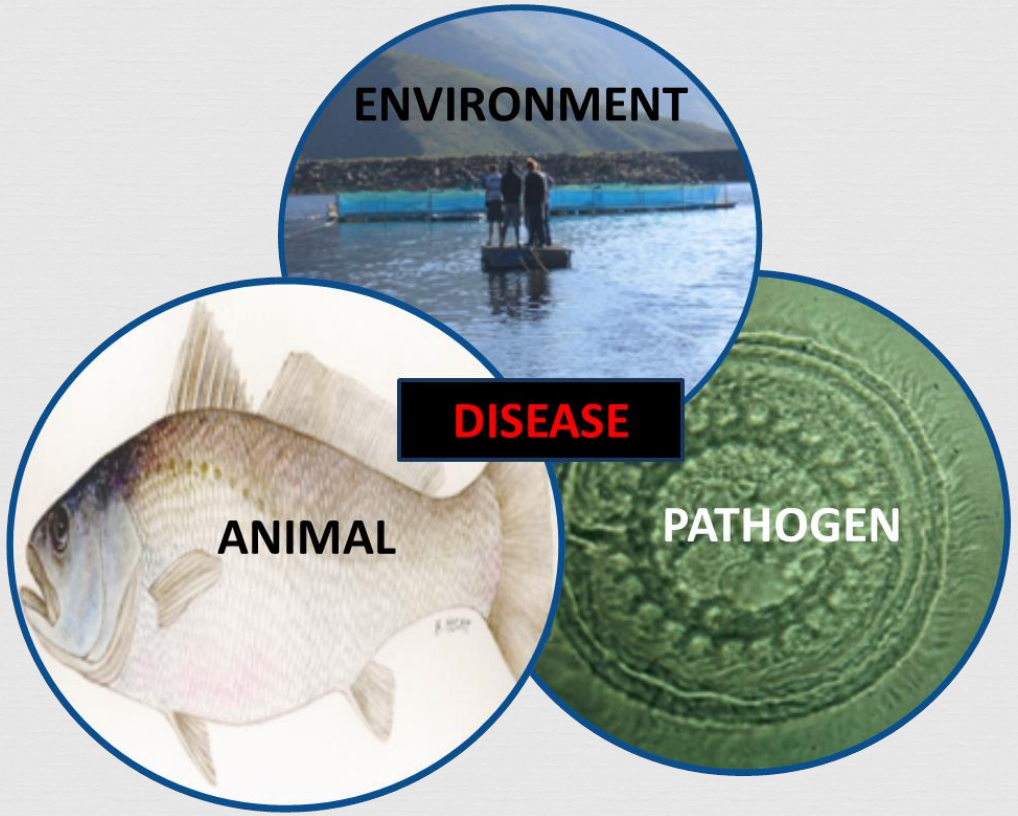
Lecture 12

Fish Health and Biosecurity

Fish Health



Fish farmer

pH

Water quality

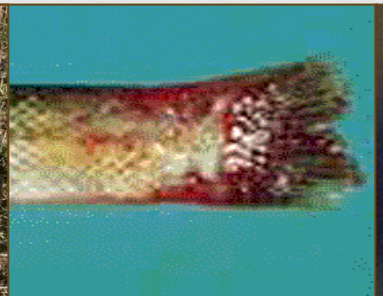
Light

Stocking density

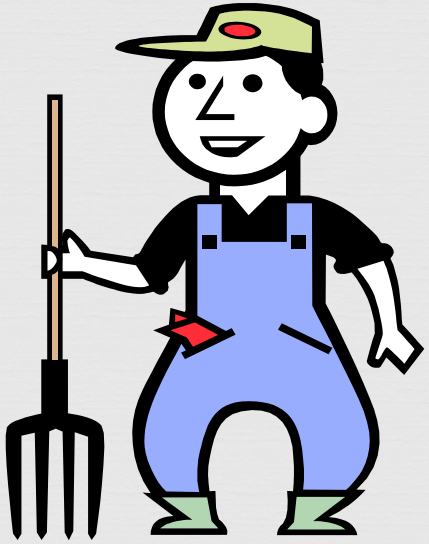
Temperature

Compromised immune system

Disease outbreak



