





Tilapia (Gwaya) farming Common diseases and health management

Neil Wendover : Technical Services Manger

Robin Wardle: Global Technical Services

What is a disease?

- **General definition:**

any alteration of the body or one of its organs so as to disturb normal physiological function

Diseased animals are not just sick or dying, they are performing below expectation. This might be only detectable through production data, not clinical or laboratory data.

Tilapia used to be considered as a hardy or disease-resistant fish.

But this is changing...with intensification of culture



Farmers' concept of disease

- Farmers not always realize that diseases are present.
- Only recognized disease outbreaks are those that cause massive acute mortalities
- Low but persistent mortality (chronic mortality) can be equally devastating.

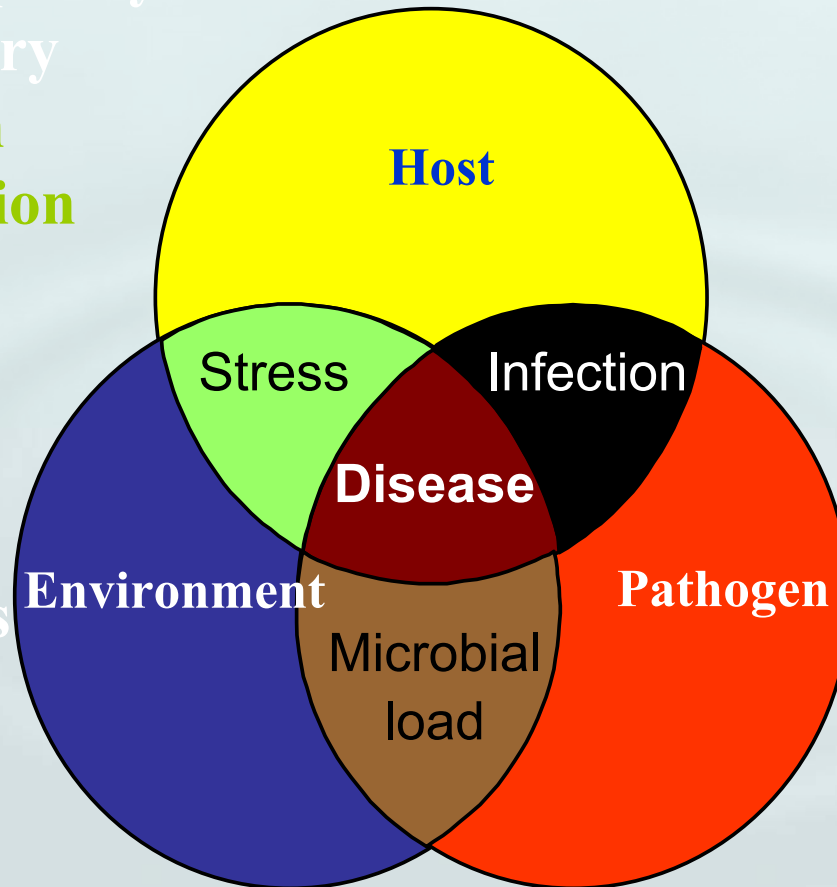
AHM Factors in Disease Expression

Animal quality

Husbandry

Nutrition

Vaccination



Water quality
Carriers/vectors

Quarantine
Avoidance
Sanitation
Virulence

Most problems are a combination of infectious and non-infectious factors

How to recognise a disease



Anatomical changes

Abnormal swimming

Colour changes

Signs of disease

Lesions & body haemorrhages

Production records

Loss of appetite

Retarded growth poor FCR

Production Recording

RECORD KEEPING will help to:

Recognize early disease signs through

Analysis of production record

Decrease in feeding activity

Increase in daily mortality

Compare present data with historical data

Did the same situation happen before?

Was it at the similar season?

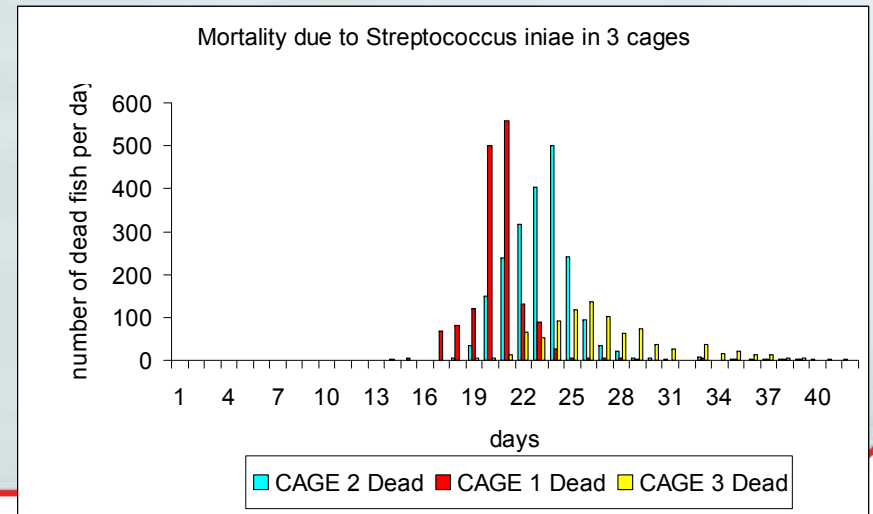
Same clinical signs?

Same environmental conditions?

Rain?

Salinity variation?

