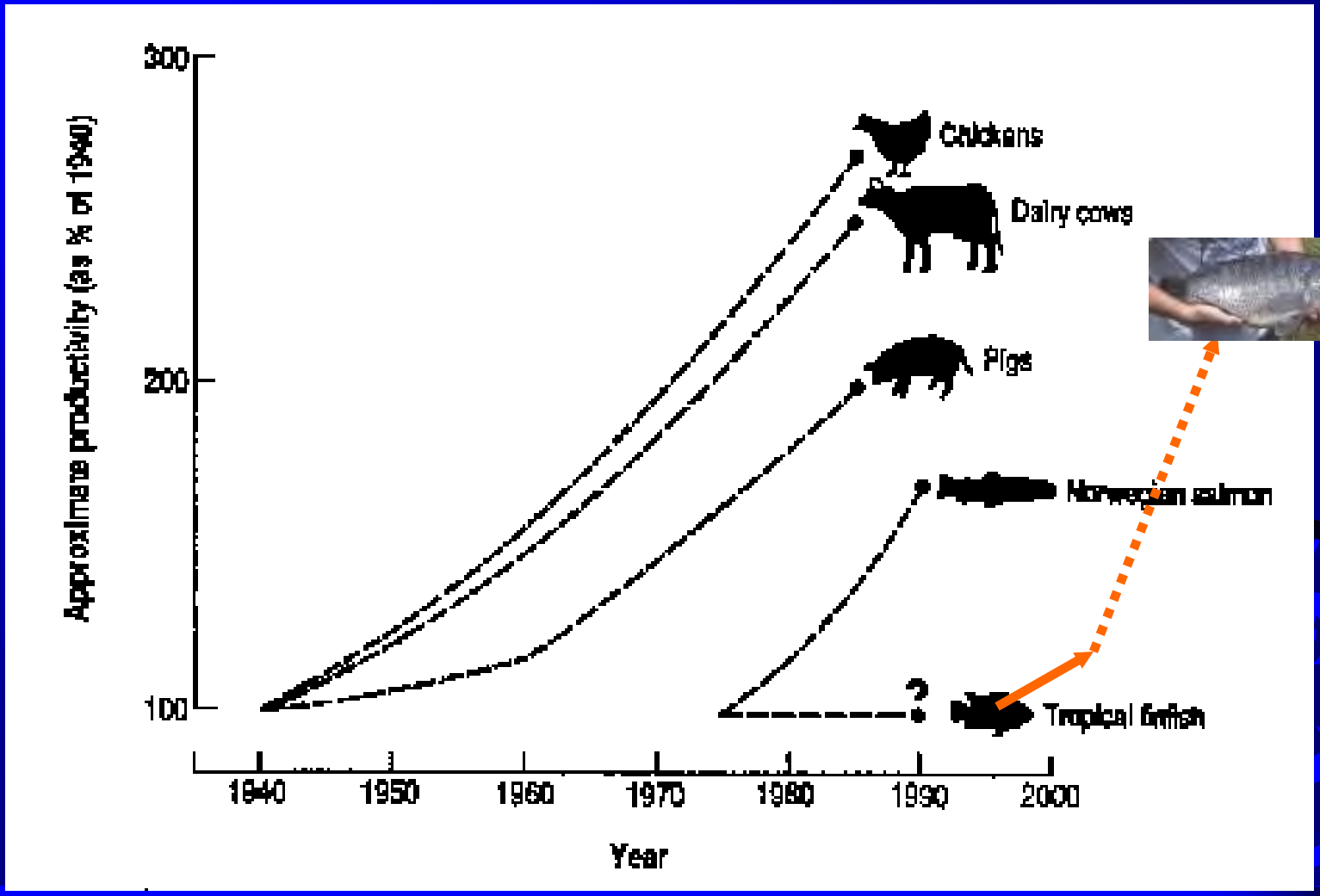
- Imports to US in 2012 were **$986,127,852**
- US production of 28,000,000 lbs at farm
- 2012 US tilapia farm-gate sales were **$84,000,000**
- 2012 US Tilapia Sales estimate –
- $**986,127,852** + $84,000,000 =

$ 1,070,127,852

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
- Several in Mexico
- 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
- http://www.broadinstitute.org/ftp/pub/assemblies/fish/tilapia/Oreni1l/
- Matching many segments to those known from other fish
- Publically available and freely accessible
- Next frontier of genetic program for tilapia

