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HANDBOOK FOR FISH HEALTH AND MANAGEMENT IN KENYA

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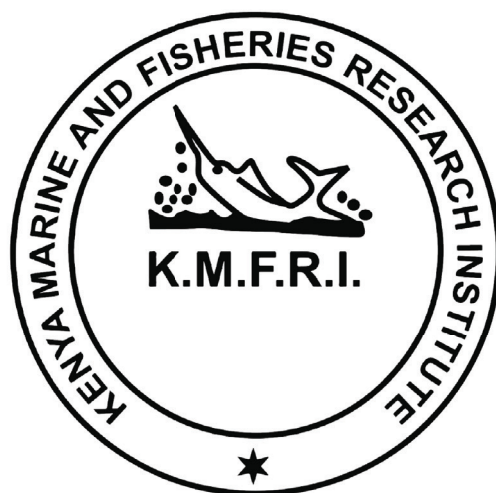


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DOCUMENT CERTIFICATION

Certification by Director Aquaculture Research

I hereby certify that this report has been done under my supervision and submitted to the Director.

Name _____

Signature _____ Date _____

Certification by Chief Executive Officer, KMFRI

I hereby acknowledge receipt of this Report

Name _____

Signature _____ Date _____



ACKNOWLEDGMENTS

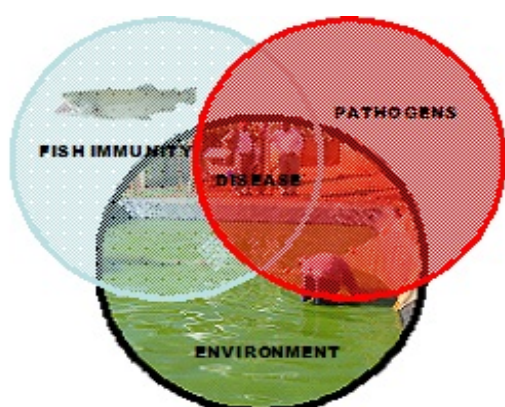
This handbook was developed through concerted efforts of project partners from KMFRI, Machakos University, University of Nairobi and Sidai Africa Ltd through the project “Evaluating Costs and Benefits of Prophylactic Health Products and Novel Alternatives on Smallholder Aquaculture Farmers in Asia and Africa (IMAQulate), Project Ref: BB/N005082/1”. The project is funded from Biotechnology and Biological Sciences Research Council/Department for International Development (BBSRC/DfID), UK and the Department of Biotechnology, India.



HANDBOOK FOR FISH HEALTH AND MANAGEMENT IN KENYA

INTRODUCTION

Disease in fish results from a breakdown in the normal aquatic environment. This is common in aquaculture systems due to the confinement of larger numbers of fish. Confinement leads to changes in the water environment thus disturbing the delicate balance between the normal



Pathogens naturally exist in a stable “*equilibrium*” with fish until this balance is disturbed

Fig. 1: Pathogens naturally in a stable “equilibrium” with fish

microorganisms in water, fish immunity and water quality.

Fig. 1. Pathogens in a stable equilibrium with fish

Source: <http://www.nafis.go.ke/livestock/fish-farming/diseases-parasites-and-predators-management-and-control/>

Common stressors in aquaculture that may predispose fish to diseases

- Poor handling of fish is a major cause of both bacterial and parasitic infections.
- Translocation of fingerlings/fry from one place to another without proper conditioning, handling and quarantine can spread diseases and parasites.
- Increased nutrient levels due to intensive cage culture promote the proliferation of parasites.
- Pollution due to high levels of ammonia predisposes fish to succumb to large numbers of parasites. Human faeces may be a source of gut parasites, especially for common carp.
- Damages of fish by predators lead to secondary bacterial or fungal infections. Predators especially birds and mammals play an important role in the life cycles of certain parasites.
- Disease, parasites or pathogens may enter fish through gills, penetration of egg membrane, ingestion, rupture of skin, wounds or through the digestive tract.

