OIE Workshop for Aquatic Animal Focal Points
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National Approaches to Aquatic Animal Health Emergencies and Response

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National Strategies on Aquatic Animal Health

- Serves as framework for the national level implementation of technical guidelines
- Contains the action plans of governments at short, medium and long term to implement the technical guidelines using the concept of ‘phased implementation based on national needs’
- At different stages of development

Impact of Aquatic Animal Diseases (AAD)

- National estimates
  - US$ 17.5 M WSSV in India in 1994;
  - US$ 650 M for YHD in Thailand in 1994
- Global estimate: US$ 20 B shrimp diseases
- In 2004, EU aquaculture was worth more than 2.5 billion Euros, but financial losses due to disease were estimated at 20% of the production value (equivalent to 500 millions Euros).
- Annual losses due to ISA
  - Norway: US$ 11 M;
  - Canada: US$ 14 M

Bondad-Reantaso *et al.*, 2005; Stirling Aquaculture, 1998; Bostock, 2002

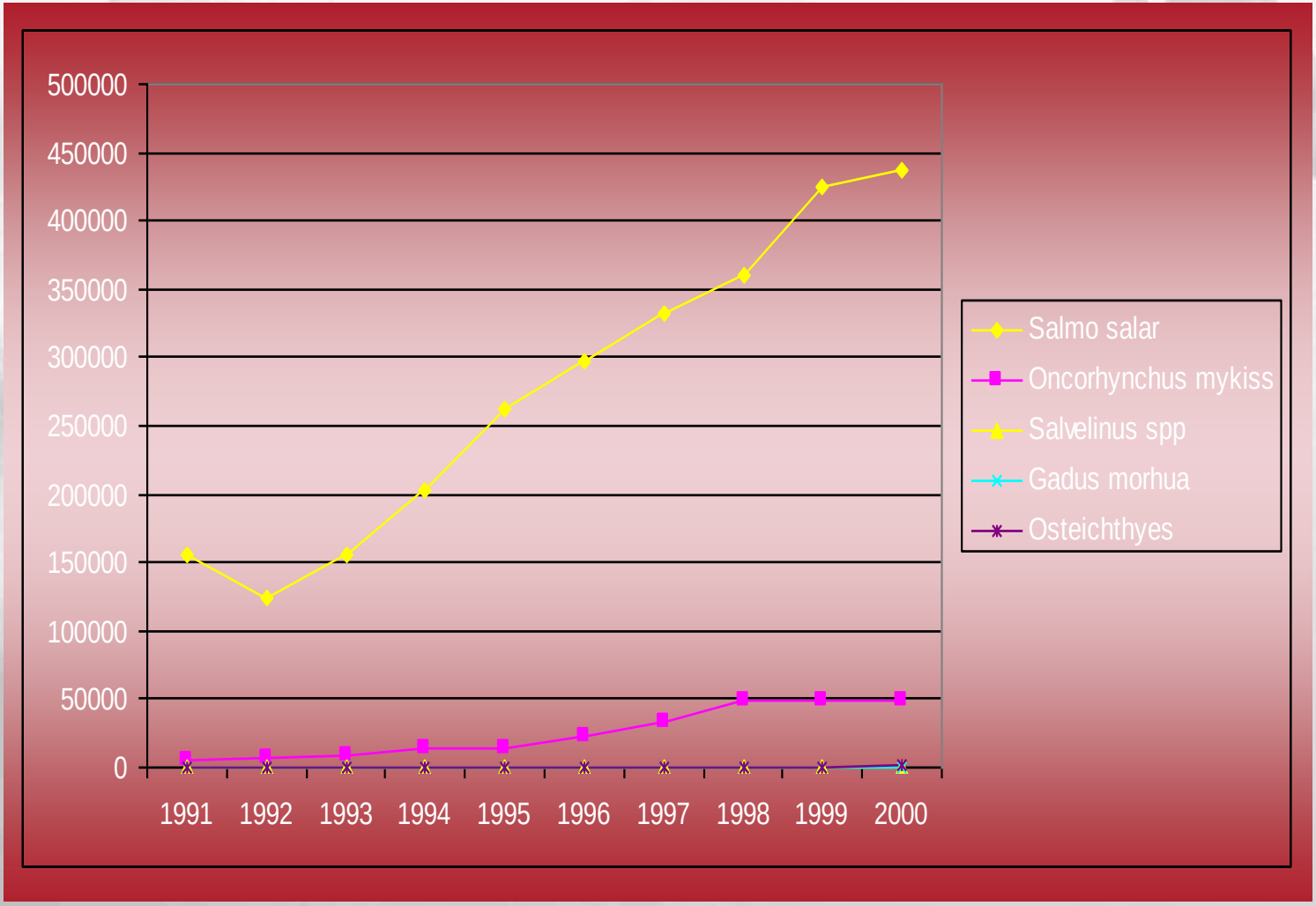
AADs and economic investments

- Disease control programs
  - USA: US$ 8.3 M ISA ; US$ 11.7 SVC
  - Canada: US$ 34 M; China: US$ 73 M
  - Norway: US$ 3.98 M
- Research
  - China: US$ 6 M; Thailand: US$ 5 M; Norway: US$ 50.1 M
- National strategies on aquatic animal health
  - Australia: US$ 2.09 M over 4 years of development and initial implementations
  - USA: US$ 375 000.00 development
- Aquatic animal health market
  - Market size: worth US$ 938 M (biologicals, antibiotics, antiparasitics, nutraceuticals)
  - R&D investment: worth US$ 48 M