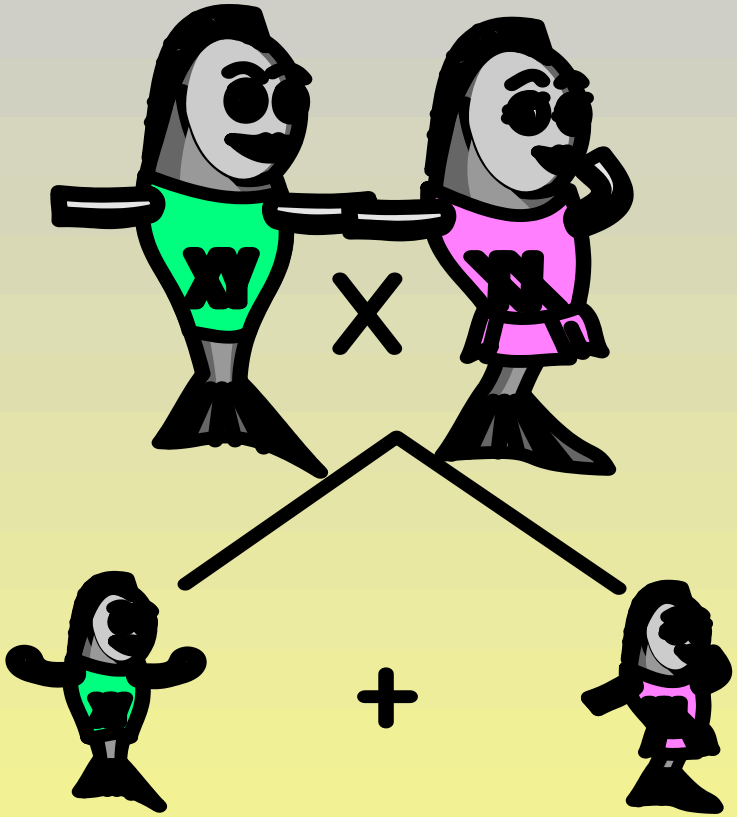
Tilapia Genome Project

The 3000 species of cichlid fish, which includes tilapia, are found in a variety of habitats in Central and South America, Africa, and India. From an evolutionary point of view, the most interesting cichlid species are the 1500 species that recently diverged in the lakes of East Africa. Remarkably, the cichlids of Lake Tanganyika have diverged into 250 species in the past 6-8 million years, and the 500 Lake Victoria species and the 700 Lake Malawi species diverged in only the past 1 million years. For the scientific community, these species provide a natural mutant screen superior to any chemical mutagenesis. The cichlids are especially diverse in tissues and systems such as the endocrine and nervous systems that are related to the neural crest, a vertebrate-specific developmental germ layer. Cichlids are also valuable model organisms for the study of sex determination evolution, speciation and behavior. The combination of a sequenced tilapia genome and the wide variety of recently evolved cichlid behaviors and morphological traits will provide a unique opportunity to study social dominance, territoriality, sexual selection, and feeding behaviors, as well as a wide variety of neural crest derived traits.

The Broad Institute has generated a high quality draft from a Nile tilapia, *Oreochromis niloticus*. The Nile tilapia is 10-15 million years diverged from the East African lake cichlids, and provides a good outgroup for the

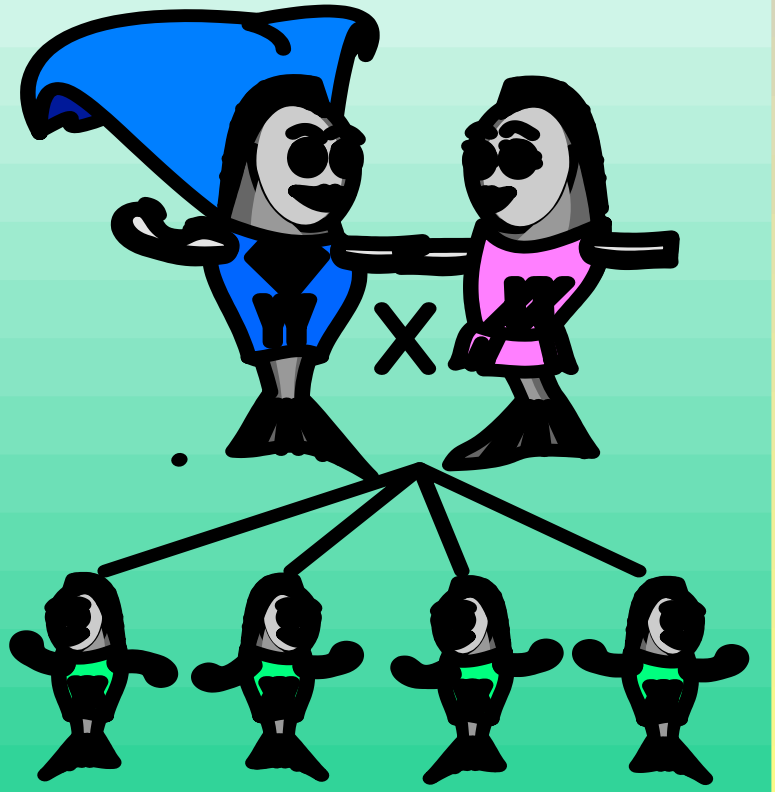
The YY male technology

THEN



Normal crosses produce equal proportion of males and females

NOW



YY males produce only male progeny (GMT®)

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
- Mexico – continued intensification, some govt support, large and small private investments
- Sub-Saharan Africa - commercialization