Day	Prod 1	Prod 2	Prod 3	Prod 4	Notes
1					
2	3.03				
3	1.26				
4		4.29			
5	3.91				
6					
7					
8		9.35			
9	2.41		66	99	89 98
10					
11	5.22		53	78	89 91
12	1.05		55	83	90 92
13		8.68			
14	4.53		52	84	89 102
15					
16	1.25		19	76	99 84
17	1.01		43	92	91 66
18		9.79			
19	3.66		50	87	80 84
20					
21			36	70	87 80
22	5.21		66	99	91 67
23	1.16	10.26			



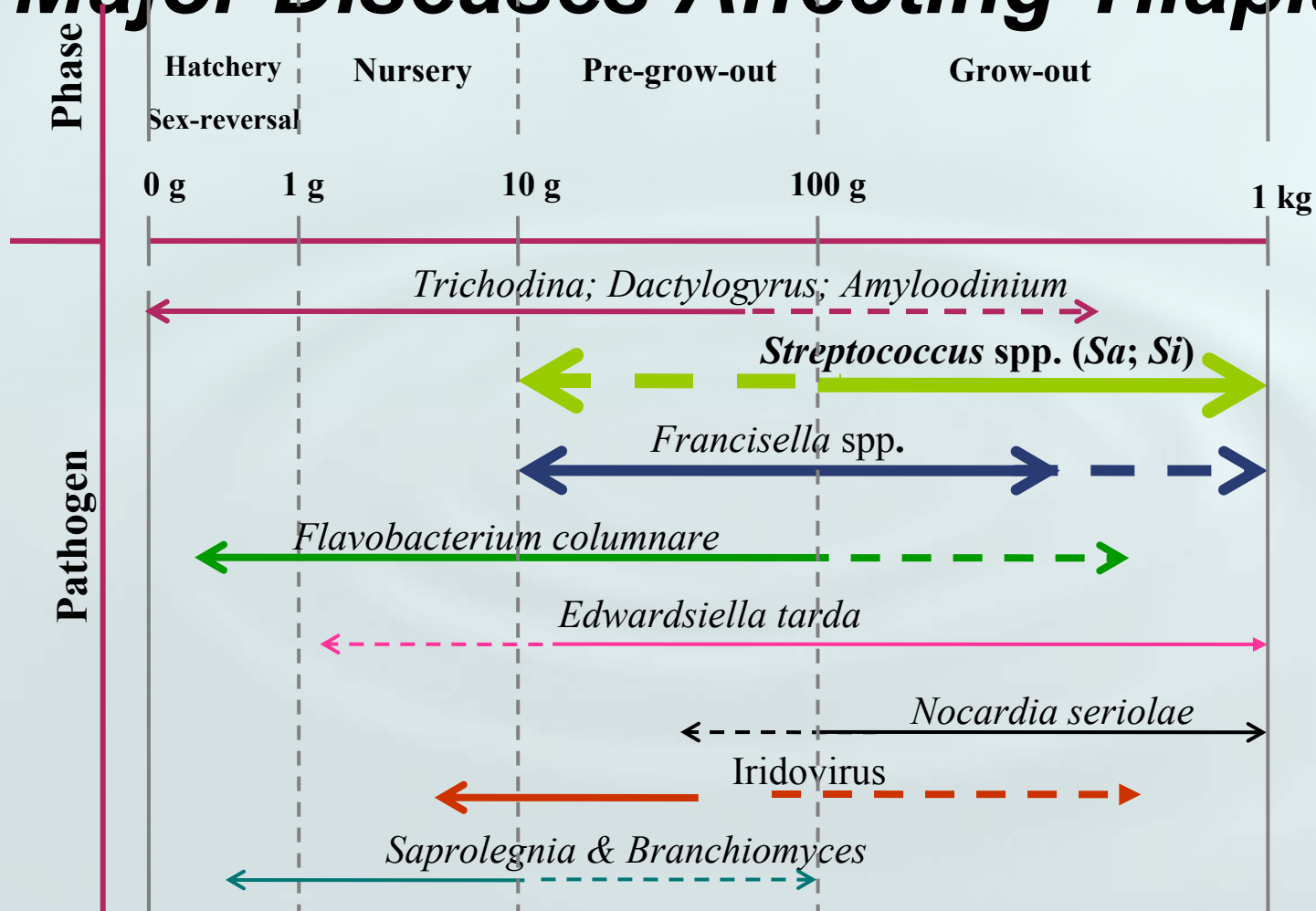
Type of diseases

- i. Non-infectious
- ii. Infectious diseases

Major infectious diseases in tilapia



Major Diseases Affecting Tilapia



Note: importance of the disease is roughly in proportion to the size of the arrow bars

Parasites

- *Simply the closer proximity of the fish to each other allow for a greater probability of infection and mortality.*
 - *There are by far more parasite species that infect fish than any other group of infectious diseases*

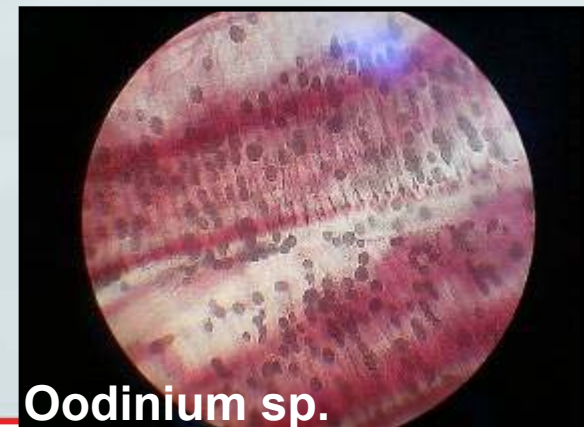


Parasitic diseases(1)

Major parasites in tilapia

Tilapia gets similar parasites as other fish species

- Protozoan parasites
 - *Oodinium*, *trichodina*, *Ichthiophtherius*
- Metazoan parasites
 - Monogenean (*Dactylogyrus*)
 - Crustaceans (*Lernea*, *Argulus*)
 - Leaches



Parasitic diseases (2)

- Can result in high mortality in young fish
- Infests gills and body surface
- Clinical signs:
 - Flashing
 - Rapid breathing
 - Weakness
- Treatment depends on etiological agent but small fish are usually sensitive so bio-assay first !!!

Parasitic diseases in grow-out stages

- Up to our experience, parasites are mainly causing damages in small stages
- Bigger fish are normally more resistant to diseases unless they are stressed/weakened by a primary cause
- Health monitoring and cage management



Iridovirus (1)

History

- A Bohle iridovirus case in tilapia was reported in Australia (Ariel & Owens, 1997).
- Found in Canada in fingerlings imported from the US (McGrogan *et al.*, 1998)

Disease

- Lethargic; darkened; bloated; gill pallor; exophthalmia; ascites; pallor of internal organs, particularly liver.
- 20% mortality in fingerlings within a month or so after stocking.
- It can be chronic without an obvious mortality peak (at water temperatures < 24 °C).