Good Farmer – stress management



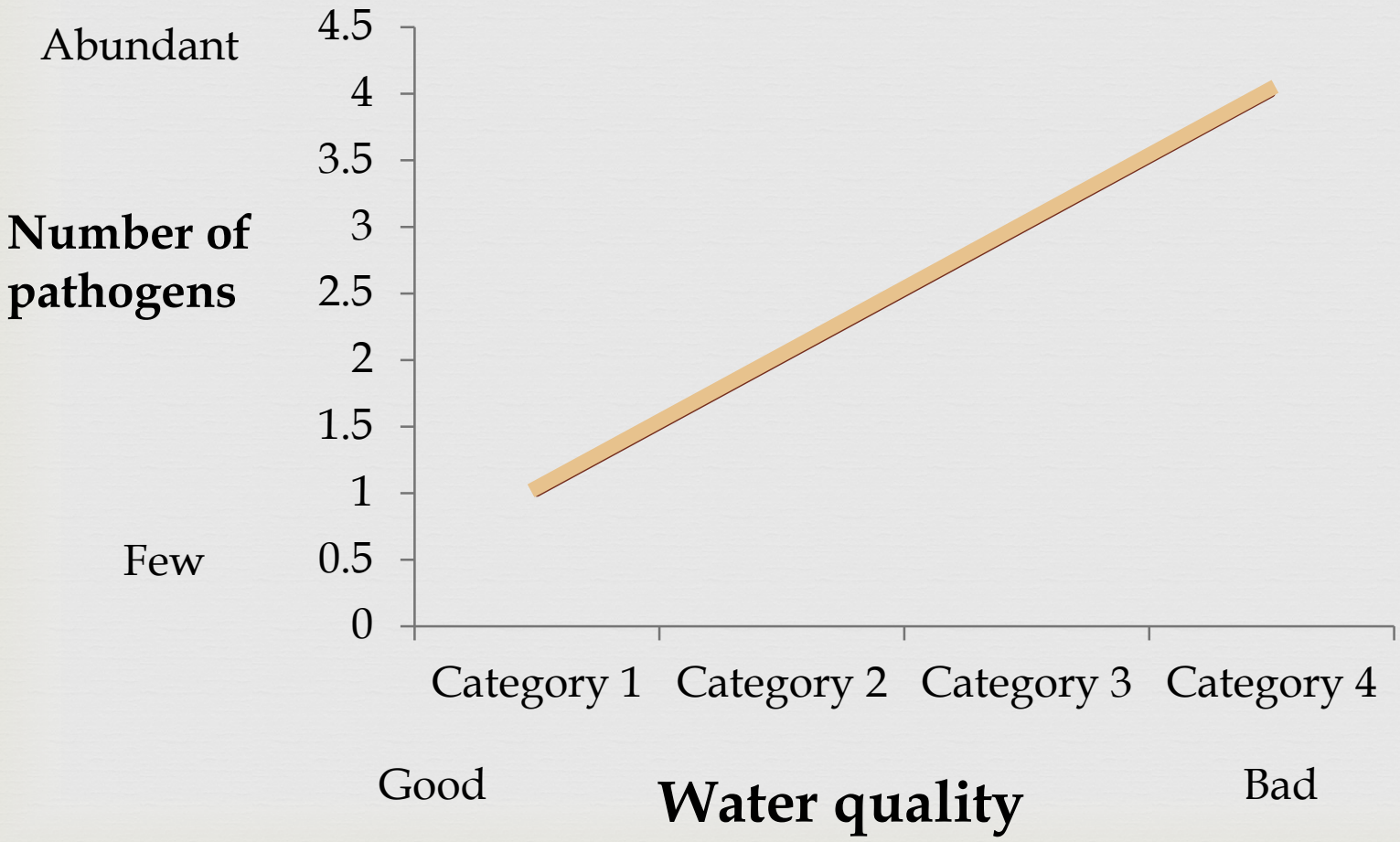
- Optimum environmental conditions
  Temperature, pH, DO, Ammonia/Nitrite,
  Heavy metals, Hydrogen Sulphide
- Stocking densities
- Transport (acclimation, conditions)
- Handling fish (harvest, netting, size grading)
- Feeding – quality of feed