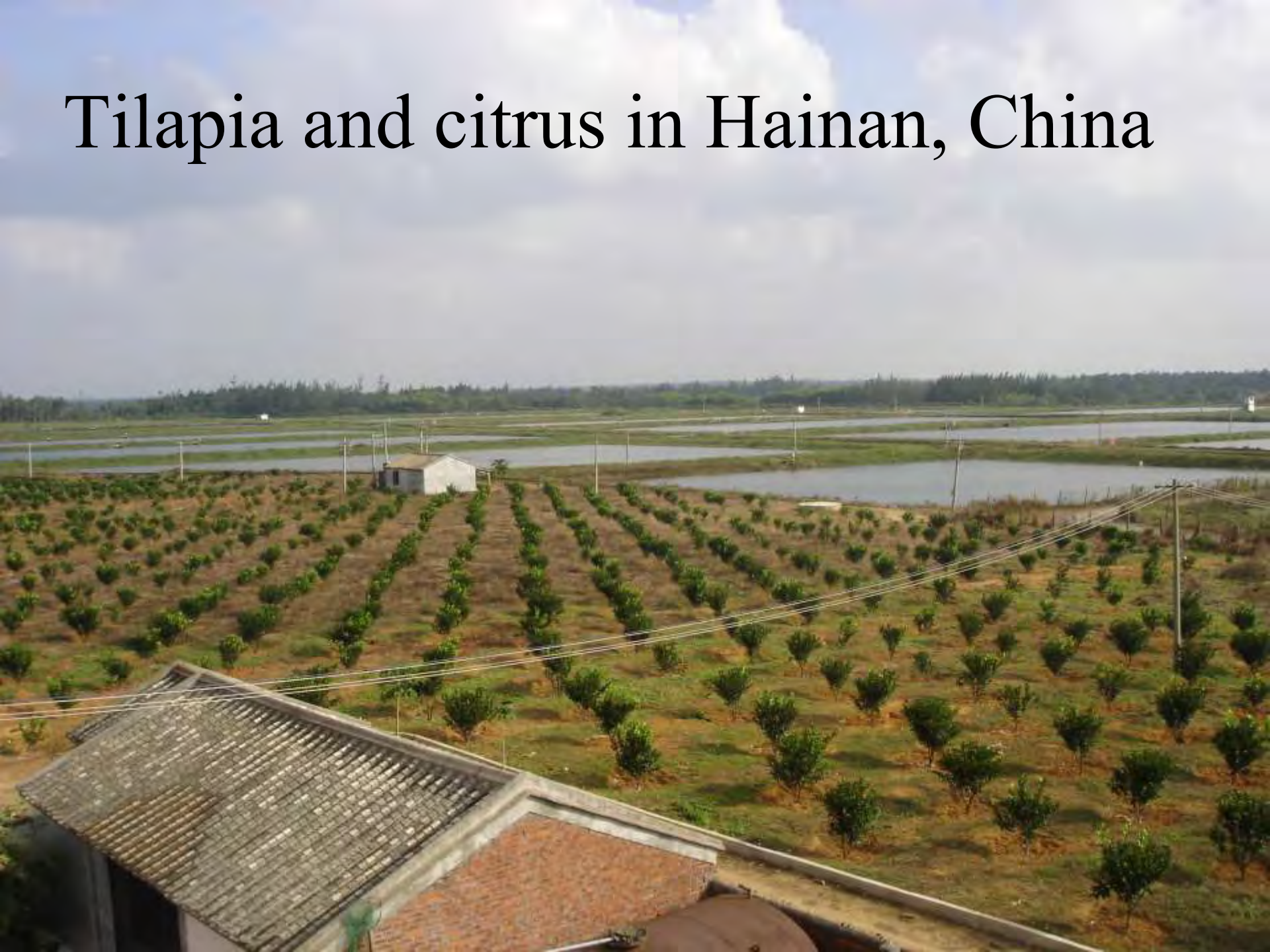
Integrated Farming Systems

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

Safford, AZ

Marana, AZ

Tilapia and citrus in Hainan, China



Desert Springs Tilapia, Hyder AZ

Tilapia-shrimp-halophytes Eritrea

Polyculture Indonesia

Stocking and harvest schedule

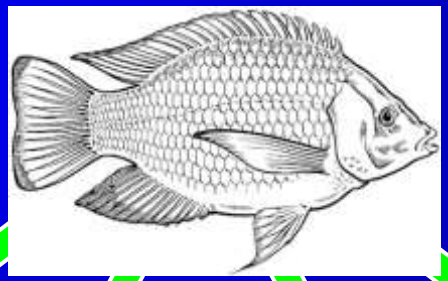

NGAN APLIKASI SISTEM PROGRESIF, PROBIOTIK DAN PROBIO
Tilapia – shrimp – seaweed polyculture in Indonesia
Pengendapan &
Penyerapan Limbah
TOM
200 ppm
Petak Udang
Petak Udang
Saluran
VIBRIO
10^4 CFU - 10^1 CFU

Gracilaria

Shrimp

Tilapia

Pathways in the use of tilapia as biomanipulator (and disease control?) in shrimp farms



