Recognizing and Responding to Fish Diseases: A Practical Guide for Aquaculture Practitioners

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ABSTRACT

Fish disease management is a critical practical skill for every aquaculture practitioner. Outbreak events caused by viruses, bacteria, fungi, or parasites are frequently triggered by avoidable environmental stressors such as poor water quality, overcrowding, and suboptimal nutrition. This article provides a field-oriented guide to recognizing the warning signs of disease, understanding the conditions that predispose fish to illness, and implementing prompt preventive and treatment responses. Using clear descriptions, practical tables, and evidence-based recommendations, this guide equips fish farmers, hatchery managers, and extension workers with the foundational knowledge needed to minimize disease-related mortality and economic loss. The article emphasizes that early detection, routine pond hygiene, and judicious use of permitted therapeutics are the three pillars of effective fish health management.

INTRODUCTION

Why Fish Diseases Matter to Every Farmer

A healthy pond starts not with medication, but with management. Disease outbreaks in fish are rarely sudden events; they are the predictable result of conditions that have been building for days or weeks. Understanding why fish get sick, and recognising the earliest warning signs,

gives farmers a critical window of opportunity to intervene before losses become catastrophic.

The aquaculture sector globally has grown at remarkable speed (Little *et al*., 2016), yet this intensification has been accompanied by increased disease vulnerability. The more fish you crowd into a pond, the more stress they experience, the weaker their immunity becomes, and the more rapidly pathogens spread (Cascarano *et al*., 2021). Fish disease management is therefore not simply a veterinary concern it is a core farm management skill (Mishra *et al*., 2017).

✓ **Key Principle**
Disease in fish is almost always a triangle of three interacting forces: the fish's own health and immune status, the pathogen's ability to cause harm, and the condition of the environment. Remove any one of these factors, and disease cannot establish. Your most powerful tool as a farmer is control over the environment (Scholthof, 2007).

1. Recognising Disease: What to Watch for Every Day

Early detection is the difference between a contained incident and a pond-wide catastrophe. Fish cannot tell you they are unwell but they show you, if you know what to observe. A daily 10-minute inspection of fish behaviour and physical appearance is one of the most valuable management habits a farmer can develop (Noga, 2010).

1.1 Behavioural Warning Signs

✓ Fish separating from the shoal and swimming alone near the surface or margins

✓ Sudden changes in swimming pattern: spinning, whirling, listing sideways, or head/tail-down posture

✓ Refusal of feed, reduced feeding response, or regurgitation of consumed feed

✓ Rubbing or scraping the body against the pond floor, walls, or aquatic plants ('flashing')

✓ Jumping erratically out of the water, gasping at the surface

1.2 Physical Warning Signs

✓ Discolouration: darkening of skin, reddish tints around eyes, gills, fins, or base of fins

✓ Frayed, eroded, or disappearing fin edges; loss of scales

✓ Visible sores, ulcers, raised lesions, cotton-wool growths, or foul-smelling wounds

✓ Swollen abdomen, bulging eyes (exophthalmia), or distended anus

✓ Pale or mottled gills; excessive mucus production

2. What Triggers a Disease Outbreak?

Pathogens - viruses, bacteria, fungi, and parasites are present in virtually every pond environment. What prevents them from causing disease under normal conditions is the fish's immune system, which is strongly dependent on environmental quality. When environmental conditions deteriorate, immune function collapses, and organisms that were previously harmless become lethal (Svobodova *et al*., 1993; Carlino-Costa & Belo, 2025).

The most common triggers encountered in field situations include: sudden temperature drops or rises (particularly below 15°C or above 30°C for tropical species); dissolved oxygen falling below 4 mg/L, especially at night; accumulation of unionised ammonia above 0.02 mg/L from uneaten feed and fish waste; and sharp pH swings outside the 6.5–

8.5 safe range. Physical stressors netting, grading, or transportation also temporarily suppress immunity and should always be followed by a prophylactic salt bath treatment. Overcrowding amplifies all of these effects and simultaneously accelerates horizontal pathogen transmission.

3. Common Fish Diseases: A Field Recognition Guide

The following tables provide a practical at-a-glance summary of the most frequently encountered disease categories in freshwater aquaculture. For detailed chemotherapy protocols, always consult a licensed aquatic animal health professional.

3.1 Viral Diseases: No Drug Cure; Prevention is Everything

Disease	Causative Agent	Recognition Signs in the Field
Viral Haemorrhagic Septicaemia (VHS)	*VHSV*	Bleeding around eyes, skin, gills; bloated belly; very high sudden mortality (Meyers & Winton, 1995)
Infectious Haematopoietic Necrosis (IHN)	*IHNV*	Swollen belly, dark skin, pale gills, trailing fecal casts; mainly kills fry (LaPatra, 1994)
Spring Viraemia of Carp (SVC)	*SVCV*	Haemorrhagic ascites, pale gills, skin bleeding; mainly affects carp in spring (Waltzek *et al*., 2005)

✓ ⚠ **Practitioner Note on Viral Diseases**
There is no approved drug treatment for any of these viral diseases. If a viral outbreak is suspected, immediately isolate affected fish, stop all fish movements, disinfect all equipment with chlorine bleach or KMnO4, and notify the relevant fisheries authority. Strict quarantine and biosecurity are the only tools available.

