

# Aquaculture: Increased Competitiveness and Product Development

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# Introduction

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- Aquaculture has during the last 30 years been a tremendous success story
  - The world's fastest food production technology (FAO)
- However, this is visible primarily in the aggregate numbers
  - For most companies it is a struggle
  - There have been more failures than successes, as in most other industries
- Aquaculture is an industry with keen competition, where only companies and species with the right characteristics succeed

# Conditions favouring increased aquaculture production

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- Population growth and economic growth lead to increased aggregate demand for food
- Stagnating global catches of fish reduce the competitiveness of wild fish
- Globalization has reduced the cost of shipping products and increased trade
- The growth of retail chains favour supply chains with sufficient control to enable efficient logistics

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- To exploit these conditions, one must be competitive

# Aquaculture is competitive

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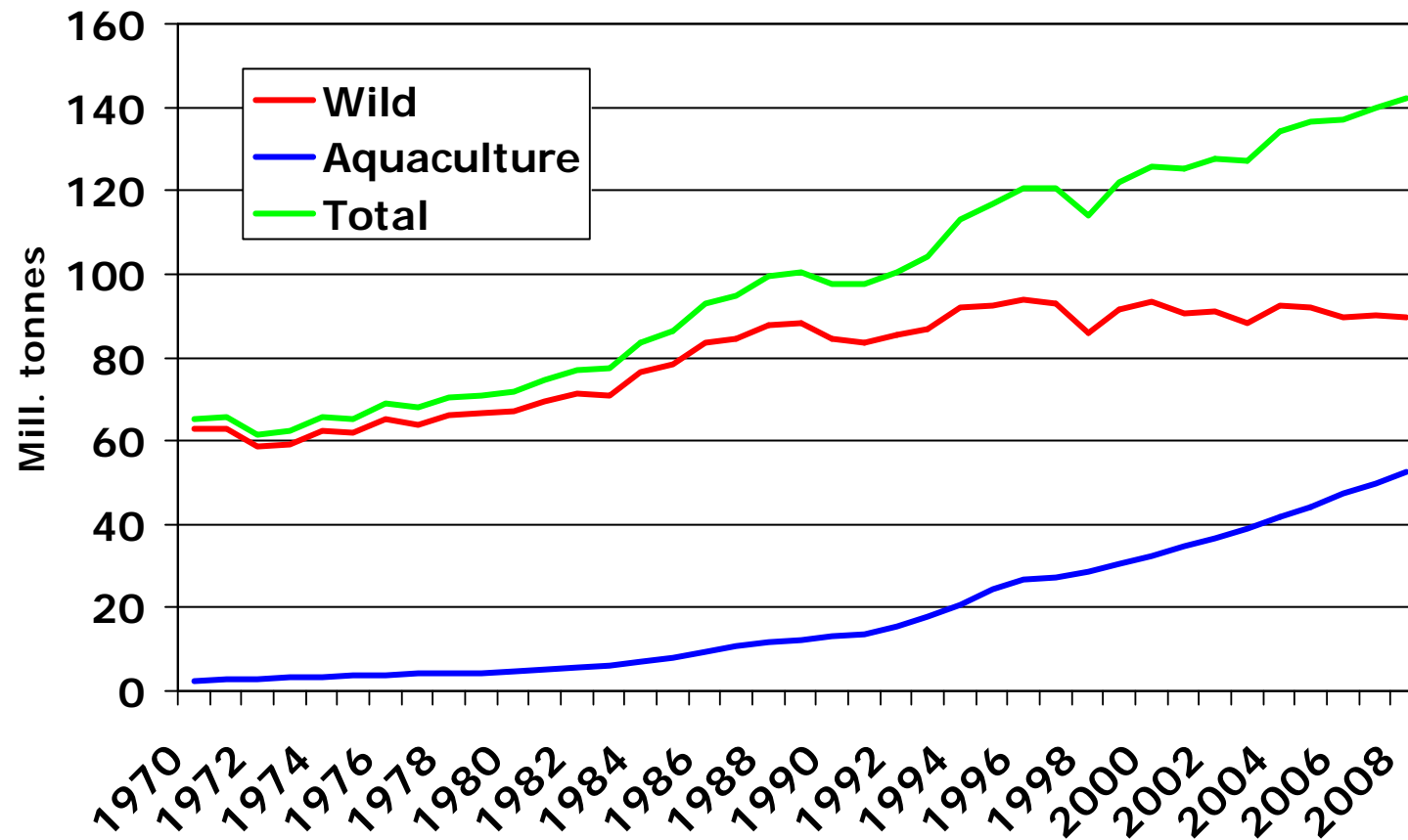
- Two main factors for growth in aquaculture
  1. Good cost development
    - Positive productivity growth
    - Will continue as more technology is adapted from agriculture
  2. Market orientation
    - Wins market shares in existing markets
    - Creates new market segments, product development
    - Predictability in the supply chain, stable quality
      - Processors do a large part of the marketing job

# Aquaculture is competitive

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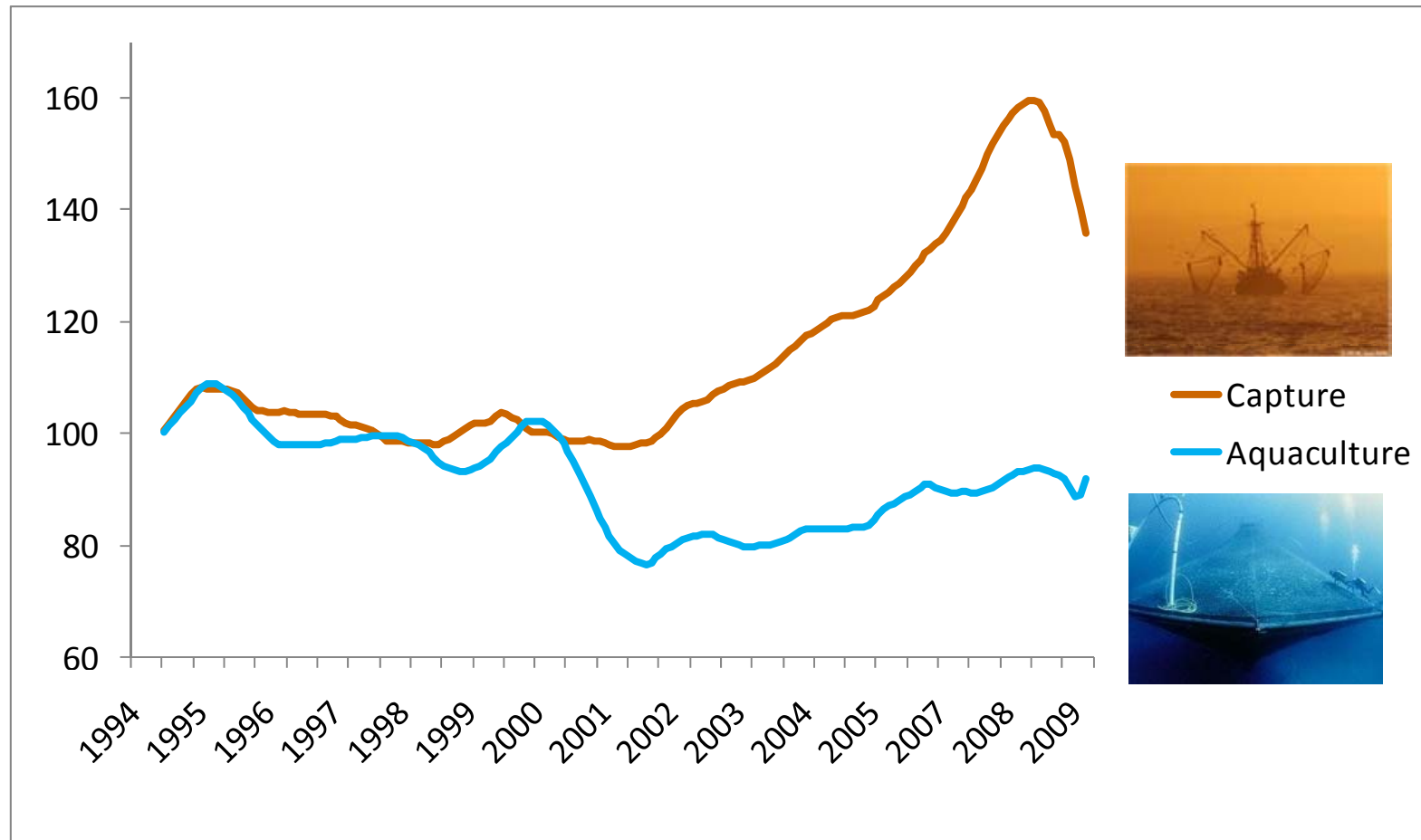
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      - Processors do a large part of the marketing job
- But as the production has increased, several questions have emerged with respect to the sustainability of this growth
  - Environmental sustainability and governance

