



NATIONAL AQUACULTURE
TRAINING INSTITUTE

From Breeder to Retailer, Chain of Custody – Quarantine and Holding



SRI LANKA
EXPORT DEVELOPMENT
BOARD



National Aquaculture Development Authority of Sri Lanka
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Introduction

- Export operations are the interface between breeders and wild collectors and the customers
- In general breeders do not export as they only deal with a few types of fish which means it is not worthwhile to export
- Exporter will deal with a range of breeders, coordinate delivery to export facility, hold fish and stabilise for export, pack and send fish to customers
- Due to large range of fish, many suppliers the exporter must focus on biosecurity and fish health/quality as well as good customer service.

Introduction

- The exporter must also be aware of current market trends, what is happening in their customers markets and competitive activity
- So essentially there are 2 key areas for the exporter:
 - Aggregate and ship ornamental fish
 - Market to the importer
- This presentation will focus on the aggregation and marketing of fish



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DESIGN AND OPERATION OF QUARANTINE FACILITIES

Design & Operation of Quarantine Facilities

- The remainder of this presentation will focus on the design and operation of quarantine facilities
- This will vary depending on the size of operation and the type of fish you deal with
- Recommendations presented are general in nature and may not be applicable or feasible to all situations – you should always consider the species you are working with and your facility
- The following slides present some of the aspects that must be considered in design / operation of quarantine facilities
- The first and most critical aspect for discussion is biosecurity

Biosecurity and Quality

- There are growing international pressures regarding the transfer of aquatic diseases – resulting in increased Health Certificates and issues about export to many countries
- Consumers demand quality product, need to ensure that:
 - Fish must conform to standards for that fish
 - Colours are bright and fixed (do not fade)
 - Tails are not ratty or stunted
 - No damage to skin, missing scales
- Also important to have disease free fish to ensure high survival after transport – low DOA claims
- Essential to maintain export credentials to Australia and countries such as USA, and the EU

