

Market Stability: Why Tilapia Supply and Demand have Avoided the Boom and Bust of other Commodities

Kevin Fitzsimmons, Ph.D.

University of Arizona, Professor of Environmental Science

World Aquaculture Society, Past-President

Aquaculture without Frontiers, Past-Chairman

American Tilapia Alliance, Sec. Tres.

INFOFISH, TILAPIA 2015

Kuala Lumpur

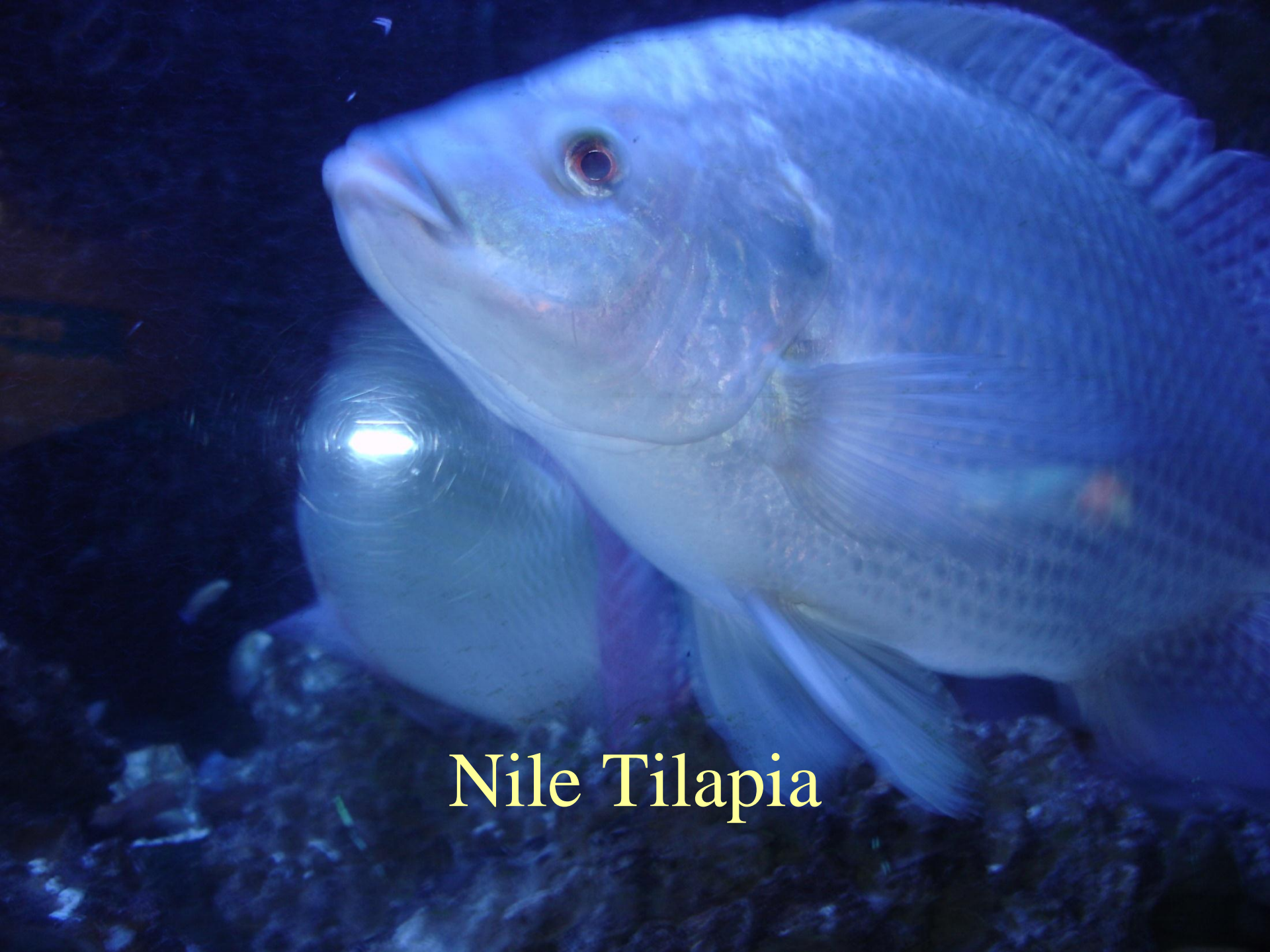
2 April 2015



Tilapia: continuing to increase in popularity globally

- Tilapias are second only to the carps as a farmed food fish.
- **In 2012 the global volume of farmed fish exceeded global volume of beef for the first time (FAO)**
- Tilapia have unique characteristics that will facilitate its continued growth to someday surpass carp production.
- Several closely related species that hybridize





Nile Tilapia

Mossambique Tilapia and Red Tilapia



Tilapia the “Green” farmed fish

- ☞ Herbivore / omnivore, low trophic level feeder
- ☞ Algae, bacteria, and detritus (bioflocs) are important food sources
- ☞ Prepared feeds are mostly grains and ag by-products
- ☞ Promoted by aid agencies and NGO's
- ☞ *Dr. M. Gupta awarded World Food Prize for promotion of tilapia aquaculture, June 10, 2005*
- ☞ Disease resistant and tolerant of poor water quality. Anti-biotics and chemicals are not needed for commercial farming.

