

PREVENTION PRACTICES FOR VIRAL HEMORRHAGIC SEPTICEMIA

Viral Hemorrhagic Septicemia (VHS) is a severe, often fatal disease of freshwater and marine fish, including a number of commercially important species. The detection of VHS at an aquaculture facility will require rapid action to contain the disease and prevent it from spreading to additional locations. This may involve quarantines or possibly depopulation of affected and exposed fish.

The biosecurity practices outlined here should be put into place immediately if VHS is confirmed in an aquaculture facility and will help you prevent the virus from entering your farm. While most of these practices should be used routinely on your farm, it is especially important to use them in the event of a VHS outbreak in your area.

Risk Factors for VHS Introduction

1. Movement of infected fish
2. Water sources
3. Fomites (contaminated objects such as equipment or vehicles)
4. Vectors (living things that can spread the virus)

Outbreak Precautionary Measures

Prevention measures to minimize the introduction and spread of VHS onto your farm fall into three general categories:

1. Restrict or stop all fish movement on your farm to prevent entry or spread of the disease.
2. Use strict biosecurity measures for fish, eggs, water sources, equipment, vehicles, vectors and people on your farm.
3. Detect and report any disease or unusual signs to your aquatic veterinarian or fish health specialist as quickly as possible.

Fish Movement

The movement of fish is one of the greatest risk factor for VHS introduction and spread in aquaculture. This includes new fish brought to the farm for breeding, grow out or restocking or those returned the farm, as well as contact with wild fish. Some fish species can be infected with VHS without showing signs of illness, these "carriers" fish can still spread the virus.

Prevention measures to reduce the risk of VHS spread by fish movement include:

- **Restrict or stop movement of fish or eggs on and off your farm.**
 - If VHS is confirmed in the U.S., movement restrictions may be put into place locally, regionally and possibly nationally.
 - Restrictions will depend on the scope of the outbreak.
 - Stopping movement of fish or eggs onto your farm until disease free assurances can be made helps to prevent the introduction of VHS on your farm or to other areas.
- **Do not allow contact of your fish with wild fish or fish from other farms.**
 - The VHS virus can be spread by direct contact with infected fish or contaminated water sources.
- **If fish must be brought onto the farm:**
 - Limit the frequency and number of new introductions.
 - Limit purchases to a few sources with known and trusted fish health programs.
 - When possible, purchase eggs or fish from certified disease-free broodstock.
 - Fish should be inspected and found free of VHS prior to purchase.
- **Quarantine any fish that have recently been purchased or returned to the farm for a minimum of 3 weeks.**
 - New or returning animals (e.g. sales, broodstock) can be infected with a disease without showing signs right away.
 - Quarantine allows time for a disease to develop and be detected without exposing your stock to the disease agent.
 - Quarantine areas should have separate water sources, equipment and ideally facilities.
 - Care and handling of these fish should be done after

Farm Entrance

- **Limit access to your farm.**
 - The entrance to your farm is a major control point.
 - Have only one gated entrance to fish production areas on your farm. This will help control and monitor visitors and vehicles arriving at your farm.
 - Keep the gate locked when not in use to prevent unwanted entry.
- **Post signs at the farm entrance to inform visitors of procedures to follow on your farm. (See Appendix A).**

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Water Sources

- **Ensure pathogen-free water sources are being used on your farm.**
 - Well water, springs and other groundwater sources should be used when possible.
 - Surface water sources should be avoided as they have a greater potential for carrying fish pathogens.
 - If this is not possible, disinfection of the water supply by ozonation or ultraviolet sources can help exclude unwanted aquatic species and pathogens.

Fish Health

Optimum health is essential for disease prevention in fish and greatly improves the ability of your fish to fight off infection.

- **Minimize stress**
 - Maintain optimum stocking densities.
 - Limit transfers of fish between units or locations.
 - Use gentle crowding and fish handling methods.
- **Maintain optimum water quality**
 - Fluctuations or improper maintenance of water quality parameters can predispose fish to disease; this includes temperature.
- **Provide proper nutrition**
 - Store feed in a cool, dry place
 - Use within 3 to 6 months
- **Maintain thorough and accurate health records**
 - Document all animal movements, including the dates of introduction, sources and movements on or off the farm.
 - Document fish deaths, illnesses as well as production parameters growth and feed conversion ratios.
 - Review records frequently to identify subtle signs of fish disease (e.g., decreased production).
- **Educate yourself (and train your employees) about VHS and the signs of illness.**
 - Signs of VHS infection include:
 - Hemorrhages on the body, around fin bases, eyes, head or internal organs
 - Bulging eyes
 - Darkened coloration
 - Pale gills
 - Distended (fluid-filled) abdomen
 - Erratic swimming behavior
 - Death
 - Some infected fish may show no or few signs of illness.
 - These signs of illness are not specific for VHS. Confirmation requires diagnostic testing.