Iridovirus (2)

Pathogenicity

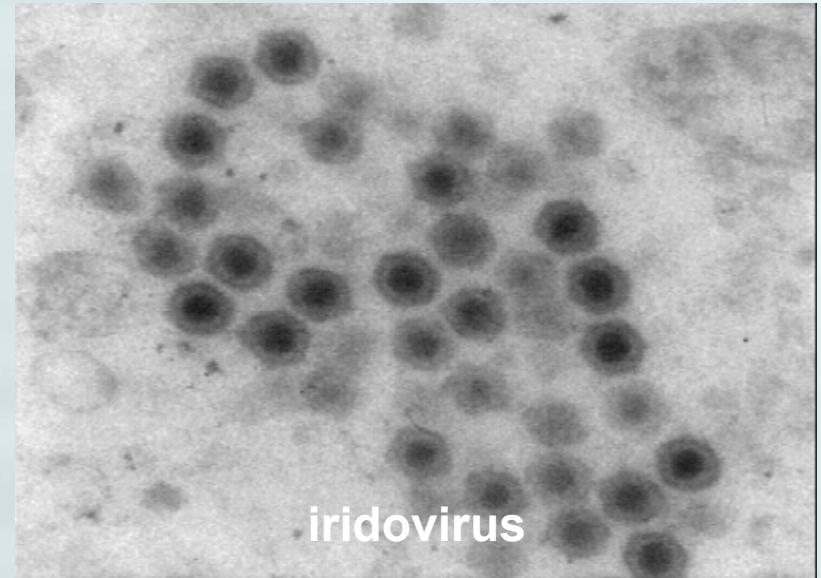
- Iridovirus infection may cause immuno-suppression, therefore facilitating other diseases.

Diagnosis

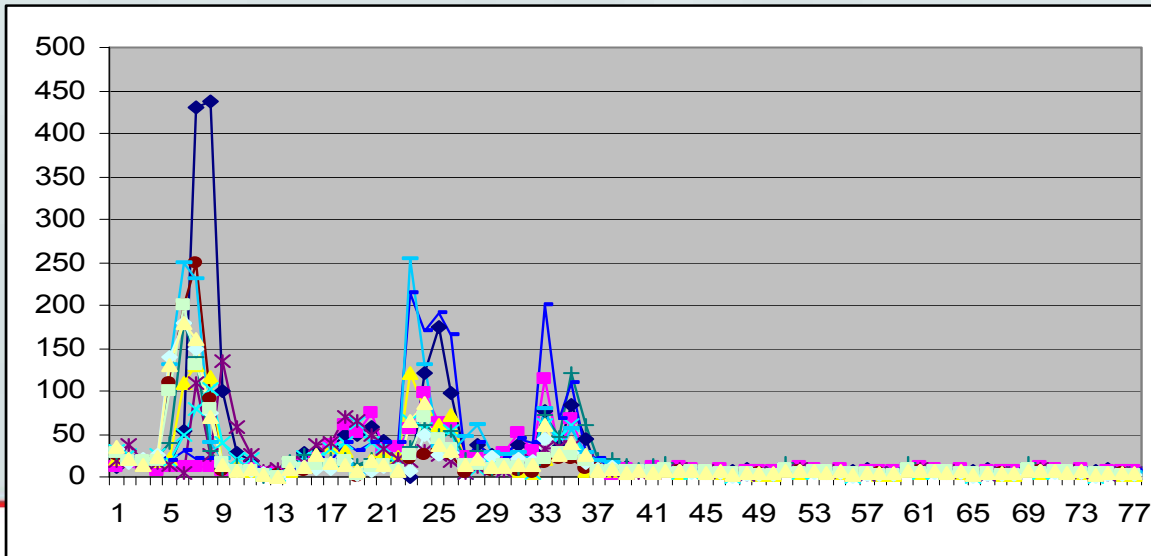
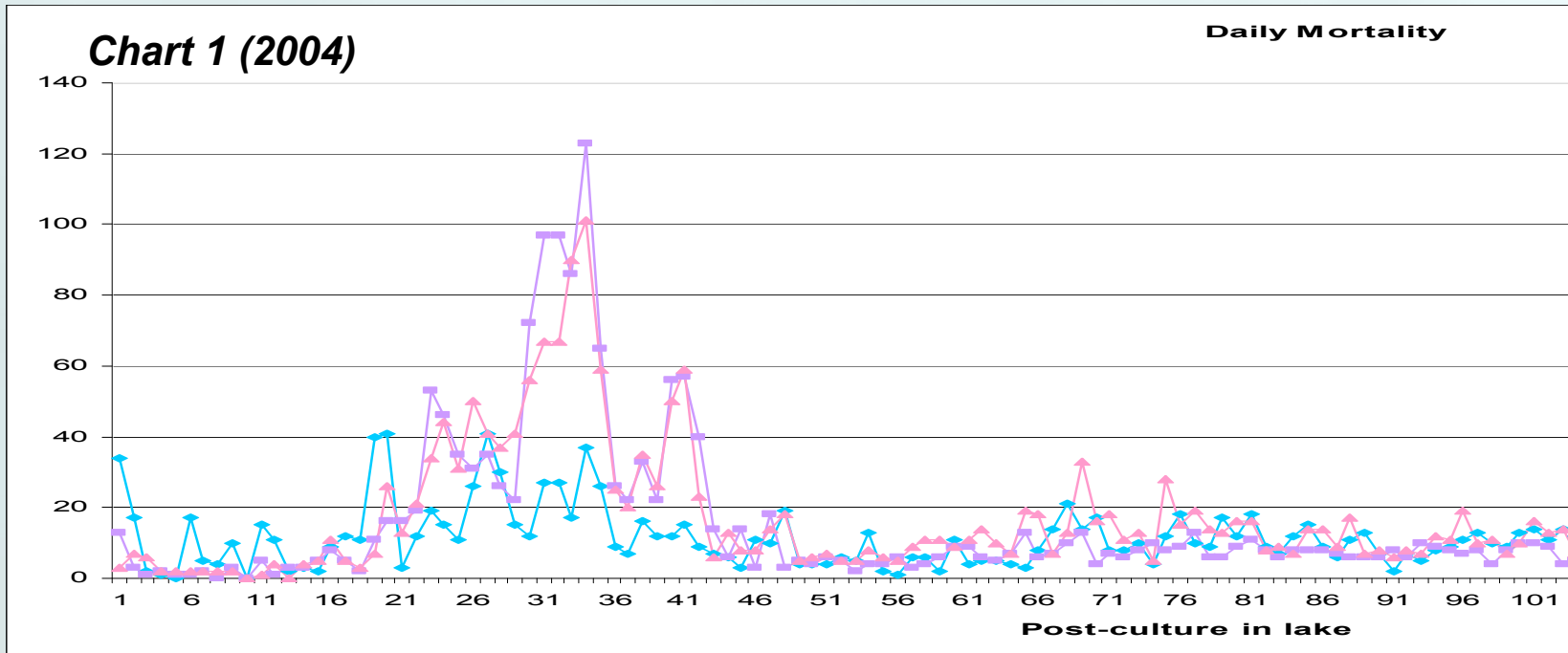
- PCR

