AQUACULTURE BIOSECURITY: STEP 2

BIOSECURITY SELF-ASSESSMENT CHECKLIST FOR LAND-BASED AQUACULTURE FARMS AND HATCHERIES

Infectious diseases of aquatic animals are a constant management challenge and economic threat for aquaculture farms. Although each site is unique, as are its disease risks, there are basic steps all operations can take to prevent infectious disease threats to farm stock.

This checklist-based document guides you through potential disease risk areas and pathogen transmission pathways for land-based aquaculture farms and hatcheries. It will help you identify areas of concern and actions to protect your animals.

ANSWER EACH QUESTION AS IT APPLIES TO YOUR OPERATION.

- If a question does not apply to your operation, skip or draw a line through that question.
- Questions answered "YES" identify disease prevention strengths (what you are doing well).
- Questions answered with "No" indicate areas for biosecurity improvements.

INCOMING AQUATIC ANIMALS

Adding or moving infected animals onto an aquaculture farm or hatchery is one of the greatest risks for introducing and spreading disease. Animals from outside sources (especially those not regularly screened for pathogens) may carry disease to the resident stock.

Health of Incoming Animals

Infected animals may not always show signs of illness. Proper care, handling, and movement of animals and their transport water can help to manage and prevent disease for your farm or hatchery.

YES	NO	BIOSECURITY QUESTION
		Are aquatic animals purchased or obtained from disease-free sources?
		Is the frequency and number of new animal introductions limited when possible?
		Do you limit the number of sources or suppliers used to obtain animals?
		Do you ask the supplier about their disease history, veterinary inspection, and biosecurity measures before purchasing live animals?
		Do you require disease testing or a veterinarian inspection before purchase?
		Do you purchase specific pathogen-free (SPF) animals when available?
		Do you inspect animals upon arrival at your farm?
		Are eggs disinfected (per local, State, and Federal guidelines) before shipping or immediately after arrival at the farm or hatchery?

Quarantine Procedures

Quarantine is the strict separation of animals that may be diseased or have an unknown health history. The quarantine period helps identify, manage, and contain potential diseases before they spread and helps "new" animals to acclimate to farm conditions.

YES	NO	BIOSECURITY QUESTION
		Are all incoming animals quarantined immediately upon arrival at the farm and before being placed with on-farm stock?
		Do you work with your aquatic animal health professional to determine quarantine periods that are appropriate for the animal, its life stage, and potential pathogens?
		Do you have a quarantine area(s) or system(s) located away from production areas?
		Do quarantine areas have a dedicated water system?
		Are you able to isolate quarantine tanks or containment units within RAS or other systems?
		Do your quarantine areas have dedicated equipment (i.e., not used for other locations on the farm or are thoroughly cleaned and disinfected before use at other locations?
		Do you treat incoming animals with approved therapeutants (e.g., freshwater, salt, formalin) before being placed in quarantine?
		Are quarantined animals monitored daily for signs of illness?
		Are quarantined animals tested for specific pathogens if appropriate or required?
		Is access to the quarantined area and animals limited to essential personnel?
		Are foot baths, handwashing stations, dedicated coveralls, and footwear provided for essential personnel at quarantine entry and exit points?
		Are quarantine animal areas cared for last (after resident stock)?
		Are any returning animals (e.g., taken to sales, exhibitions, etc.) quarantined upon return to the farm and before introduction to the current stock?

Farm Management Procedures

On-site procedures, such as handling dead or diseased animals and waste products, can reduce pathogen risks. All employees should be trained in husbandry and diseases for the species kept on the site. Monitoring and evaluating production records can help to detect subclinical infections or identify disease problems (e.g., sudden versus gradual increases in death rate).

YES	NO	BIOSECURITY QUESTION
		Do you monitor all animals on the farm regularly for disease?
		Do you increase the frequency of inspections during periods of higher risk?
		Do you promptly remove and separate animals showing signs of illness?
		Do you have an animal isolation area located away from production areas?
		Are you able to isolate tanks or other containment units within RAS or other systems?
		Do you promptly remove and dispose of any dead animals in a biosecure manner?

YES	NO	BIOSECURITY QUESTION
		Do you investigate causes of illness or disease with your aquatic health professional (e.g., testing or necropsy)?
		Are signs posted to inform personnel of tanks/units with disease or undergoing treatment?
		Are dead animals disposed of in a way that prevents access by wildlife, pests, or vermin?
		Do you manage waste products, shipping water and containers, and associated equipment to prevent cross-contamination of other production areas?
		Are farm personnel trained to recognize signs of illness or distress in animals and who to inform when signs are noticed?
		Are farm personnel trained to limit stress when handling animals and to recognize signs of illness for species and age groups?
		Do you maintain thorough animal health and production records to monitor for subtle or emerging disease issues?