# Global seafood production



Source: FAO

# FAO – Fish price indices by technology



Source: FAO

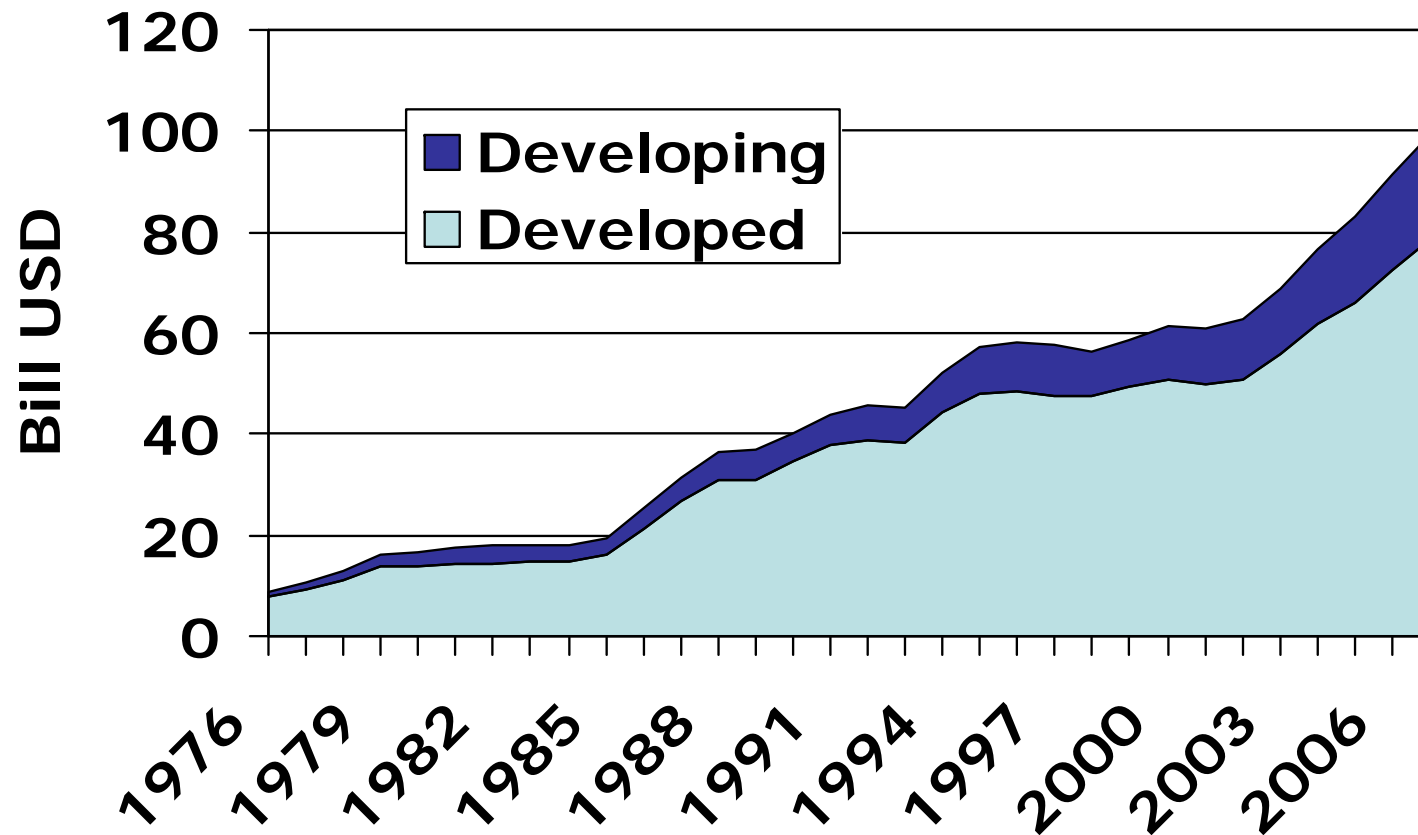


## Growth in seafood trade

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- Adjusted for inflation, trade value has increased threefold from 1976 to 2006 from 28.3 billion USD to 86.4 billion USD
- During the same period the volume has increased from 7.9 million tonnes to 31.3 million tonnes, or almost fourfold
- Hence, the unit value of the seafood has decreased, increasing seafood's competitiveness as a food source

# Global seafood imports



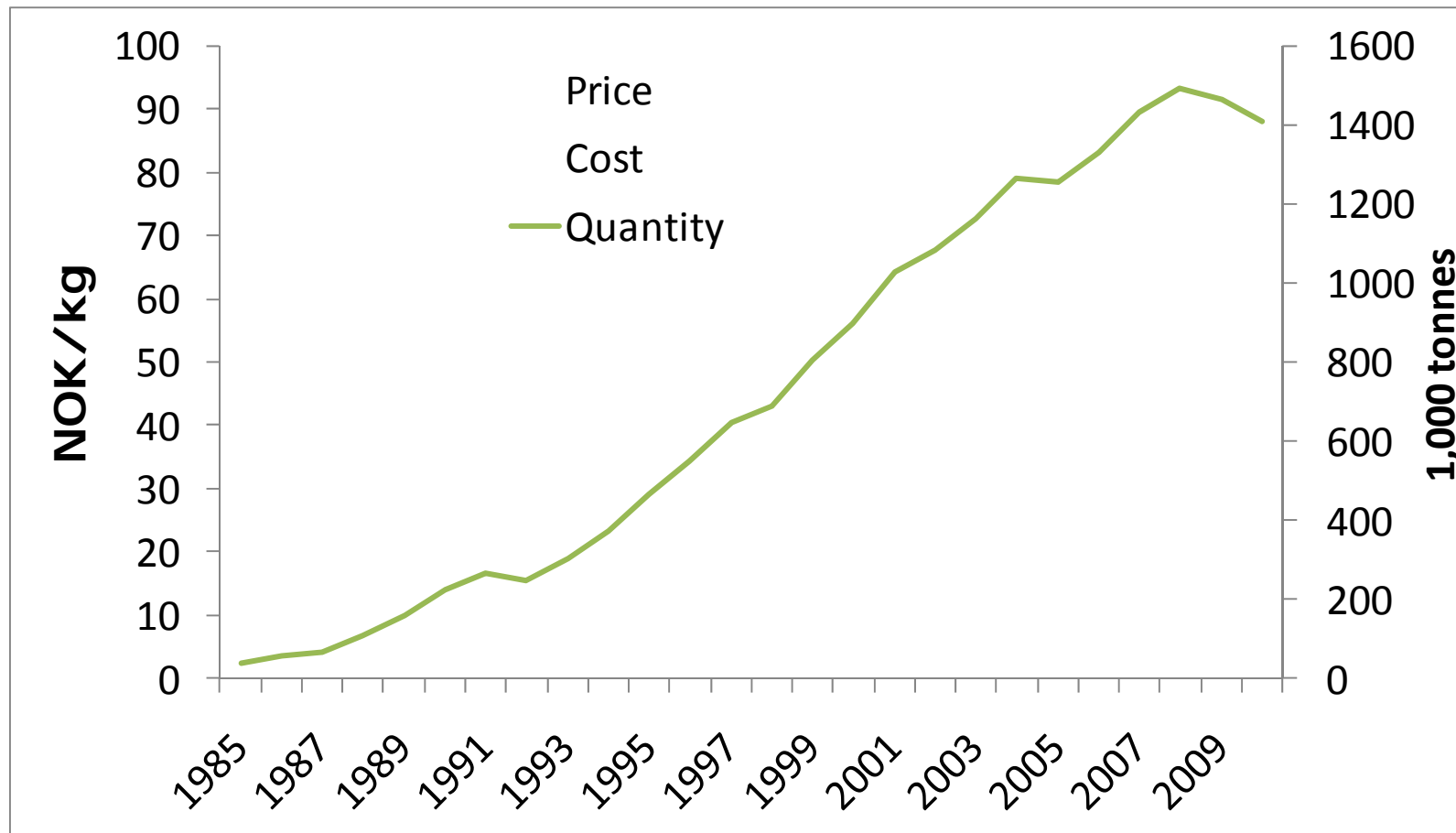
Source: FAO

## New species

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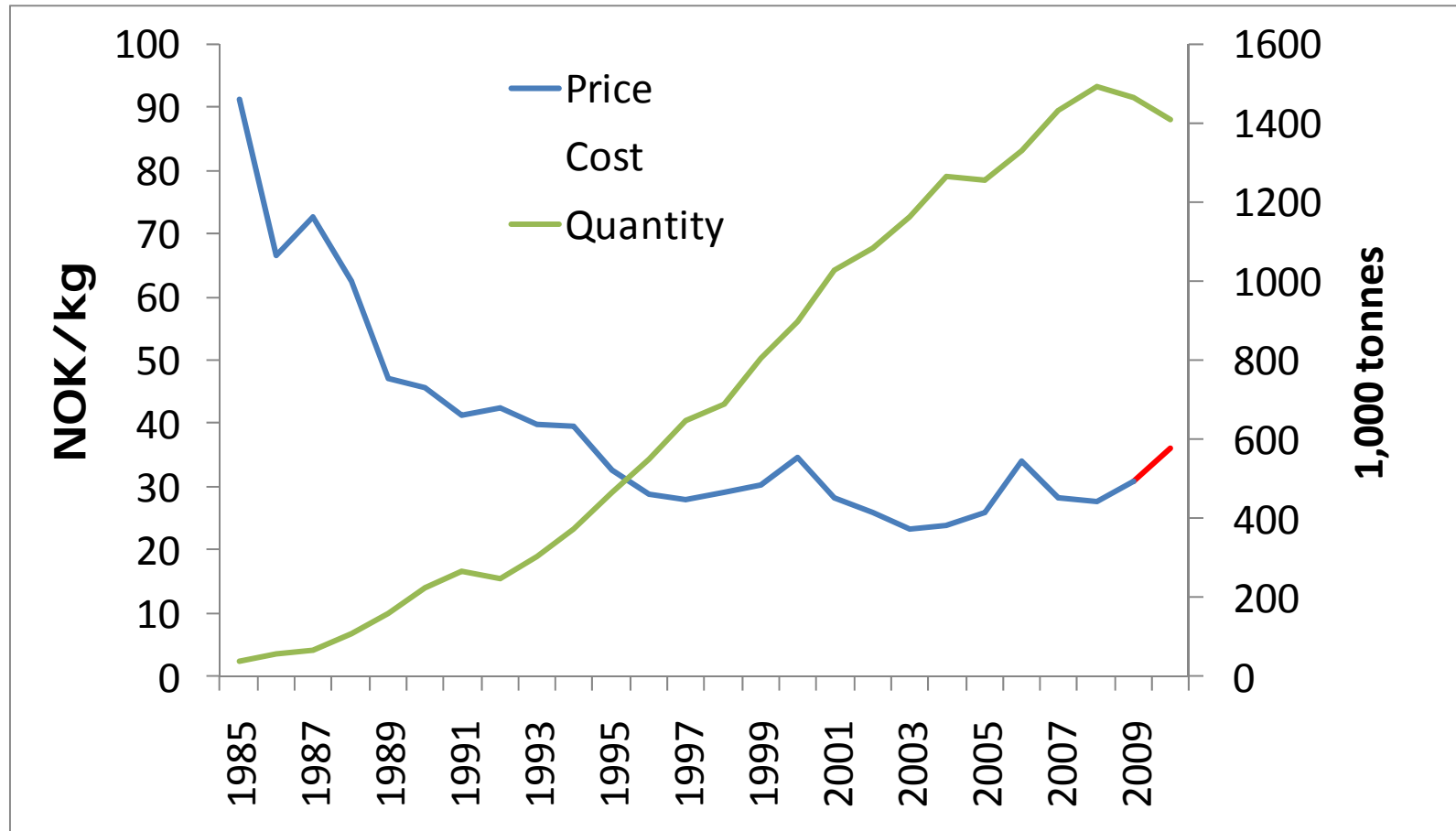
- Most new aquaculture species have, to varying degrees, had to develop their own markets, and have used price as a main argument
- This is profitable because of lower production cost due to technical innovations
  - Productivity growth
- For the most successful species this has been amplified by increasing demand
- Salmon and shrimp lead in many areas (and we do have most data for salmon)
  - Sea bass and sea bream are interesting examples of how very limited market development limits growth
  - American catfish is loosing out because of limited productivity growth