Treatment and prevention

- No treatment
- Hygiene and disinfection
- Vaccination (future?)

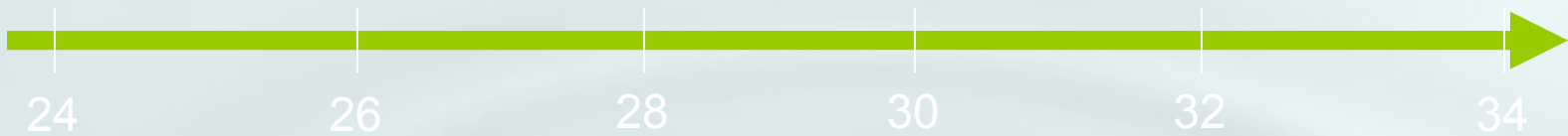


Importance of production recording & analysis



Daily mortality from Iridovirus outbreak in tilapia cages post stocking

Temperature in the expression of diseases: some examples



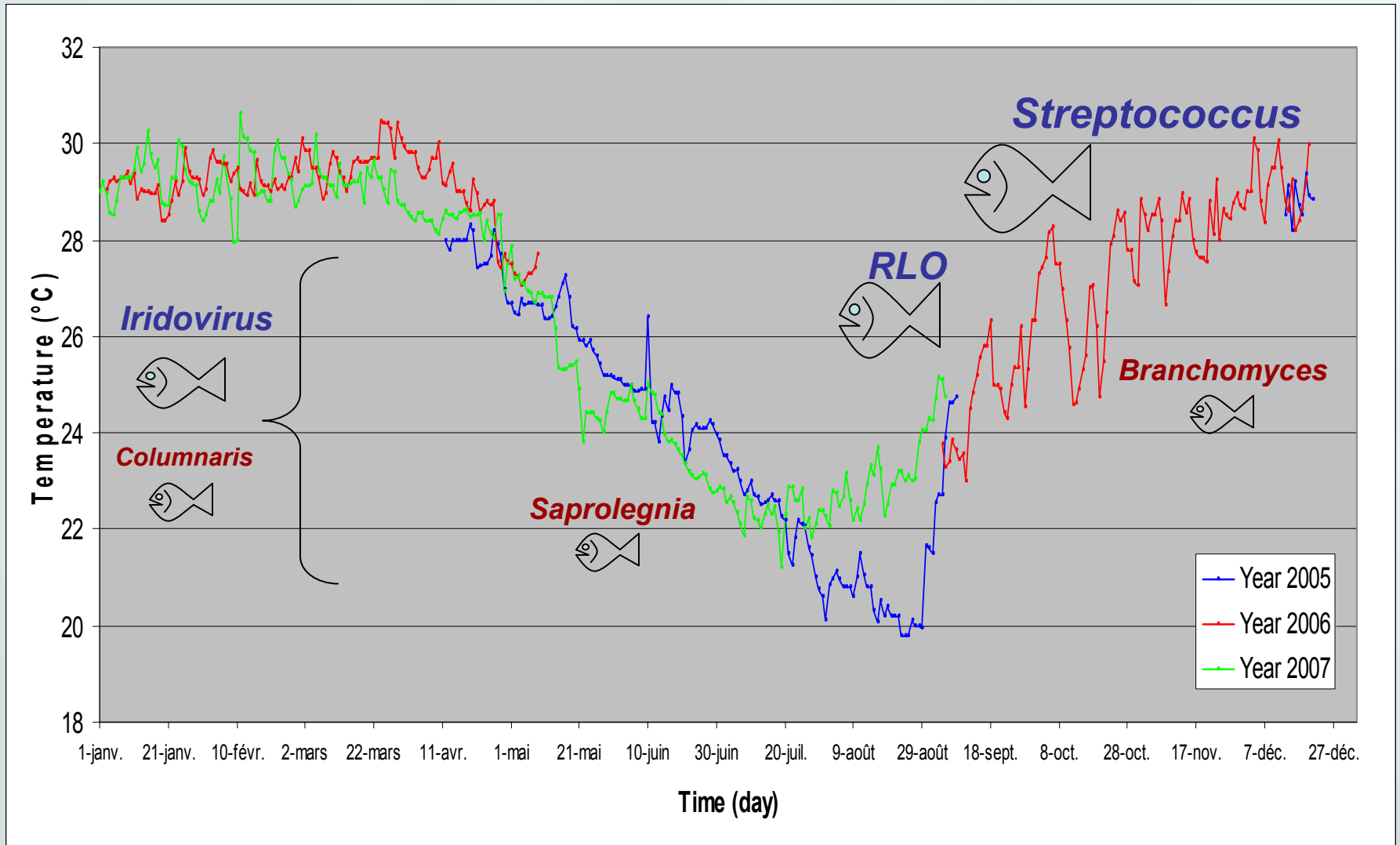
Columnaris*

S. agalactiae

S. iniae

* Sudden change of temperature

Lake Kariba temperature variation



Columnaris disease (1)