Monitors Fish

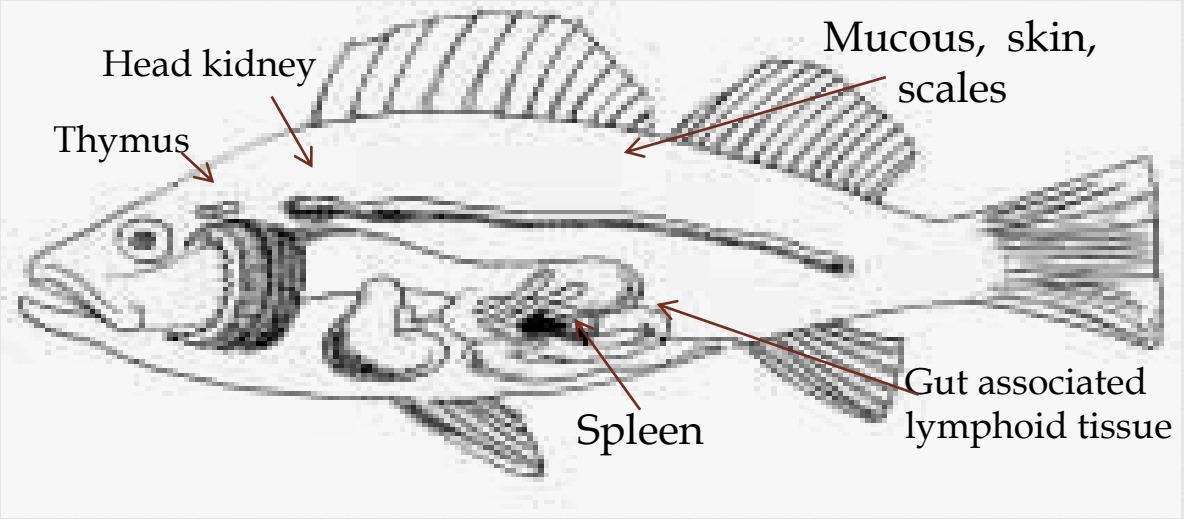
<u>Signs of sick animal:</u>

- Loss of appetite
- Lethargic
- Abnormal behaviour
- External appearance
- Mortalities increase

Good management



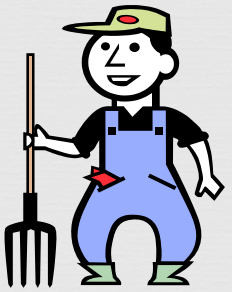
Fish Immune mechanisms



- **Non-specific**
  - Skin; mucous; scales; phagocytic white blood cells eg neutrophils, macrophages; inflamatory responses

- **Specific** (adaptive)
  - T cells; B cells; antibodies

Bad farmer



Fish farmer

PROBLEMS!!

For environment
For fish health
Expensive
Antibiotic & chemical residues

Treatment

Antibiotics
Chemicals
Chemotherapeutants

“Prevention is better than cure”

- Biosecurity (different levels)
  - -Water source free of pathogens (Borehole vs. Surface, treatment)
  - -Disease free stock
  - -Transfer of pathogens (transport of animals, self-sustaining stock, wild fish,
  - - Quarantine
  - - Prevention of birds, snails and other vectors
  - - Disinfection (ponds, equipment, people)
- Toxins/ Contamination (feed management, water source, etc.)
- Regular monitoring

Summary

Proper management and prevention of disease will :

- Increase profit
  - More fish survive
  - Healthy animals have a better FCR
  - Healthy animals grow faster
  - Healthy animals are of better quality
  - Less expenses for drugs and chemicals
- Consumer / environment safety
- Animal welfare

Biosecurity

- Practices, procedures and policies to prevent introduction and spread of:
  - Infectious diseases
    - Microorganisms
      - Bacteria, viruses, fungi
    - Parasites
  - Aquatic invasive species

Biosecurity

- Reduce risk of disease introduction
  - Minimize spread on-farm or to new areas
  - Promote fish health
- Protect economic investment
  - Reputation
- Protect against new diseases
  - Viral hemorrhagic septicemia
- Protect human health
  - Food safety