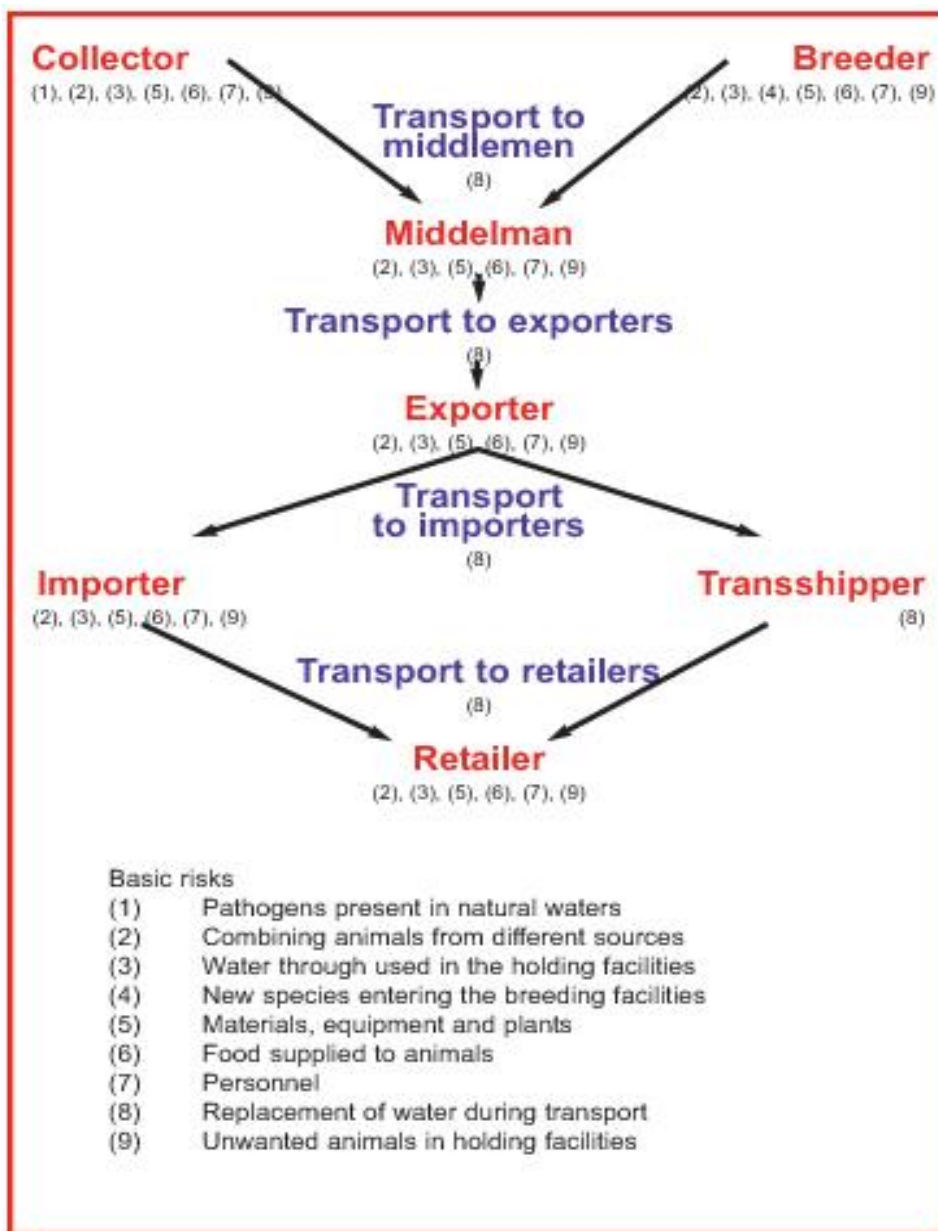


Biosecurity and Quality

- International trade is likely to become more regulated / restricted due to disease transfer risks
 - Eg. Recent changes to import regulations to the EU
- Set up your facility as 'Disease Free'
 - Be vigilant
- Biosecurity has been defined as:
 - “protection from the risks posed by organisms to the economy, environment and peoples health through exclusion, eradication and control”
- Put simply it is preventing disease from entering or spreading within your facility / region / country
- Simply said, more difficult to implement!

Risk Factors

- There are a range of risk factors that can increase the likelihood of disease or act as a potential source of disease
- Biosecurity measures are used to manage these risks to reduce potential for disease – these must be considered in all aspects of facility operation
- These measures can include a range of infrastructure measures and operational procedures to control disease spread
- This is complicated due to distribution chain shown in the following slide





Pathogens in Water

- Many disease are carried in water and even a tiny droplet may contain enough pathogens to cause disease
- Water for the facility should be safe
 - Potable water (usually treated in some way to reduce micro-organisms)
 - Ground or well water
 - Avoid water from rivers lakes etc – filtering and disinfection may be needed
- Screen your water source to protect from birds etc





Combining Fish from Different Sources

- Any new source of fish can be a potential disease source
- Where fish from different sources mix there is a chance of cross-contamination
- Species may 'carry' disease that they have natural immunity to causing few problems, other species may have no such immunity resulting in severe mortality
- Be careful when introducing new stock – quarantine them properly



Pest and Host Species

- The presence of other types of aquatic life, birds, reptiles and animals can also introduce disease
 - Many of these species can also be an intermediate host for disease
- Many parasites have more than one host in their life cycle and may be present in worms, snails and birds – their presence will contaminate the facility
- These pest species should be excluded with bird netting etc



Good Husbandry Practices

- Maintaining fish in a healthy state is important as elevated stress leads to increased disease
- Important factors to consider are:
 - Water quality and temperature
 - Nutrition – both quality and quantity
 - Handling and stocking of fish
- Operators in all sectors of the industry must be aware of the needs of the species they are dealing with
- Must have the necessary tools and training to look after the fish properly



Hygiene

- Disease may also be spread around a facility and good hygiene practices are essential in preventing this
- Staff or visitors can easily spread disease
 - Footbaths and washing hands can reduce this risk
- Ensure all equipment is cleaned and disinfected properly after use, using separate equipment in different parts of the facility also reduces risk



Biosecure Practices

- This section has highlighted the importance and principles of Biosecurity for our industry
- More details are provided in 'Fish Health' sessions
- The following sections detail design and operation of quarantine and export area based on these biosecure principles



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FACILITY DESIGN FOR EXPORT

Export facility

- There are literally hundreds of export facilities around the world ranging from small backyard operations to large sophisticated operations in countries such as Singapore
- In most cases, the export facility will consist of 3 key areas:
 - Holding tanks for quarantine and treatment of fish
 - Coolroom for reducing temperatures of fish during pre-packing preparation for shipping
 - Packing area including oxygen source, system for preparation of packing water