3.2 Bacterial Diseases - Most Responsive to Early Treatment

Disease	Causative Agent	Recognition Signs in the Field
Columnaris ('Cottonwool')	*Flavobacterium columnare*	Whitish-grey patches on head, gills, fins; ulcerated lesions with red edges (Davis, 1922)
Haemorrhagic Septicaemia (MAS)	*Aeromonas hydrophila*	Red fluid in body cavity; liver discolouration; bulging eyes; skin necrosis (JSTAGE, 2019)
Edwardsiellosis	*Edwardsiella tarda*	Scale loss, skin ulcers; gas-filled wounds with foul odour (Vincent, 2012)
Furunculosis	*Aeromonas salmonicida*	Blood-stained boil-like lesions bursting through skin; haemorrhagic septicaemia (Cain & Polinski, 2014)
Bacterial Kidney Disease	*Renibacterium salmoninarum*	Swollen kidney, abdominal fluid; white intestinal mucus; mainly in salmonids (Wiens & Kaattari, 1999)
Epizootic Ulcerative Syndrome (EUS)	*Aphanomyces invadans* + *Aeromonas*	Deep red skin ulcers; deformed 'cauliflower' mouth; seasonal occurrence (Kar, 2015)

3.3 Fungal and Parasitic Diseases -

Disease	Causative Agent	Recognition Signs in the Field
Saprolegniasis	*Saprolegnia spp.*	White/grey cotton-like tufts on skin, fins, or eyes; always secondary to injury (Robertson *et al*., 2009)
Branchiomycosis (Gill Rot)	*Branchiomyces sanguinis*	Necrotic patches on gills; fish gasp at surface; high mortality in warm water (Özcan & Arserim, 2022)

Costiasis	*Ichthyobodo necator*	Bluish-white skin film; fish scrape against surfaces; affects fry and juveniles (Becker, 1977)
Whirling Disease	*Myxobolus cerebralis*	Spinning/whirling locomotion; black tail; spinal deformity in young salmonids (Bruno *et al.*, 2006)
Dactylogyrosis	*Dactylogyrus spp.*	Grayish gill edges; respiratory distress; gill mucus excess (Mhaisen & Abdul-Ameer, 2019)
Argulosis (Fish Lice)	*Argulus spp.*	Visible disc-like parasites on skin; inflamed red spots; flashing behaviour (Misganaw & Getu, 2016)
Lernaeosis (Anchor Worm)	*Lernaea spp.*	Thread-like parasites embedded in skin; inflammation and haemorrhage at attachment site (Misganaw & Getu, 2016)

4. What You Can Do: Prevention and First-Line Treatment

4.1 Before Stocking: Pond Preparation

A well-prepared pond is the most cost-effective disease prevention measure available. Before stocking any fish, the pond should be completely drained and sun-dried for at least 7–10 days to reduce pathogen and parasite burdens in the substrate. Apply quicklime at 400–600 kg/ha for new ponds or 500–800 kg/ha for ponds with a history of disease; this raises pH, neutralises harmful gases, and kills most soil-dwelling pathogens. Bleaching powder at 50–100 kg/ha is applied after water filling. Prior to introduction, new fish stocks should receive a prophylactic 2–3% salt bath for 1–2 minutes or a 5-ppm formalin dip (Noga, 2010).

4.2 Routine Monthly Practices

✓ Apply $KMnO_4$ at 2.5 kg/ha and slaked lime at 100–200 kg/ha every month to maintain water quality

✓ Perform bi-monthly netting to assess fish health and remove any sick or dead individuals promptly

✓ Exchange at least 30 cm of water per month to dilute waste metabolites

✓ Disinfect all nets, baskets, and equipment with 5–25 ppm formalin or 250 ppm $KMnO_4$ solution before each use

✓ Feed only fresh, high-quality balanced diet (minimum 24% crude protein, 2–3 times daily)

4.3 When Disease Is Suspected: Primary Treatment Options

At the first sign of disease, immediately isolate affected fish if possible. Apply a short bath treatment of $KMnO_4$ at 100–250 ppm for 2–3 minutes, or a 2–3% salt solution bath for 1–2 minutes. For confirmed bacterial infections (based on symptoms and, ideally, a laboratory diagnosis), oxytetracycline mixed in feed at 50–60 mg/100 kg fish/day for 15 days is the standard first-line antibiotic. Erythromycin phosphate (1 mg/kg BW) is specifically indicated for Bacterial Kidney Disease (Wiens & Kaattari, 1999). For ectoparasites, a formalin bath at 25–40 ppm for 30 minutes or a 3–4% NaCl bath for 2–3 minutes provides rapid relief. Copper sulphate at 1–2 ppm is effective for both fungal and certain protozoan infections but must be used cautiously, as toxicity margins are narrow. Always consult a fish health professional before administering injectable antibiotics or unfamiliar compounds.

Golden Rules for Disease Prevention

① Never introduce fish from unknown or untested sources. ② Quarantine all new fish for a minimum of 14 days before introducing to your main pond. ③ Never share nets or equipment between ponds without disinfection. ④ Remove dead fish immediately, they are a direct infection source. ⑤ Record all disease events, treatments used, and outcomes - this is your most valuable management data.

CONCLUSION

Managing fish health successfully comes down to consistency in the basics: clean water, adequate space, balanced nutrition, and a vigilant eye for early warning signs. Viral, bacterial, fungal, and parasitic diseases will always be present in the aquatic environment - the farmer's task is to ensure that fish are never in a state of vulnerability that allows those pathogens to take hold. When disease does occur, rapid recognition and a systematic response, beginning with environmental correction and appropriate first-line chemical treatment will save both the stock and the business. As the aquaculture industry moves toward greater sustainability, investment in biosecurity, immunoprophylaxis, and diagnostic capacity will reduce dependence on antibiotics and improve the safety and profitability of fish production for generations to come (Shrivastava *et al*., 2025).

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