Promotion of *Chlorella* dominance

Feeding on organic waste

Bioturbation of sediment

Production of natural antimicrobials

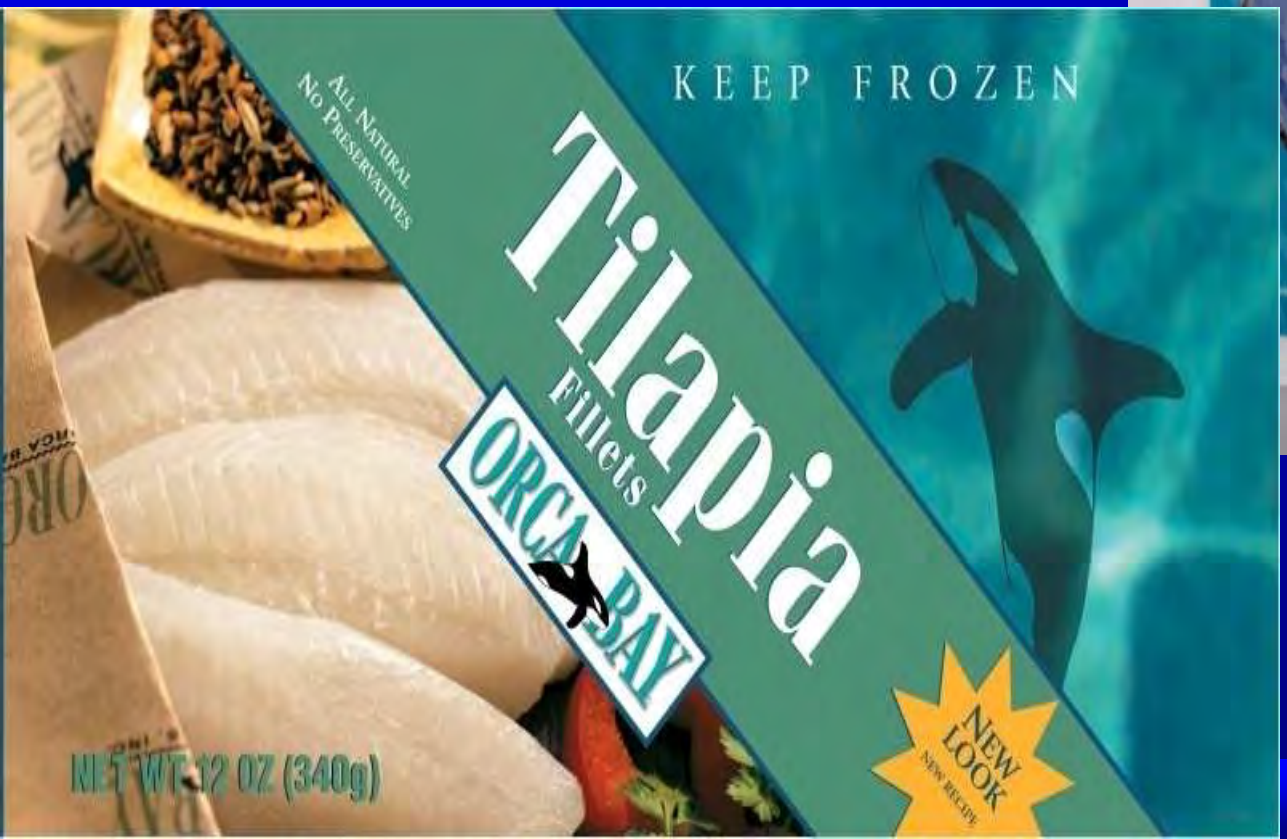
IMPROVED SEDIMENT QUALITY

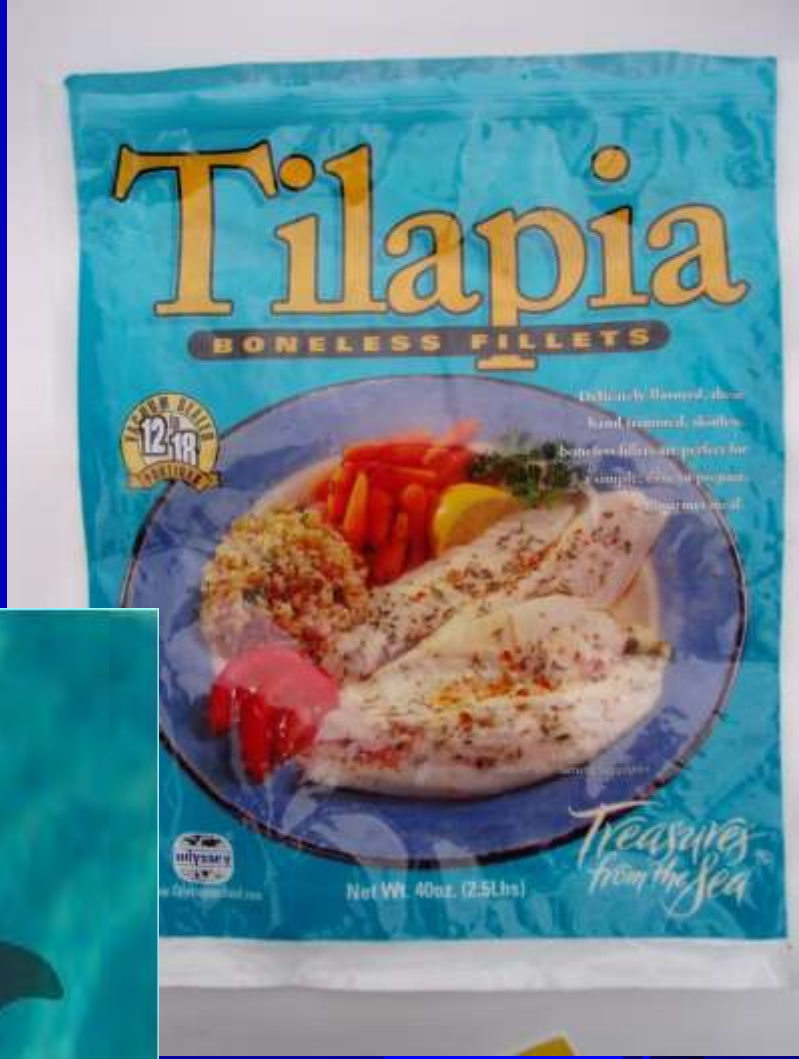
IMPROVED WATER QUALITY

SUPRESSION OF GROWTH OF *V. harveyi* and *V. parahaemolyticus* ?