The building

- Export facility should be housed in a building – this allows better control of the holding environment and assist in biosecurity
- Ideally the building should be closed to prevent birds, animals and insects from entering (requirement of many countries).
- A minimum of a roof and insect netting on walls is recommended



Holding Tanks

- All tanks should have a minimum of aeration to provide oxygen
- In general all tanks should have an effective biological filter to reduce toxic ammonia
- If this is not possible, regular water changes will be needed
- Hard plumbing incoming water and drains make it easier to work in fish rooms
- Maintaining good water quality is essential to product quality
- The number of holding tanks should be enough to hold 2 weeks exports



Holding tanks







Coolrooms

- Some form of coolroom is recommended to allow shipments to chill before shipment
- Often used to store fish in bags for pre-packaging
- Packing area may also be located in here
- This is a critical part – proper packing temperature is needed to ensure quality and survival during transport



Coolrooms



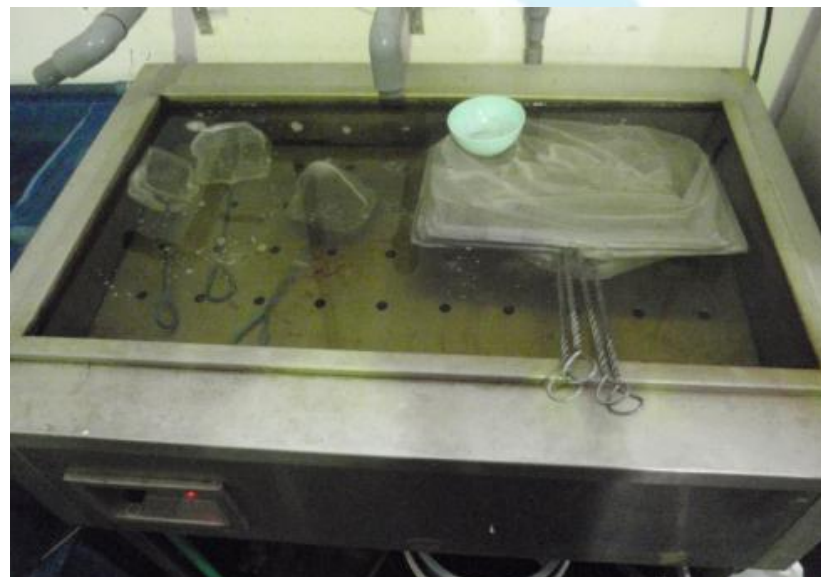
Packing Area

- Packing area is where the final packing will be carried out
- In general the area will have
 - A bench / work area for packing bags
 - packing water tanks where water for preparation of packing water
 - A supply of oxygen to inflate bags
 - Room for collating shipment and placing bags in boxes
- Should be ample room for several workers without them getting in each others way
- Good lighting to allow proper inspection of fish – this is the last point of quality assessment



Packing Area











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QUARANTINE AND HOLDING PRACTICES

Sources of Fish

- The success of most exporters comes down to the quality of their suppliers
 - They must be reliable and able to supply consistent quality of fish
 - Must be capable of producing the volume of fish required on a consistent basis
- Exporters need to establish close links with their suppliers
 - Essential for success
- In many cases, exporters can offer assistance, technical input to farmers to help improve fish quality
- Some exporters may assist breeders by supplying foods, medicine etc (use buying power to help reduce production costs)
- Important to manage and look after suppliers – they need to be profitable otherwise you will have no fish

Sources of Fish

- For the exporter, there are 2 possible sources of fish
 1. Local farms and wholesalers
 2. Direct imports from other countries
- In general for Jamaican exporters the focus of sourcing will be from local farms
- For Local sourced fish these can be divided into 2 methods of supply which need to be dealt with separately
- Tranship Fish
 - Fish delivered on the day for shipping direct from farms
- Quarantine Fish
 - Will be delivered days before shipment and held onsite in quarantine

Tranship Fish

- This method relies heavily on the skill level of farmers
- It is advised that this be avoided with new or in-experienced farmers
- There is little opportunity for fixing the quality of fish before transporting, you need to be confident of the quality and health of supply
- This method is well established in mature markets like Singapore where many fish are delivered just hours before shipping to export markets