Causative agent

- Gram – long filamentous yellow pigmented rod bacteria
- *Flavobacterium columnare*

Symptoms

- Gills and mouth necrosis
- Sloughing of epidermis (saddlepatch)

Epidemiology

- More common in hard water
- With high levels of organic matter
- Stressed fish more sensitive

Disease pattern, virulence

- High mortality possible
- Chronic disease



Columnaris disease (2)

Transmission routes

- Horizontal, via the water

Diagnosis

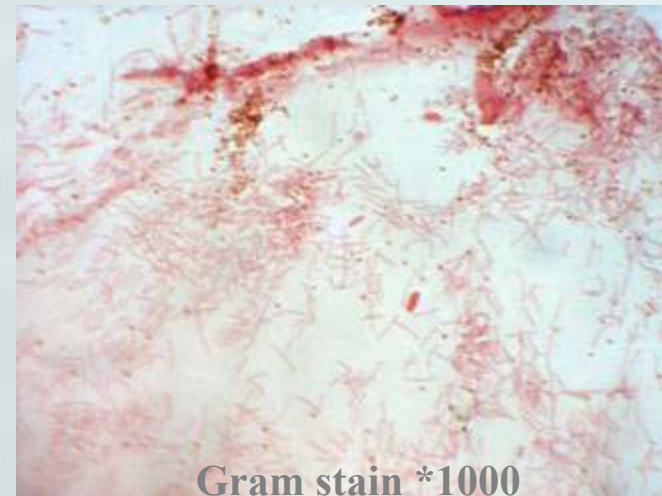
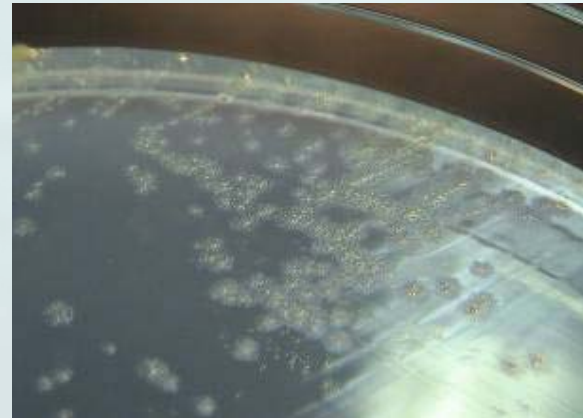
- Presumptive: clinical signs
- Conclusive: bacteriology

Treatment, recommendations

- Salt 6-10 ppt
- KMnO_4 : 2 ppm
- OTC bath: 1.5 hr, 75mg/kg fish

Recommendations:

- Temperature fluctuation
- More a problem in lower temperature season
- Handling
- Overcrowding
- Poor water quality
- Poor nutrition



Gram stain *1000

Fungal diseases

Saprolegnia

- In low temperature season
- Cotton-like lesions on the skin
- Usually a secondary pathogen in immunosuppressed fish
- No practical treatment



Branchyomyces

- Gill fungus
- Affect nursery stage
- Especially in high temperature season



Saprolegniasis

Causative agent Saprolegnia spp
Achyla spp or *aphanomyces* spp

Gross signs

Cottony growth on fish eggs & infected tissues.

The colour of mycelium varies from white to brown depending on what particles are trapped and usually affects the gills.



Effects on host

Progressive & fatal fish becomes lethargic/tires easily/not responsive to external stimuli.