Improvements in packaging

IQF Fillets in re-sealable packages






Ocean
Tilapia
Fillets
Tropische zoetwatervis
Poisson d'eau douce tropical
Tropical freshwater fish


ANOVA
Gourmet
Tilapia
2


Tilapia
Tilapia
7-9


CIOOO
Tilapiafilet
gram
Verse vis uit Indonesië


TiLoveYa
Boneless & Frozen
Fresh Tilapia Fillets
Lemon-Dill


TiLoveYa
FARM RAISED


TiLoveYa
Boneless &
Fresh Frozen Fillets
Tilapia
HQ


TiLoveYa
GUTTED & SCALED
Frozen Tilapia
All Tilapia are not created equal,
Zero Toxin TiLoveYa,
for lovers of healthy food
HQ Sustainable Maritime Industries, Inc.


TiLoveYa
Boneless &
Fresh Frozen Fillets
Tilapia
All Tilapia are not created equal,
Zero Toxin TiLoveYa,
for lovers of healthy food
Available Packages

Value added meals


RESEALABLE
High Liner
MILD TASTING
Tilapia
Loins
Lean-cut,
individually vacuum packed
MICROWAVEABLE
• NO Additives
• NO Preservatives
• NO Carbohydrates
NET WT. 40 oz (2.5 lb.) 1.13 kg


High Liner
Tilapia
Loins
CAPTAIN'S FAVORITE RECIPE
Nutrition Facts


Nutrition Facts


Ready to cook gourmet seafood
Sea Cuisine
Natural Cut Crusted Fillets
TORTILLA CRUSTED TILAPIA
with Chipotle & Lime
NET WT. 2 LB (907g)
KEEP FROZEN
SERVING SUGGESTION


TRUSTED SINCE 1849
GORTON'S
NEW!
Premium Fillets
Tilapia
CRUNCHY BREADED FISH FILLETS
FIVE STAR TILAPIA
KEEP FROZEN
NET WT 17.2 OZ. (488 g)


Oven Poppers
From Our Kitchens To Your Home
Tilapia
Stuffed with Sun Dried Tomato, Shrimp & Lobster
Carbs 8g
Protein 19g
2
5 oz. servings of hand-selected stuffed fish fillets
Premium Choice
NET WT. 10 OZ. (284g) • KEEP FROZEN • LESS THAN 200 CALORIES PER SERVING


High Liner
SEAFOOD SELECTS
PRIMAVERA
TILAPIA
Tilapia and spring vegetables in a garlic butter sauce
ALL NATURAL INGREDIENTS
NET WT 32 oz (2 lbs) 907 g


SUNFLOWER
SUNFLOWER


TILAPIA
TILAPIA
TILAPIA FILLETS


Skillet Crisp
Skillet Crisp
Authentic Asia
Shrimp Wonton Soup
Club Price!
7.99
Club Price!
FREE
Club Price!
2/4.00
PARCHMENT BAKE
GORTONS
GRILLED Tilapia
GORTONS
GRILLED Tilapi
Club Price!
3.99
4.99
Club Price!
FREE
4.99
Club Price!
FREE
GORTONS
GORTONS


Tomato
Herb
Marinated
Tilapia
10.5 oz (298 g)


Savory
Farm Raised
SKINLESS BONELESS
Tilapia


TUSCAN STYLE TILAPIA
topped with fresh tomatoes, black olives, parmesan cheese & pesto
QUAY 5


SeaPak
SHRIMP CO
NEW!
ARTICHOKE PESTO
TILAPIA
naturals
2
All-Natural
Fillets
NET WT. 12 OZ. (340g)


Air Tahiti Nui

ONE-STEP SEAFOOD FILLETS

Tarragon Butter Tilapia

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

Savory Seafood Grille

Cajun Creole TILAPIA

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

SimpleSteps

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

ALL NATURAL BREADED TILAPIA FILLETS

Excellent Price!
Great Availability!

Flakey Inside!
Crispy Outside!

Popular White Meated Fish
Great For Dinners, Sandwiches, and Buffets!

Retail 2lb. Box

Top View

Back View

Side View

For Prices Click Here

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

McDonald's and other fastfoods could double tilapia global demand

Traditional product forms

Yangon BBQ tilapia

Byproducts - Tilapia Leather

Manolos, Now Available In Tilapia

January 20, 2012 4:35 pm

Manolos made from discarded tilapia skin, raffia, and cork? Why not. Until now, the shoemaker hadn't delved into the green scene, but eco-chic designer Marcia Patmos was able to change that. "They were very open and loved my suggestion of bringing sustainability into the shoes, as long as I could find the right materials that they couldn't supply," Patmos tells Style.com. So, she settled on natural resources and fish industry byproducts for the Spring '12 collection. "The materials were actually very easy to work with," Patmos adds. "Mixed together or dyed, they're very versatile." The heels ($975) and the flats ($645) are hitting Manolo stores next week. Patmos revealed she's already hard at work on the next round—an ankle bootie made of vegetable tanned leather—for the the Fall '12 Manolo Blahnik for M.Patmos collection.