## Real Norwegian export price and cost and global production of Atlantic salmon(2009=1)



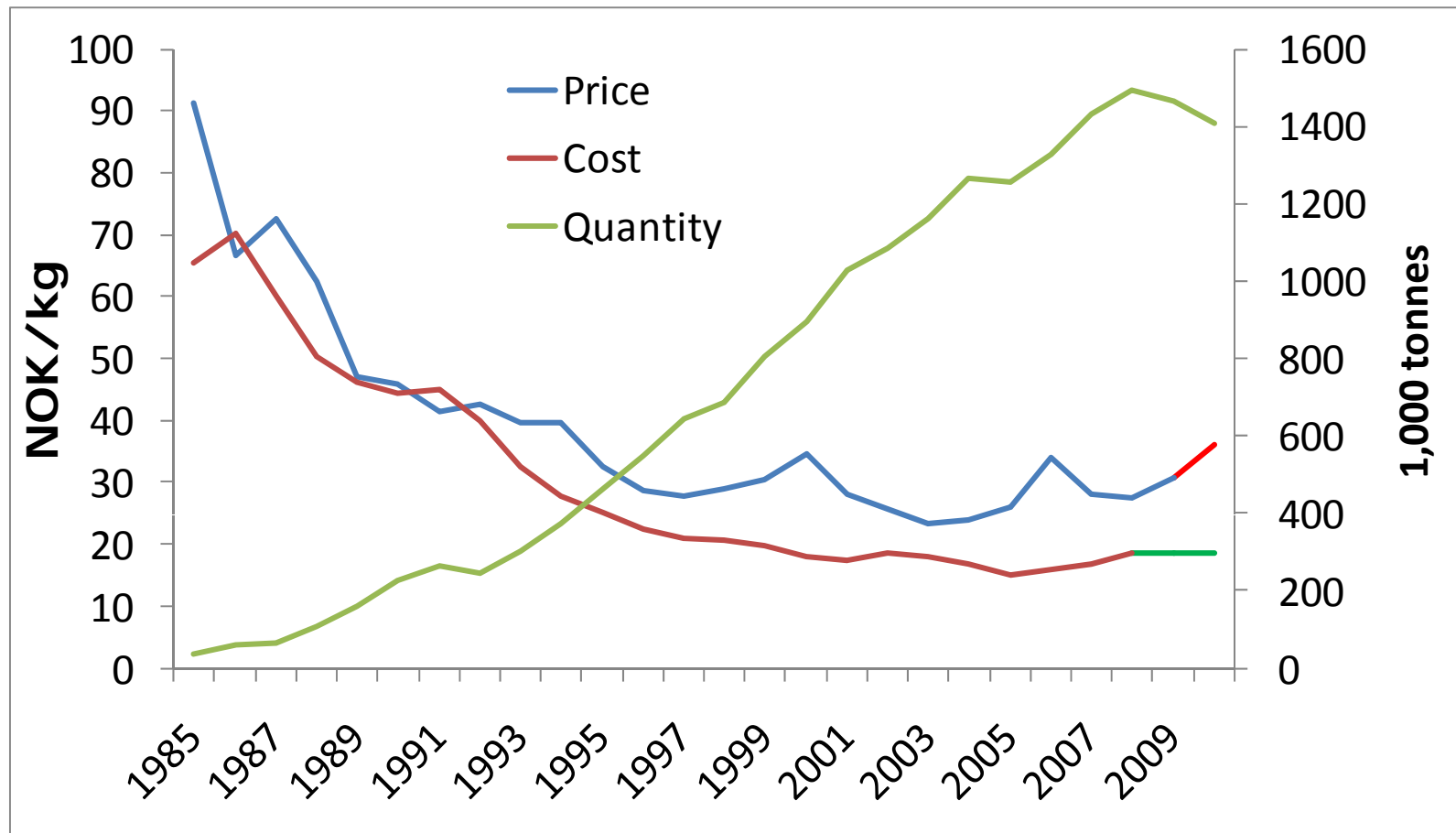
Sources: FAO, Kontali and own estimates

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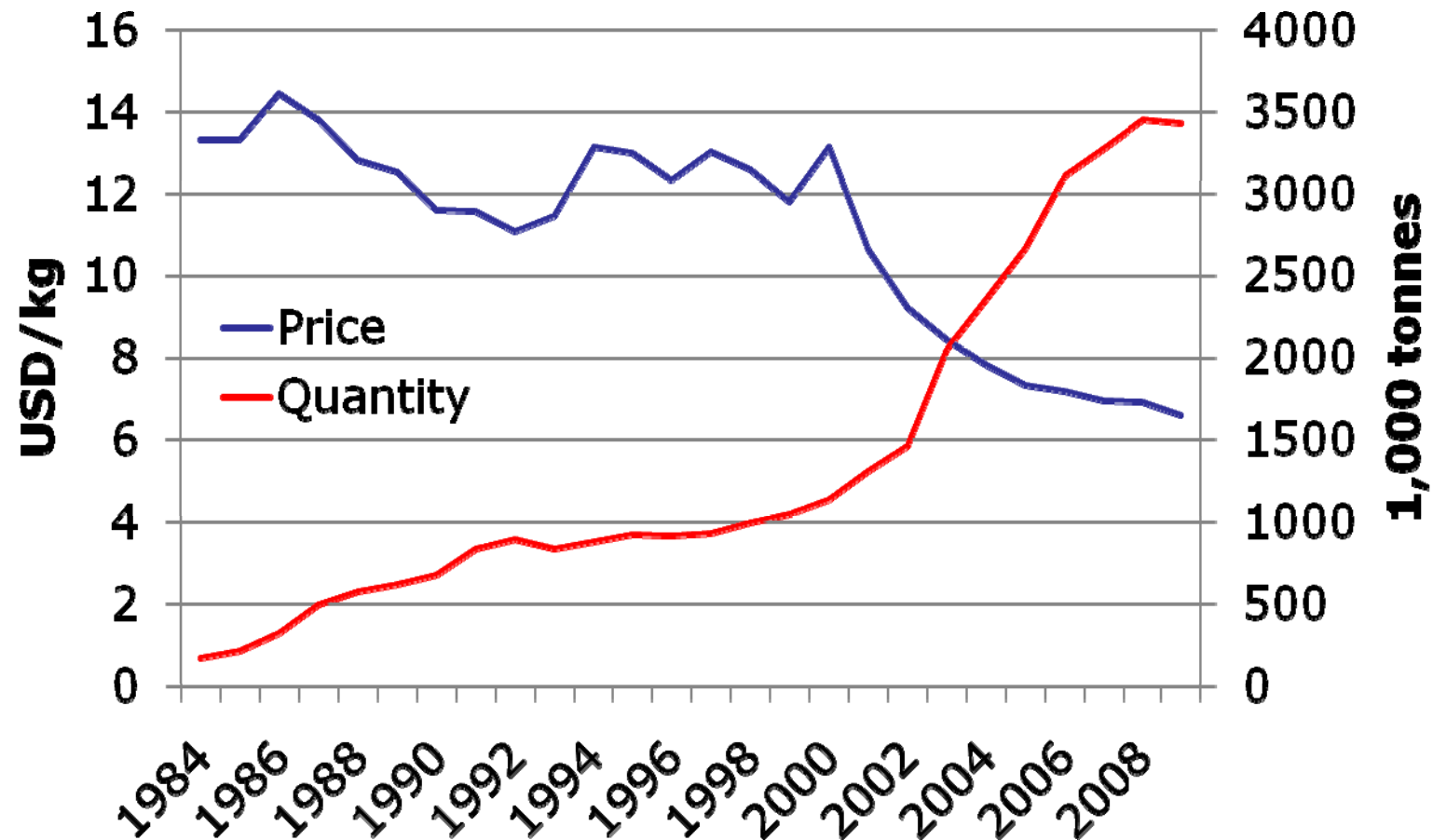
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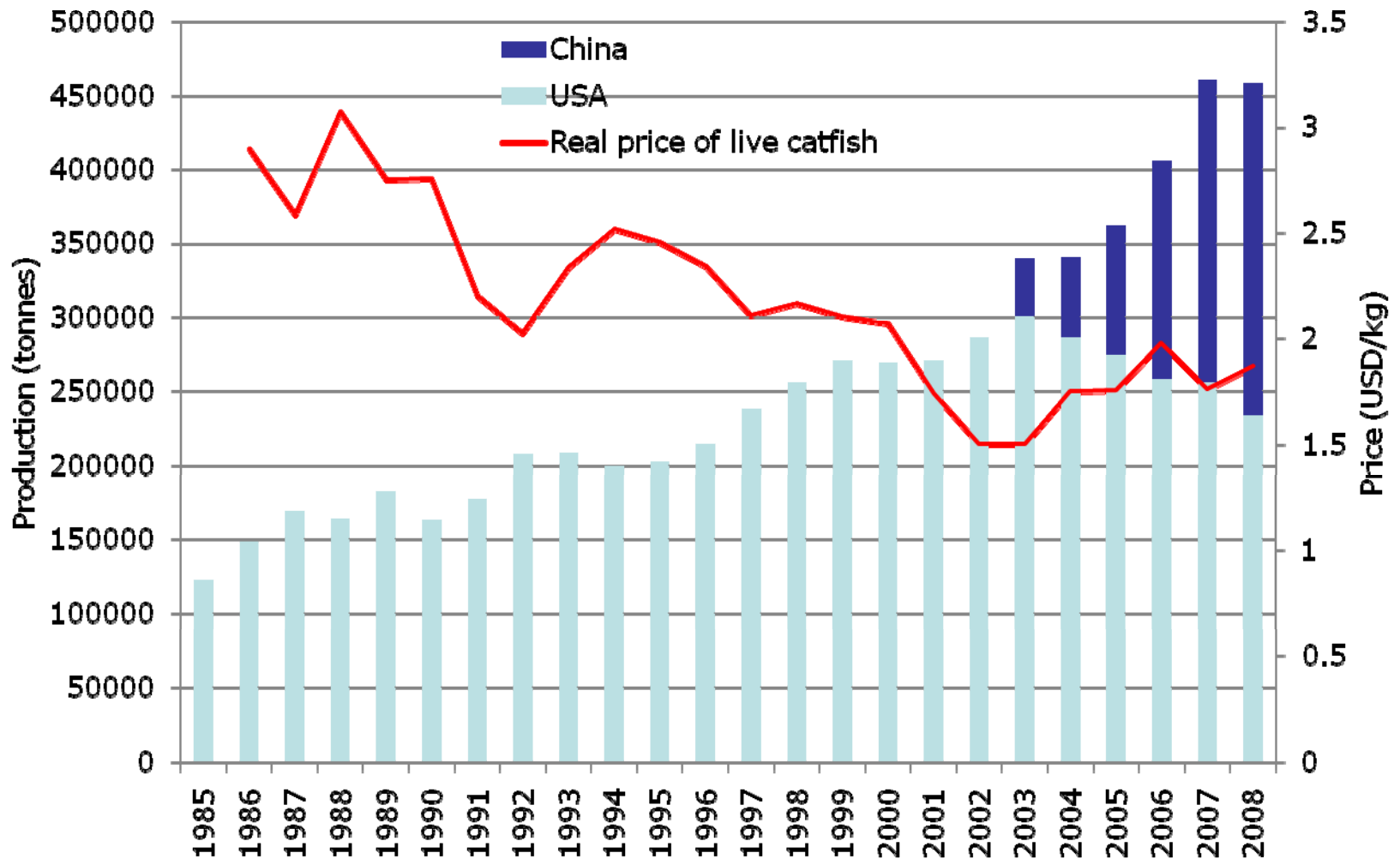
# Global Shrimp Aquaculture Production and real price (2008=1)



Sources: FAO, Jim Anderson.