Aquaculture profiling

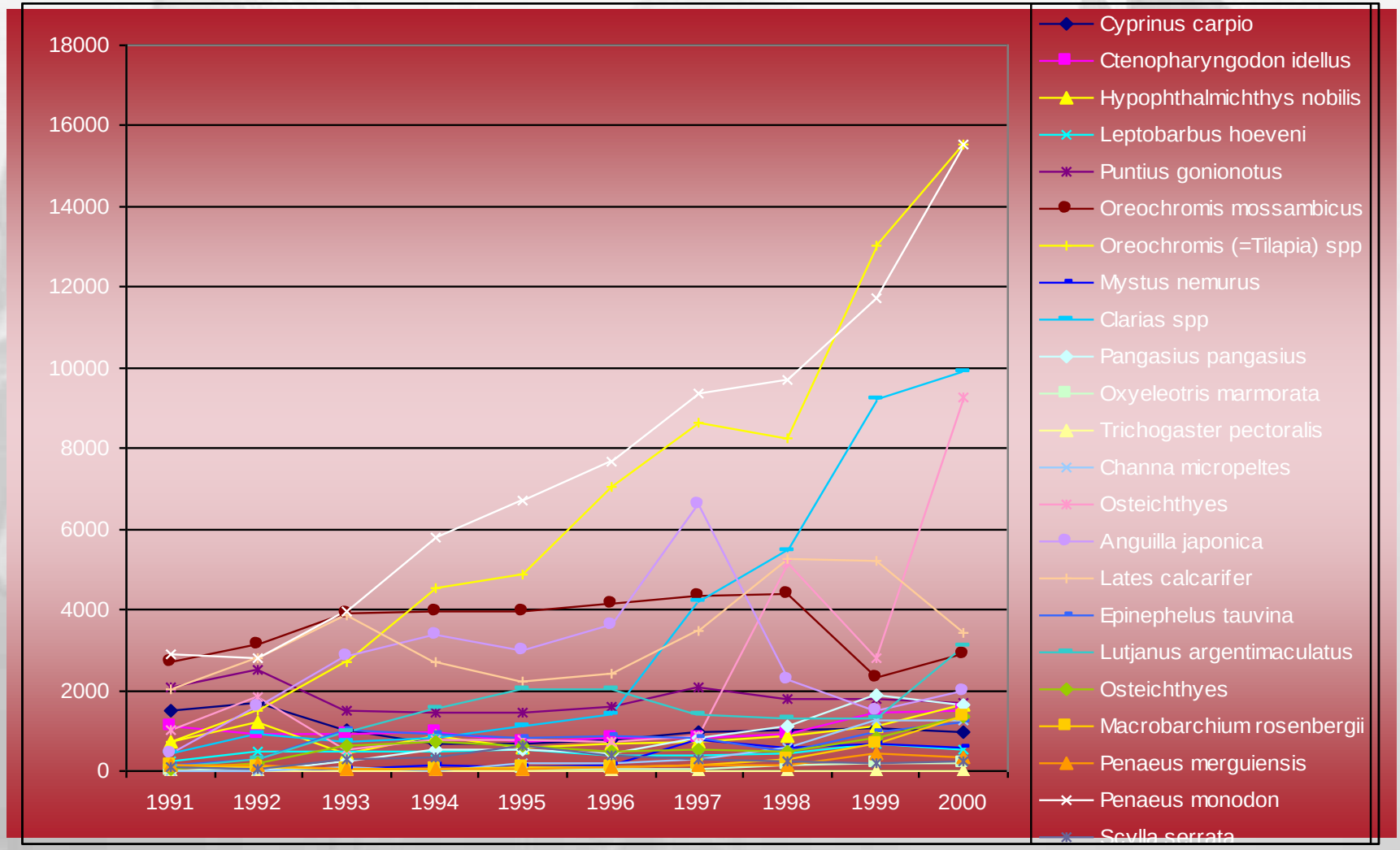
Developed Countries	Developing countries
Few species Optimized feed	Many species Trash fish
Full scientific basis Established technology	Some scientific basis Traditional technology
History of disease investigation	Disease investigations are new
Closed cycles	Wild broodstock and fingerlings
Prevention: vaccination	Treatment: antibiotics
Corporate and well-organized	Small-holders, semi-organized