—Kristin Studeman

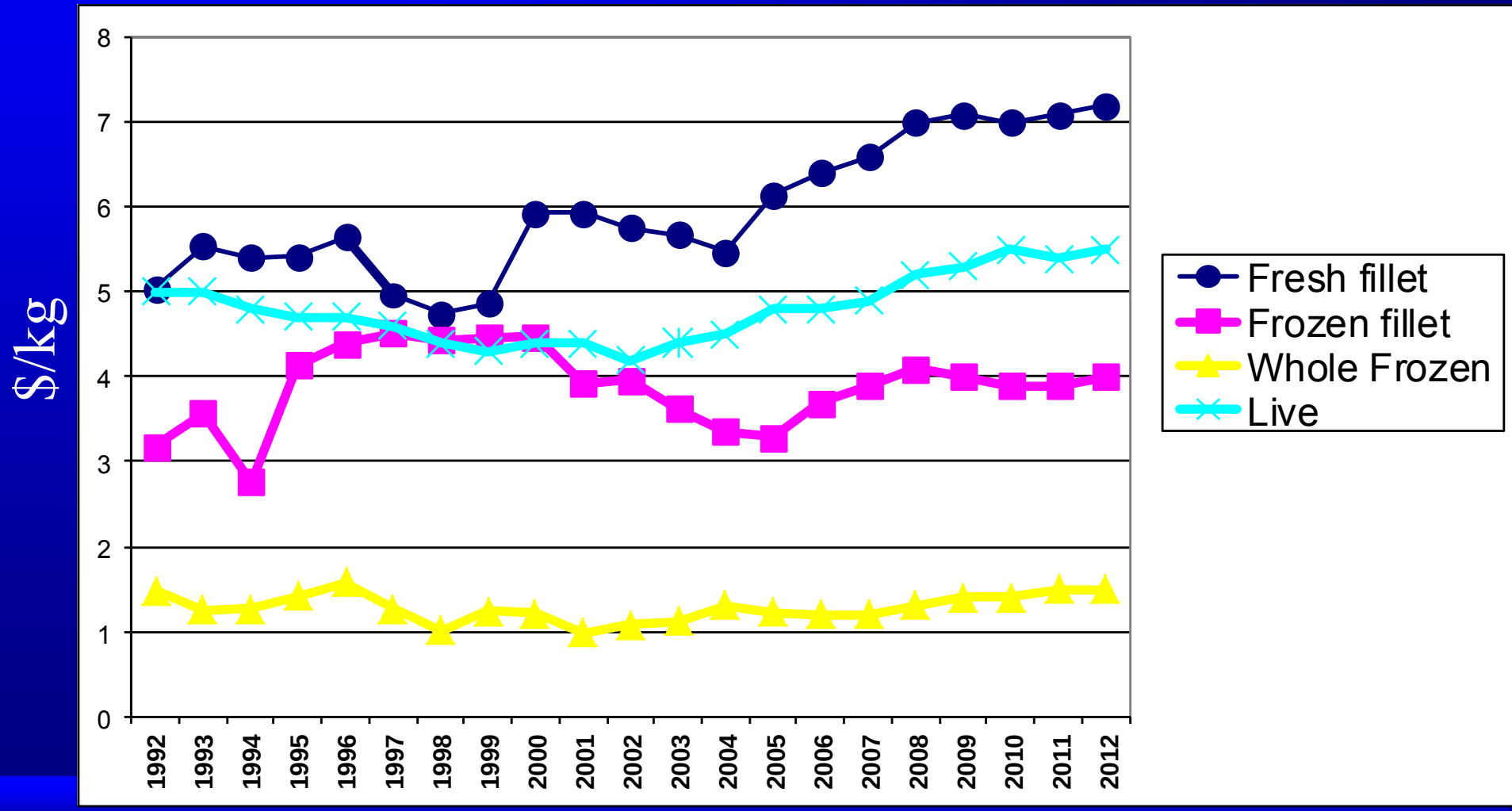
Health and Beauty Products

Tilapia Orange Juice

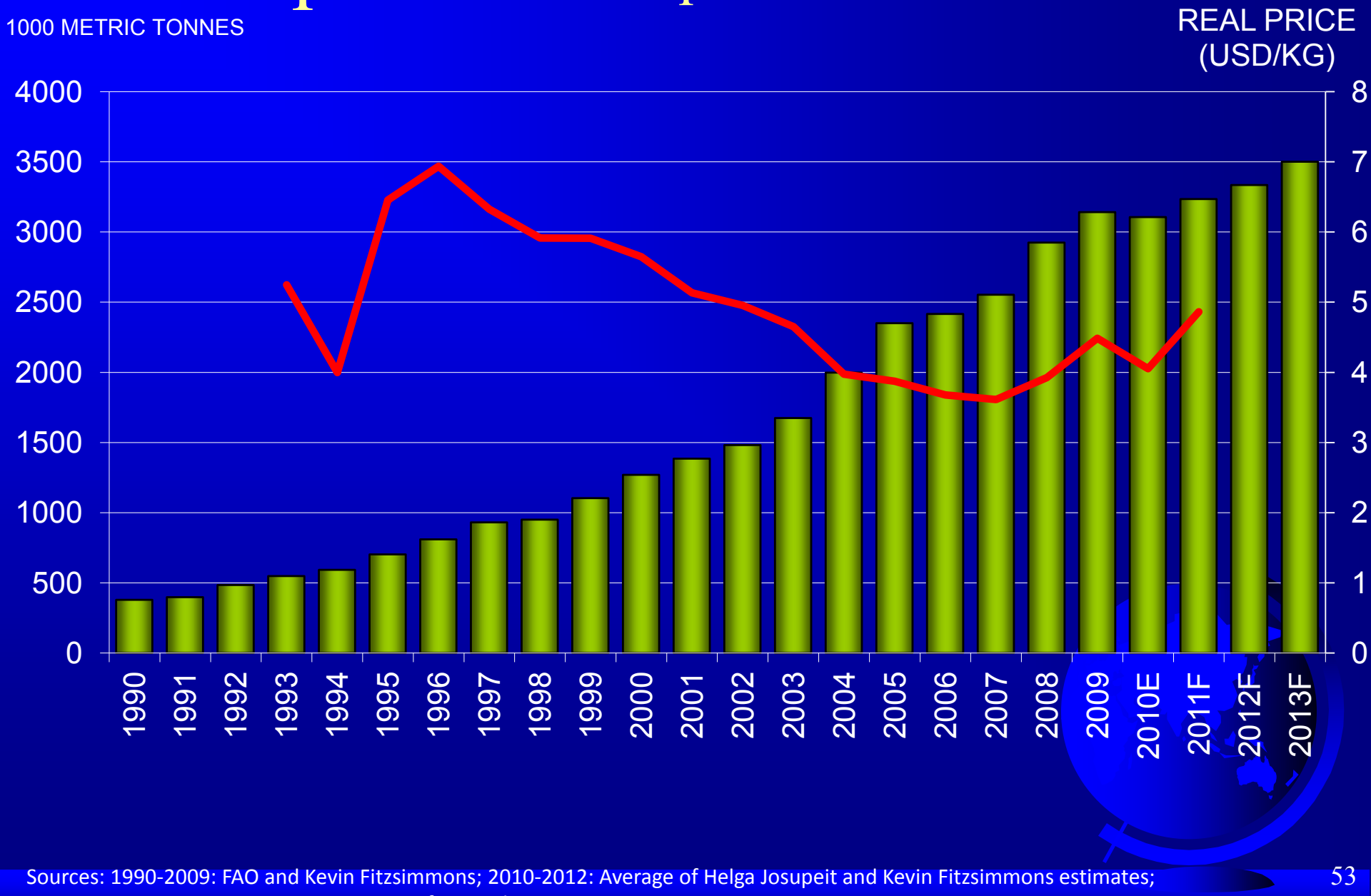
Tilapia pedicures and manicures

Global Tilapia Market Trends

Prices have been constant, only fresh fillets have increased significantly, will not see increases beyond inflation