- **Monitor animals closely and frequently for any developing illness or signs of disease.**
- **Promptly remove dead fish and euthanize dying fish.**
 - These fish can serve as a reservoir of disease organisms.
 - Dispose of dead fish so predators, wild birds or other animals will not have access and spread disease.
- **Isolate ill fish.**
 - Use separate facilities, water sources, equipment, and staff to handle isolated fish OR handle or visit the isolated animals LAST.
 - Clean and disinfect all equipment, clothing, boots, etc. that come into contact with sick fish.
 - Keep effluent from this area away from stocking areas of the farm.
 - Change clothing and wash or sanitize hands after working with these fish to avoid cross-contamination.
- **Contact your aquatic veterinarian or fish health specialist immediately if unusual illness or signs are noticed.**
- **Have ill fish tested or necropsied to determine the cause of illness.**
 - Many fish diseases can have similar signs of illness.
 - Diagnostic testing is the only way to confirm VHS.
 - Prompt detection can help reduce further spread of the disease.

Equipment and Vehicles

Any equipment (e.g., nets, buckets, hoses, footwear) or even vehicles used to work with or move fish can serve as a potential source of disease transfer between facilities or units. These items should be cleaned and thoroughly dried (preferably in direct sunlight) or chemically disinfected before use in another location.

- **Clean and disinfect equipment or vehicles before reusing them.**
 - This includes anything that has come in contact with the urine, feces, mucus or other body fluids of fish.
 - VHS is susceptible to drying, sunlight and most common disinfectants - See Appendix B.
 - Any visible debris (mud, aquatic plants) should be removed before applying a chemical disinfectant.
 - Most disinfectants are inactivated by organic materials such as dirt, feces, and mucus - thereby preventing the killing action of these products.
- **Fish production tanks, raceways and ponds should be disinfected between each lot of fish.**

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- **Use the proper concentration of any disinfectant (always mix according to the product label).**
- **Allow a disinfection solution to “sit” and work.**
 - To be effective, disinfectants need time to kill the microorganisms present.
 - Refer to the product label for the recommended contact time (usually at least 5 minutes).
- **Some chemical disinfectants require neutralization or are toxic to fish.**
 - See Appendix B.
- **Do not share equipment or vehicles with other farms.**
 - If this is not possible, ensure equipment and vehicles are properly cleaned and disinfected before having contact with your fish.
 - Any residual water or debris should be removed from vehicles, including bilge water from boats.
- **Delivery vehicles and personnel should follow your established farm biosecurity guidelines regarding parking and animal contact.**
 - Vehicles should be clean prior to entering your farm.
 - Have allowed visitors and vehicles park at the entrance to the farm or in established parking areas away from all fish production areas.
 - When possible, have deliveries left at the entrance to the farm.

Vectors

Wildlife

- **Prevent contact with free roaming animals (e.g. wildlife, cats, dogs, etc.).**
- **Implement predator management and rodent control programs.**
 - Living creatures, such as fish-preying birds, can transfer fish diseases between locations by carrying the pathogen on their body or feet, or by dropping fish or fish parts at other locations
 - Keep farm areas clean and tidy to avoid attraction of birds or rodents.
 - Contact USDA-APHIS or your local extension office for approved control methods in your area.
- **Do not allow contact of your fish with wild fish or fish from other farms.**
 - The VHS virus can be spread by direct contact with infected fish or contaminated water sources.

Employees

- **Employees that have contact with fish at other locations (including their own home), should use strict biosecurity measures while on your farm.**
 - VHS may be spread by contaminated clothing, boots, and equipment (fomites) if these items are recently contaminated with infected fish.
 - Provide clean boots and coveralls on site for employees to wear on your farm.
- **Foot dips should be placed near the entrance to animal areas**
 - Foot dip solutions should be changed daily or when visibly soiled.

Visitors

- **Minimize traffic and visitors to only those essential for the continued operation of the farm.**
- **Post warning signs telling visitors to keep out. (See Appendix A)**
- **Monitor and record traffic on or off your farm.**
 - Maintain a log sheet of all visitors and vehicles that enter your farm. This will help with disease surveillance and tracking if needed.
 - Do not rely on your ability to “recall” visitors and vehicles that were on your farm.
 - A daily visitor log form is available in Appendix C.
- **Provide clean coveralls and disposable or disinfected footwear.**
 - Post signs to direct visitors to a designated area where these are available.
 - Require that these items be worn by all visitors at all times while in animal areas.
 - Make sure boots are clean before entering animal areas; provide a well-maintained foot bath OR clean disposable boots and a receptacle near the entrance to the animal facility.
 - After exiting animal areas, wash and disinfect boots OR remove them and dispose of them properly.
 - When leaving your farm, visitors should remove all protective clothing and footwear provided by the farm and leave it in the designated area.
- **All visitors should be accompanied by someone from the farm at all times.**
- **Restrict close contact or handling of fish by visitors (unless necessary for the health of fish).**

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