Fish production in Norway



Source: FAO 2000 90/2

Aquaculture in Malaysia



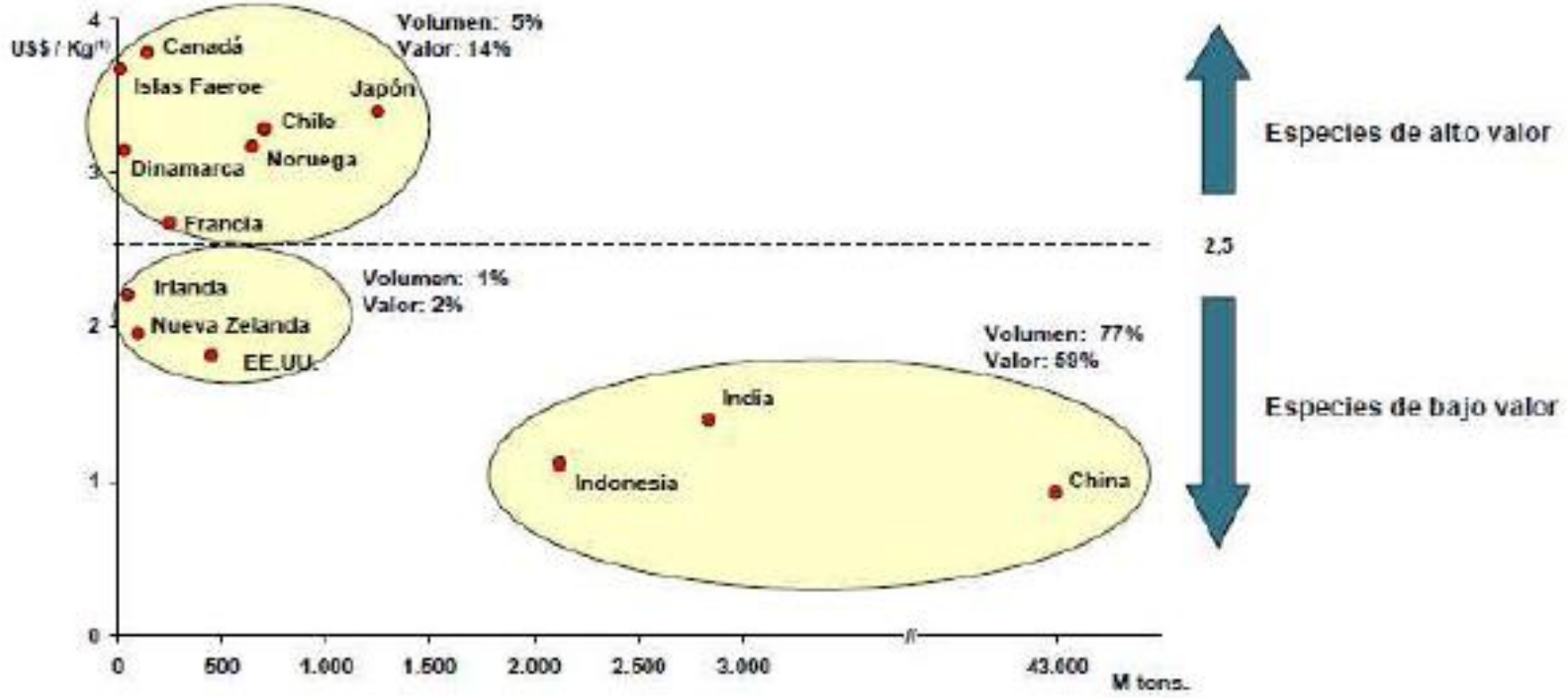
Source: FAO 2000 90/2

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

Increase in the number of species cultured as risk to aquaculture

Region	1970	2000
China	14	21
Asia (excluding China)	55	107
Oceania	3	30
Europe	19	60
Africa	5	43
Latin America & the Caribbean	8	46
North America	9	19

Subasinghe (2003)

Biosecurity and aquaculture

- In aquaculture, biosecurity is a collective term that refers to the concept of *applying appropriate measures* to reduce the probability of a biological organism or agent spreading to an individual, population, or ecosystem, and to mitigate the adverse impact that may result (Arthur *et al.* 2004).

- This analysis is done in a way that incorporates the best scientific information available in a defendable manner.

- WTO SPS Agreement emphasizes the need to apply risk analysis as a basis for taking any SPS measures beyond existing standards.

Important treaties and agreements related to international trade in fish and fish products

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

Examples of voluntary guidelines

- CCRF Aquaculture Development
- FAO CCRF Guidelines on Health Management for Responsible Movement of Live Aquatic Animals
- FAO/NACA Asia Regional Technical Guidelines

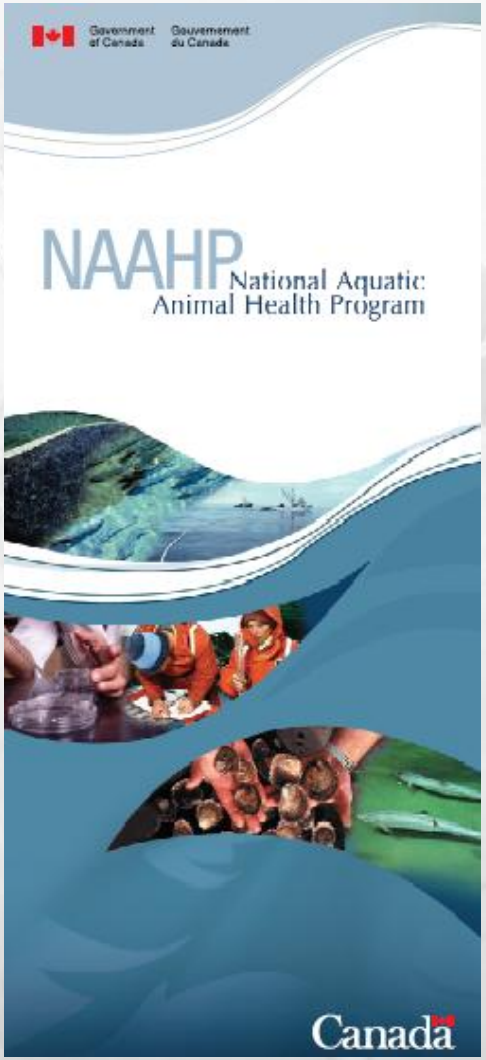
Biosecurity and National Strategies

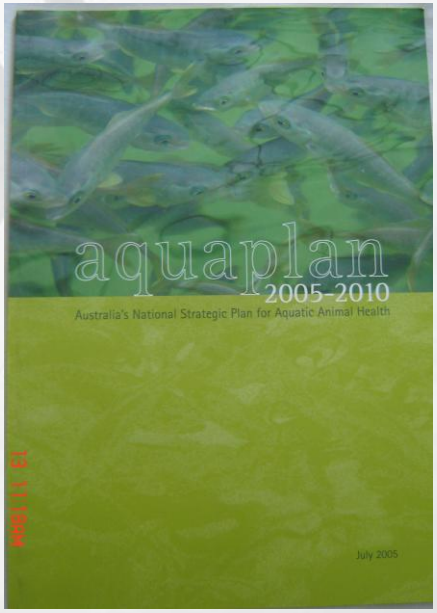
Policy, legislation and enforcement	Zoning
Risk analysis	Emergency preparedness
Pathogen list	Research
Information system	Institutional structure
Health certification and quarantine	Human resource development
Surveillance, monitoring and reporting	Regional and international cooperation

