Why is Aquaculture and Aquatic Animals Health so important?

Franck C.J. Berthe
Secretary General
Aquatic Animals Health Standards Commission
Contribution of food fish to the human diet

Fish as percentage of total animal protein intake

<table>
<thead>
<tr>
<th>Region</th>
<th>Percent</th>
<th>Bar Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>21.1</td>
<td>21.1</td>
</tr>
<tr>
<td>Asia</td>
<td>23.3</td>
<td>23.3</td>
</tr>
<tr>
<td>Africa</td>
<td>19.4</td>
<td>19.4</td>
</tr>
<tr>
<td>Europe</td>
<td>10.3</td>
<td>10.3</td>
</tr>
<tr>
<td>Oceania</td>
<td>9.4</td>
<td>9.4</td>
</tr>
<tr>
<td>North &amp; Central America</td>
<td>7.1</td>
<td>7.1</td>
</tr>
<tr>
<td>South America</td>
<td>5.7</td>
<td>5.7</td>
</tr>
<tr>
<td>Developed Countries</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Developing Countries</td>
<td>18.8</td>
<td>18.8</td>
</tr>
<tr>
<td>LIFDCs*</td>
<td>20.6</td>
<td>20.6</td>
</tr>
<tr>
<td>World</td>
<td>15.9</td>
<td>15.9</td>
</tr>
</tbody>
</table>

* including China
Global farmed terrestrial and aquatic meat production

Million Metric Tons

HOG/PIG MEAT (APR 3.1%)

POULTRY MEAT (APR 5.1%)

BEEF & VEAL (APR 1.2%)

AQUATIC MEAT (APR 9.4%)

MUTTON & LAMB (APR 1.0%)

(Source: FAOSTAT, 2003)
Fish production and food consumption
Figure 1. Long-term world population growth, 1750 to 2050

Growth in salmon production

- **Aquaculture production**
- **Wild salmon production**

### Million MT

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5

### Years

- 1950
- 1955
- 1960
- 1965
- 1970
- 1975
- 1980
- 1985
- 1990
- 1995
- 2000
- 2005
Share of world fisheries production destined to exports

A. Lem (FAO), IIFET, 2008
World fish trade: export value

in 1000 US$ (FAO) -
Aquaculture trends
Aquaculture trends

- Intensification of aquaculture production driven by the availability of sites and ability to exploit non-agricultural land
- Diversification of species use, e.g. high value marine species
- Increasing attention on better management of the sector
- Increasing influence of markets, trades and consumers – greater attention to food quality and safety, moving towards value adding and processing of products for export
- Enhancing regulation and improving governance, with emphasis on self-regulation by farmer association
Inappropriate management frequently leads to residues and contaminants in aquatic products and environments, raising food safety and ecosystem integrity concerns.
Fish welfare is a growing concern
"You can see by its smile that this halibut was humanely killed."
Aquaculture

- Started as freshwater food production systems
  - spread to all continents
  - all aquatic ecosystems
  - a range of aquatic sp

- Different profiles of production
  - Small scale, non commercial and family based
  - large scale commercial and industrial production

- Trade at national, regional and global levels
# Aquaculture profiling

<table>
<thead>
<tr>
<th></th>
<th>Few species</th>
<th>Many species</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Optimized feed</td>
<td>Trash fish</td>
</tr>
<tr>
<td>Full scientific basis</td>
<td></td>
<td>Some scientific basis</td>
</tr>
<tr>
<td>Established technology</td>
<td>Full scientific basis</td>
<td>Traditional technology</td>
</tr>
<tr>
<td>History of disease investigation</td>
<td>Disease investigations are new</td>
<td>Wild broodstock and fingerlings</td>
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<tr>
<td>Closed cycles</td>
<td>Prevention: vaccination</td>
<td>Treatment: antibiotics</td>
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<td>Corporate and well-</td>
<td>Small-holders, semi-</td>
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<tr>
<td></td>
<td>organized</td>
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</table>