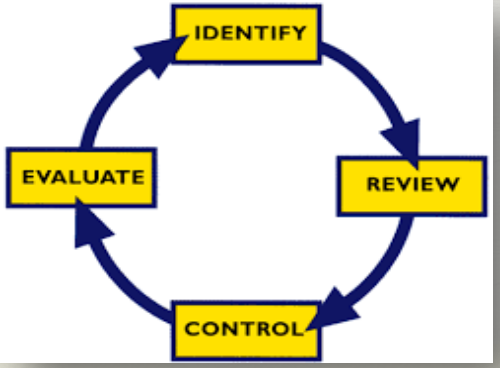
INTERNATIONAL AQUACULTURE BIOSECURITY CONFERENCE

Biosecurity

- Identify Hazards
  - Understand disease transmission
  - What are the risk factors for your farm
- Assess Risks
  - Impacts to your farm
- Determine biosecurity measures needed
  - Prioritize

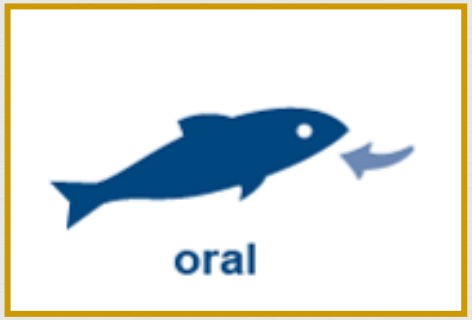
To identify hazards

- inspection
- talk to employees
- check records
- get advice
- review codes



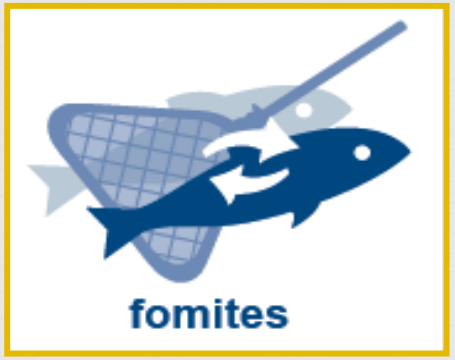
Disease Transmission in Fish

- Direct contact between fish
  - Vertical or horizontal
  - Entry through skin, open wounds, gills
- Ingestion (oral)
  - Infected live or frozen fish
  - Cannibalism of dead or dying fish
  - Contaminated feed



Disease Transmission in Fish

- Water Sources
  - Inputs, transfer
  - Including aerosols
    - Spray or splashes between tanks
- Fomites: Inanimate objects
  - Equipment: Nets, buckets, siphon hoses
  - Footwear, clothing, vehicles



Disease Transmission in Fish

- Vectors: Living creatures
  - Predatory birds, wildlife
  - Pets
  - People
- Zoonotic: affects people
  - Bacterial agents
    - *Mycobacterium*
    - *Edwardsiella*
    - *Erysipelothrix*
    - *Klebsiella*

Disease Introduction Risk Factors

- Fish Movement
  - Incoming Fish, Eggs
- Water Sources
- Fish Health
- Equipment and Vehicles
- Vectors (Animal and Human)

Risk: Fish Movement

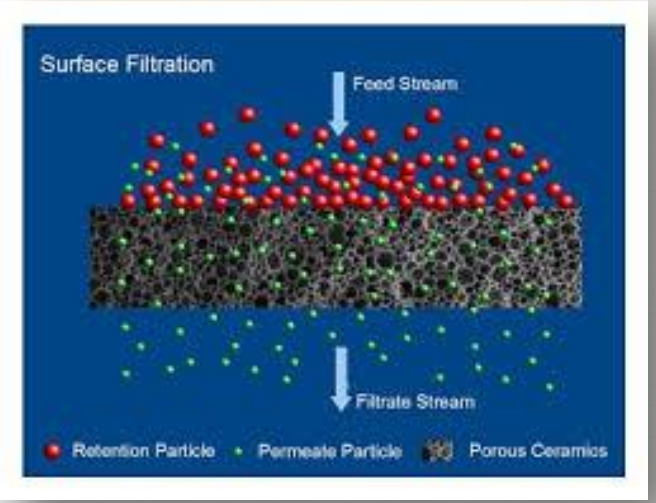
- New or returning fish
  - Broodstock
  - Eggs
  - Grow out
  - Restocking
- Prevention
  - Purchase healthy fish
  - Quarantine new arrivals