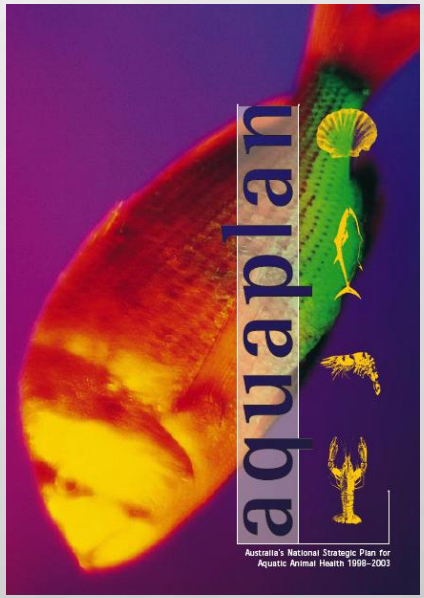
Examples of National Strategy

- Australia
- Canada
- USA
- Myanmar
- India
- Thailand
- Nepal
- Viet Nam
- Philippines
- Cambodia
- Laos
- Latvia
- Bosnia/Herzegovina

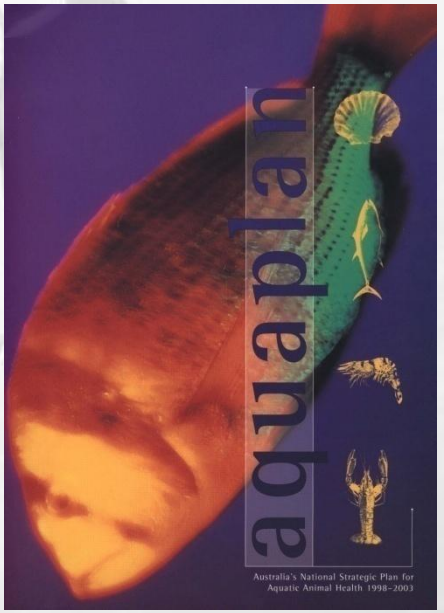
- Vets and non vets…



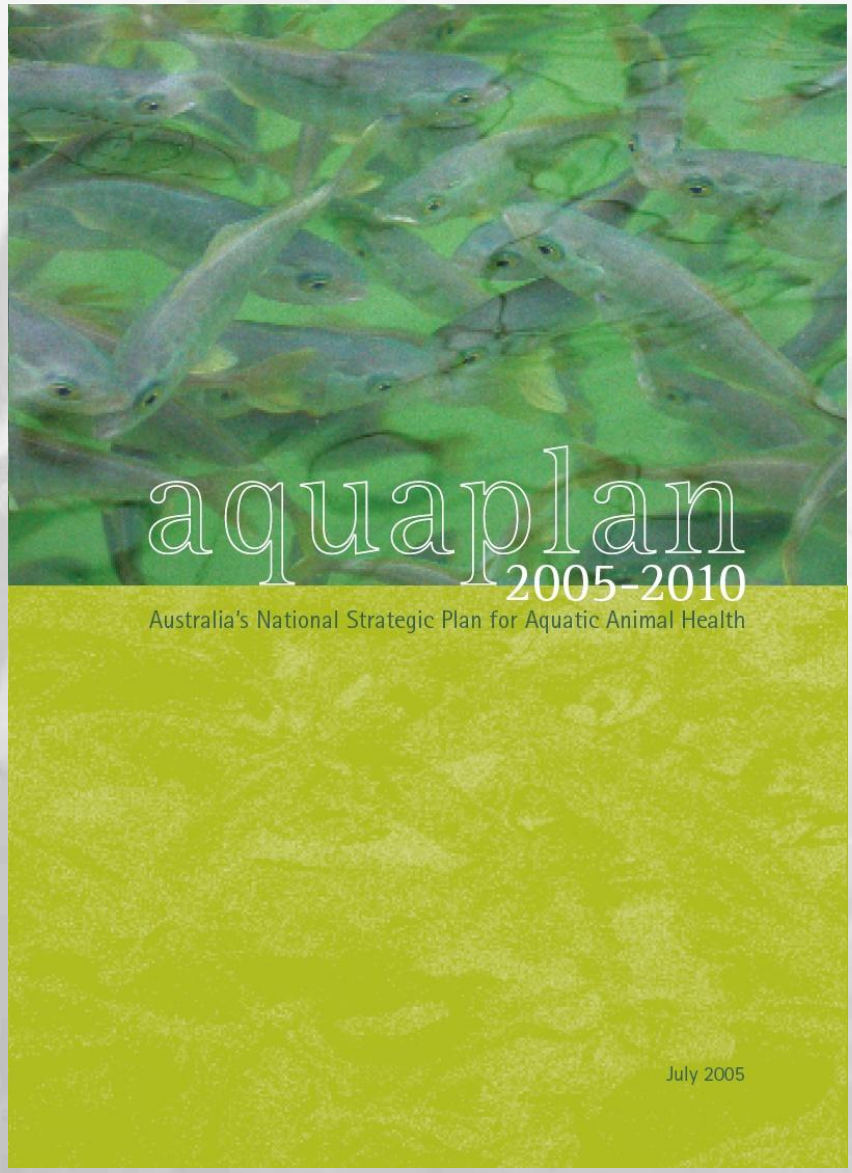


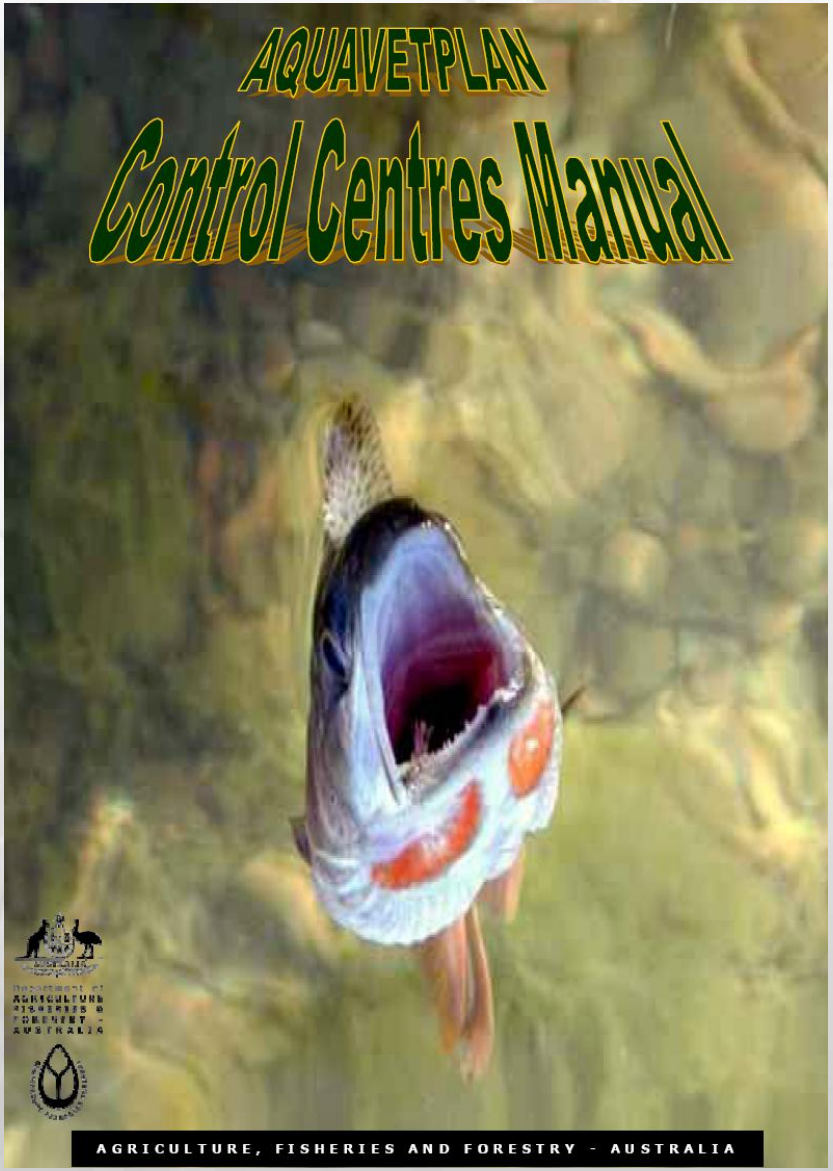


- Australia: ‘AQUAPLAN’ contains a five year strategic plan for aquatic animal health that was prepared through close consultation between government and industry
  - initiatives ranging from border controls and import certification, enhanced veterinary education, capacity to manage exotic animal disease incursions



- **Remaining free from several major aquatic diseases which has given the country a comparative advantage, both in terms of production and trade**


aquaplan
2005-2010
Australia's National Strategic Plan for Aquatic Animal Health
July 2005


AQUAVETPLAN
Control Centres Manual
AGRICULTURE, FISHERIES AND FORESTRY - AUSTRALIA

What is requested for addressing AAH emergencies with an adequate response?

- ✓ A functional Early Detection System (refer to Surveillance presentation). Involvement of AAH Focal Points.
- ✓ Communication network to inform ASAP Competent Authorities, OIE Headquarters, other stakeholders.
- ✓ Predefined SOPs for handling the outbreak (contingency planning, including emergency harvests, destruction and waste disposal).
- ✓ Predefined SOPs for improving biosecurity in other facilities susceptible to this infection (certified SPF fry, vaccination, vectors exclusion devices, water disinfection, etc.).