Tranship Fish

- Bags of fish arriving on day of shipment should be kept in a shaded area that is not too hot or cold
 - Do not leave out in direct sunlight
- Ideally put on to trolleys in their correct order for shipping
- Bags should be marked appropriately with species, size, number of fish – this is very important particularly when dealing with multiple deliveries or shipments





Transship Fish

- Fish must be checked properly – if in doubt the fish should not be packed for export
 - Return to farm
 - Put into tanks and treat
- Signs to look for:
 - Red rashes
 - Fish 'rolling' in bags
 - Fish gasping



Tranship Fish

- If time permits, fish should be re-bagged
 - Replace 50% of the bag water with new water
 - Re-oxygenate the bag
 - Can re-bag with Potassium Permanganate dosed water for several hours 2 – 2.2 mg/L
 - Leave on trolleys – send for cooling





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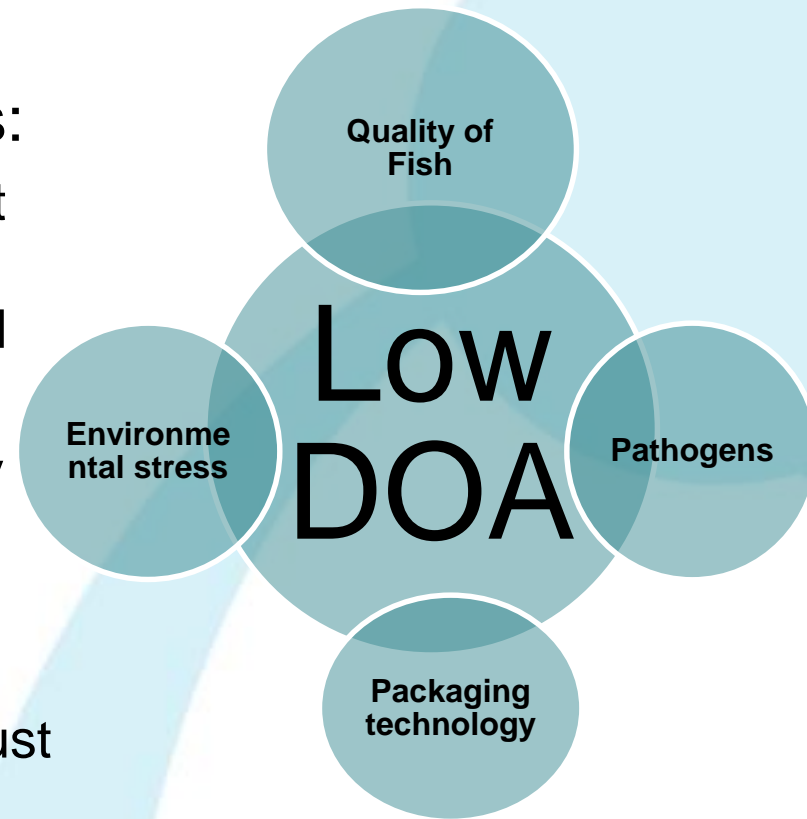
CRITICAL FACTORS FOR QUARANTINE

Estimated Fish Kill due to transport

- The industry standard for Dead On Arrival (DOA) is between 3 – 5%
- Trade in industry is valued at a minimum of USD\$278 million with an average value of \$0.17 = 1,635 million fish per annum – FAO data
- Based on 5% DOA = 65 million fish per annum
- This figure is low – in reality export data is higher than FAO data suggests
- Mortality does not include Dead After Arrival (DAA) – this could be as high as 10% of a shipment over 7 days
- This can be reduced through proper quarantine practices which are discussed in this section

Critical Control Points for Quality of fish

- The following are Critical Control points for quarantine of fish – pay particular attention at these points:
 - Order from a known supplier (if a first shipment then visit their facility to tell what you want in terms of quality and packing)
 - Inspection of fish on arrival - are they what you ordered
 - Holding tanks – fish should be observed daily for any problems or signs of disease. Poor quality fish must be culled
 - Counting and Pre-packaging of fish
 - Final bagging and putting into boxes





Factors determining fish shipment quality

- 1. Fish Quality
- 2. Pathogens
- 3. Stress -
environment
- 4. Packaging
technology