COMMON SIGNS OF DISEASE OR ILLNESS IN FISH

Behavioural signs:

- The fish may refuse to feed or overfeed and trailing faeces appear at the vent.
- Weak, lazy or erratic swimming
- The fish may not keep its swimming position with some floating on water belly up
- Roughing/rubbing against hard surfaces due to itching
- Crowding/gathering at the inlet

Physical signs:

- Gaping mouth
- Open sores, lesions, loss of scales, bloated belly
- Pale, eroded, swollen, bloody or brownish gills
- Condition of the fins and gills will deteriorate, fins may be abnormally folded, eroded or clamped close to the body
- Cloudy or distended eyes
- Presence of disease organisms on skin, gills, fins
- Colour may fade out /change
- Body shape, condition and/or behaviour will be abnormal
- Other noticeable signs of injuries, growths or abnormalities.

What are the causes of fish disease?

- Poor quality or contaminated feed or poor feeding methods
- Exposure to extreme conditions or toxic environments

- Poor water quality like extremes in pH, High ammonia where the water is either too acidic or alkaline
- Presence of toxic gases such as ammonia, lack of dissolved oxygen, too high or low temperatures
- Overcrowding and/or behavioural stresses, for example in storage or transport
- Improper and/or excessive handling, bullying and other stressful conditions
- Toxins in food such as fungal toxins (mycotoxins) in stored feeds, pesticide residues etc.
- Water pollution by agricultural or industrial effluents, sewage effluents, and heavy silt loads.
- Temperature (too high or too low)
- Infection from viruses, bacteria, fungi or parasites

Types of fish disease by causative agent/s

- i. Bacterial - fin rot and tail rot
- ii. Fungal infections - woolly or cottony patches on the surface of fish, and gill rot
- iii. Parasitic
 - Ectoparasites – Those that occur outside the fish body e.g. Black spot, white spot, fish louse and nematode.
 - Endoparasites – Those that get into the body of the fish
- iv. Dietary – High carbohydrate levels in fish feeds, lack of proteins and lipids will result in liver tumours and poor body formation.

SOME COMMON FISH DISEASES AND THEIR PREVENTION

PATHOGEN	SYMPTOM	PREVENTION
Fungus	<ul style="list-style-type: none"> Cottony grey-white or brown patches on the skin 	<ul style="list-style-type: none"> Proper fish handling Avoid handling fish in cold water. Low organic matter in water
Trematodes	<ul style="list-style-type: none"> Black spots Yellowish cysts on gills 	<ul style="list-style-type: none"> Control snails and control predators like birds. Remove infected fish.
Bacteria	<ul style="list-style-type: none"> Loss of appetite. Fin and tail rot. Pale gills. Fluid in the abdomen. 	<ul style="list-style-type: none"> Improve water quality.
Nematode (Contraecum)	<ul style="list-style-type: none"> Roundworm in spiral shape near gills 	<ul style="list-style-type: none"> Not really a problem for fish health but leads to consumer dissatisfaction
Parasitic protozoan	<ul style="list-style-type: none"> Fish try to scrap their bodies on hard surfaces (flashing) 	<ul style="list-style-type: none"> Salt, Potassium Permanganate or formalin bath. Keep water temperature near the optimum range for that species of fish.

Nutritional diseases of fish

CAUSE	SIGNS	PREVENTION
<ul style="list-style-type: none"> Lack of proteins 	<ul style="list-style-type: none"> Poor growth. Caudal fin erosion. Loss of appetite. 	<ul style="list-style-type: none"> Feed protein-rich food e.g. soya beans, or animal protein sources (fish meal, BSF meal)
<ul style="list-style-type: none"> Lack of lipids. 	<ul style="list-style-type: none"> Poor growth. 	<ul style="list-style-type: none"> Feed with energy-rich foods.

1. Parasitic fish diseases

Parasites affecting fish can be internal (endoparasites) or external (ectoparasites). Common fish parasites include protozoa, nematodes/cestodes/trematodes (worms) and crustaceans (e.g. louse).

a. Gill and skin flukes

Cause

- Flukes infect fish by direct contact with contaminated fish. Flukes attach themselves to the body and eat skin/gill tissue and blood.

Symptoms

- The gills may move rapidly and fish may gasp at the water's surface
- The fish may scrape itself against objects
- Colours fade as damaged areas are covered in mucus.
- The skin may redden in places
- The fins may become ragged

b. Roundworms

- Anisakis

Causes

A serious parasitic human worm (nematode) that lives in fish and marine mammals. Infects human beings through consumption of raw fish causing anisakiasis. Toxins in cooked fish may cause severe allergic reactions in some humans.