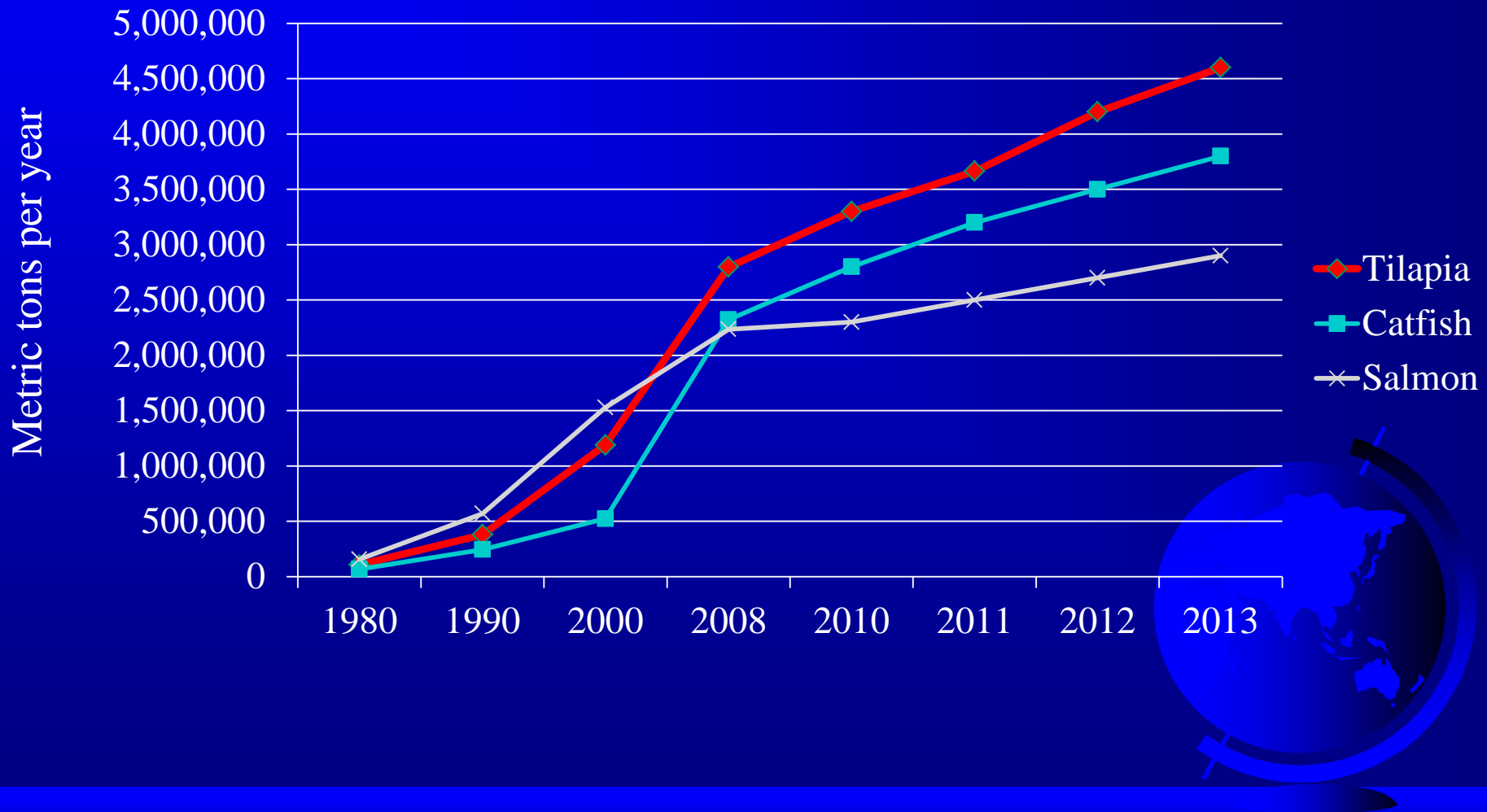


Farmed around the world diversifying supply

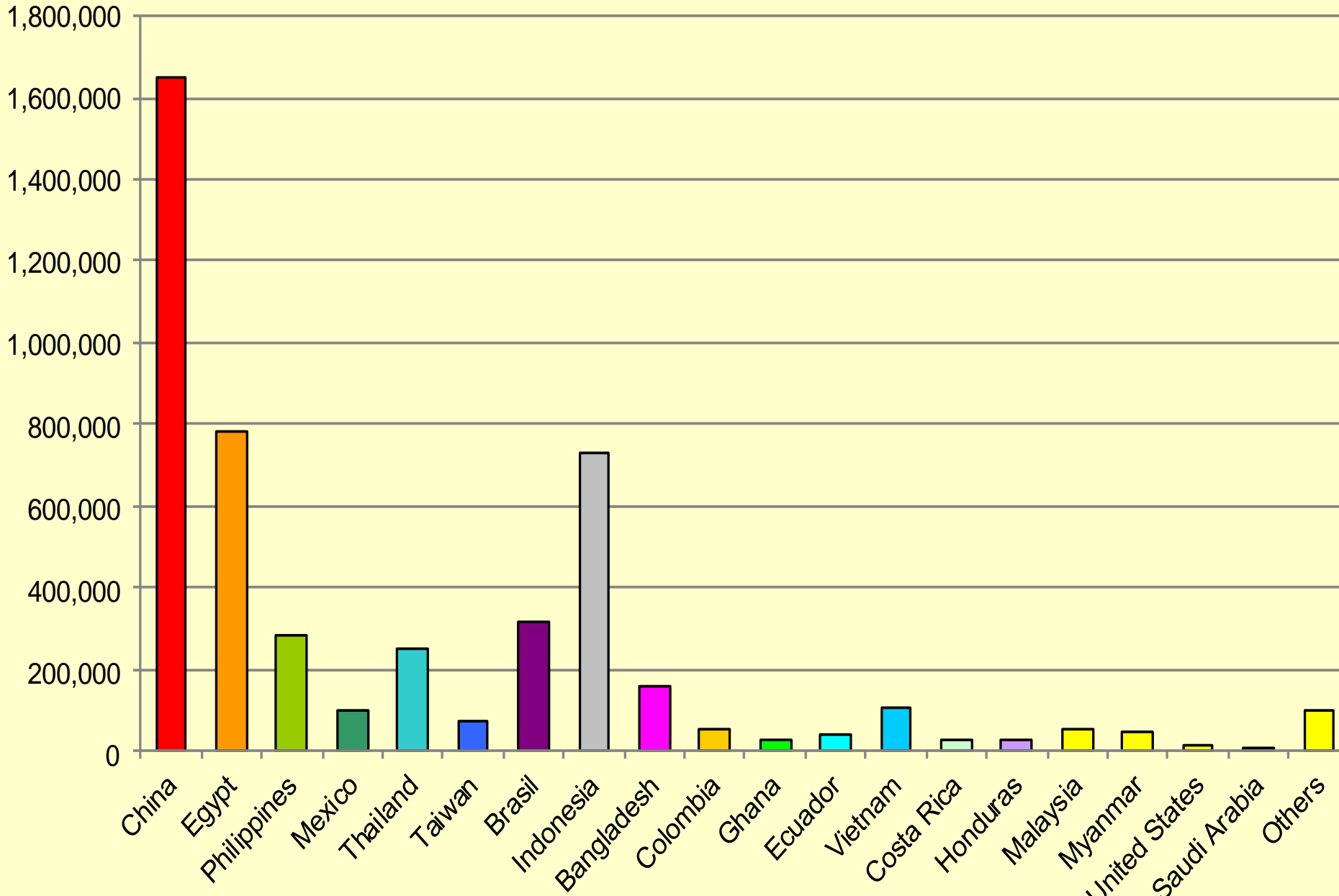
- ➡ Tilapia production in 140+ countries.
- ➡ China is world's largest producer.
- ➡ Egypt, Philippines, Thailand, Indonesia, Latin America, Middle East, Ghana are significant producers
- ➡ Germany, Belgium, Spain, Canada, Korea, Japan, most states in US



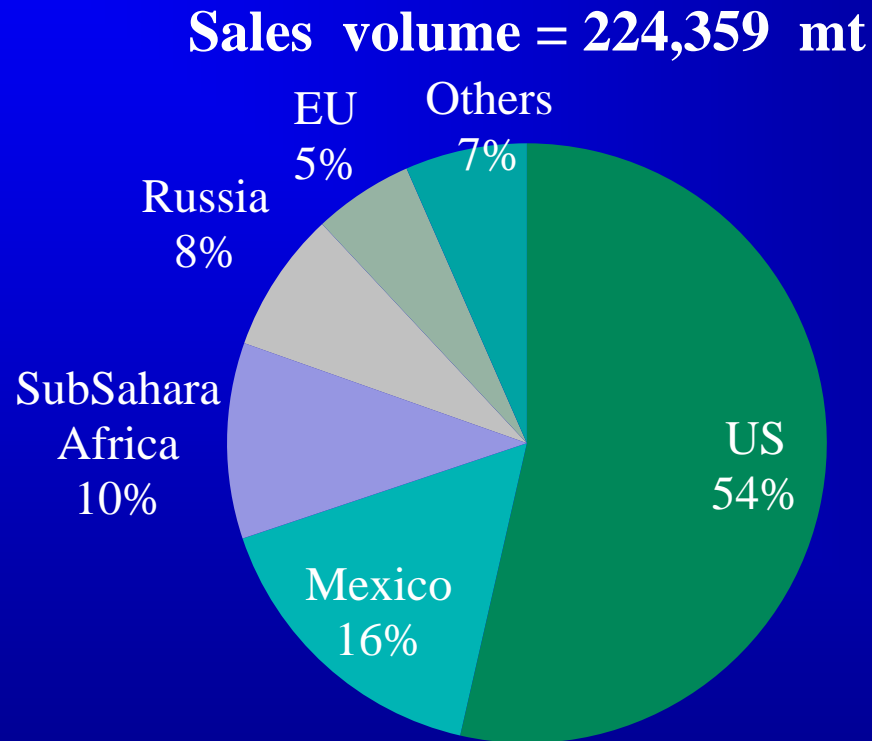
Global production of some major farmed fishes



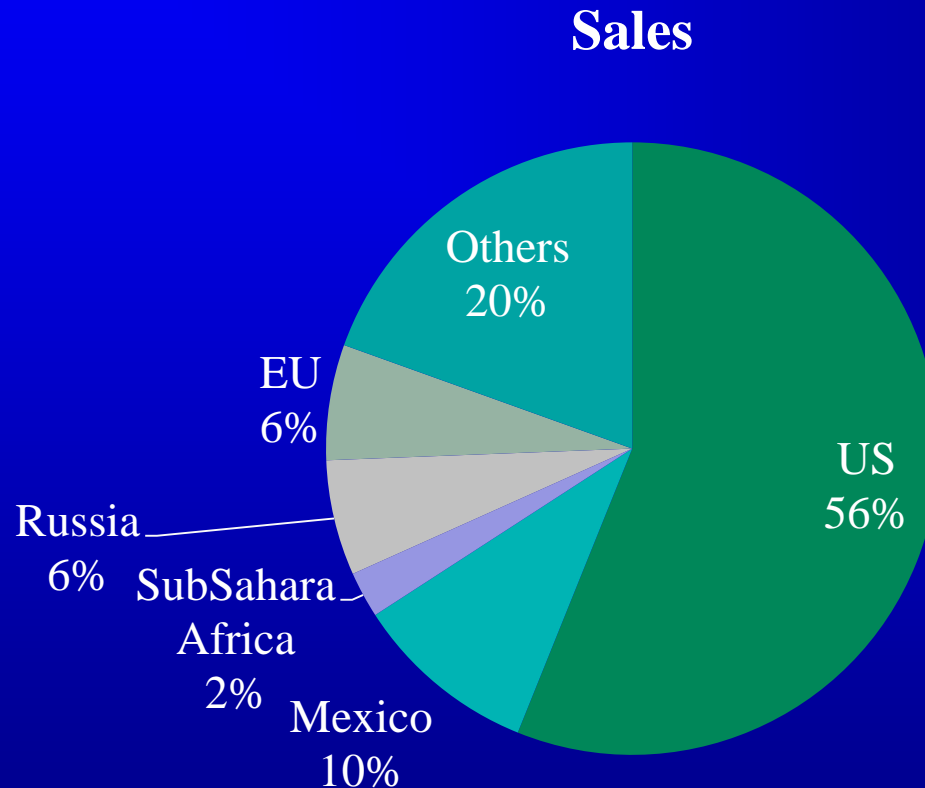
World Tilapia Production of 4,850,000 mt in 2014