- ✓ Defining containment zones. Restriction of animal transports only between already certified compartments.
- ✓ Monitoring through a reinforced surveillance program

Chronology of events in AAH emergencies and adapted response

Early Detection from:

- Farmer observations of mortalities or clinical signs
- Active surveillance sampling
- Triggered by suspicion of OIE listed disease, or national list or emerging disease

Immediate Information of Competent Authority (CA):

- Official sampling (CVO)
- Diagnostic confirmation through National Reference Laboratory
- Shipment to OIE Reference Laboratory

Disease early diagnosis in shrimp

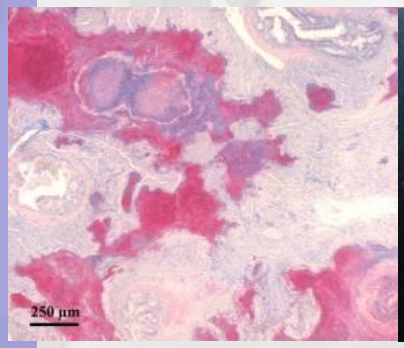
- **Early detection and gross signs:** abnormal swimming, tail rot, shell discoloration, black gills. Hypertrophied lymphoid organ or hepatopancreas, hemolymph aspect and clotting time, etc.
- **Sampling for lab diagnostics** (Histology, Molecular Biology, Bacteriology).
- Can be an OIE listed Disease, a National listed Disease or an Emerging Disease

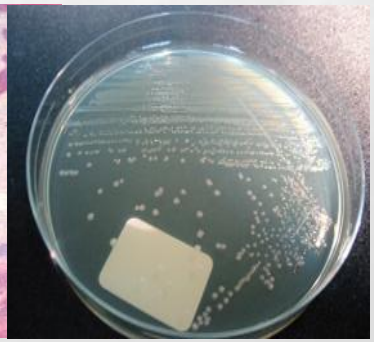
Disease early diagnosis in fish

- Observe the fish for external signs
  - Reduction in appetite
  - Clinical signs
    - **Abnormal swimming**
    - **Exophthalmia**
    - **Hemorrhages on body**
    - **Skin lesions**

Disease diagnosis in lab for fish

- Observe the fish for internal signs
  - » Nodules/ granulomas
  - » Enlarged spleen
- Sampling for lab test
  - Virology: PCR, cell culture, EM
  - Bacteriology: agar plate, impression smear
  - Parasitology: microscopic examination
  - Fungus: agar plate, microscopic examination
  - Histopathology