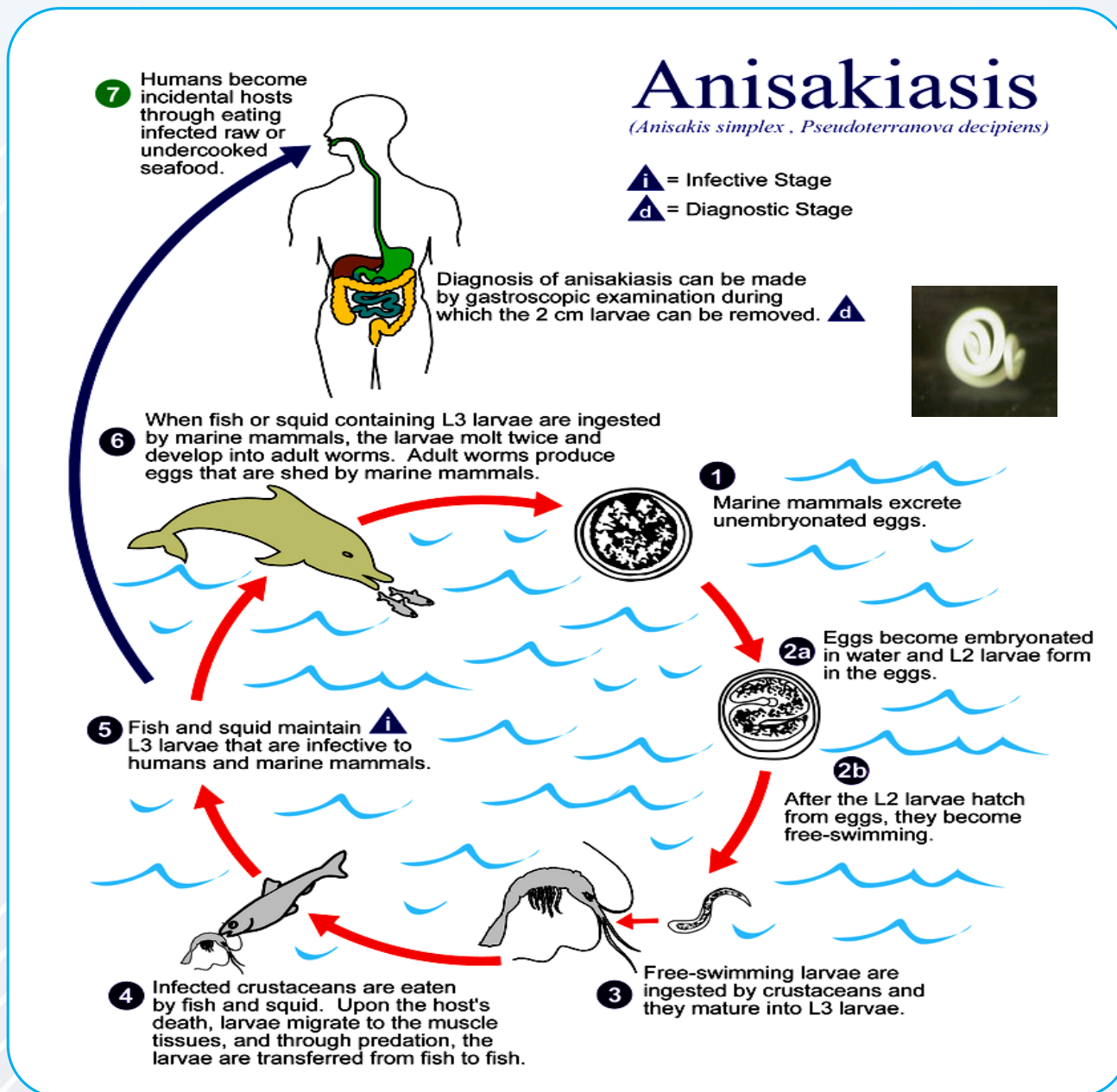


Fig. 2. Life cycle of parasites affecting cultured fish

Control in humans

- Eat properly cooked fish
- Regular deworming with albendazole.

c. Anchor worm

Cause

- Spread by introduction of infected fish to the farm. Caused by a crustacean parasite that infects fish and can grow up to 12mm.