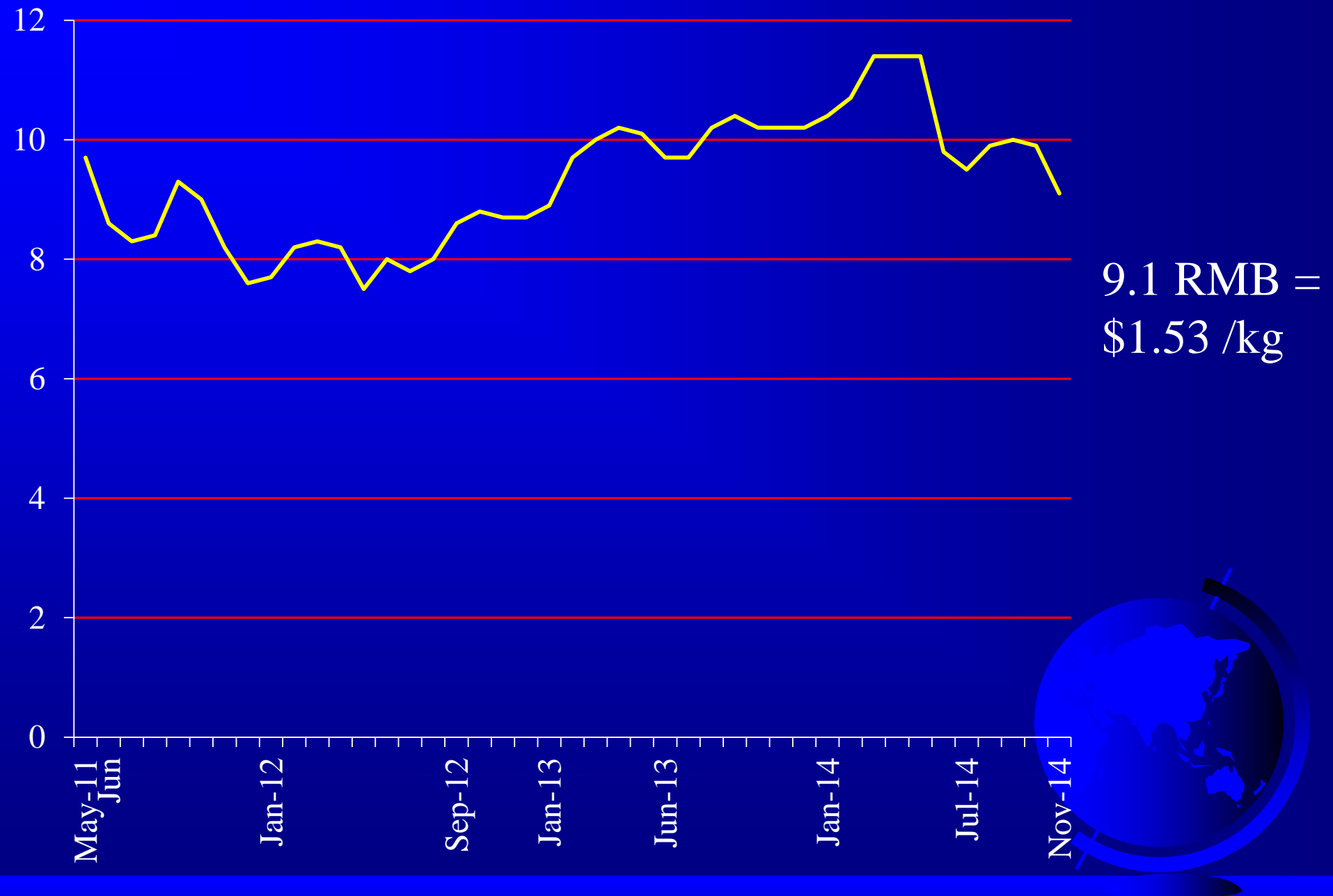
2008 Tilapia exports from China



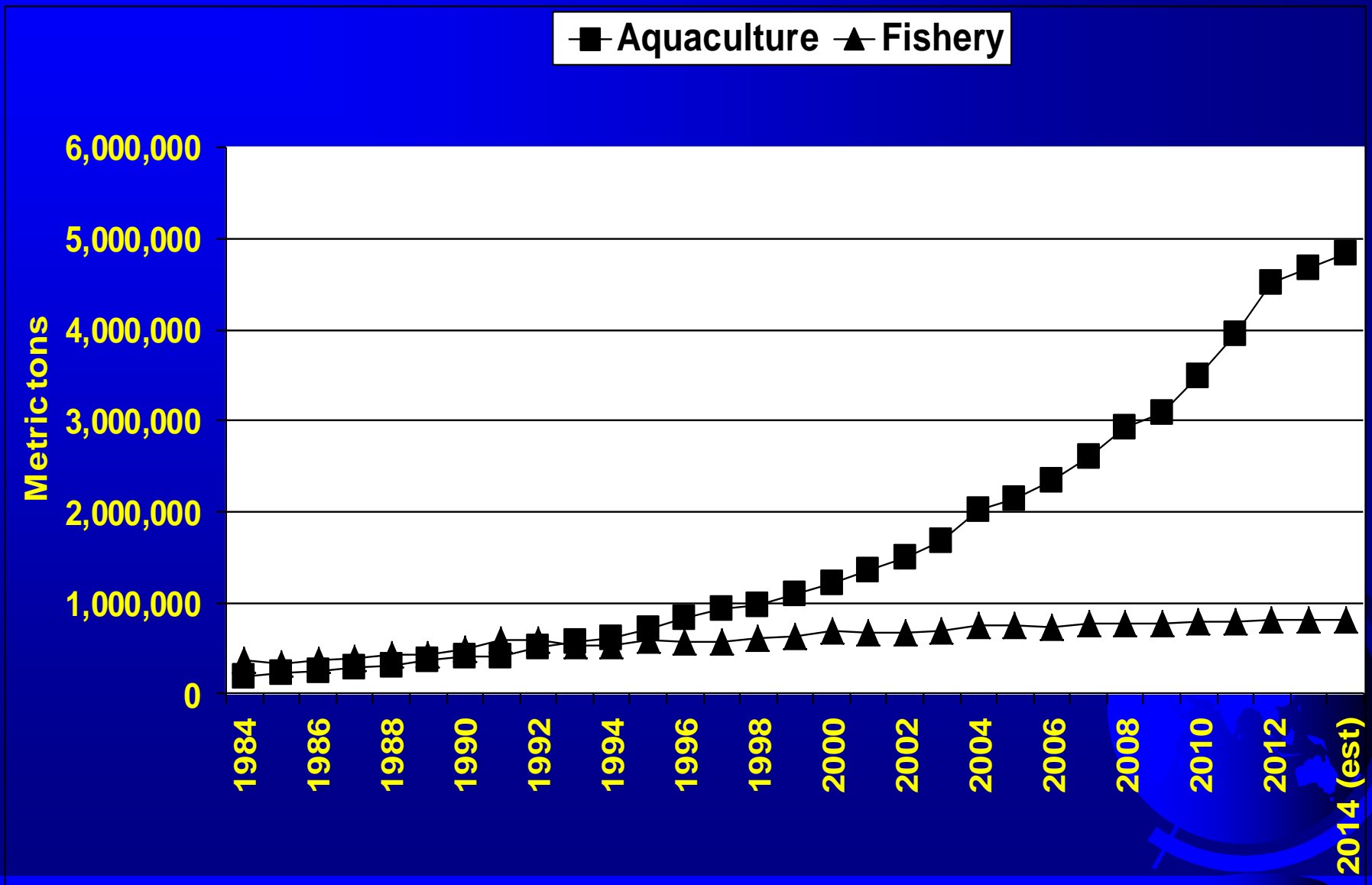
2012 Tilapia exports from China



Farm gate price for 700 g tilapia in China



Global production of tilapia



US Tilapia consumption (imports and domestic)

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

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

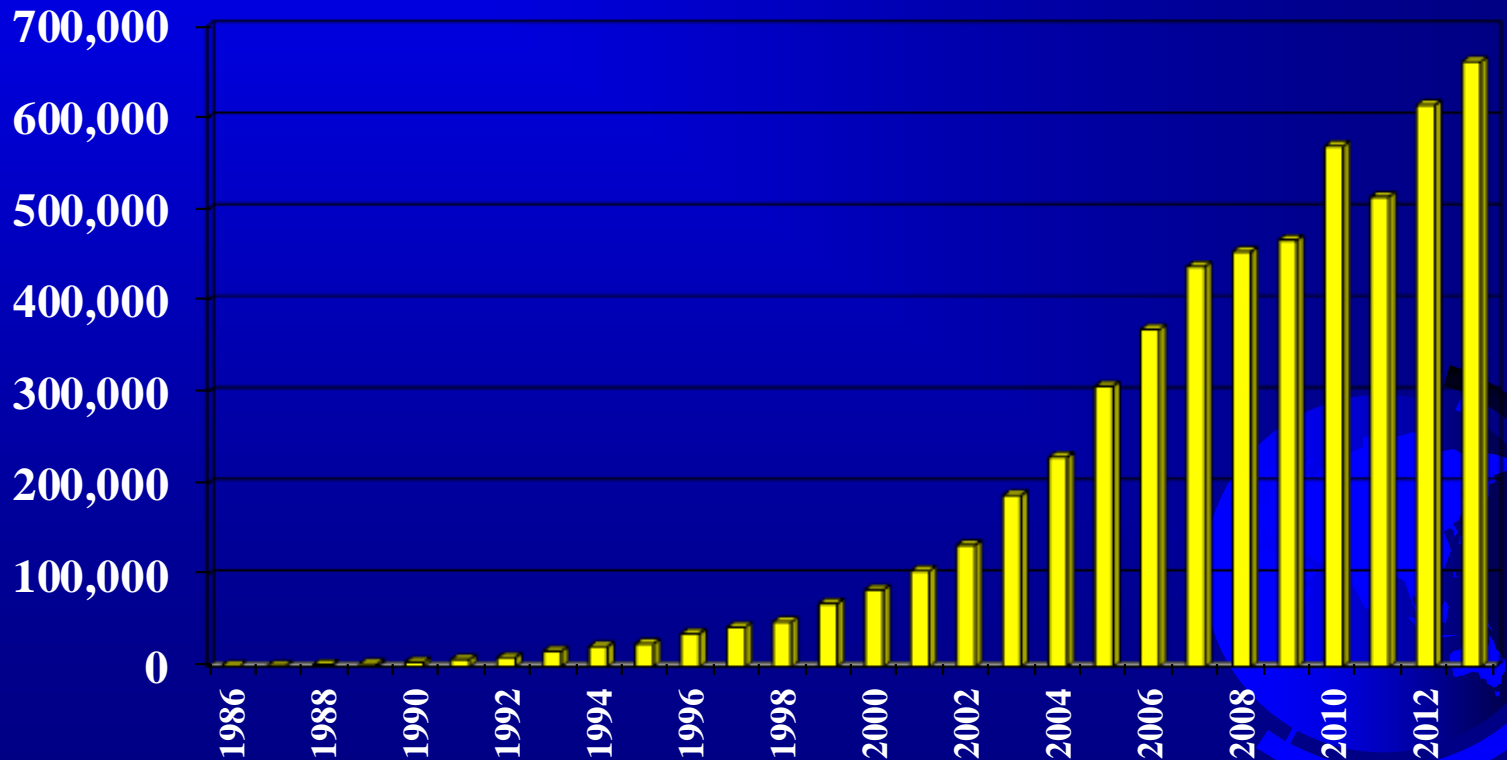
579,443 mt of live weight (equivalent – 2010)