- Disease investigations are new.
- Closed cycles.
- Wild broodstock and fingerlings.
- Prevention: vaccination.
- Treatment: antibiotics.
- Corporate and well-organized.
- Small-holders, semi-organized.
Aquaculture

Variaciones de volumen y precio polarizan la producción
Países asiáticos con altos volúmenes y enfocados en especies de bajo valor

Distribución de principales países acuícolas según producción y valor por kilogramo (2005)

(1) Calculado según valoración FAO de producción y volúmenes de cosecha de acuicultura en 2005
Fuente: FAO, análisis BCG
Fish production in Norway

![Graph showing fish production in Norway from 1991 to 2000]

- Salmo salar
- Oncorhynchus mykiss
- Salvelinus spp
- Gadus morhua
- Osteichthyes

Source: FAO 2000 90/2
Increase in the number of species cultured as risk to aquaculture

<table>
<thead>
<tr>
<th>Region</th>
<th>1970</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>Asia (excluding China)</td>
<td>55</td>
<td>107</td>
</tr>
<tr>
<td>Oceania</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Europe</td>
<td>19</td>
<td>60</td>
</tr>
<tr>
<td>Africa</td>
<td>5</td>
<td>43</td>
</tr>
<tr>
<td>Latin America &amp; the Caribbean</td>
<td>8</td>
<td>46</td>
</tr>
<tr>
<td>North America</td>
<td>9</td>
<td>19</td>
</tr>
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Subasinghe (2003)
Possible causes for disease introduction into a country

- Import health requirements inadequate or non-existent
- … or ineffectively enforced (or ignored)
- Unreliable disease surveillance/diagnostics in exporting country
- Route of entry not previously recognised or sufficiently controlled
  - species not previously known to be susceptible or carrier (not OIE-listed)
  - unrelated vector species type (amphibia and fish for ranaviruses)
  - ornamental/pet trade (mostly unregulated)
  - live animals for ‘direct’ human consumption (eels, carps, molluscs)
  - dead animals used as bait or feed for aquatic animals (shrimps, pilchards)
  - processing of products in unregulated plants (shrimp, trout)
  - live fish transport vehicles (wellboats)
  - ships ballast water?
Live food or fresh food pathway

Larval cestode *Callotetrarhynchus nipponica* is an example of a parasite problem of yellowtail, *Seriola quinqueradiata*, associated with feeding with raw anchovy, *Engraulis japonica* (Ogawa, 1996)
Baitfish of the species *Sardinops sagax* and a mix of bycatch species imported from California, Peru, Chile and Japan, without quarantine and on a scale of more than 16000 tonnes per annum for feeding sea-caged blue fin tuna in Southern Australia is near where epizootics began. It was hypothesized that this is the most likely source of the introduction of herpesvirus in Australian waters (Campbell and Hewitt, 2008)
Yearly shipping movements
“… Over the past two years, about 50 million tons have been added to a global fleet capacity of close to 420 million tons. In 2009 and 2010, more than 175 million tons is due to come into service.”

Global transfers of live shrimp

Courtesy Prof. D. Lightner
Global distribution of WSSV

USA
Mexico
Colombia
Ecuador
Guatemala
Honduras
Nicaragua
Panama
Peru
Brazil

India, Bangladesh, Iran, Sri Lanka

Japan
Taiwan
South Korea

China
Thailand
Malaysia
Indonesia
Myanmar
Philippines
Taura Syndrome Virus to Asia

- Import of *P. vannamei* for aquaculture largely due to several misconceptions on utilizing Specific Pathogen Free and high health shrimp
- TSV first recorded in Taiwan in 1999 (scientific literature)
- *P. vannamei* being illegally imported to other countries with the same risk (Indonesia, Myanmar, Philippines, Thailand, etc.)
- TSV reported from several countries in the region; Taiwan, Indonesia, etc.
Aquaculture - diseases
Mass mortality of koi and common carp in Indonesia