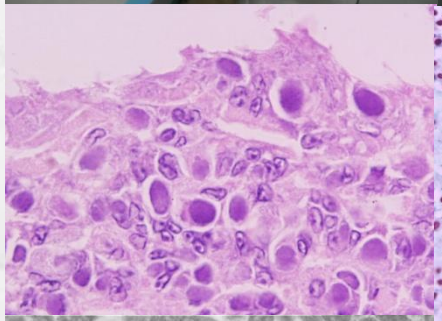
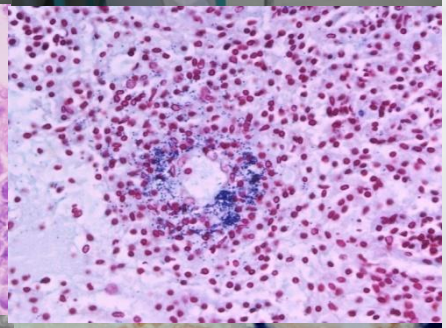
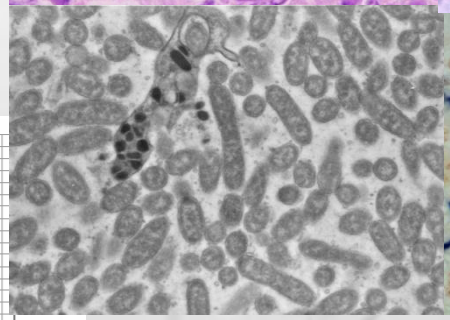
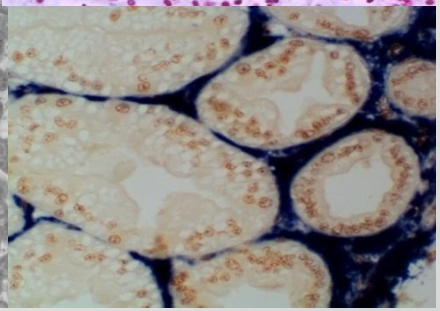


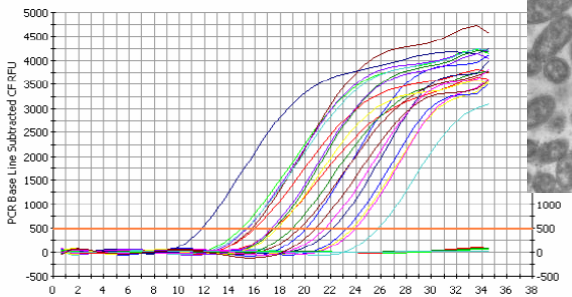
Disease diagnosis in lab for shrimp

Histology:

- Histopathology
- In Situ Hybridization
- T E M

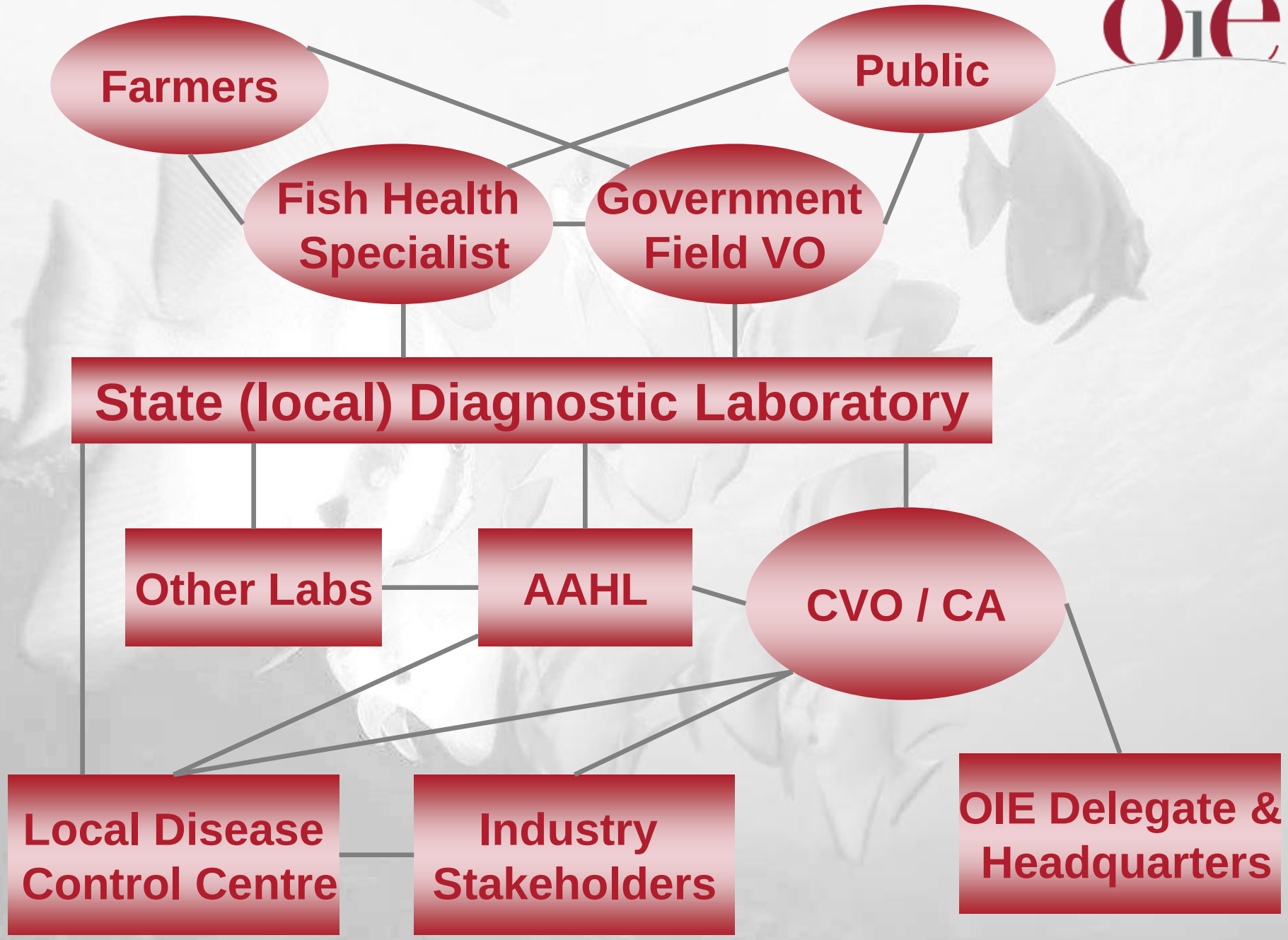


Molecular Biology:

- PCR - RT-PCR
- ELISA



Adapted from AquaVetPlan

Chronology of events in AAH emergencies and adapted response

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Official Case Confirmation:

- Country official notificaton to Members through OIE WAHIS
- OIE Headquarters ensuring large communication

Immediate action of CA and Local Disease Control Centre:

- Implement Contingency planning (Aquatic Code, chapter 4.4)
- Destruction, disposal and fallowing (Aquatic Code, chapter 4.5) if necessary. Decontamination later on.
- Disease Monitoring in the facility and around

Return to previous sanitary status when possible

Emergency harvests

Destruction and disposal

Fallowing Aquaculture Farms

Chronology of events in AAH emergencies and adapted response

If the Disease is already established and becomes endemic:

CA taking preventive actions in other facilities handling susceptible animals

- Improve biosecurity procedures in facilities handling susceptible species if required
- Defining certified disease free compartments (zones) and control animal transports
- National surveys to estimate the diffusion of the Disease and define zoning
- Improve skills of stakeholders regarding this disease, including private sector, diagnostic laboratories (capacity building).

Farm level health management

Dealing with day-to-day situations in farms, pond/farm health management is of prime importance in preventing, controlling and even eradicating serious diseases

Farm level health management

Inequities in aquatic animal medicine and/or husbandry education and inaccurate information dissemination are core issues

Dead fish are thrown into the open waters

The role of farmers

Empowering farmers to manage disease and other risks as the key to success under reducing public funds

Examples of preventive measures: security and biosecurity

Examples of preventive measures: 100 % indoor production cycle

Pathogen exclusion from water through filtration

Technologies available for low water flows (hatcheries, Nucleus Breeding Centers, in-door recirculated growout).

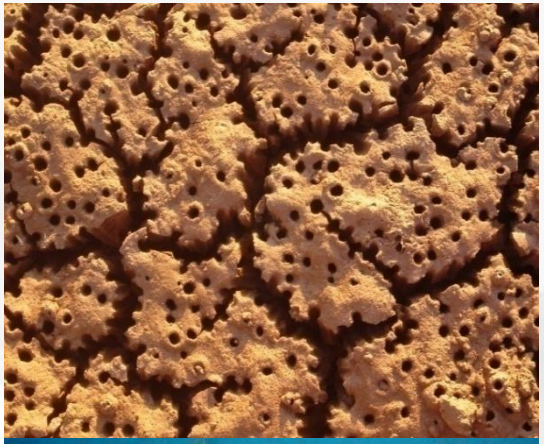
Pathogen exclusion from water through filtration

Drumfilters with a 100 µm mesh to automatically remove vectors from the water intake canal (Indonesia)

Technologies available for semi-intensive or intensive grow-outs.

Bird scaring or exclusion devices

List of potential vectors / hosts



High diversity of vectors looking very similar, although they carry different pathogens

Pathogen exclusion through water and soil sterilization (physical or chemical)

Apart from UV light, strong oxidants could be used, but producers should use them with precaution to not induce environmental impacts.

Some piscicides are used in earth ponds after filling, and some pesticides to kill crustaceans in the bottom. These practices should be abandoned, because they damage the environment.