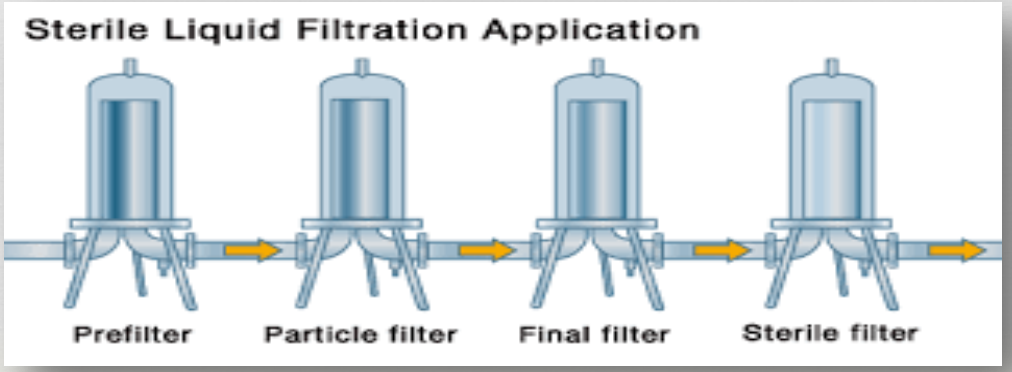
Prevention: Incoming Fish

- Quarantine new or returning fish
  - Time varies - 4-6 weeks
  - Maintain quarantine area separate from rest of farm, including
    - Water sources or flow circuits
    - Equipment
    - Effluents
  - Care for quarantined fish LAST or by a designated employee

Risk Factor: Water Sources

- Surface water greatest risk
  - Variable water quality, fish pathogens
- Ground water sources less risk
  - Well water, springs
- Municipal sources





Proper Cleaning Protocol

- Remove all visible debris
  - Inactivates many disinfectants
  - Microorganisms can “hide”
- Wash (soap and water) and Rinse
- Dry
- Apply disinfectant solution
  - Use appropriate concentration
  - Allow appropriate contact time
- Rinse and/or neutralize
  - Sodium thiosulfate for chlorine products

Prevention: Fomites

- Foot dips
  - Near entrance
  - Used prior to and after leaving area
  - Change solution daily or when visibly soiled
- Boots/waders
  - Submerse and clean
  - Allow necessary contact time

Prevention: Vectors (Animals)

- Limit contact
- Minimize bird nesting sites
- Implement predator and rodent management programs

Prevention: Vectors (People)

Farm Visitors

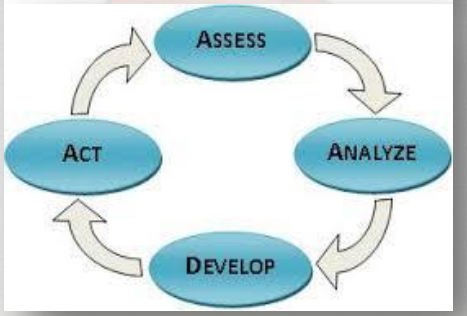
- Post signs
- Maintain a visitor log
- Use foot dips/baths for shoes
- Accompanied by farm personnel
- Avoid animal areas

Prevention: Vectors (People)

- Employees
  - Wear clean clothing or coveralls
  - Use foot dips
  - Wash or sanitize hands before and after contact with fish
  - Work for areas of lowest risk to highest risk
  - Limit access to egg or fry facilities

Implementation

- Communication
  - Discuss plan with employees and visitors to the farm
- Written plan
  - Becoming more common requirement
  - Ensures all have access to procedures
- Reassessment
  - What is working, what is not



Conclusions

- Threat of infectious diseases to aquaculture will continue
- Use of biosecurity measures
  - Help to prevent disease introduction and spread
  - Protects your fish, your farm and your investment