Aquaculture Biosecurity

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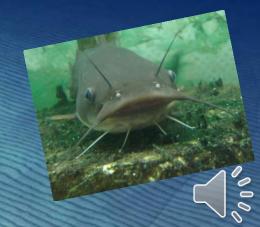
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Aquatic Species

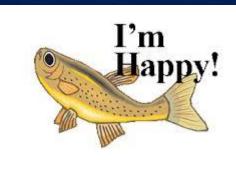






Management vs Treatment

- Prevention of disease = Successful management
- Good water quality
- Nutrition
- Sanitation
- Biosecurity





Biosecurity

Procedures intended to protect humans or animals against disease or harmful biological agents

Safe life through cleanliness



Aquaculture Biosecurity

The 3 Principles of Biosecurity

- Reduce risk of pathogen introduction to facility
- Reduce risk of pathogen spread throughout the facility
- Reduce conditions within the facility that increase susceptibility to infection and disease (i.e. stress)



Biosecurity: VECTORS Preventing the introduction





Domestic animals

Water source



Live Feeds



New fish stocks/eggs



Feral animals



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Biosecurity: Preventing the Introduction

Introduced fish

- Reputable supplier
- Health and feeding records





Specific pathogen free animals
Fish Health professional
diagnostics/screening



Biosecurity: Preventing the Introduction

- New fish stock quarantine
- Fish eggs quarantine and disinfection
- Live feeds know source or culture yourself
- Domestic animals fencing
- Feral animals bird netting, sounds, traps





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Biosecurity: Preventing the introduction

- People washing hands prior and after; disinfectant foot baths
- Vehicles park outside perimeter of facility
 - Refrain people or vehicles that were at another facility entering your facility for 24 hours
- Water source UV, chlorination



Biosecurity: Prevent the Spread

- Vector control (birds, chickens, dogs, people, etc.)
- Dedicated/disinfected equipment (nets, buckets)
- -All in All out policy
- -Quarantine new animals





Many factors affect the disinfection process

- Type of disinfectant
- Concentration
- Temperature/pH
- Contact time
- Organic matter
- Number of organisms
- Type and growth phase of organism





Virkon Aqua Potassium peroxymonosulfate

- Approved by EPA for aquaculture
- Broad spectrum
- Fast acting
- Relatively safe for personnel
- Works at low temperatures
- Breaks down into harmless organic salts





Fish Quarantine

Basic

- Separate tank/system far removed from established aquaculture systems
- Dedicated equipment (i.e., nets, pumps, airlines) for each quarantine system
- Upon Fish Arrival

Temperature acclimated by exposing incoming fish bag to quarantine tank

Critical parameters are temperature and pH

Acclimation

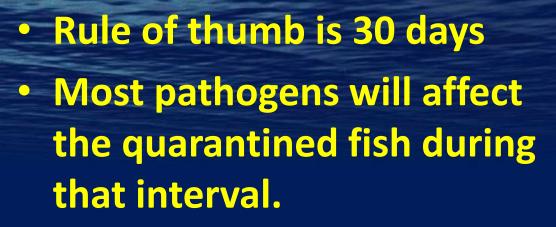
- Gradually acclimate fish with new tank water to bag water
- When water chemistries are similar between the incoming bag water and tank water, the fish can safely be moved with a dedicated net.



NEVER put bag water into new tank.



Quarantine Duration



 Fish Health Specialist/veterinarian



Biosecurity: Reduce the susceptibility Good husbandry skills Culling of dying and dead fish Proper Sanitation





Transportation

Basic Rule:



- Fish should not be fed 24 to 48 hours prior to transport
- Within the Farm
 - Important for water chemistries between the two systems (outgoing and incoming) are similar
 - Hauling system (e.g. buckets) should not be overpopulated
- Outside Farm
 - Hauling tank needs aeration (battery operated)
 - Keep stocking density low



Fish should be checked frequently for signs of poor water quality (oxygen deprivation) and functioning air pump

Daily Observations

Ensure daily observation of fish to assess their health and well-being.

 Provide a mechanism of direct and frequent communication between workers, manager, & owner

Timely and accurate information on problems or animal health, behavior and well-being is conveyed to the fish health specialist or veterinarian.
These observations should be

recorded.



Sanitation

- Keep surrounding area clean
- Store equipment/disinfecting tubs away from systems
- Separate areas for eating
- Washroom available







Occupational Health and Safety Training



- -Zoonotic Diseases: diseases that can be transmitted between animals and man
- Bite/Scratch Injuries
- Physical methods of euthanasia such as decapitation





Aquatic Zoonotic Diseases

Bacteria:

- Aeromonas hydrophila
- Streptococcus iniae
- Vibrio spp.
- Mycobacterium spp.
- -Salmonella spp.
- Listeria spp.Leptospirosis
- Parasite:
 - Angiostrongylus cantonensis





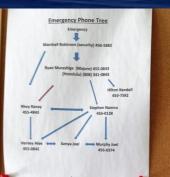
"Fish Handlers disease" Caused by *Mycobaterium*

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Angiostrongylus cantonensis nematode

Record Keeping



Standard Operating Procedures Aquaculture Technologies of the Marshall Islands (AT Hatchery/Nursery Facility

Sicsecurity

Prior to entering: hastery/nursery facility, do not go to other facilities. (Note: if un-avoidable, wesh down legs, hands, and footware thoroughly before coming to facility. If increasing shower, change cloth and footware)

every time. Make sum the bottom of your footware is completely interested.

Authory live tool norm and rear door.

Avoid going from sursetry to hatchery (hatchery includes LRT into two

Une clean clubbes at all times. Take home didy club on a daily basis for

Use COMMON SENSE. If you happen to touch something that is "driv" of dartaminuted (driv PVC pipe, took, pend), alppens, bucket, baker, not, croth, etc. 1 you need to wash your hands. Everything on the drawed and

8 Be cautious and aware – Take care of spreading containinants by addressing politi (head – rotler, Atamia, politik, algae, enrichment, sphoned water, etc...) anneedably and boing excloses (sphothing inte other tanks, tuckels, culture, etc.) where transferritor or transmission.

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ery / Nursery Disaster Plan

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ning entergenny vituation, staff the cease all feedings of animals until situation is faily use enter fuel consumption. We trave on site 24 hours of fail plonage. Once back up general Other nets an normal. We check all systems and furn off all controlled autooratic typicers (



k Feeds; Creating a Sustainable Model o culture in the Marshall Islands." Train, train, train • SOPs: -Water chemistries - Feeding -Water exchanges/system changes - Stocking/quarantine Other Visitor logbook



The So What???

Economic strain

- Direct loss of product (mortality)
- Diagnostics



- Time spent diversion of personnel management and labor
- Reduced quality of survivors
 Missed markets