Histopathology displays epidermal necrosis

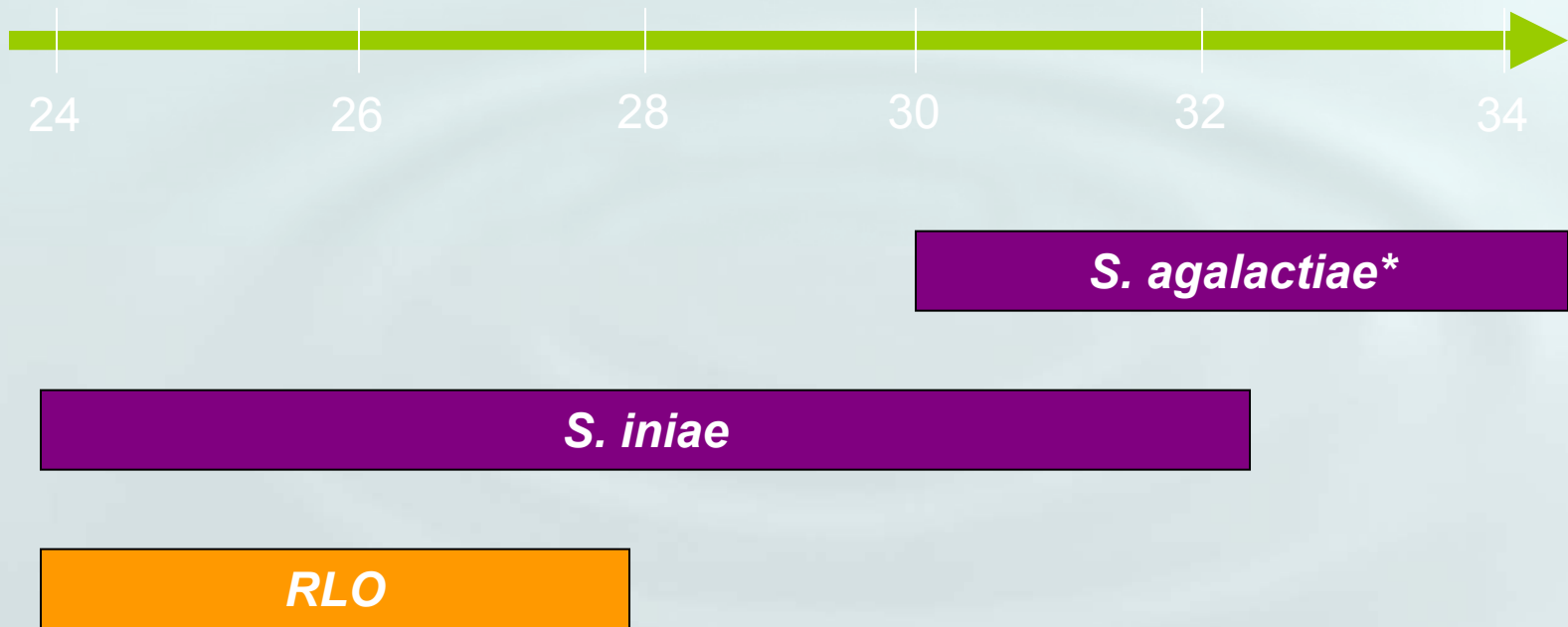
Treatments

Sodium chloride 22ppt 30mins/30ppt 10mins or 1-3ppt indenfinite.

Formalin at a concentration of 0.4 - 0.5 ml/L
30% formaldehyde may be used for 1 hr.



“A change in temperature”: some examples



* Sudden change of temperature

Rickettsia Like Organism

Causative agent

A fastidious intracellular organism
Gram - ; approx. 0.9 x 0.6 μm



History

Piscirickettsia salmonis is the first fish RLO pathogen fully characterized (Fryer *et al.*, 1992).

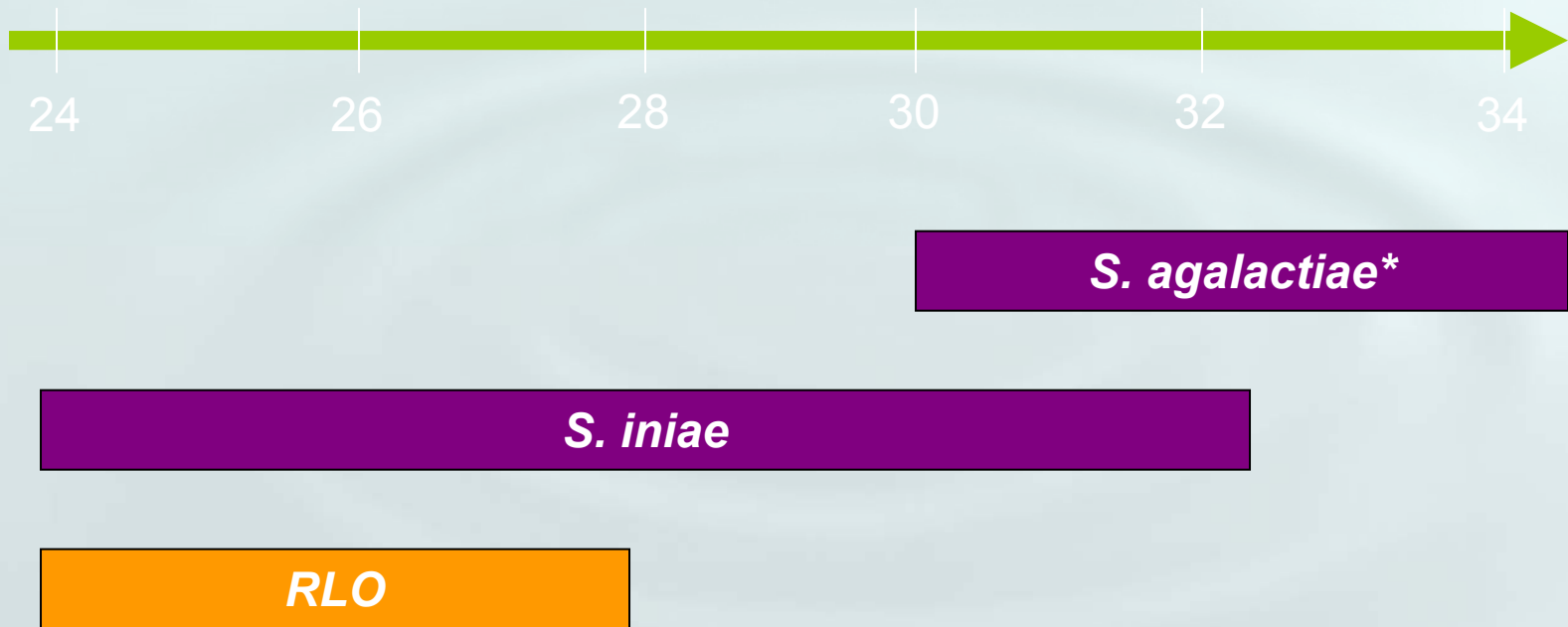
In tilapia, it was first documented in Taiwan (Chern & Chao, 1994; Chen *et al.*, 1994)

From 1994 onwards, RLO found in Hawaii, USA (Mauel *et al.*, 2003)

Recently reported in Costa Rica with heavy mortality

Found in Asia

“A change in temperature”: some examples



* Sudden change of temperature

Streptococcus

The disease is associated with an estimated annual impact on aquaculture over USD\$100million