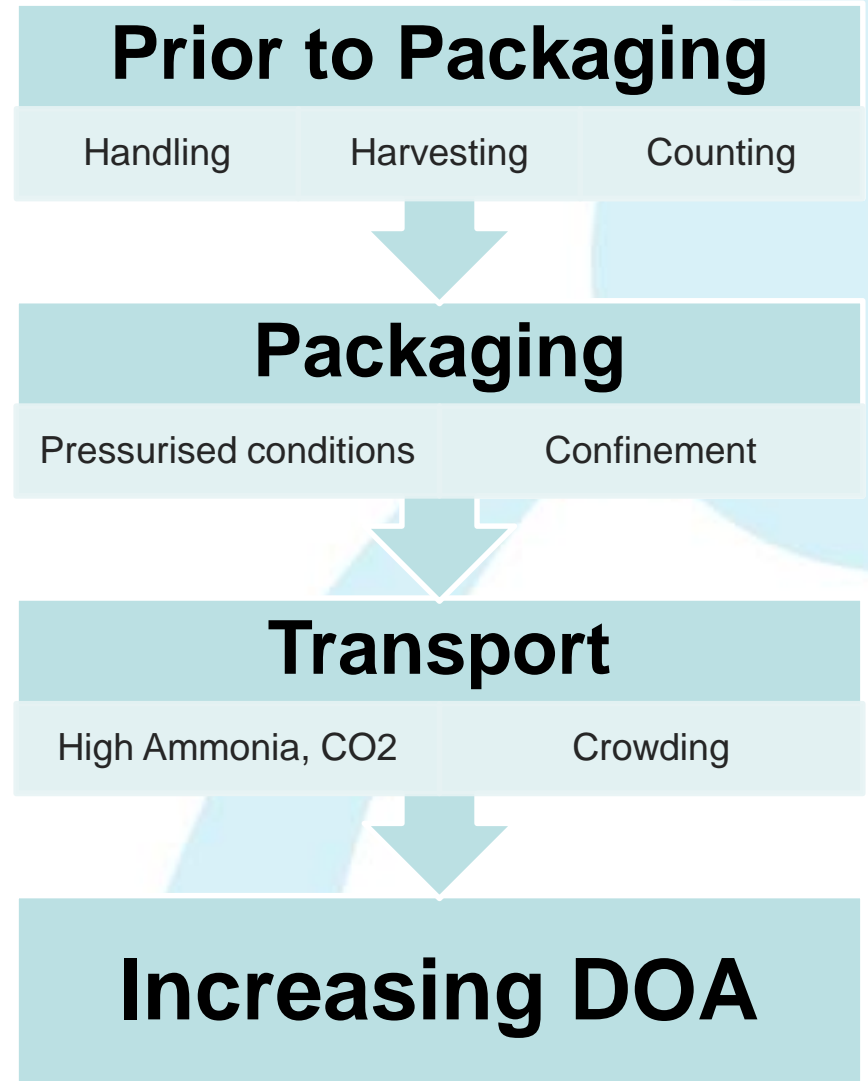


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CRITICAL CONTROL FACTOR – FISH QUALITY

1 - Fish Quality

- In terms of live transport, fish quality refers to the ability for fish to withstand the stresses of transport and arrive in good quality at the customers
- This equates to Stress Resistance – fish with good stress resistance will travel better and have lower DOA



Fish Quality

- Fish quality starts with the farm, which is why it is important to work closely with your supplier
- Minimise handling stress through
 - Minimal handling of fish
 - Using correct nets that do not tear fins and skin/scales
 - Always keep fish in water
 - Always be aware of water quality differences
 - Don't expose fish to extremes of temperature
 - Any handling process should be quick but done carefully
- Water quality is also very important – ensure fish are grown in water that is suitable for them
- Adequate aeration (= dissolved oxygen), pH and ammonia or nitrite are generally the critical factors to consider

Feeding

- Feeding good quality food during production and while in quarantine is important - foods should meet nutritional needs of the species (protein, fat content etc)
- Live feeds can be highly beneficial
- Addition of Vitamin C at the rate of 1 – 2 grams per kilogram for 7 to 10 days prior to harvesting can reduce mortality.
- Majority of fish should be fed twice per day, every day
- Observe fish behaviour while feeding
 - Do all fish get the opportunity to feed?
 - Can you recognise a thin fish?
 - Is there a reason why the fish aren't feeding normally?