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

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

660,762 mt of live weight (equivalent – 2013)

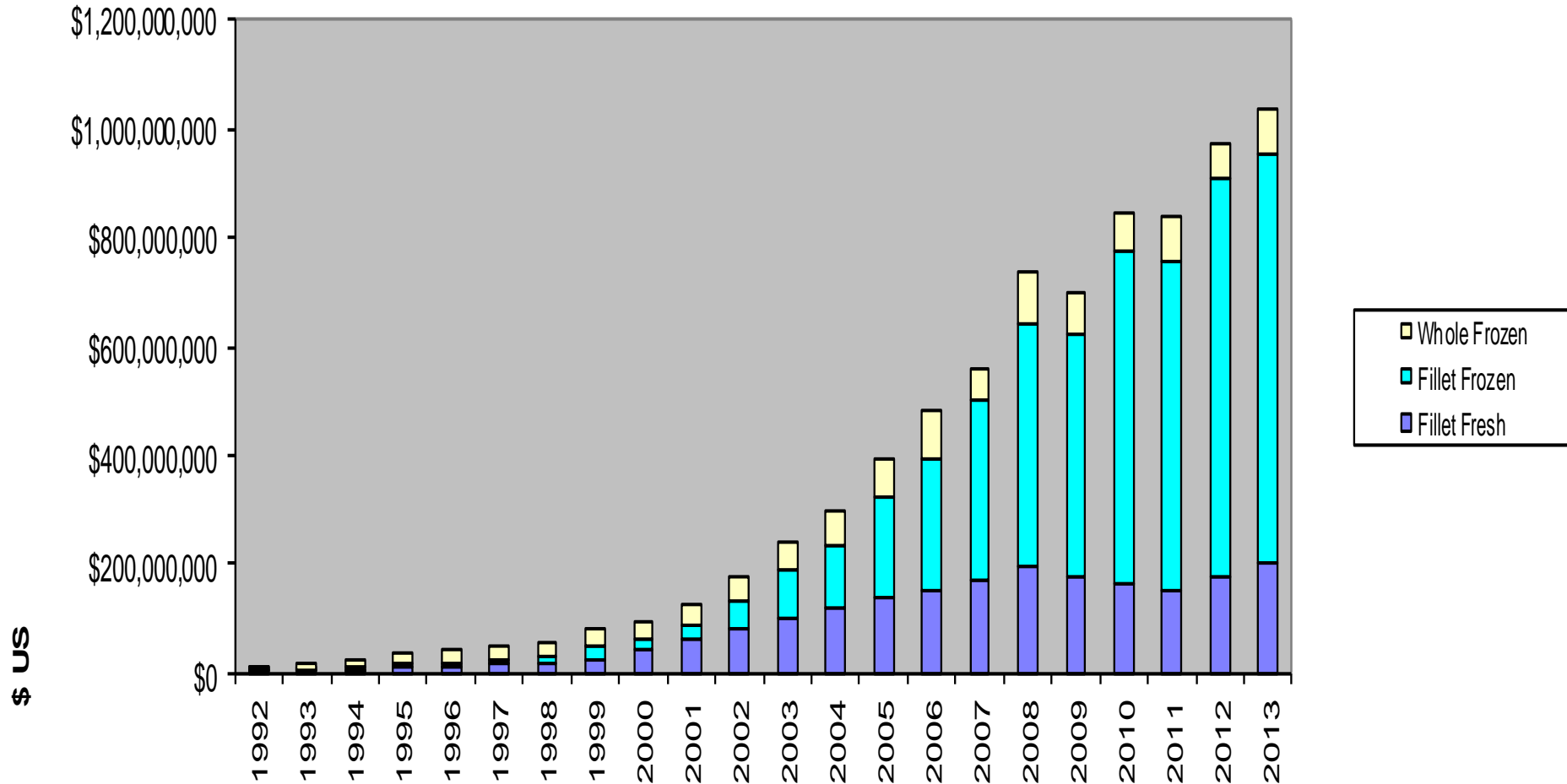
Metric tons



\$696,085,981(2009) , \$842,866,006(2010), \$838,349,634(2011), **\$986,127,852 (2012)**

\$1,034,501,000 (2013)

Value of Tilapia product forms imported to the U.S.



US Sales of tilapia

- Imports to US in 2013 were **\$1,034,501,000**
- US production of about 30,000,000 lbs at farm
- 2013 US tilapia farm-gate sales were about **\$88,000,000**
- 2013 US Tilapia Sales estimate –
- **\$1,034,501,000 + \$88,000,000 =**
\$ 1,122,501,000



Selective breeding and genetic improvements

- Excellent breeding programs
 - G.I.F.T. - Malaysia
 - Acuaplan - Mexico
 - Genomar - Brasil and Norway
 - Chitralada – Thailand
 - TabTim – Thailand (CP Group)
 - GIFT Excell – Philippines
 - Molobicus - Philippines
 - GIFT Bangladesh
- Several in Israel
- YY Supermale - Philippines and Swansea, Egypt and Indonesia



Tilapia Genome Project

- March 2011 - First assembly of the tilapia genome
- *Oreochromis niloticus* – Nile Tilapia
- <http://www.broadinstitute.org/ftp/pub/assemblies/fish/tilapia/Orenil1/>
- Matching many segments to those known from other fish
- Publically available and freely accessible
- Next frontier of genetic program for tilapia





Tilapia Genome Project

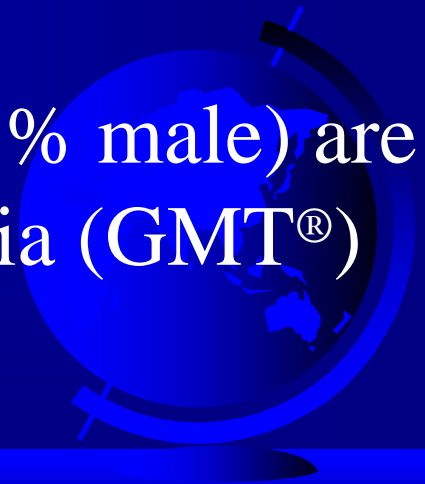
The 3000 species of cichlid fish, which includes tilapia, are found in a variety of habitats in Central and South America, Africa, and India. From an evolutionary point of view, the most interesting cichlid species are the 1500 species that recently diverged in the lakes of East Africa. Remarkably, the 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



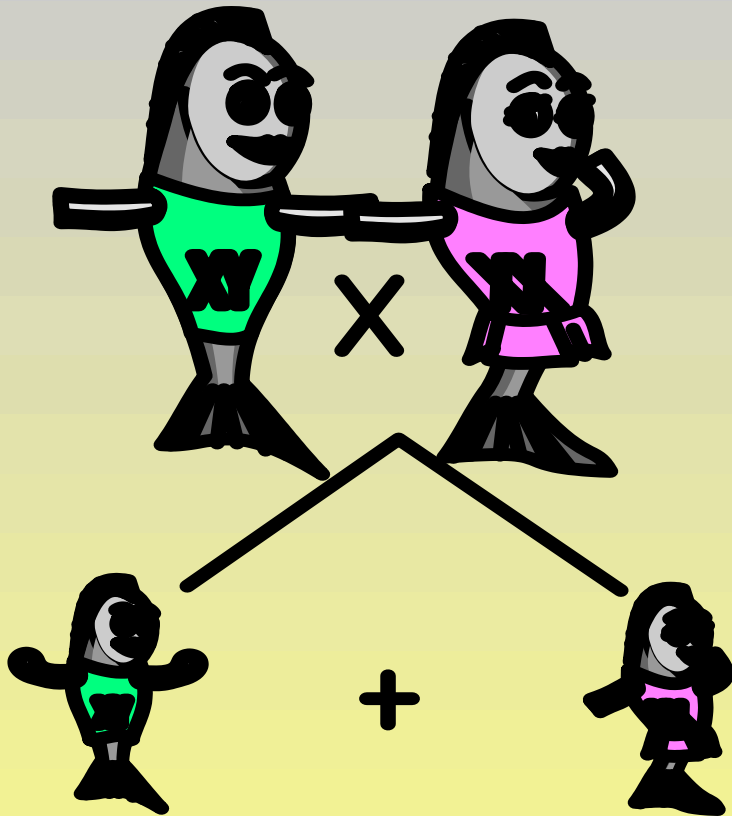
The YY male technology

- ➡ Combines hormonal feminization and progeny testing
- ➡ Breeding programme produces novel YY males
- ➡ YY males sire only male (XY) progeny in crosses with XX females
- ➡ All male progeny (actually $\geq 95\%$ male) are known as genetically male tilapia (GMT®)