It is ubiquitous & has been isolated from various “wild” species



Streptococcus

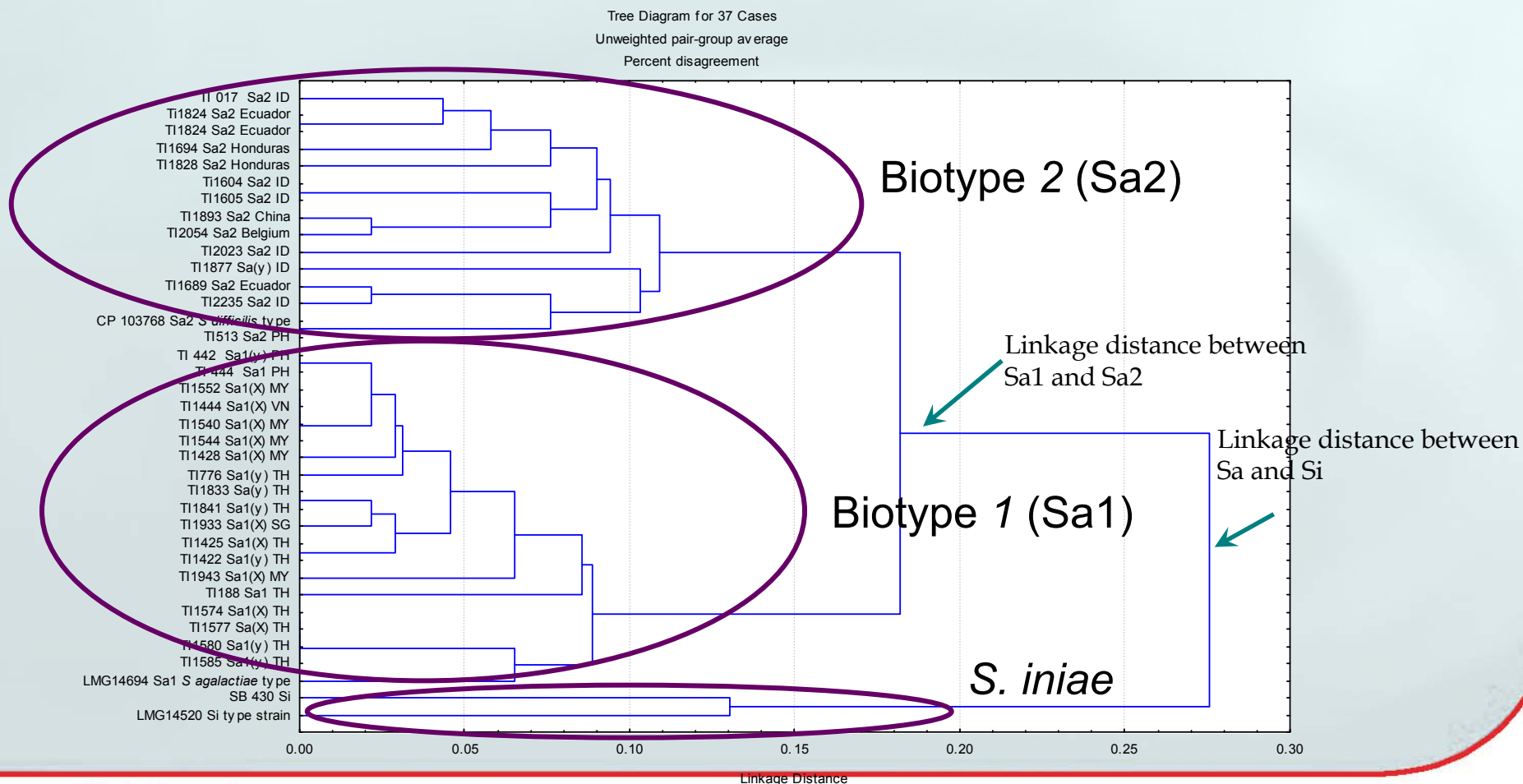
Epidemiology & transmission

- **Epidemiology**
 - All size of fish from 5g onwards
 - Bigger fish from 200g onwards are more prone to develop the disease
- **Disease pattern, virulence**
 - Up to 30-40% overall mortality
 - Mainly chronic mortality in tilapia with acute peaks associated with high temperature
- **Transmission routes**
 - Horizontal transmission. Bacteria is in the environment and become pathogenic when fish are stressed



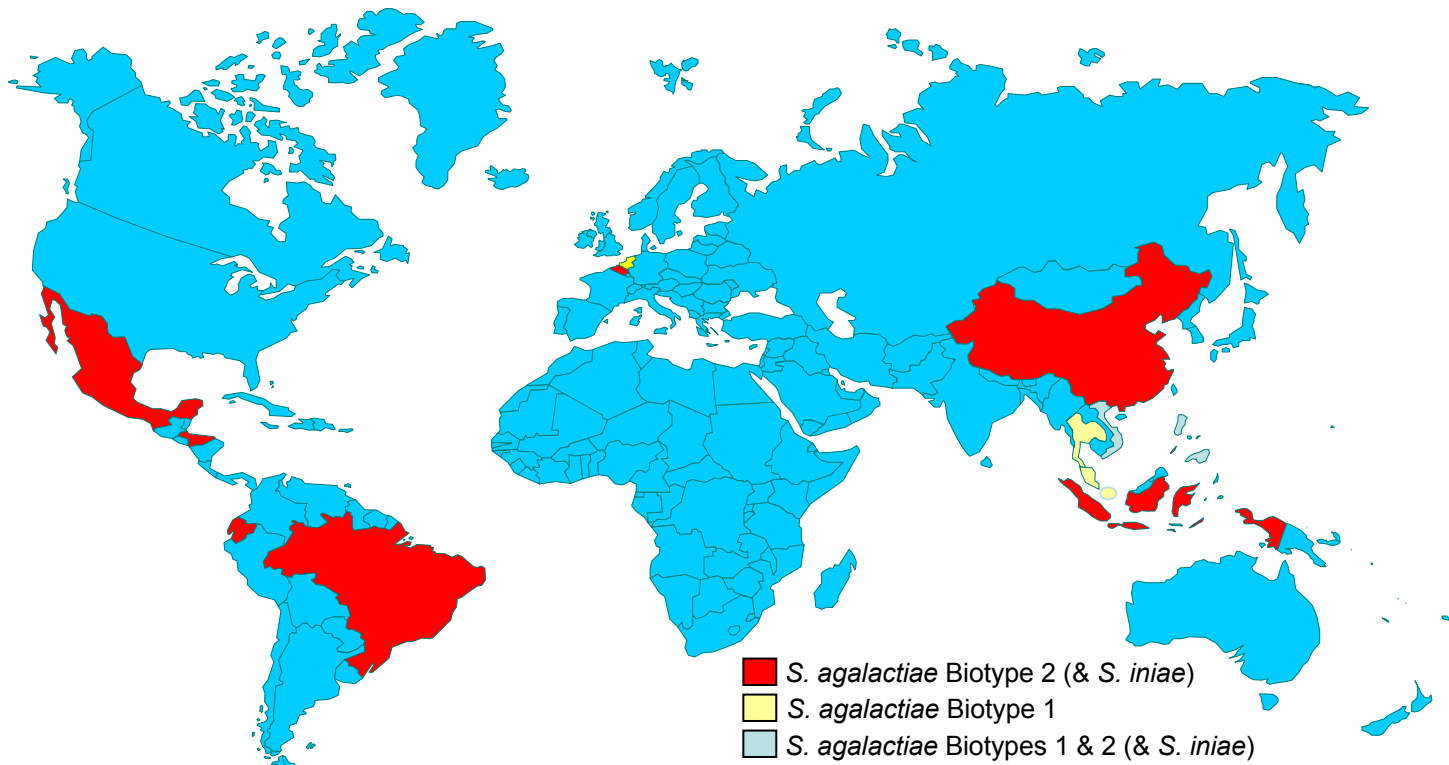
Differentiation of fish pathogenic *S. agalactiae*