Note: *M. rosenbergii* is not included.

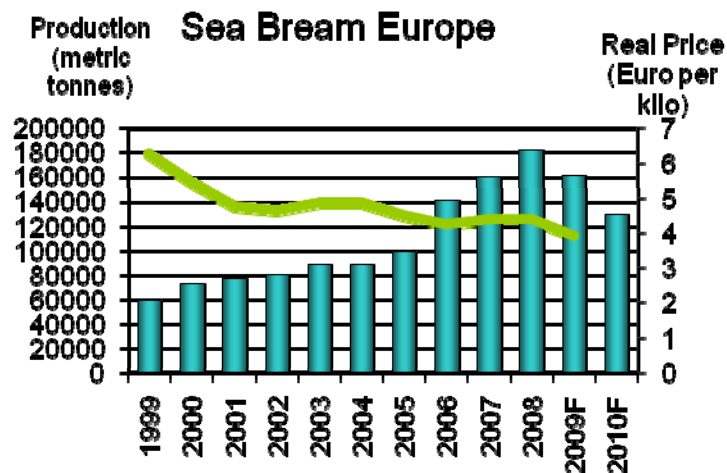
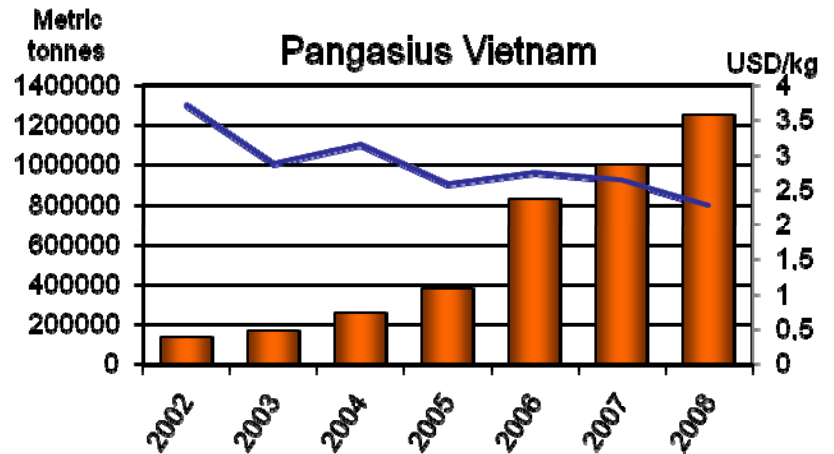
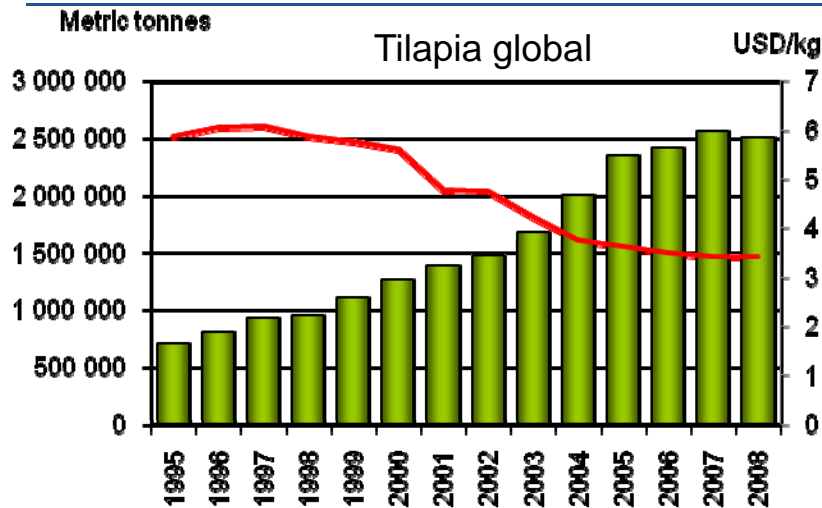
# Channel catfish – Decline of USA and rise of China



Source: FAO, USDA



These figures also suggest that productivity growth over time has driven expansion



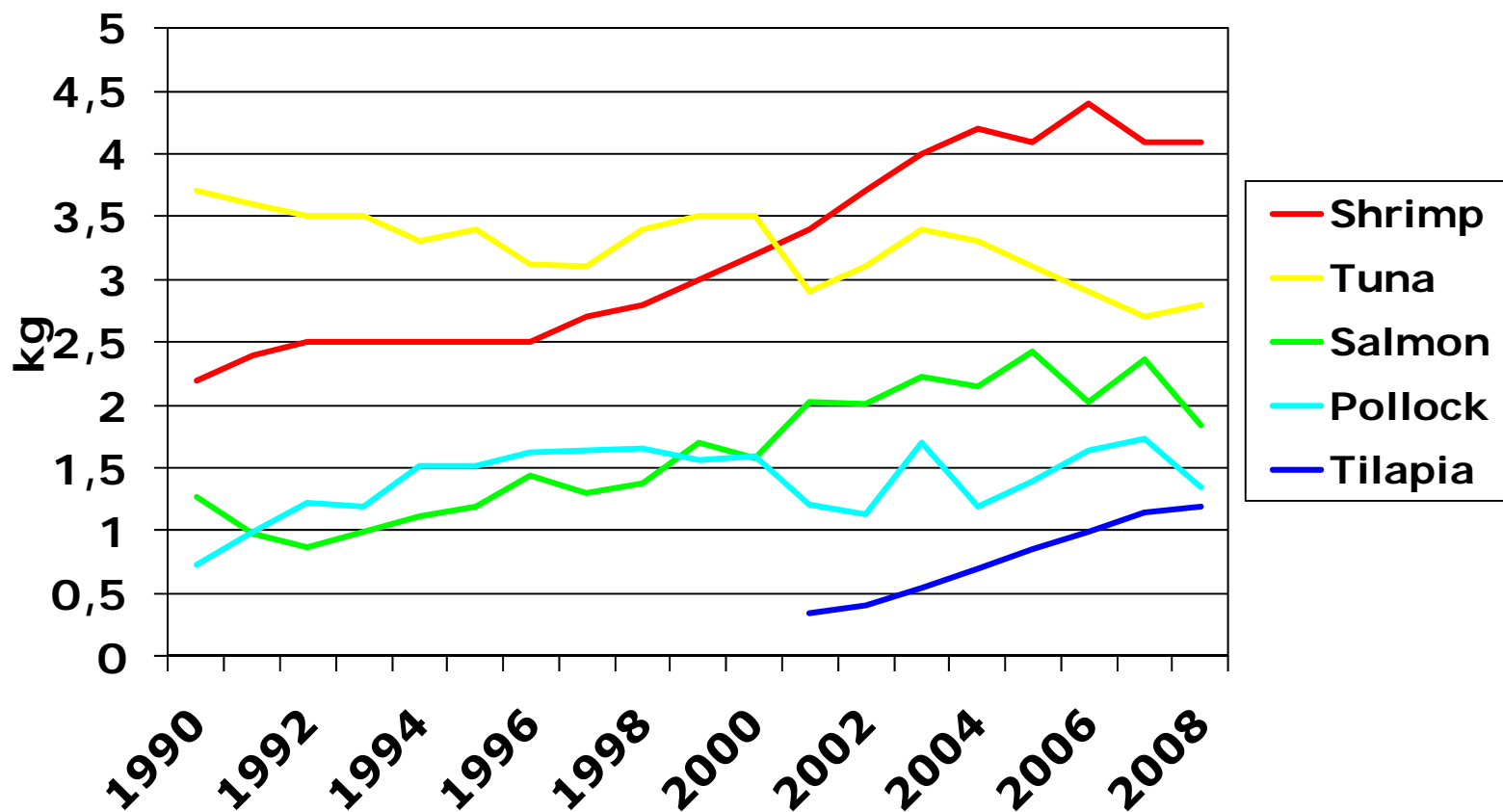
Source: FAO, GOAL, Kontali

## Increased demand

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- Salmon and shrimp are the two most successful species so far, although in recent years, tilapia and pangasius is also great success stories
- The main difference between these species and all other species is the much larger market they are serving
  - For these species, the geographical market has been expanded to become global in scope
  - As new markets has been penetrated, the competitive edge of the products have allowed local processors to generate new product forms
- In contrast, sea bass and sea bream are local species in Europe consumed in one main product form. Catfish is local to the US

## Per capita seafood consumption, USA



Source: NFI

# Innovations in logistics and marketing

- The control in the production process has allowed a number of innovations in the supply chain
  - E.g. large scale air freight of seafood, just-in-time delivery, and substantial product innovation
- One started in the traditional fresh fish counter, with unprocessed products....



- ..and continued with fresh packed product, branded products..