Tilapia Global Aquaculture Production

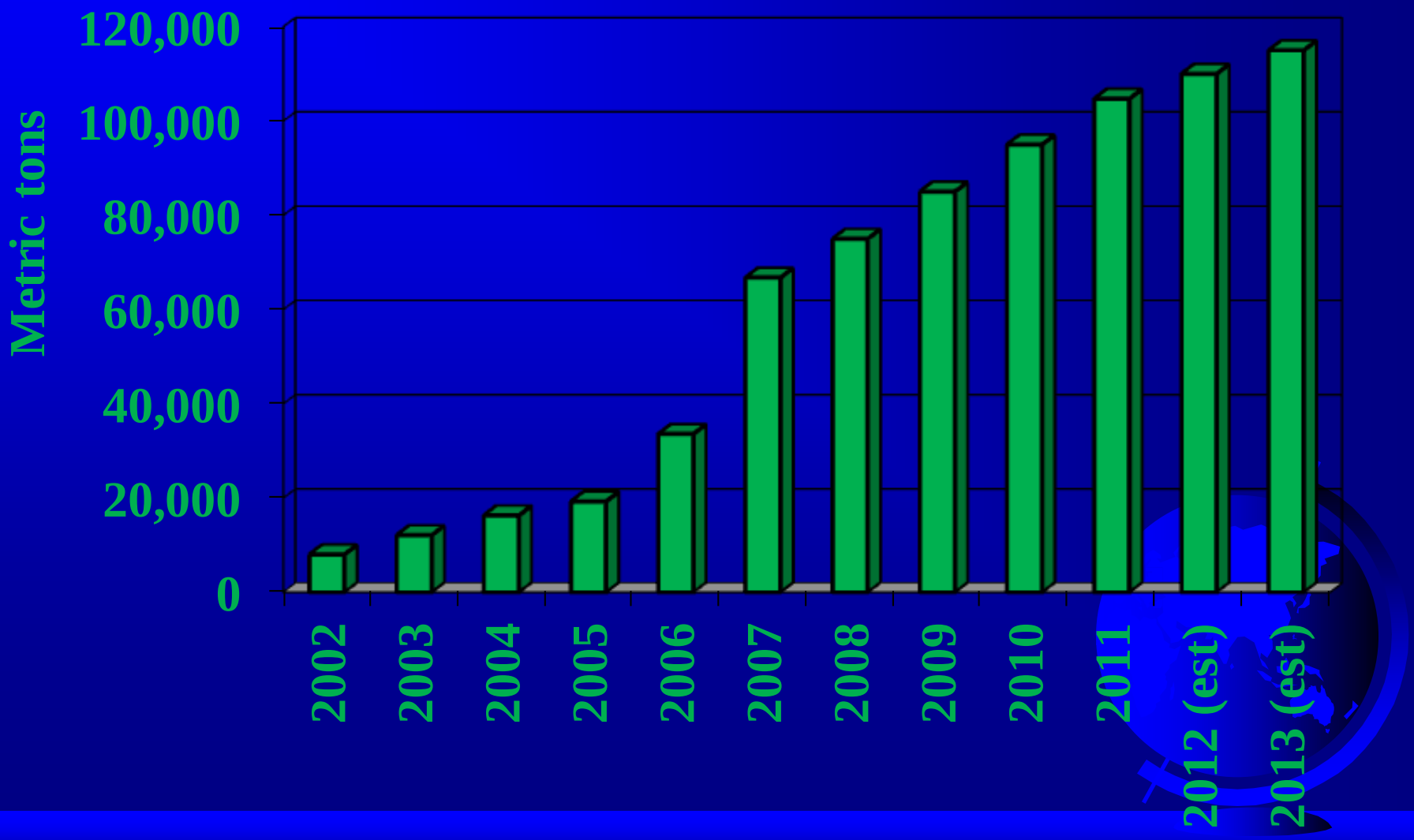


Sources: 1990-2009: FAO and Kevin Fitzsimmons; 2010-2012: Average of Helga Josupeit and Kevin Fitzsimmons estimates; 2013: Kevin Fitzsimmons; Prices US import frozen tilapia Jan- Jun: NMFS