- Biochemical & phenotypic analysis identifies two *S. agalactiae* clusters
 - S. agalactiae* Biotype 1 and *S. agalactiae* Biotype 2 (*S. difficilis*)



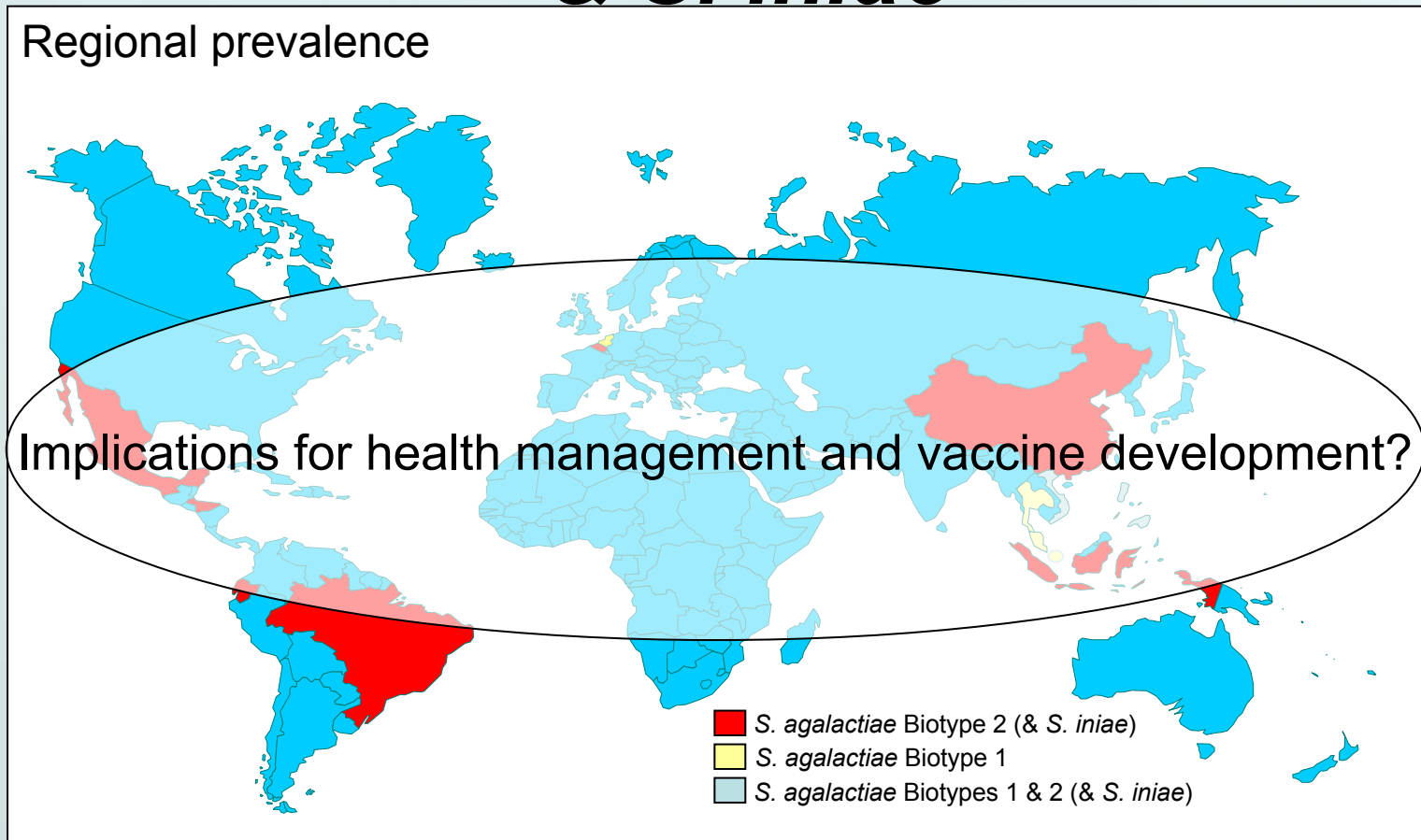
Regional Prevalence *S. agalactiae* & *S. iniae*

Regional prevalence



Regional Prevalence *S. agalactiae* & *S. iniae*

Regional prevalence



Strategies for Aquatic Health Management

A. Therapeutic exclusion management

B. Prevention Strategies

1. Stock selection programs
2. Good husbandry practices
 - a. Water Quality
 - b. Bio-security & hygiene
3. **Biological Immunostimulation (immunological memory)**
 - a. Immunostimulants (Vit C B-glucan etc)
 - b. Probiotics
 - c. **Vaccination**

Summary

- Tilapia are no longer “disease-resistant”
- Disease in a particular farm is dependant on a series of factors:
 - Geographical location
 - Environment (water parameters, temperature, salinity)
 - Species
 - Husbandry
- Knowledge of the disease is one of the first step of health management

- Aquatic health management is not a magic bullet
- Just the application of several principles in order to
 - Limit risk of diseases
 - Improve quality of fish
 - Improve profitability
- Vaccination will be one of they key strategies for future aquatic animal health management in tilapia.