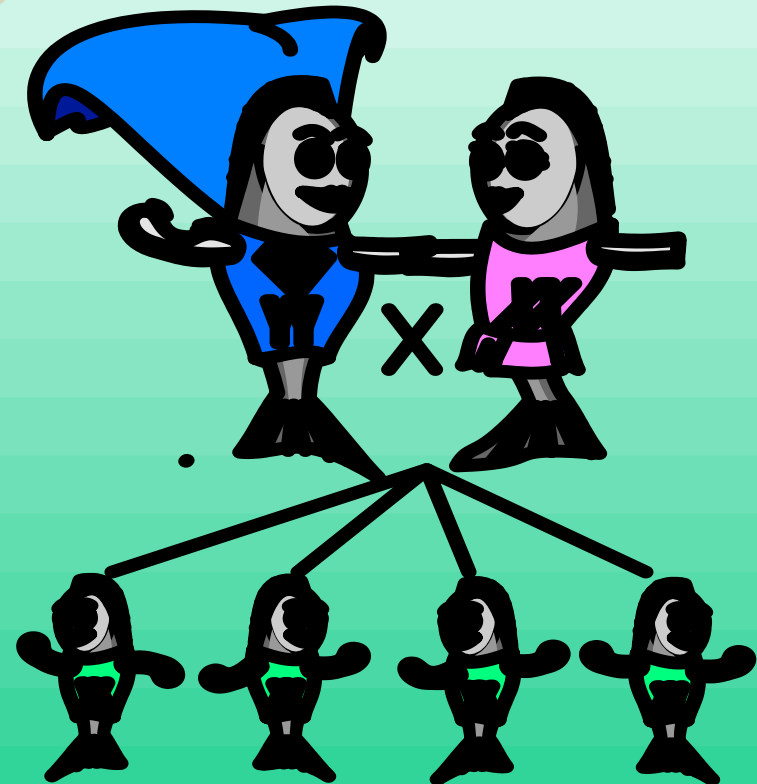
The YY male technology

THEN



Normal crosses produce
equal proportion of
males and females

NOW



YY males produce only male progeny
(GMT[®])

Selective breeding and genetic improvements

- Excellent breeding programs
 - G.I.F.T. - Malaysia
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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
- Brasil – 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



Grows well in most production systems

- ☞ Ponds
- ☞ Cages
- ☞ Raceways, round tanks, recirculating systems
- ☞ Ranching (lake releases)
- ☞ Freshwater, Brackish water, Estuarine, and Marine



Grows well in most production systems

- ☞ Polyculture with shrimp, catfish, carp
- ☞ Herbivorous and /or omnivorous
- ☞ Good growth in fertilized ponds
- ☞ Many agricultural by-products can be used in tilapia feeds or to fertilize ponds



Intensive ponds

Ponds in Brazil



Ponds in Costa Rica



Multiple small cages



Taal Lake, Philippines, 2007



Taal Lake, Philippines, 2009



Irrigation Reservoir, Arizona



Paulo Afonso Reservoir, Brasil

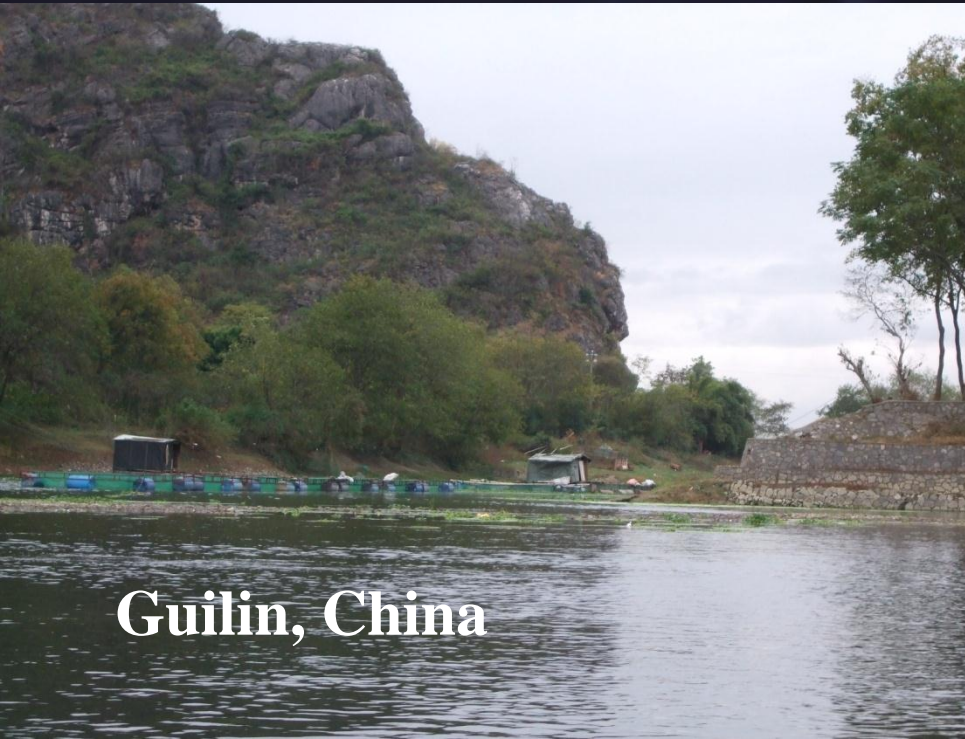
Small cage farms



Nile Delta, Egypt



Lake Kenyir, Malaysia



Guilin, China



**All tilapia farms have dogs,
even cage farms**

Large cage farms



Mexico

- ➡ 4,623 licensed tilapia farms out of 9,230 total aquaculture licenses in all of Mexico
- ➡ 20,000 ton Dos Lagos farm in Chiapas
- ➡ Second farm now started, also by Regal Springs
- ➡ 2013 sales of 1,343,000,000 pesos (\$103,000,000 US)



Nepal

- ➡ Live tilapia sales
- ➡ Farmed in south near Indian border, sold in Kathmandu and Pokhara