Cameron, 2003; Rukyani, 2003
Retrospective Analysis of the case

First occurrence of KHV in Blitar among koi carps in March 02

Quarantine records at Surabaya revealed importation of koi carp from China through Hong Kong in Dec 01-Jan 02

First KHV outbreak of common carp in March-April 02 in Subang

First KHV outbreak in Bandung, West Java in March 02 from infected fish from Blitar

Ministerial Decree in June 02 restricting live fish movement

First KHV outbreak in Blitar among koi carps in March 02

First KHV outbreak in Cirata reservoir May 02

First KHV outbreak in Lubuk Lingao in Jan 03
Aquaculture - diseases

- Mortality
- Efficiency of production process
- Cost of diagnosis and control
- Environmental impacts
- Dissemination of pathogens
  (regional, national, international levels)
Farmers suffer as bug wipes out oysters

CAGE OF DISASTER ... A worker, Awang Mohamad, scooping out the dead fish from the cage.

Thousands of fish in cages found dead
Aquaculture - diseases

- Antimicrobial use
- Residues
- Quality of products
- Lost of market
- Lost of jobs
Responsible use of antibiotics
Disease outbreaks due to international trade

Although local pathogens combined with other factors such as poor husbandry and inadequate water quality are the most common causes of disease outbreaks in aquaculture, the introduction of ‘exotic’ pathogens through international trade in live aquatic animals and their products continues to be a major reason for new epizootics.
The main aim of OIE is to ensure the sanitary safety of international trade in live animals and their products.

This is achieved by providing guidelines on the health measures to be used by the competent authorities of importing and exporting countries to prevent the transfer of agents pathogenic for aquatic animals, while avoiding unjustified trade barriers.
Developing the OIE standards for aquatic animals is the role of the Aquatic Animal Health Standards Commission.
Aquatic Animal Health Standards
Commission Members (elected in May 2009)

President:
• Dr Barry Hill

Vice President:
• Dr Ricardo Enriquez Sais

Secretary General:
• Dr Franck Berthe

Members:
• Dr Olga Haenen
• Dr Huang Jie
• Dr Victor Manuel Vidal

CVO meeting - 8 December 2009, Brussels
The OIE standards applicable to international trade in aquatic animals are laid out in the International Aquatic Animal Health Code and Manual.
## Treaties and agreements related to international trade in aquatic organisms and their products

<table>
<thead>
<tr>
<th>Binding</th>
<th>Non-binding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement)</td>
<td>ICES Code of Practice on the Introduction and Transfers of Marine Organisms</td>
</tr>
<tr>
<td>Aquatic Animal Health Code (OIE)</td>
<td></td>
</tr>
<tr>
<td>Convention on Biological Diversity and the Cartagena Protocol on Biosafety (UNEP)</td>
<td>EIFAC Codes of Practice and Procedures for Introductions and Transfers of Marine and Freshwater Organisms</td>
</tr>
<tr>
<td>Convention on International Trade in Endangered Species (CITES)</td>
<td>Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals in Asia (TGBCIS)</td>
</tr>
<tr>
<td>European Union (EU) related legislation and directives</td>
<td>FAO Code of Conduct for the Responsible Fisheries (CCRF)</td>
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Take home messages

- Aquaculture is the fastest growing sector of food production
- Aquaculture development continuously brings new challenges regarding aquatic diseases
- This happens in the context of an increased societal scrutiny
- OIE standards are continuously improved and added
...... The current situation offers a big challenge and an opportunity to all concerned but, if maintained at the present level, major epidemics will continue to threaten, break out and impact the ultimate goal of aquaculture sustainability.”

“Aquaculture development, health and wealth” Aquaculture in the Third Millennium NACA/FAO 2000
Thank you for your attention