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CRITICAL CONTROL FACTOR – DISEASE STATUS

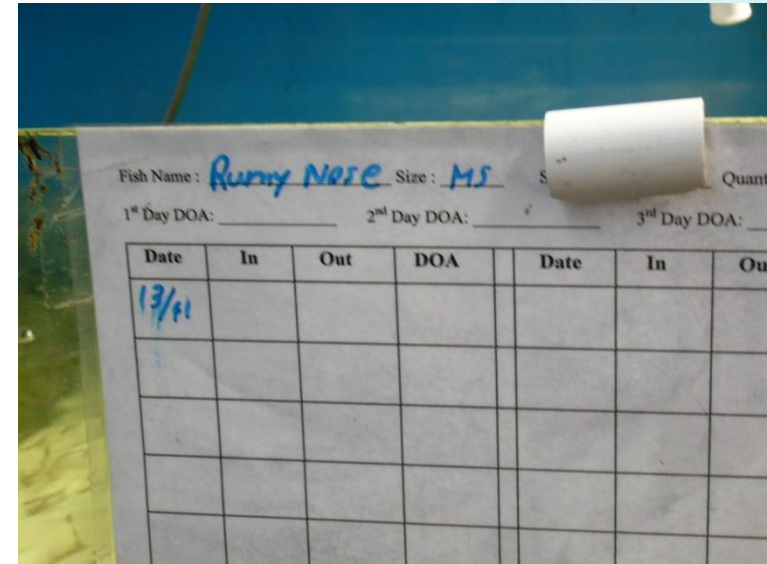
2 – Pathogens / Disease

- Fish that are sick or carrying disease will not withstand being packed and transported due to low or compromised stress resistance
- This disease can also spread easily from sick fish to other healthy fish in transport bags, quarantine tanks etc
- Need to identify sick fish – these should be held for treatment
 - Do not send sick fish – they will die
- Therefore, it is critical to prevent and control diseases



Disease Monitoring

- Monitor fish carefully, observe fish health daily
 - Look for signs of disease, abnormal behaviour
 - Remove and record dead fish on Tank Charts – this is useful in detecting trends in fish health
 - Treat fish as needed and record treatments on tank charts



Fish Name: Runny Nose Size: MS S... Quant...

1st Day DOA: _____ 2nd Day DOA: _____ 3rd Day DOA: _____

Date	In	Out	DOA	Date	In	Out
13/11						





Abnormal Behaviour in Fish

- When the fish are unhealthy and are stressed they can be seen to:
 - Not feed vigorously
 - Swim in an erratic fashion around the tank
 - Swim on their side or in a different way to the rest of the school, whirling, lethargy
 - Flashing at the surface or against surfaces in the tank in a rapid swimming motion
 - Colour changes in their skin or fins can also be observed, this varies between species.
 - Rapid breathing action
 - Can you think of any others?

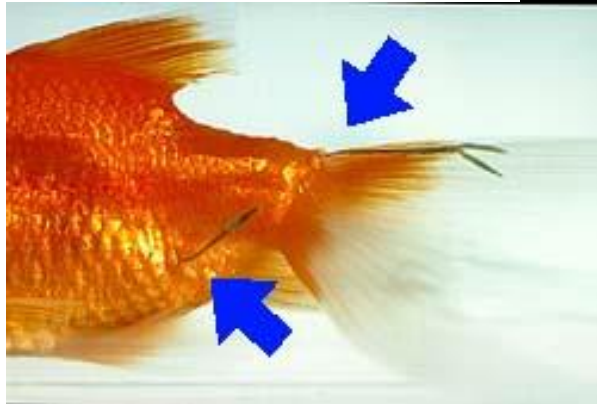
Parasites

- Common symptoms include:
 - Behavioral such as Scratching (flashing), abnormal swimming, Increased breathing rate, lethargy.
 - Skin - Slime changes, White spots, colour change, sores, blood spots.
 - Fins – Erosions, fins droop.
 - Gills become swollen/flared gills, Increased 'breathing' rate.
 - Feeding – reduced feeding, Anorexia.
- Signs of internal parasites are:
 - Reduced feeding
 - Swollen stomach
 - White or stringy faeces



Common External Parasites

- Common external parasites include:
 - Whitespot, Velvet, Slimy skin disease (*Trichodina*, *Chilodenella*, *Costia*)
 - Flukes, Anchor worm, Fish lice