- ..and one see an increased number of ready meals and convenience food based on salmon

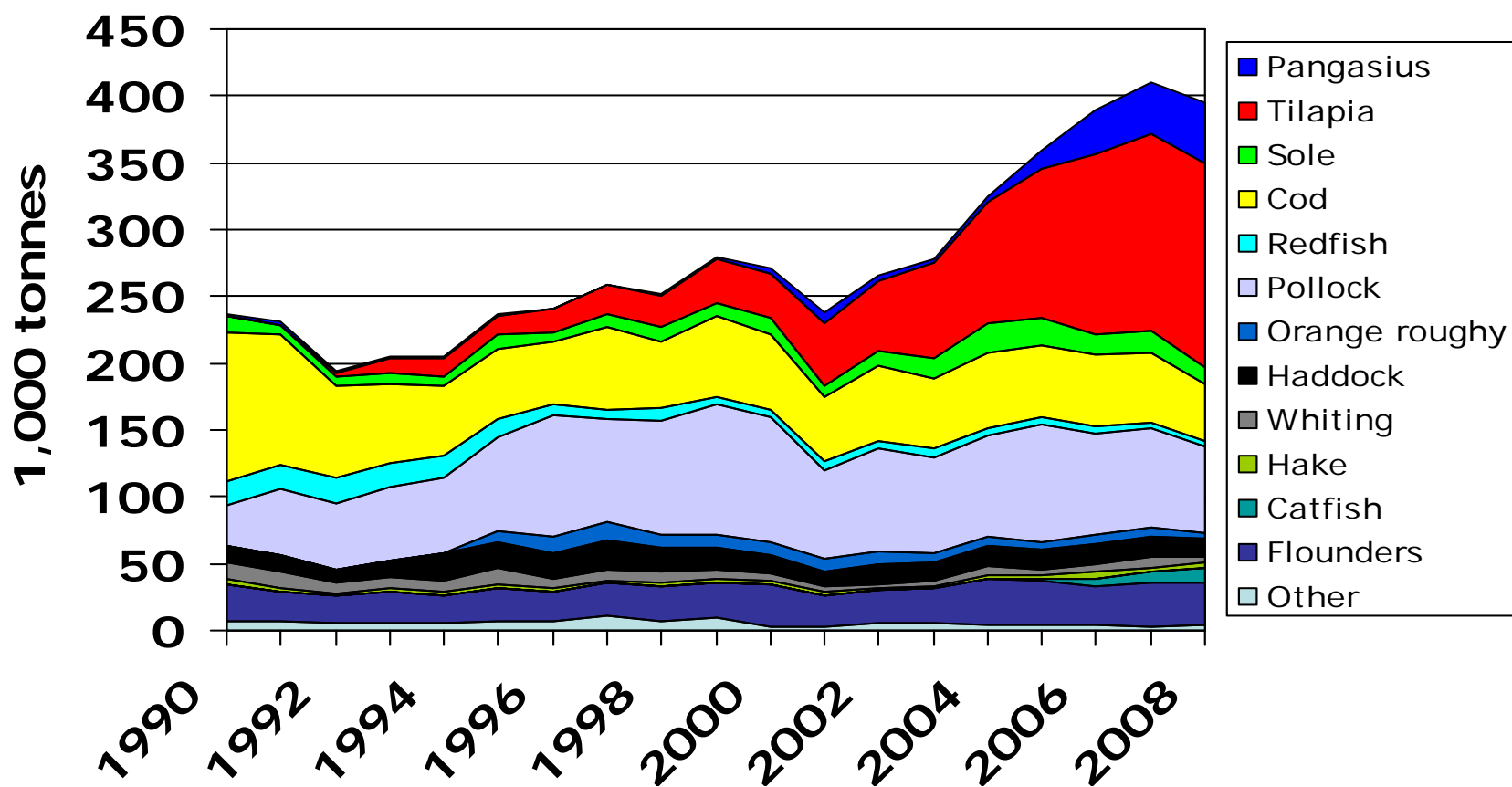


# Tilapia and Pangasius

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- During the last years, tilapia and pangasius has been the most successful aquaculture species when measured in increased production
- Provide examples of a development that other species will copy in the future
  - Low production cost and flesh with a neutral taste makes the fillets highly versatile and highly competitive
- They have entered the whitefish market, one of the largest segments of the seafood market
  - Ca 6 million tonnes if only the main wild species are included
  - Ca 13 million tonnes if all species including aquaculture are included
- From 1980 the market has changed from a regional north Atlantic market to a global market
- The size of the market and a large number of processed product forms makes it an easy market to enter for new species

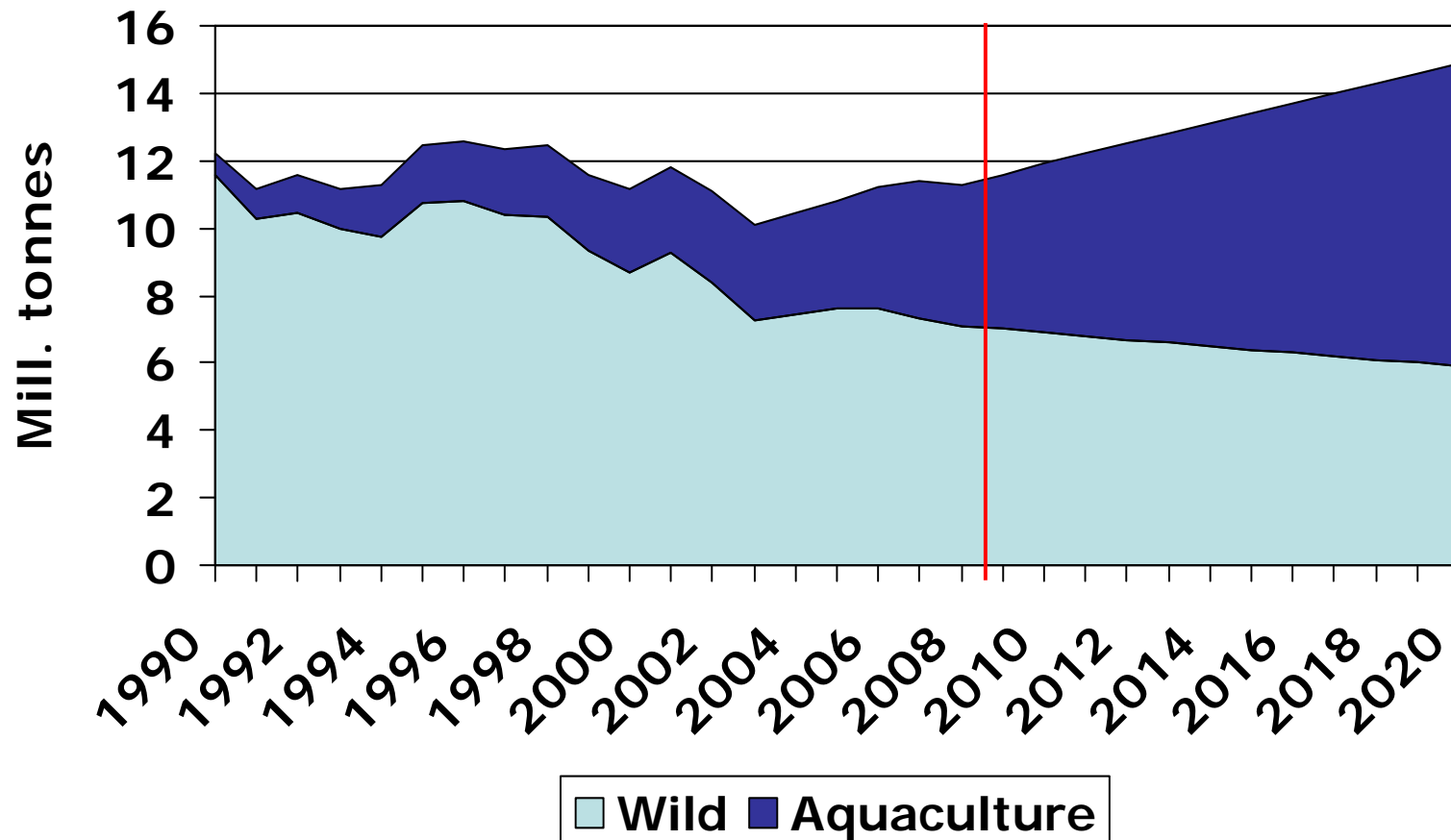
# US imports of frozen whitefish, 1990-2008



Source: NMFS



# New aquaculture species are expected to dominate the whitefish market

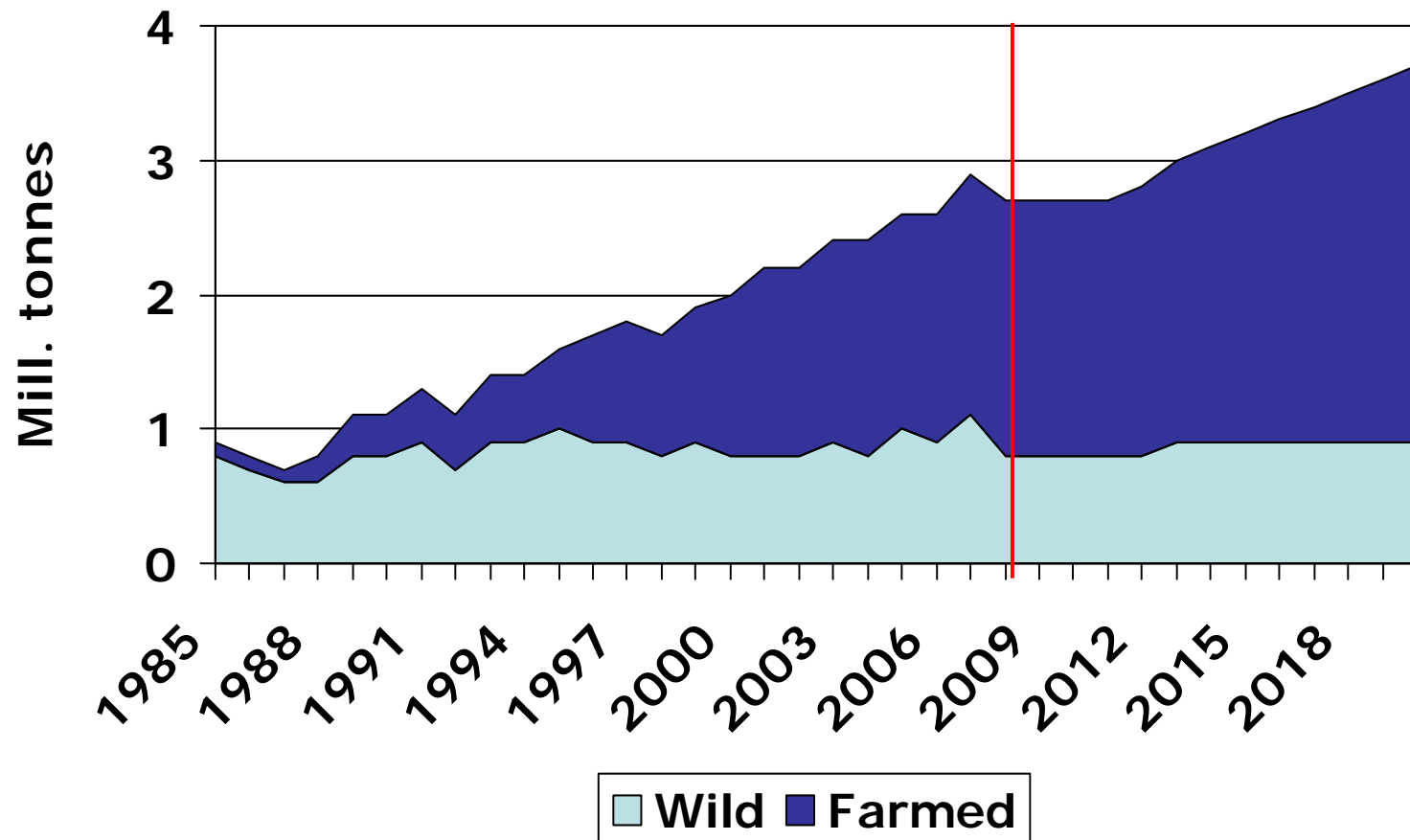


Source: NSEC, FAO, own estimates



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## Aquaculture already dominate the salmon market