Tilapia and citrus in Hainan, China



Tropical Inland Integrated System

☞ Tilapia → oil palm, rice, sugar cane



Costa Rica

Mexico



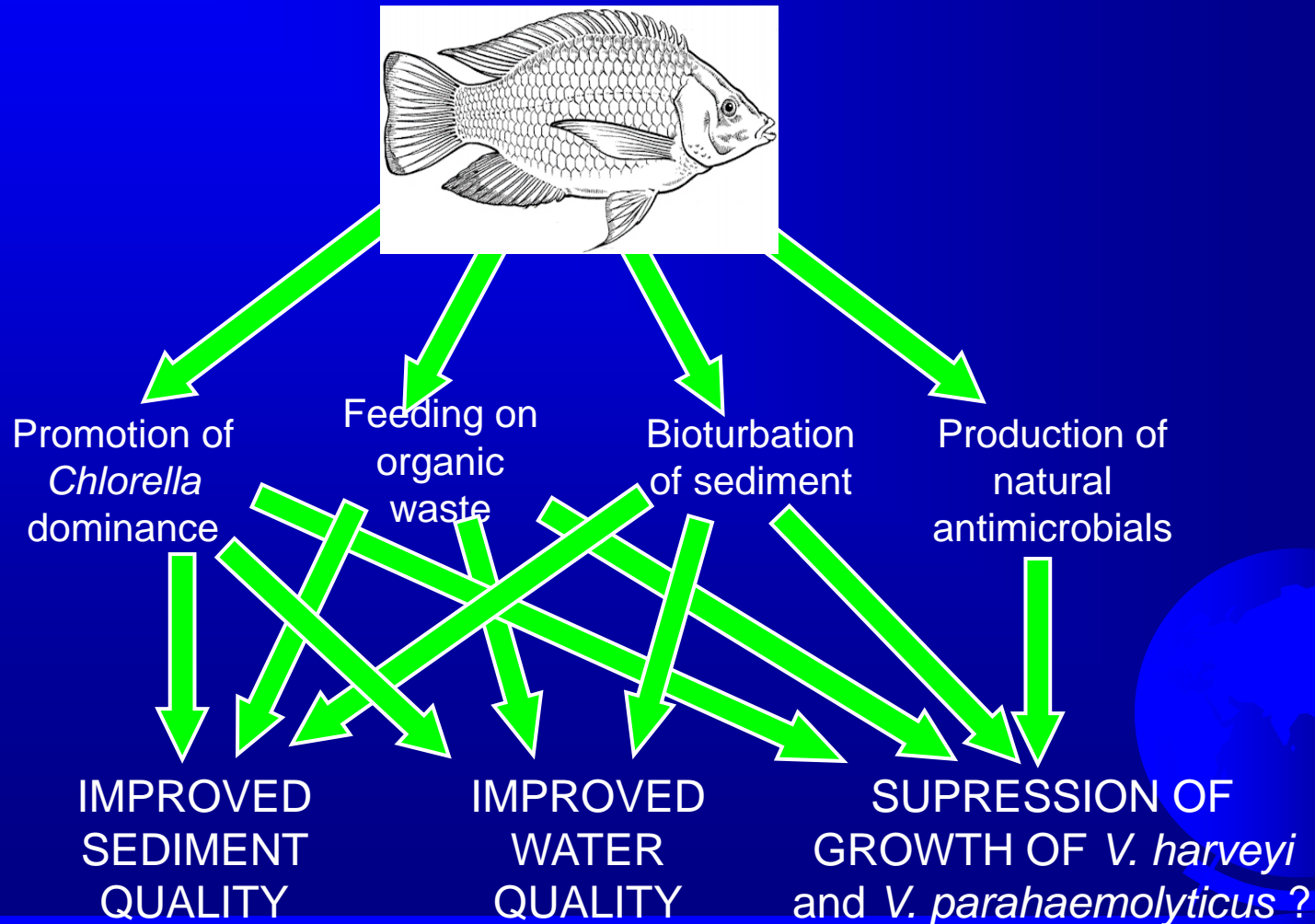
Guyana



Tilapia - shrimp polyculture



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



Stocking and harvest schedule



Tilapia-shrimp-halophytes Eritrea



Salicornia

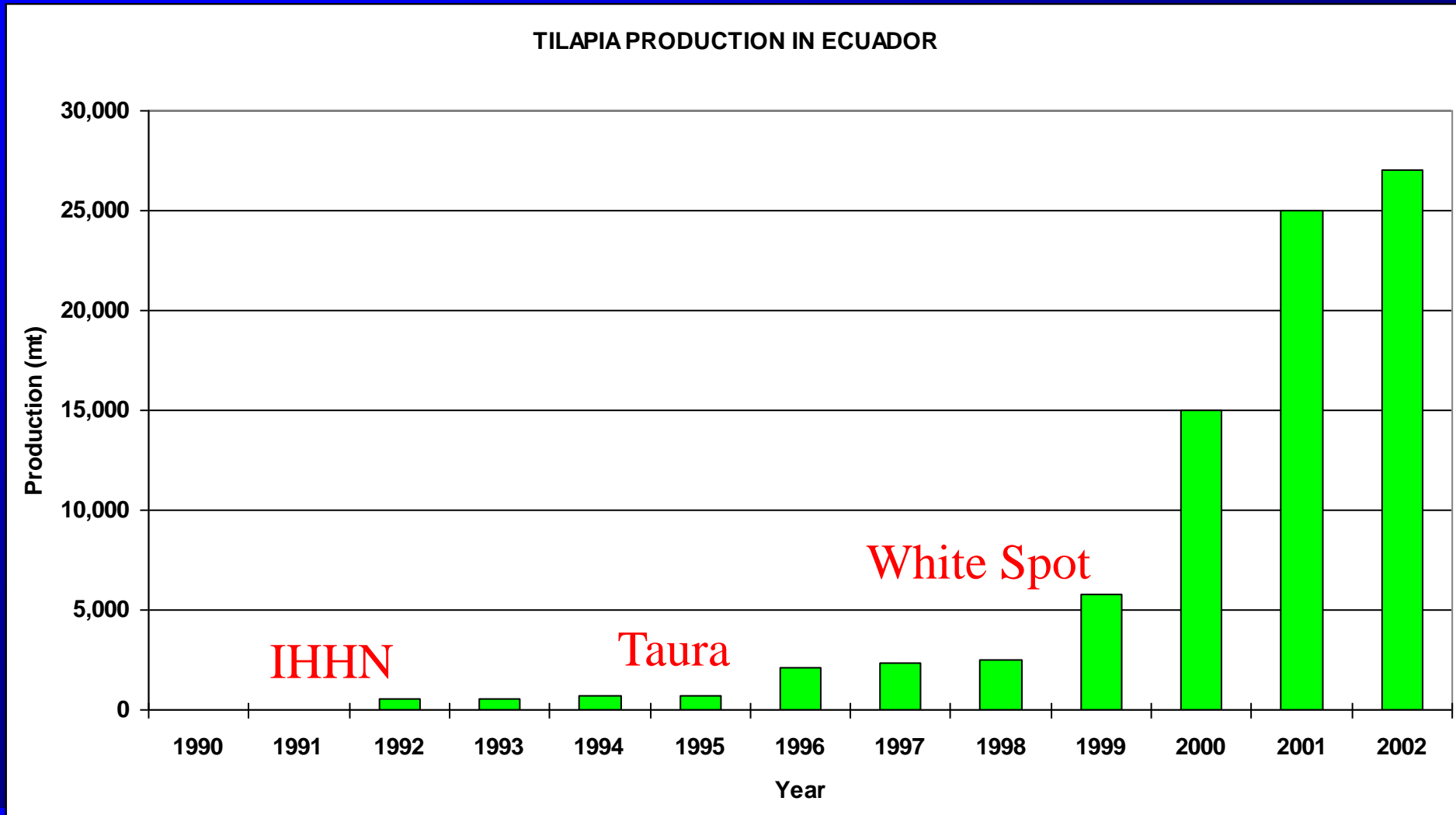
Mangroves

Mangroves

Salicornia

Shrimp and tilapia ponds

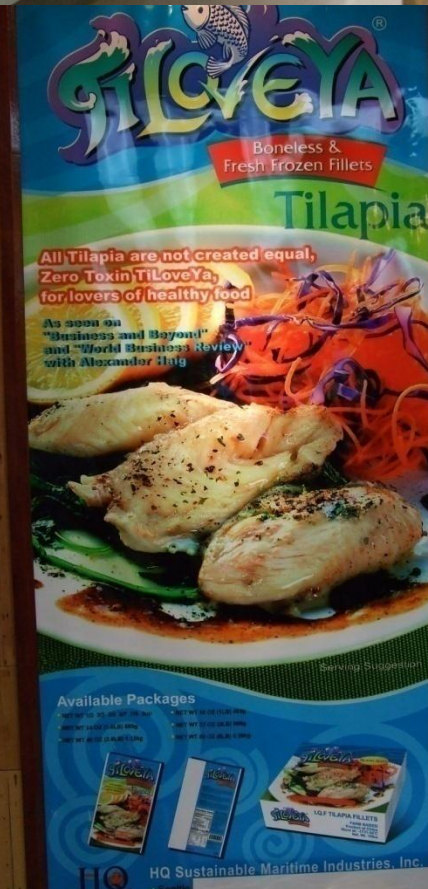
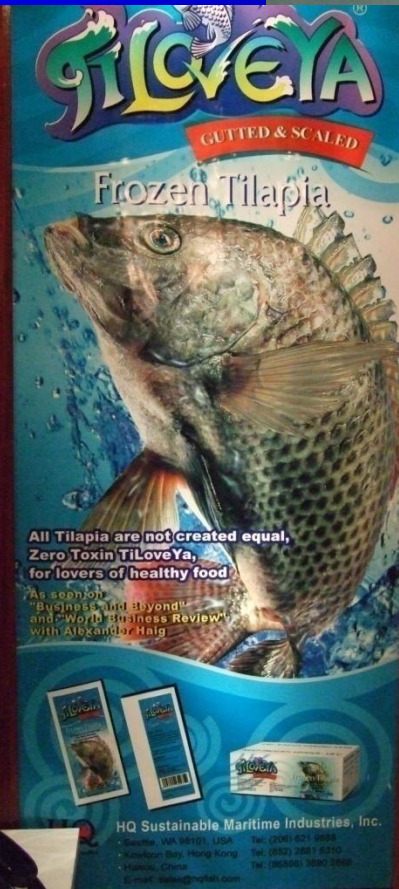
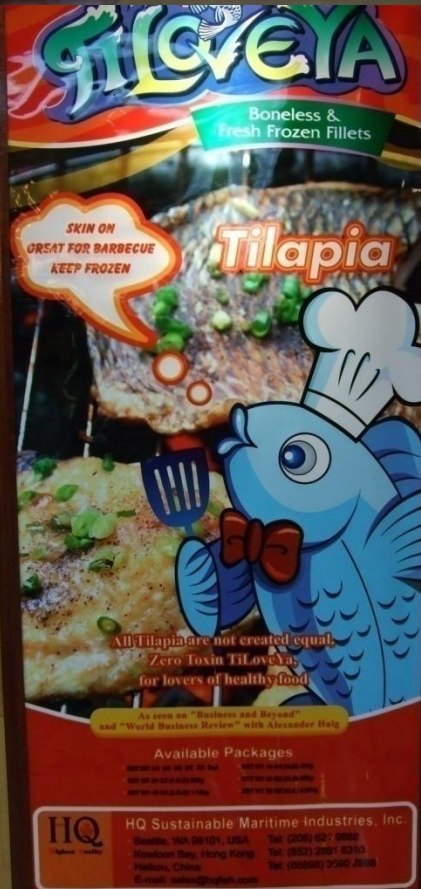
Tilapia production in Ecuador and shrimp viral infections



Improvements in packaging









Traditional product forms



Yangon BBQ tilapia



Tilapia (June 2007, Tesco, UK)

£8.99 kg

£4.08 lb

Whole
Jamaican
Tilapia

and Clubcard
points too

 \$18 US per kg whole fish!!!!