Treating parasites

- The first step is to ensure water quality is correct and do a water change or any other corrective action if needed
 - Correct water quality reduces stress on fish
 - A water change can reduce the number of parasites, particularly for protozoan infections
- If you know what the parasite is, treat with the appropriate medication as per label
- If you are unsure, use a broad spectrum multi-cure. Salt can also be added to the water at 1 – 2 teaspoons per 10 litres of water

Hygiene

- Hygiene practices important to prevent spread of disease
- All equipment is regularly disinfected to prevent the spread of disease
 - Hot water
 - Chlorine
 - Disinfectants such as hydrogen peroxide, potassium permanganate
- Sterilise all nets between tanks to prevent cross-contamination
- Footbaths and hand wash in entry/exits



Prophylactic Treatments

- Prophylactic or preventative treatments of tanks can be an important method in preventing disease
- As with puppies and kittens, fish need periodic treatment to remove parasites and ensure ongoing health.
- Ich & Protozoan Parasites
 - Minimum 1x weekly, 2x weekly if needed
 - Copper
 - Potassium Permanganate, Acriflavine etc
- Flukes
 - Treat monthly – maybe more often in warmer weather
 - Trichlorofon
 - Praziquantel
 - Dimilin



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CRITICAL CONTROL FACTOR – ENVIRONMENT

3 - Environment

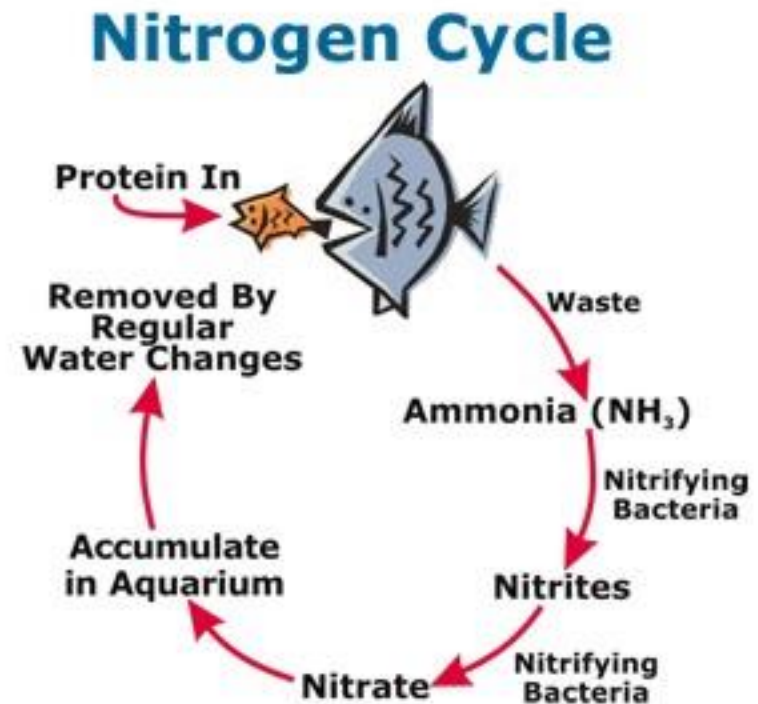
- Range of factors will impact on quality of fish through producing stress in fish including:
 - Extremes in temperature
 - Low levels of oxygen
 - pH decreases
 - Ammonia
 - Pressure changes
 - Light intensity
 - Presence of disease
- The holding environment needs to optimise these to minimise stress and maximise health of fish

Control of Water Quality

- As is the case when growing fish, water quality is also extremely important in holding tanks
- Fish can be kept in range of tanks / containers.
- Ideally need a minimum of aeration, but preferably some form of biofiltration
- Coldwater species such as Koi and Goldfish are often kept in Recirculating systems that can sustain high stocking densities

Control of Water Quality

- Filtration is important for water quality
- Traps solids for removal from the tank – clean filters regularly!
- Biological
 - Filters should be cleaned in a manner which does not harm the bacteria
 - No chemicals, hot water, no direct tap water, do not wash vigorously etc
 - Low pH, Low oxygen levels, some antibiotics and drying out can also harm nitrifying bacteria
 - The filters are a living entity
 - Require oxygen
 - Just as important as the fish in the tank!





Thankyou....

The end....

Any questions?????