Source: NSEC, FAO, own estimates

## The retailing sector and logistics is changing

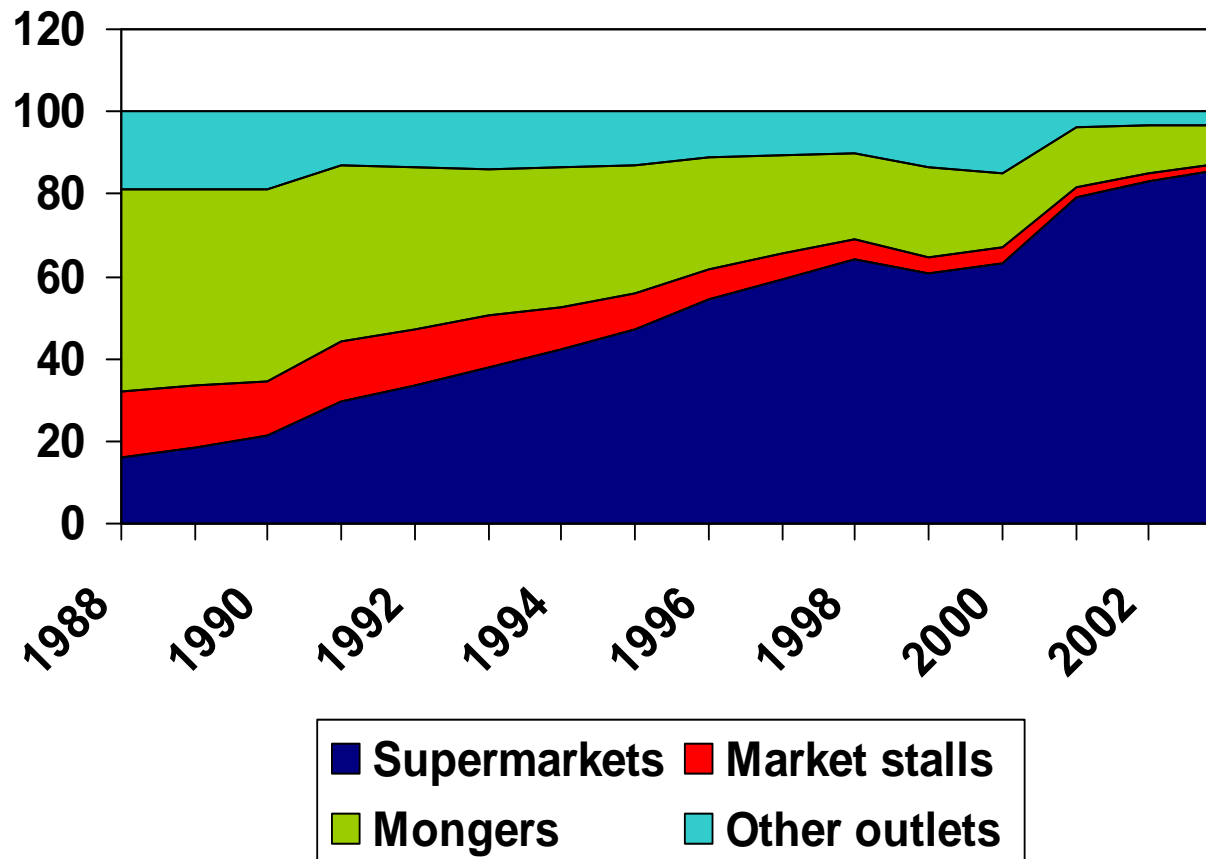
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- Traditional (seafood) supply chains consisted of a number of levels where transactions took place between independent agents
- Retail chains allows for economies of scale and scope in marketing, retailing, logistics and distribution
  - Few seasonal products and smallscale suppliers get access to the shelves because that gives higher cost
- In most European countries retail chains make up more than 80% of retail sales
  - Murray and Fofana, Guilotreau et al
  - Traditional outlets like fish mongers disappear



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## Market share by value of fish retail in the UK, 1988-2003



Source: Sea  
Fisheries Industry  
Authority (SFIA)

## The retail chains are demanding customers

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- I. Price:** (a) Price level, (b) linkage to market prices, (b) quantity discounts.
- II. Volume and timing:** (a) Total volume, (b) regularity of deliveries, (c) flexibility in deliveries, e.g. in relation to "normal" volumes and times of delivery.
- III. Raw material attributes:** (a) Size distribution, e.g. fillets, (b) quality attributes, e.g. colour, fat, texture, taste, (c) fresh vs frozen, (d) uniform quality, (e) shelf life.
- IV. Product range and differentiation:** (a) Fish species, (b) Product varieties, e.g. easy-to-cook, ethnic foods, healthy foods, (c) private labels / brands, (d) consumer advertising.
- V. Production process:** (a) Raw materials in feed, (b) environmental effects of production, (c) animal welfare, (d) third party certification, e.g. ISO, EMAS, (e) traceability.
- VI. Transaction costs:** (a) Negotiation, (b) planning, (c) control and enforcement, (d) transportation og (e) storage.



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The product is not only the physical seafood product...

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...but also a set of services for the industrial buyers related to:

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- **Volume**
- **Timing and frequency**
- **Flexibility**
- **Cost efficiency in distribution**
- **Food safety**
- **etc.**

## The retail chains are demanding customers

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- The set of extra services increase the complexity of the composite product that a supplier is providing
  - Ecolabels is just an additional extra service
- In addition to productivity growth, this increase the competitiveness of aquaculture because it is less costly to provide the added services