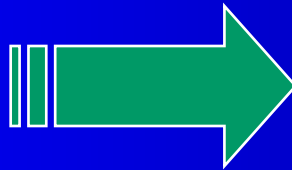
Finest[★]

£12.99 kg

Tuna Loins



Byproducts - Tilapia Leather



Tilapia skin furniture from Brazil



Tilapia scales for flowers and skins for shoes



Tilapia pedicures and manicures



Fish Encounter 温泉鱼疗

Price: RMB**68**/person
价格: 人民币**68**元/每位

Location: First floor swimming pool
地点: 酒店一层泳池旁



Health and Beauty Products



 東方海洋
ORIENTAL OCEAN
高纯度海洋生态食品开创者

我只信赖东方海洋
岁月带不走青春

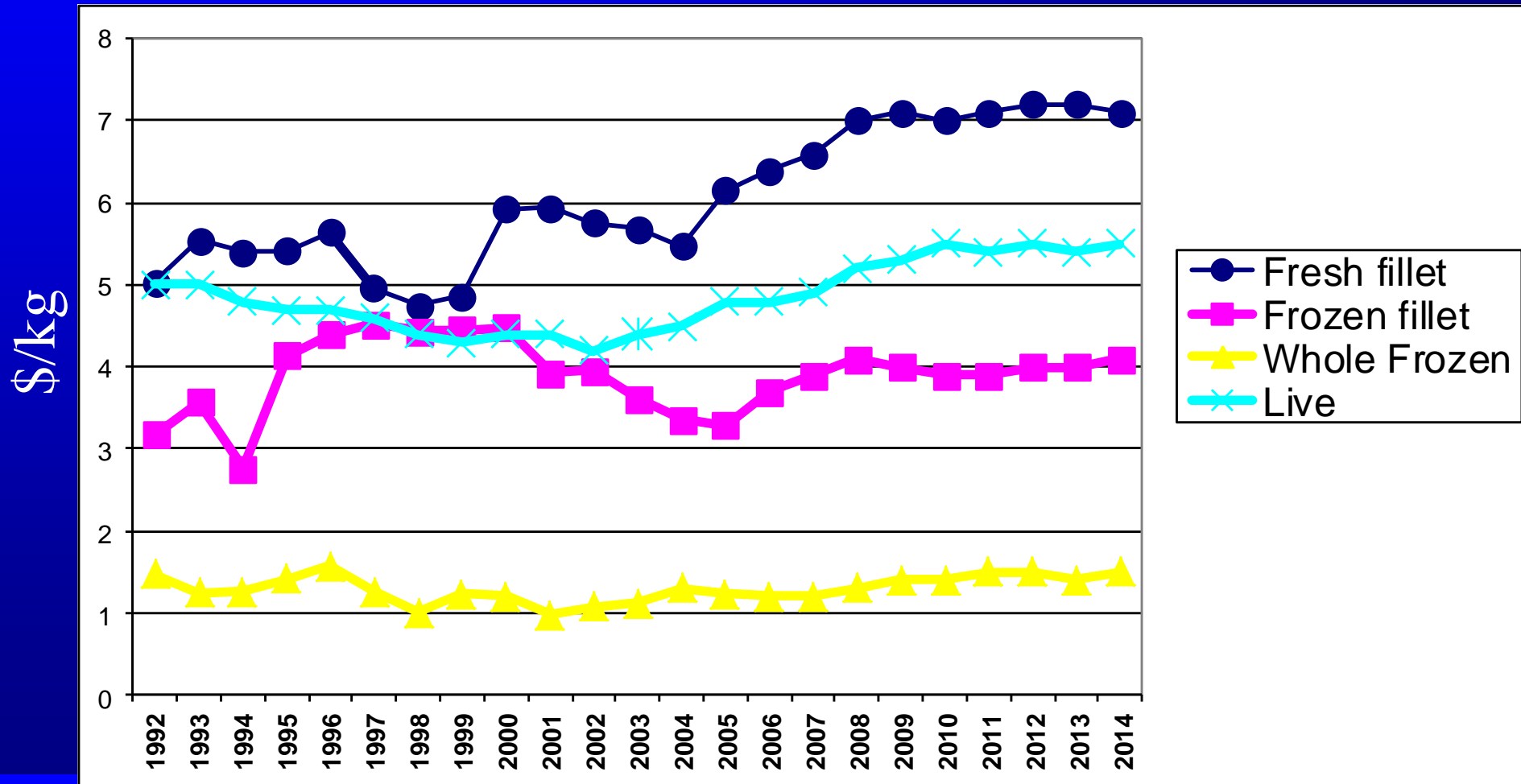

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胶原蛋白肽
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{与赵雅芝一起体验}
{东方海洋胶原蛋白}

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传真：0535-6929555 http://www.dongfanghaiyang.com
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Global Tilapia Market Trends