Photos: Dr D.V. Lightner

Large areas of greenhouse covered ponds

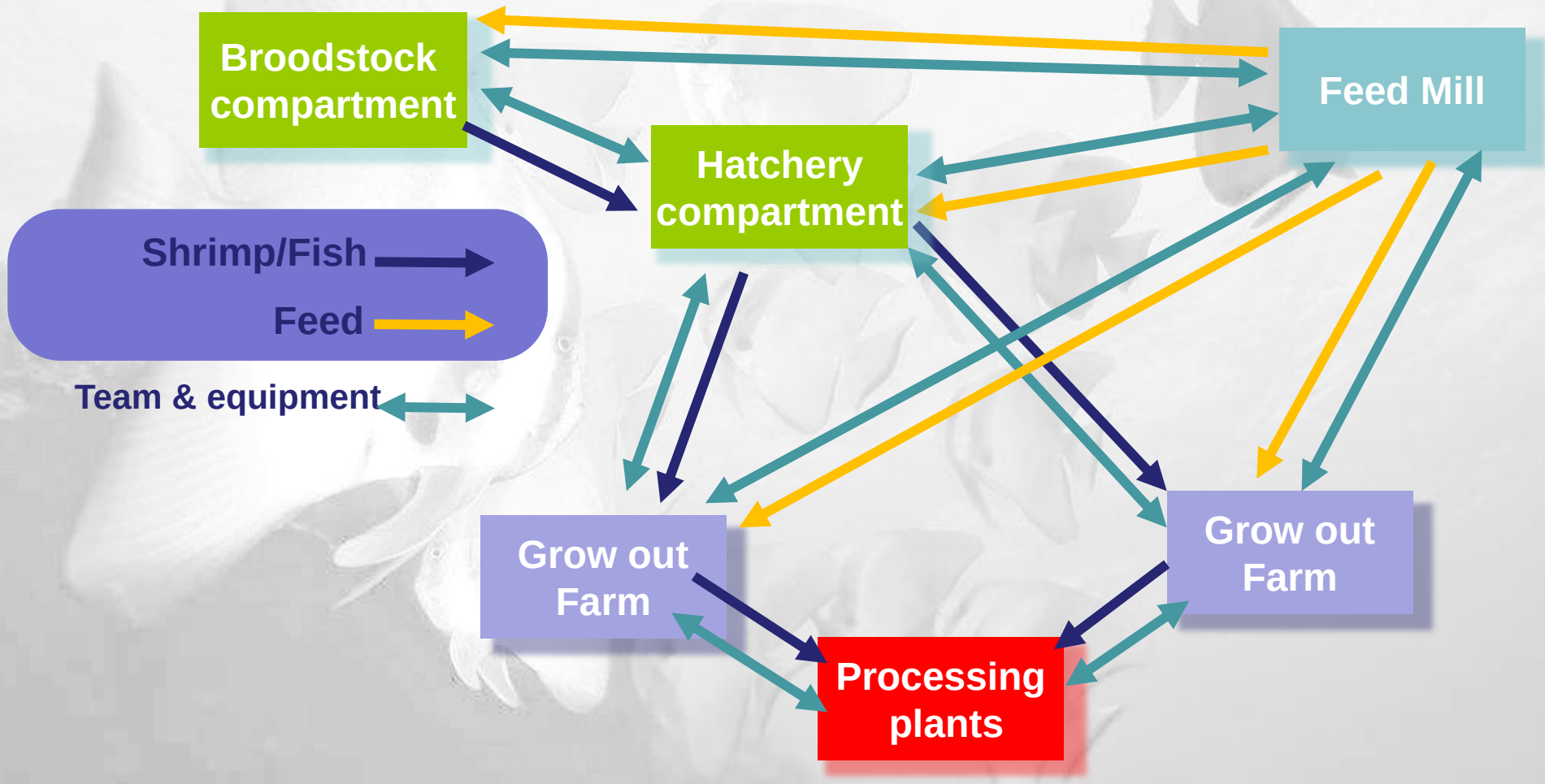
Health Certification Programs

It is imperative that activities such as health monitoring, diagnosis, quarantine, reporting, communication, emergency planning and response, be undertaken at the farm and farm cluster levels

Ongoing efforts at certification of service providers

FHS/AFS
NACA AFS/FHS

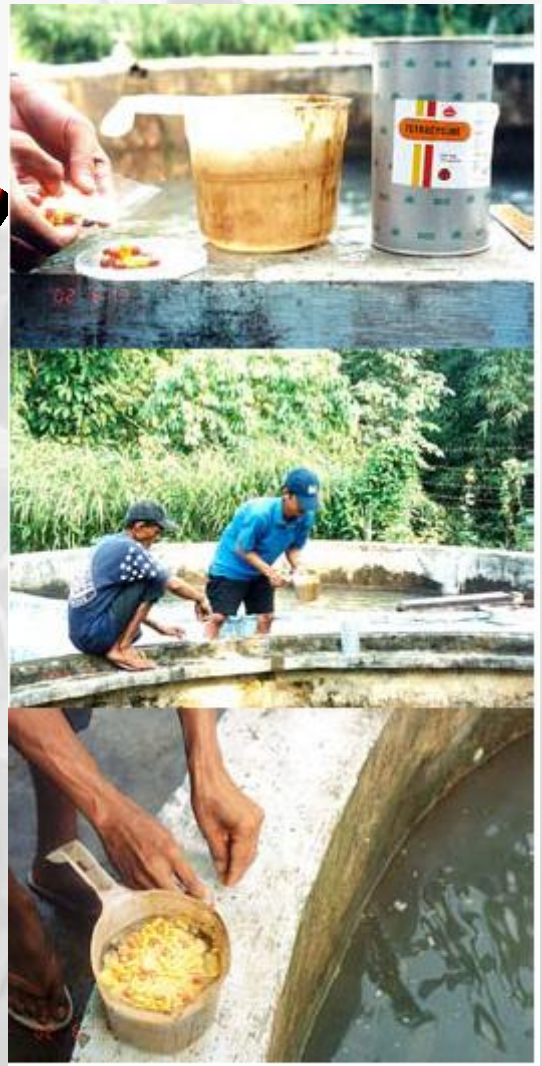
A model of compartment for the aquaculture industry



A possible future organization involving veterinarians for more efficient biosecurity practices in aquaculture

Responsible use of antibiotics

March 18, 2012
Vietnam puzzled
50 Percent of Exports
Have Been Found to
Contain Antibiotic
Residues…



Farmers administer antibiotic treatment (tetracycline) with poor success.

Disease control and prevention: vaccination

- 1 person can inject 1,000 fish in one hour
- 4 injectors working 8 hours a day can vaccinate 32,000 fish per day

Take home message

- With regards to fish health, aquaculture development and increase in international trade continuously bring new challenges
- Aquatic Animal Diseases remain a major limiting factor to sustainability of the sector
- Biosecurity and Risk analysis are the main pillars of a National Strategy on AAH
- International and regional guidelines are continuously reviewed and improved

Take home message

- National strategies enable ad hoc compliance to these standards with due respect for national priorities, objectives and means
- Increased cooperation between fisheries and veterinary authorities are necessary to support national plans
- The global aquaculture development calls for innovative responses in health management
- Empowering farmers to manage disease and other risks is seen as the key to success under reducing public funds

Take home message

- Certification is certainly one critical issue, currently, because of its multiple and significant implications (compartments).
- Whole-of-government approach to aquatic animal health. Embracing aquatic animal health as part of the “one-health” approach
- Whatever can go wrong, will go wrong – in any given situation, if you give them a chance... (Murphy’s law)

Conclusion

✓ Aquatic Animal Health Focal Points have a crucial to play in Early Detection and Emergency Preparedness.

✓ Preparation for emergencies can be based on literature. But it is necessary to adapt it to local aquaculture techniques to check applicability.

✓ Emergencies SOPs must not stay “on paper”, but be financially manageable and immediately applicable for efficiency.

✓ Prevention is always better and cheaper than implementing contingency plans, less costly and painful

Thank you
for your attention

Courtesy of Dr Franck Berthe