Symptoms

- Whitish-green threads hang out of the fish's skin, with an inflamed area or ulcer at the point of their attachment.

Control

- Avoid introduction of infected fish.
- All new fish must be quarantined before introduction to the farm.

Treatment

- The water can be treated with insecticide. The adult parasite can be removed manually and the wound treated with antiseptic to prevent bacterial infection.



Fig 3. Fish affected with anchor worm

2. Fungal diseases of fish

Under normal conditions, fungal spores are commonly found in aquarium water without causing any disease to fish. Healthy fish have a protective mucus covering which can prevent infection by fungal spores. Under poor aquatic environment, through bad water quality, rough handling, fighting or physical injury, the protective mucus is damaged leading to outbreak of fungal

infections. Fungus can be a secondary infection to other conditions

Symptoms

- Grey white or brown cotton wool like growths on the skin or fins

Control

- Maintain good water quality

3. Bacterial diseases of fish

d. Columnaris

Common names

Cotton Wool Disease, Saddleback Disease or Cotton Mouth



Fig 4. Fish affected with columnaris

A bacterial disease affecting freshwater fish kept in warm conditions. Does not affect fish kept in salty water conditions.

e. Fin rot and mouth fungus

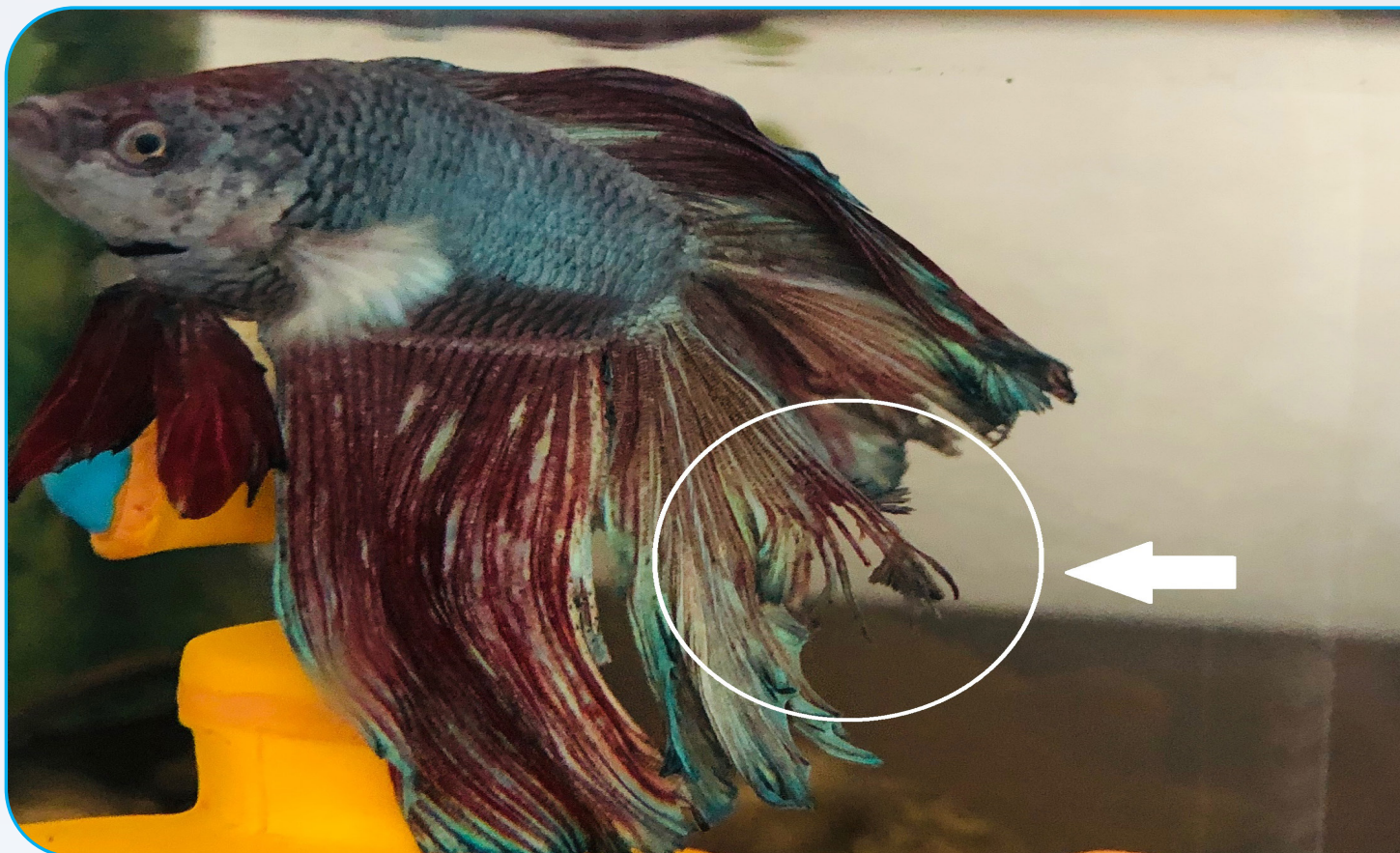


Fig 5. Fish affected with fin rot

Causes

Bacteria such as *Aeromonas*, *Pseudomonas* (fin rot) and *Flavobacterium* (mouth fungus)

Signs

- Bacterial fin rot causes ragged rotting of the fin.
- In fungal infections, the fin rots more evenly producing a white 'edge'.
- Damaged, split or ragged-looking fins (fin rot) with fin edges turning black/brown.
- Fins will have white dots in cases of *Ichthyophthirius multifiliis* infection.
- Cotton wool-like tufts around the mouth (mouth fungus).

- May cause loss of appetite and listlessness.
- When chronic may develop ulcers in the body.

Control

- Good water quality
- Feeding fresh food in small portions
- Maintaining constant water temperature
- Keeping the tank from becoming cluttered.

f. Ulcer Disease & Haemorrhagic Septicemia

Cause

- A number of different bacteria including *Aeromonas* and *Pseudomonas*.

- Spread by other infected fish.
- Bad water quality can trigger the disease.

Symptoms

- Open sores and ulcers, reddening of fins and vent, may lose their appetite and colour may change.
- What can you do to prevent a disease/parasite?



Fig 6. Fish with lesions

4. Viral diseases of fish

Healthy fish that have a balanced diet and good water conditions have strong immune systems to fight off such infections.