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

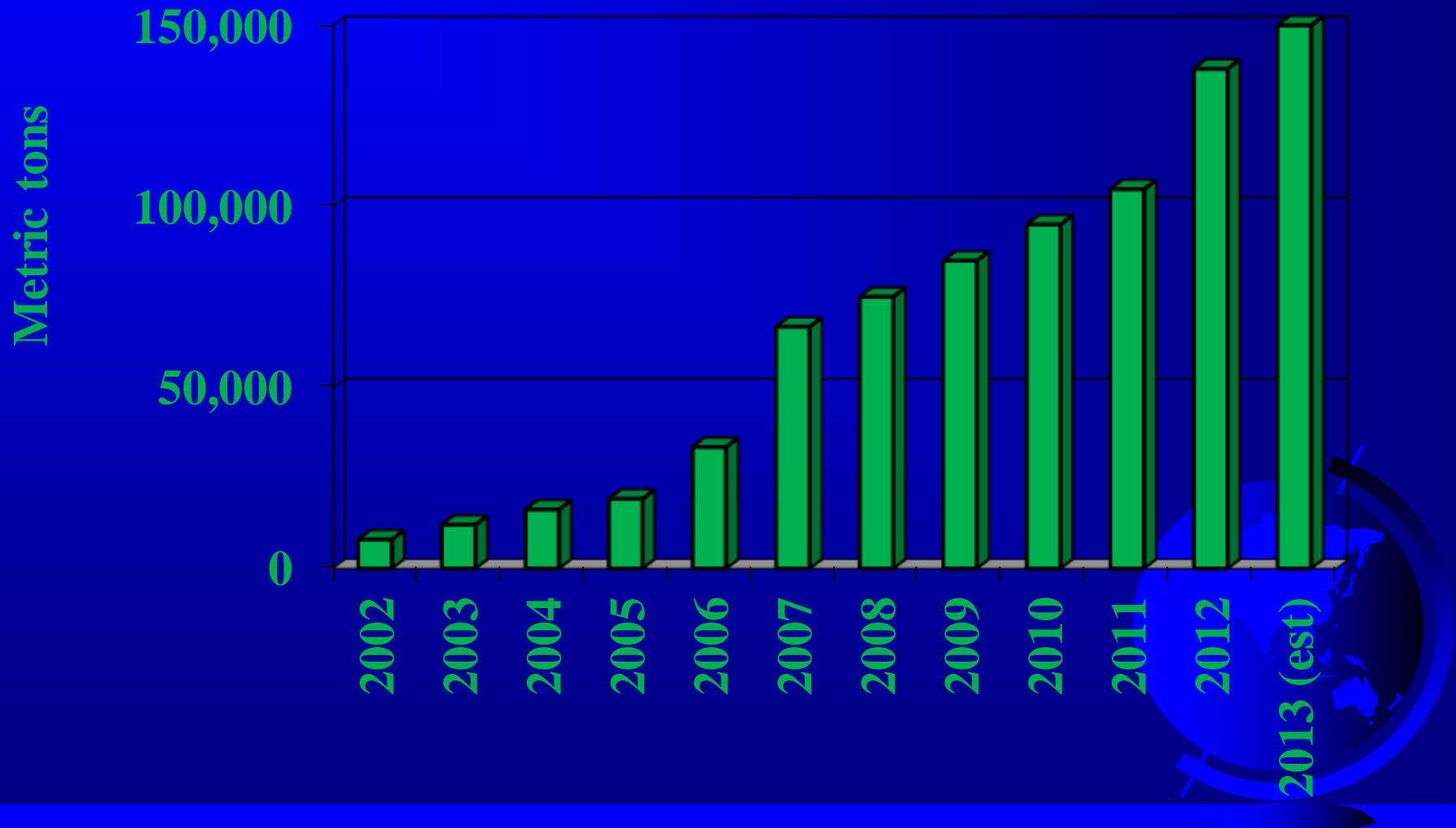


Global Aquaculture Tilapia Sales

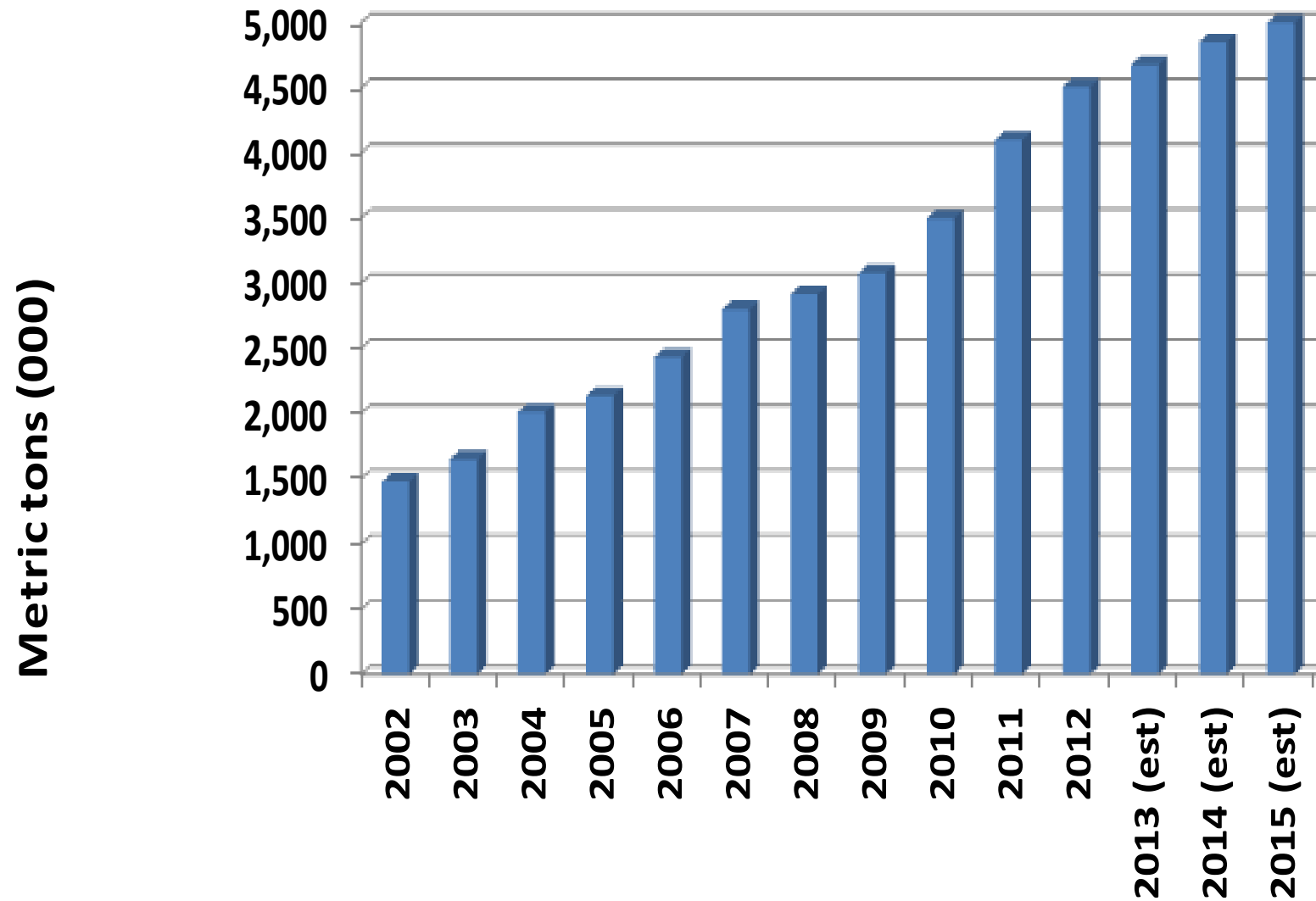
- For year 2000 =US \$ 1,615,321,000
(FAO FishStat 2007)
- 2005 sales = \$ 2,457,312,000
(FAO FishStat 2007)
- 2010 sales = \$ 5,680,410,000
(FAO FishStat 2012)
- 2012 sales = \$ 7,656,257,000
(FAO FishStat 2014)
- 2014 sales > \$ 10,000,000,000



Bangladesh tilapia aquaculture



Future global tilapia aquaculture



ISTA 11

☞ **Surabaya, Indonesia**

- ☞ In conjunction with WAS Asia-Pacific Chapter
- ☞ Regal Springs, Surya University, Matahari Sakti Feeds, AquaFish Innovation Lab, WorldFish, and
Aquaculture without Frontiers
- ☞ **26-29 April 2016**



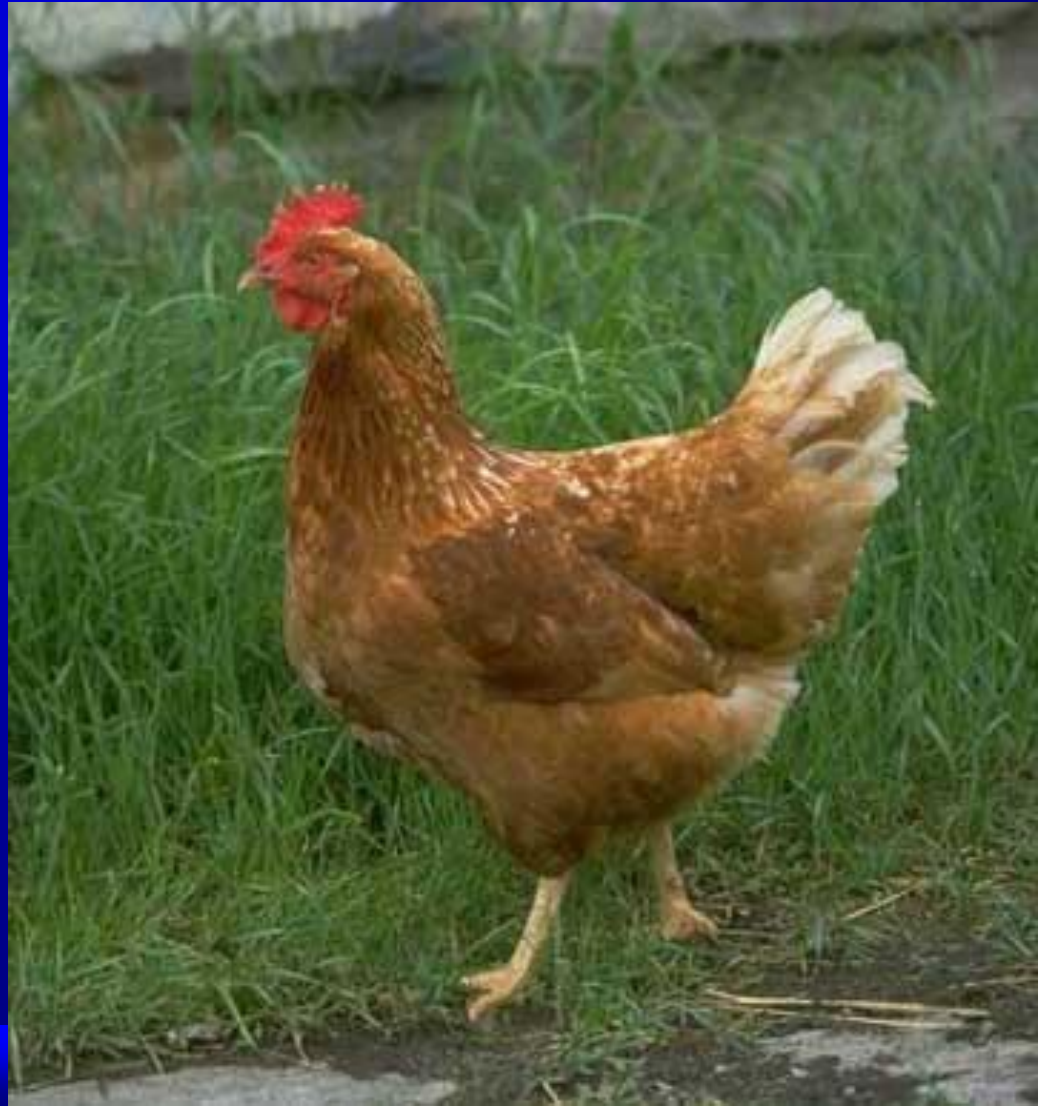
Current Global Market Trends

- ➡ Increase in demand for all forms of tilapia
- ➡ Demand increase will be greatest for frozen fillets
- ➡ Demand increase will be significant for fresh fillets
- ➡ High profit margin for prepared meals assembled and packaged in developing countries



Conclusions

- Tilapia has long been called the aquatic chicken.
- Instead.....
- The “terrestrial tilapia”



Conclusions

- Global tilapia production was 4,507,002 metric tons in 2012 (FAO, 2014), should exceed **4,800,000 MT in 2014**. (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.



Conclusions

- Global tilapia production was 4,507,002 metric tons in 2012 (FAO, 2014), should exceed **4,850,000 MT in 2014** and **5,000,000 in 2015**. (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.



Buy TILAPIA



Thank you
Questions?