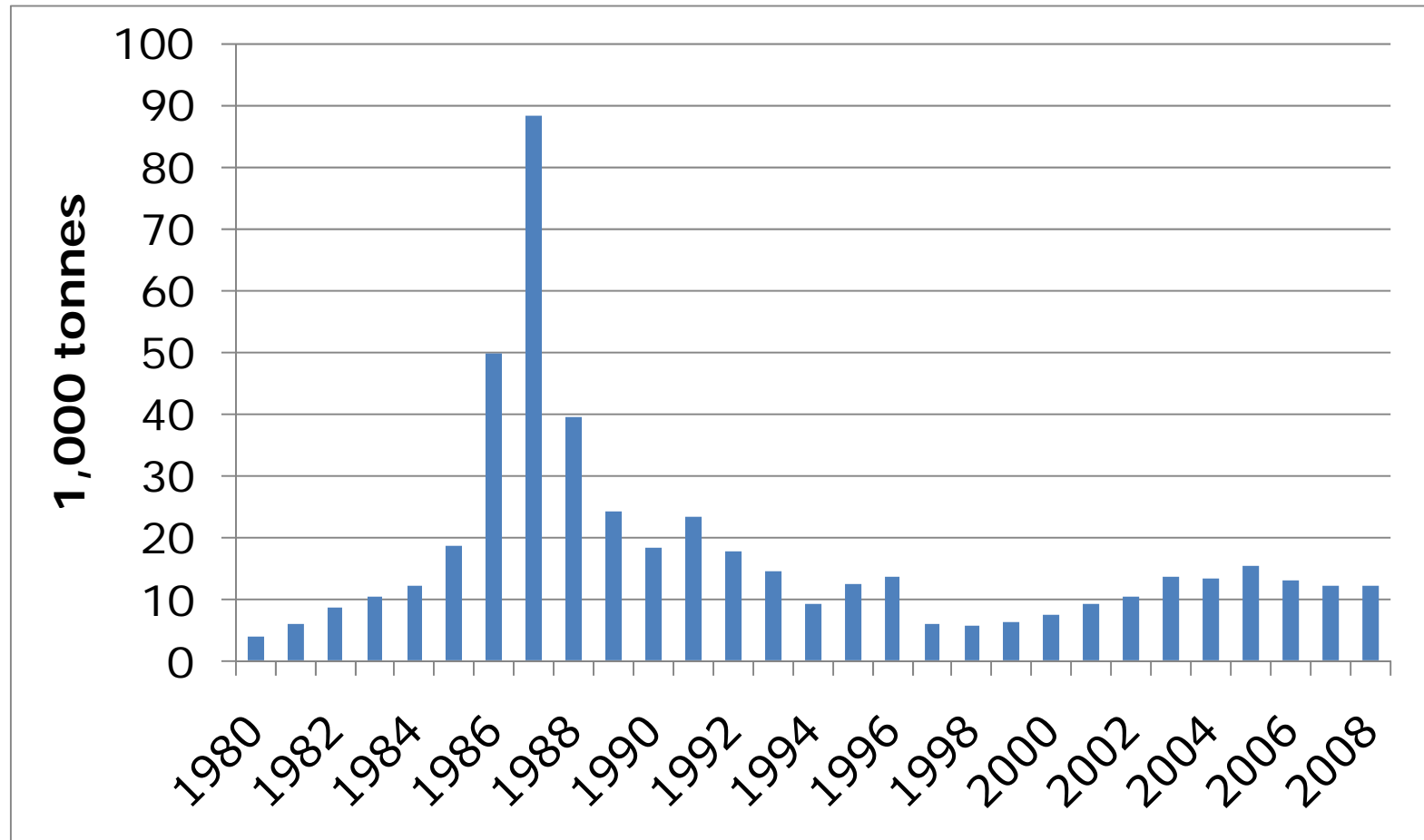


# Sustainability

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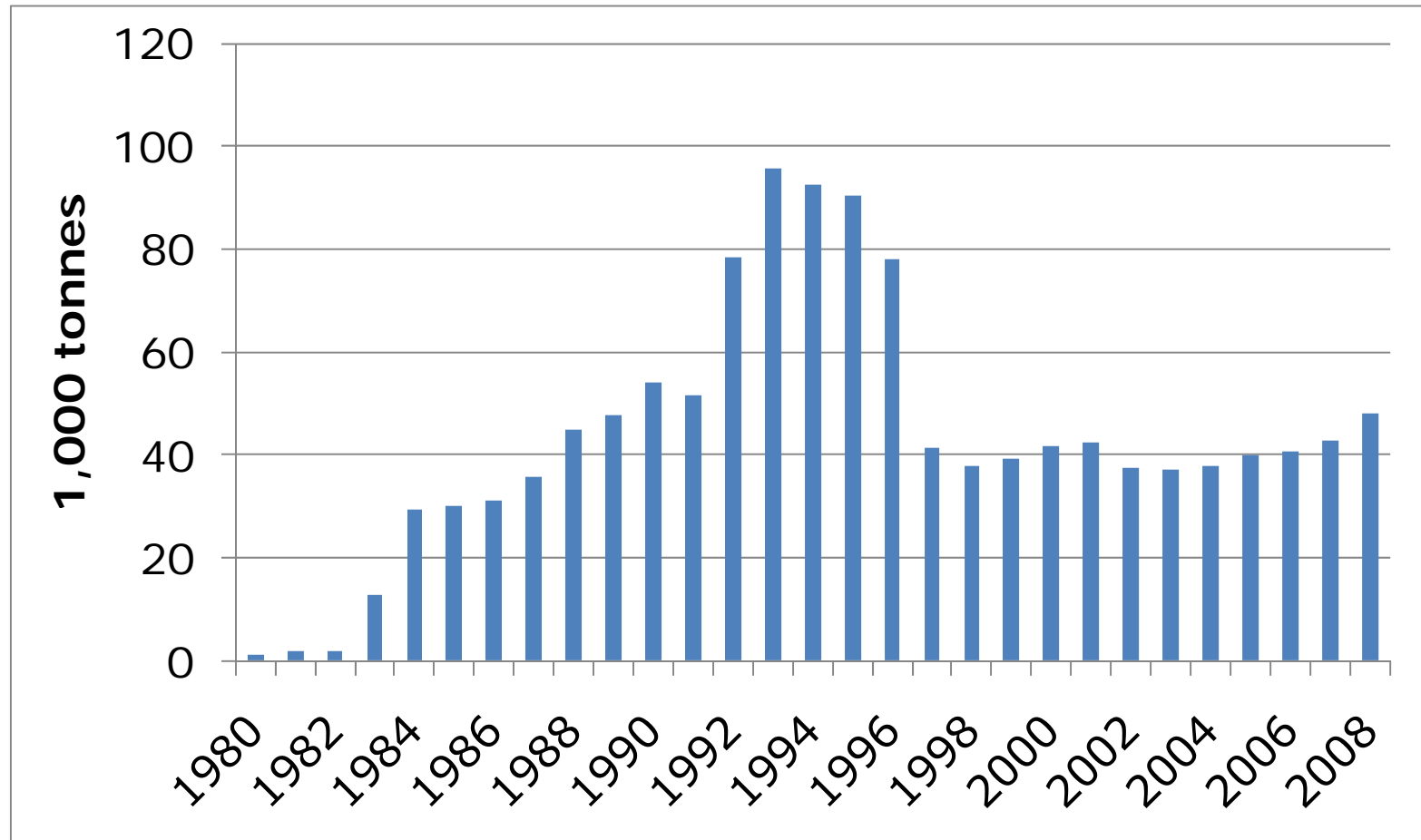
- So far the aggregate numbers shown indicate a great success story
- However, there has also been a number of failures, and several people has questioned the sustainability of aquaculture
  - Local issues, pollution and emissios, land use
  - The fishmeal trap or are there enough feed