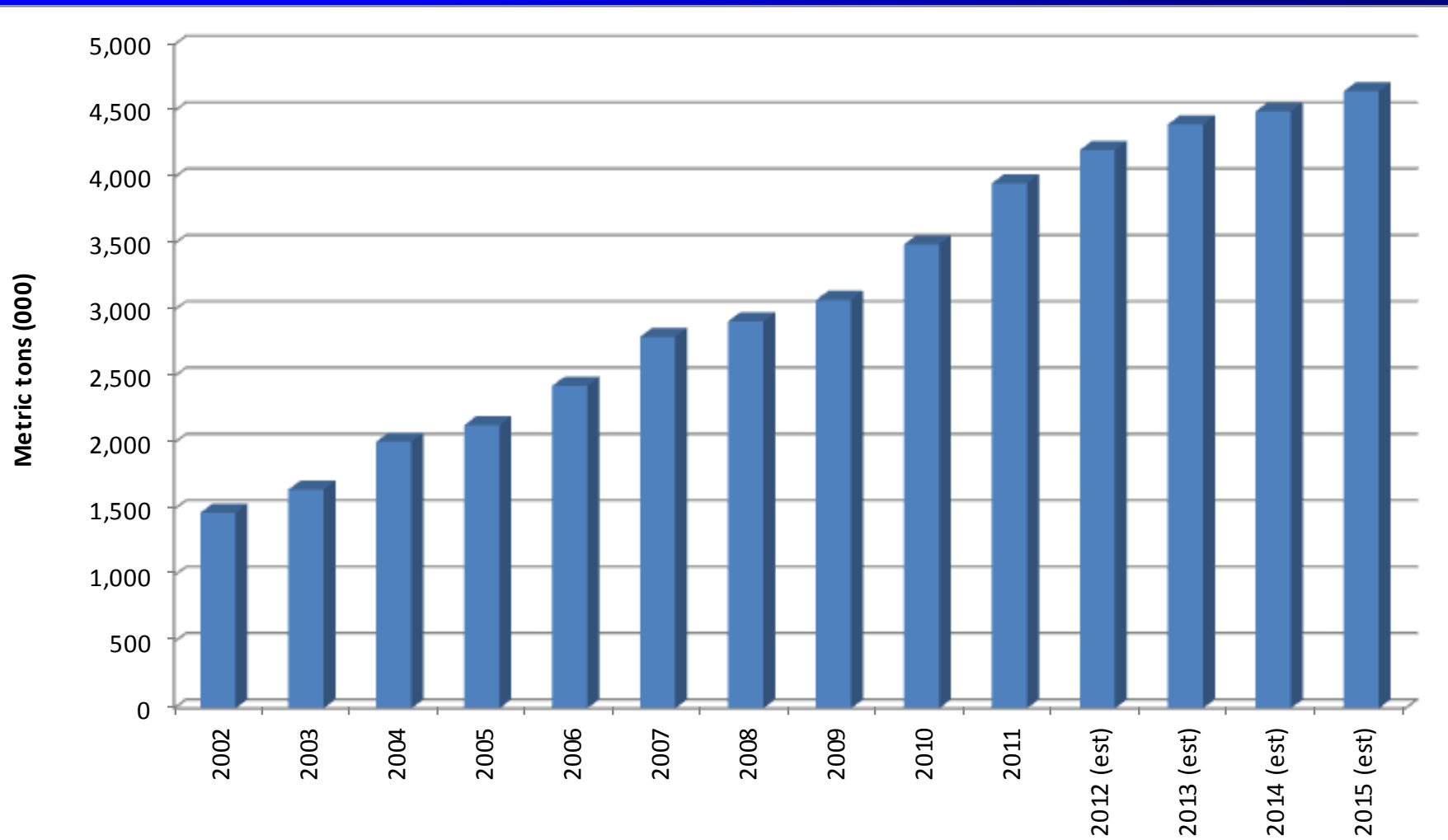
Global Aquaculture Tilapia Sales

- For year 2000 =US $ 1,744,045000
  (FAO FishStat 2007)
- 2005 sales = $ 2,457,312,000
  (FAO FishStat 2007)
- 2010 sales >$ 5,718,263,000
  (FAO FishStat 2012)

Bangladesh tilapia aquaculture



Future global tilapia aquaculture



Conclusions

- Global tilapia production was 3,957,949 metric tons in 2011 (FAO, 2013), should exceed 4,207,900 MT in 2012. (6% growth)
- 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.

International Symposium on Tilapia in Aquaculture, Jerusalem 2013

The 10th International Symposium on Tilapia in Aquaculture (ISTA 10)

6-10 October 2013, Ramada Jerusalem Hotel





Three days of professional conference and one day tour to the North of Israel, will provide an updated and extensive vision to one of the most important aquaculture fish species in the world.

You are invited to contact us to ensure you receive more information on attending, presenting and exhibiting at the symposium.

E-mail: ista10@siamb.org.il

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
ARIZONA
TILAPIA
Thank you!
Questions?