g. Cripnid herpes virus

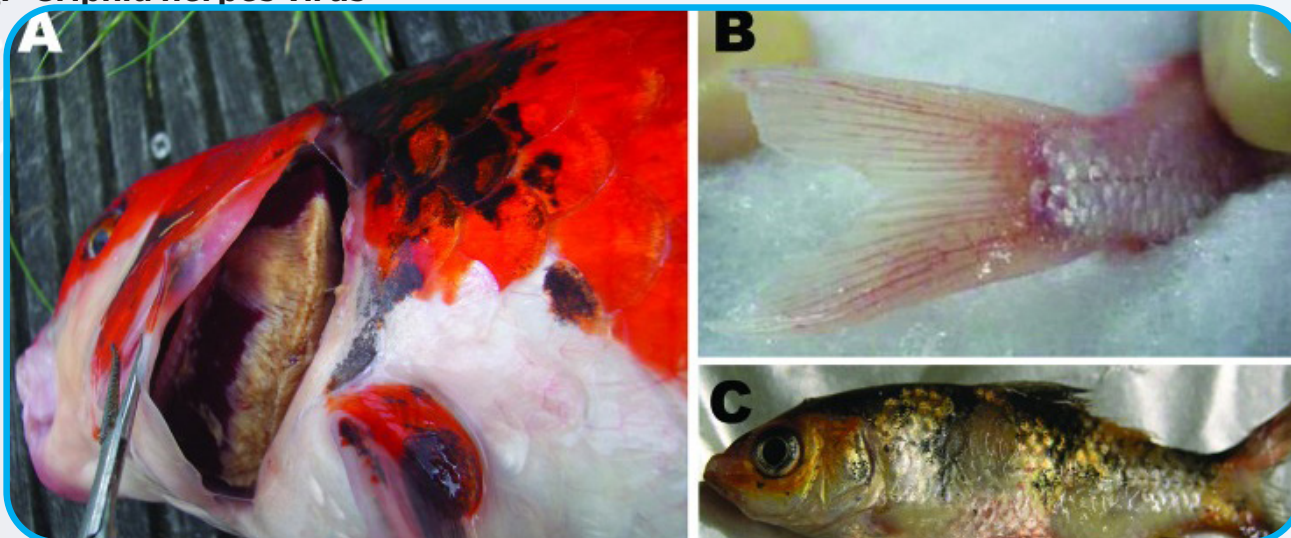


Fig 7. Fish affected with herpes virus

Causes

- A herpes virus affecting common carp

Signs

- Causes growths that are white or grey in colour and look like melted candle wax.

Control

- Maintain a good aquatic environment to ensure strong immunity among the farmed fish
- Avoid the introduction of infected fish.

h. Viral hemorrhagic disease

- Spread from fish to fish through water transfer, contaminated eggs and or bait fish from infected waters.

- Survivors remain lifelong carriers spreading the disease and contaminating the farm and water bodies.

Signs

- Listlessness or limping and hang just beneath the surface
- Swim very abnormally, like constant flashing circling due to the effect of the virus on the brain.
- Darkening of the skin
- Pop eye
- Pale or red-dotted gills
- Sunken eyes
- Bleeding around orbits (eye sockets) and at base of the fins.



Fig 7. Fish affected with viral hemorrhagic disease

i. White spot disease (Itch)



Fig 8. Fish affected with white spot disease

Source: <https://commons.wikimedia.org/w/index.php?curid=1010022>

- Protozoan disease of fresh water fish that damages the gills and skin as it enters the tissues, leading to ulceration and loss of skin. Ich is one of the most common and persistent diseases in fish. It appears on the body, fins and gills of fish as white nodules of up to 1 mm, that look like white grains of salt.

How does it enter a farm?

- Introduced by infected fish. Spreads rapidly and often costly and difficult to control. May lead to up to 100% mortality.

How do we control the disease?

- Only introduce healthy fish to your farm.
- Quarantine any new tropical fish should be quarantined for at least four weeks and cold-water fish for eight weeks.
- Wash your hands before and after the maintenance of each tank and use separate equipment to prevent cross-contamination

- Control the movement of water, people and equipment to the farm.
- Empty infected tanks, wash them with hot water and allow them to stay idle for 4 days.

Treatment of Infected Ponds

Ponds with infections should be drained and badly infected fish culled.

- Dry the pond when there is sunlight for about seven days.
- Dampen the pond bottom.
- Spread Lime (Calcium carbonate) evenly over the entire surface of the pond bottom at the rate of 1500 kg/Ha.
- Wait for 15 days then restock the pond with healthy stock.

DISEASE CONTROL IN FISH

- Ensure quality and sufficient water supply, with adequate dissolved oxygen and free of pollution.
- Maintain clean pond environment by controlling silting, plants and proper phytoplankton and zooplankton balance. Regular pond disinfection is recommended.
- Keep the fish in stress-free conditions by controlling stocking density, keeping different sizes separate to reduce fighting, providing an appropriate food supply, handling the fish properly etc.
- House only suitable species together, make sure they are compatible and not likely to bully or eat each other.
- Prevent the entry of disease organisms by preventing the entry of wild fish by using screens and eradicating them from canals and ponds.
- Ensure that all fish got from outside to the farm are clean without parasites or diseases.

- Quarantine new fish to ensure they are healthy before introducing them to an established culture facility.
- Always use high-quality feeds.
- Conduct regular monitoring of the water entering the farm to ensure its quality.
- Prevent the spread of disease within the farm by controlling predators, particularly birds and mammals.
- Disinfect ponds regularly to kill both the disease-causing microorganisms and their intermediate hosts
- Avoid water sharing among ponds (ponds connected with each other).
- In case of a disease outbreak, remove sick and dead fish from the ponds immediately
- Bury diseased fish with quicklime away from the ponds.
- Always disinfect pond and fish handling equipment.

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