# Shrimp production, Taiwan



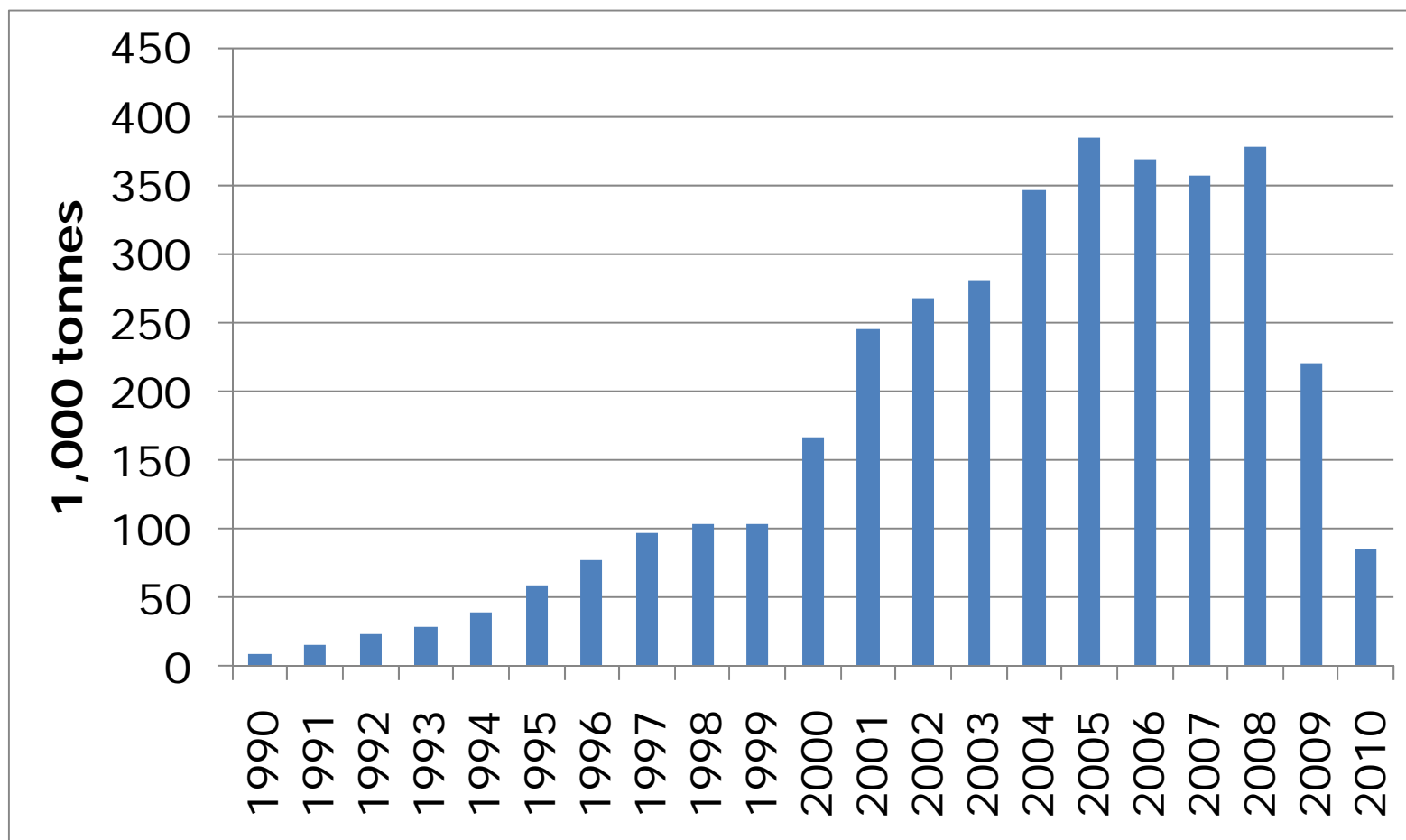
Source: FAO

# Shrimp production, The Philippines



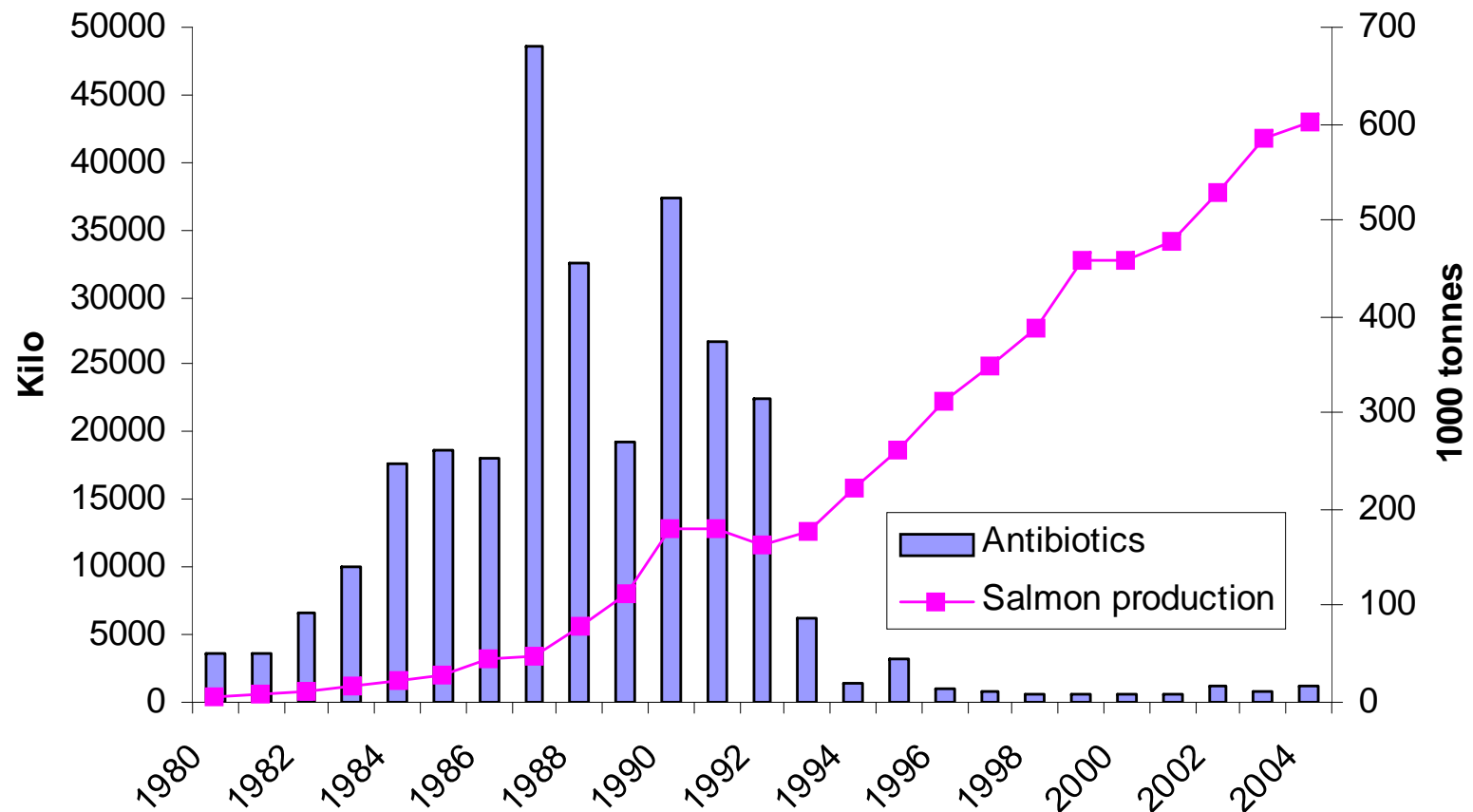
Source: FAO

# Salmon production, Chile



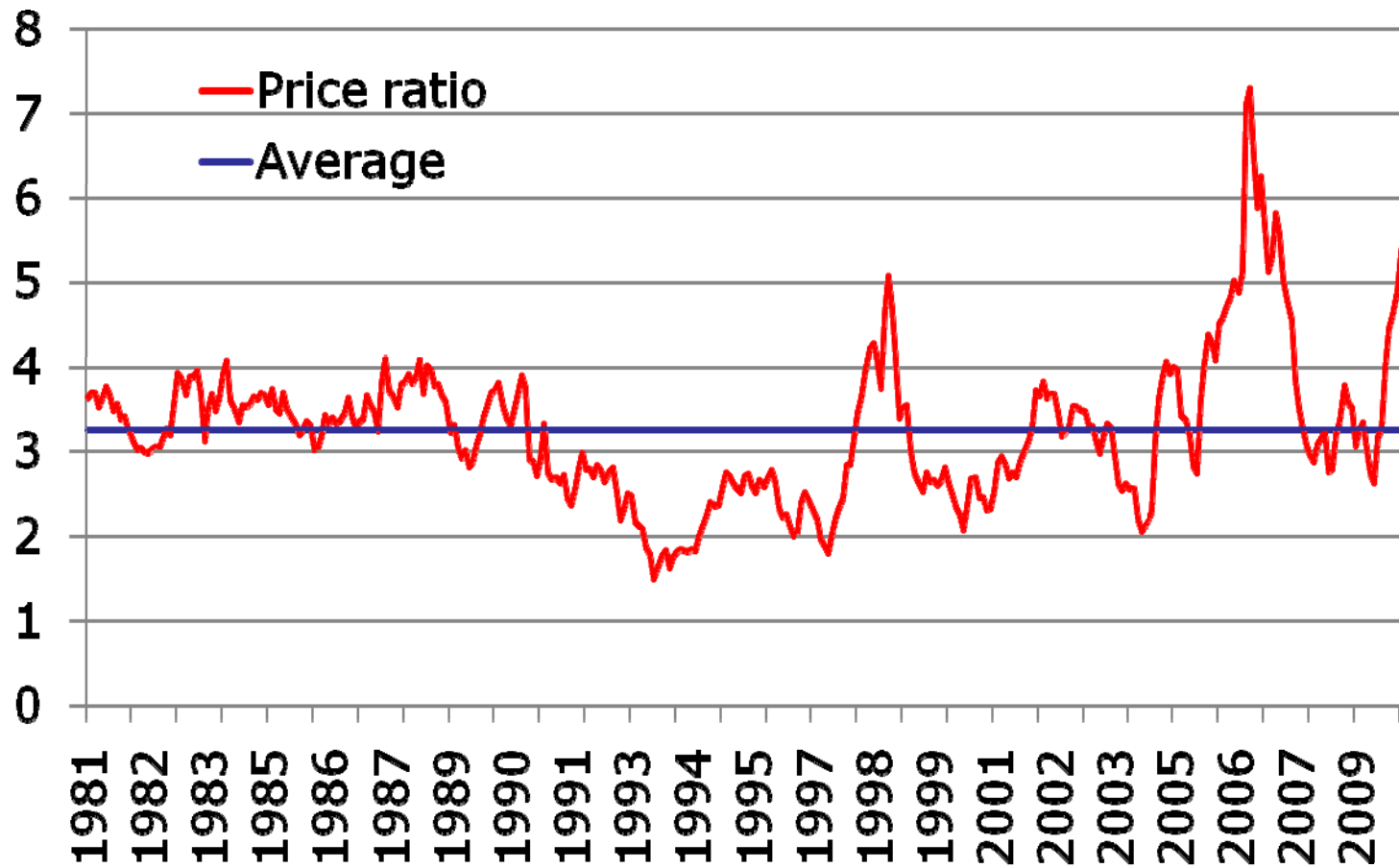
Source: FAO, Kontali

# Use of antibiotics in the Norwegian salmon farming industry



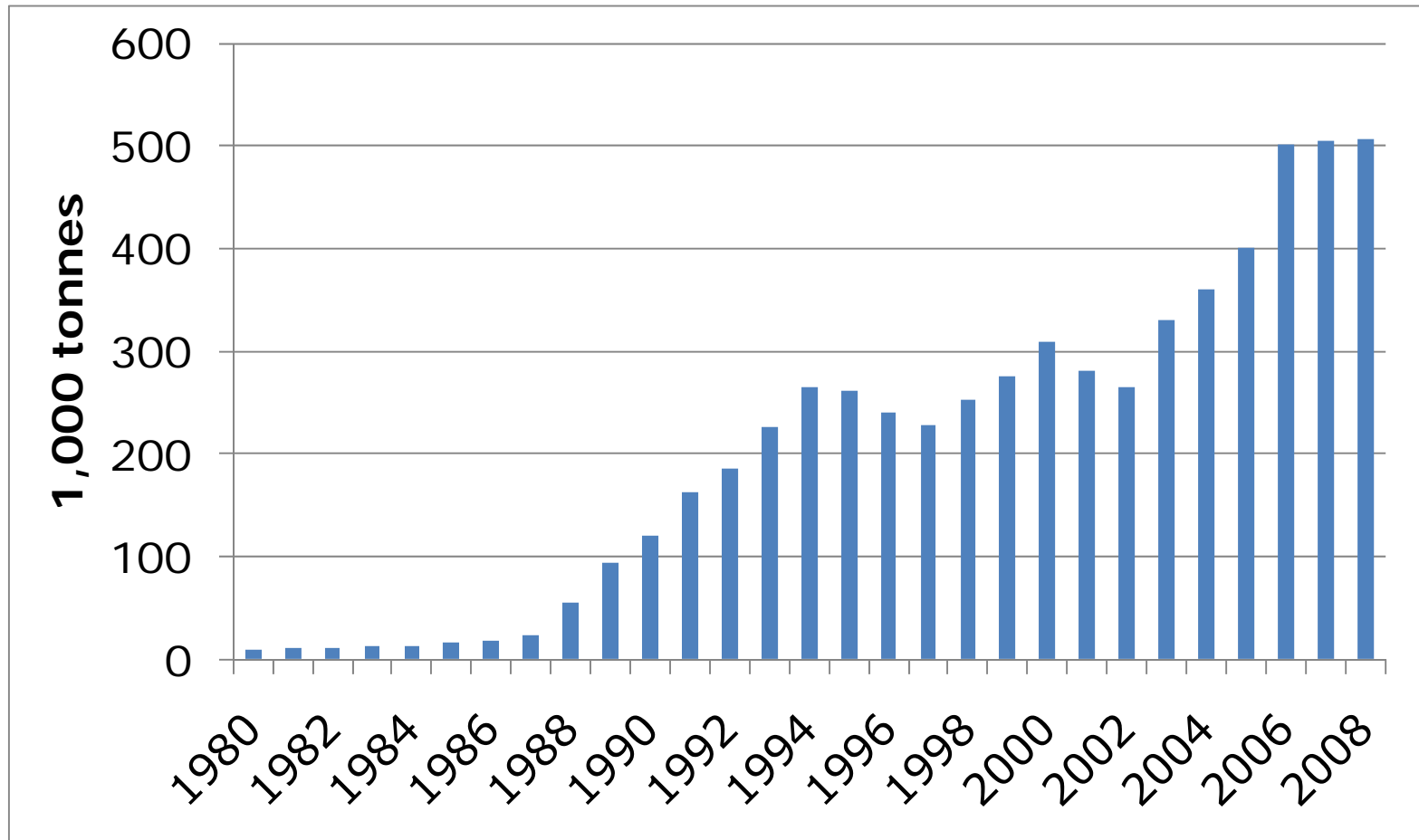
Source: Norwegian Directorate of Fisheries

## Fishmeal and soyameal prices



Source: IFFO

# Shrimp production, Thailand



Source: FAO

# Aquaculture is sustainable

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- While there has been numerous examples of unsustainable aquaculture operations, there is nothing inherently unsustainable with aquaculture
  - What is the issue is whether the producers choose to operate on a sustainable basis
- This is largely a function of self interest and governance
  - Is something aquaculture has in common with agriculture, forestry and many other industries



# Aquaculture production will continue to increase

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- Because it is profitable
- Control of production process leads to technological development and productivity increase
  - Cost reductions
  - Breeding
- This makes aquacultural products increasingly competitive
- Species that does not have production processes with these characteristics, will not succeed as large volume species
  - In the intermediate term, there will be relatively many species exploring new technology
- As with agriculture, control with the production process and productivity improvement is necessary if one are to feed more people. Wild fisheries do not have this potential

# Aquaculture production will continue to increase

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- Aquaculture is likely to be like any other crop or livestock in the future, because one has the same type of control with the production process
- It will also face similar environmental challenges
- Aquaculture will limit potential price increases and possibly reduce prices for wild fish, leading to reduced fishing pressure
- Most farmed species are likely to be primarily fed with vegetable inputs
- Although the fishmeal trap is not present today, the only way to ensure that increased demand for small fish does not lead to over fishing is management.
- Cost considerations, will still limit such overfishing and will limit the number of species that is farmed in the future
- Local environmental issues are a management problem and can be solved

# Aquaculture production will continue to increase

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- Cost consideration will leave only a few high volume species, of which there are produced millions of tonnes
  - Tilapia, and maybe some other finfish species?
  - Shrimps
  - Mussels and scallops
  - ?
- In animal production there are four; livestock, pigs, poultry and sheep
- These species will be sold in a similar fashion
- There will be a large number of species produced in moderate quantities
  - Like quail, deer etc.