SOURCE WATER

Aquatic animals depend on their water source for survival; however, water can carry infectious pathogens (i.e., bacteria, viruses, fungi, parasites). Water contamination occurs from the urine, feces, reproductive fluids, and mucus of infected animals.

Water Sources

Land-based aquaculture farms may use different water sources (e.g., surface water, groundwater, municipal) to rear their animals; each source varies in its risks for pathogen spread. Some pathogens can also be spread between tanks by aerosol, spray, or splash.

YES	NO	BIOSECURITY QUESTION
		Are pathogen-free water sources (e.g., groundwater) used for the farm or hatchery?
		Are water sources tested for pathogens of concern for the aquatic animals being farmed?
		Are settling ponds used to reduce solids and organic load before use?
		Are water sources adequately aerated to improve water quality?
		Are mechanical and/or biological filtration systems used to remove suspended solids, organic matter, and ammonia?
		Are inflow pipes screened to prevent the introduction of wild stocks and predators?
		Are higher-risk water sources, if used, treated using ozone or ultraviolet light for disinfection/sterilization, and according to the manufacturer's recommendations?
		Is chemically treated water (e.g., municipal sources) neutralized or inactivated before use?
		Are covers, barriers, or distancing used to reduce disease transfer by aerosol, splash, or spray?

Water Quality

Regularly testing and monitoring of water quality is crucial to prevent disease outbreaks and ensure the health and well-being of farmed aquatic animals.

YES	NO	BIOSECURITY QUESTION
		Are water quality parameters tested regularly?
		Are water quality parameters recorded and evaluated on a set schedule?
		For intensive systems, are regular water exchanges and filtration used to minimize waste and pathogen buildup?

Transport Water

Water used for transport (e.g., hauling tanks, buckets) or residual from equipment use, including boats, can also spread pathogens.

YES	NO	BIOSECURITY QUESTION
		Is residual water and debris removed from transport equipment or vehicles before use?
		Are transport vehicles and equipment cleaned, disinfected, and dried before and after transport?
		Are dedicated vehicles and equipment used solely for transport purposes?
		Are pathogen-free water sources or treated water sources used for aquatic animal transport?
		Are portable filtration units used in transit to remove debris and other harmful substances?
		Are temperature control devices and aerators used to maintain optimum water parameters?
		Is water quality monitored during transport to address health issues quickly?

FOMITES: VEHICLES AND EQUIPMENT

Equipment or vehicles can be a potential source of disease-causing organisms (pathogens). When these objects come into contact with infected animals or contaminated water sources, they are called fomites and can potentially spread disease. Any item used during transport, stocking, handling, or harvesting aquatic animals can be a potential fomite. Examples include nets, seines, buckets, weigh scales, siphon hoses, vehicles (e.g., transport trucks, ATVs, boats), and footwear or waders.

Limit and Control Vehicle Access

YES	NO	BIOSECURITY QUESTION
		Do you have a limited number of vehicle entry points to your operation?
		Do you limit or restrict the entry of vehicles, including watercraft, into animal areas?
		Do you have designated drive paths for vehicles accessing your farm?
		Are signs posted at entry points to inform vehicles entering of biosecurity procedures?
		Are records kept of all vehicles entering the farm?
		Do you avoid or limit the sharing of vehicles, machinery, and equipment between sites?

YES	NO	BIOSECURITY QUESTION
		Are vehicle wash stations provided on-site and located away from animal areas?
		Are shared vehicles/equipment drained, cleaned, and disinfected before use on your farm?
		Are hauling tanks cleaned, disinfected, and thoroughly dried between uses?

Aquaculture Facilities

YES	NO	BIOSECURITY QUESTION
		Are uneaten food, dead animals, and waste products routinely removed to prevent buildup?
		Are tank covers, barriers, or distancing between units used to minimize aerosol transmission?
		Are production units (e.g., tanks, raceways, aquaria, earthen ponds) cleaned and disinfected (and fallowed) between lots of animals?
		Are tank components (e.g., inflow and outflow pipes, aerators, spray bars) and any other equipment inside the tank/production area cleaned and disinfected at this same time?
		Do you avoid using porous materials or surfaces (e.g., wood, concrete), to allow for better disinfection?
		Are concrete or wood surfaces in contact with production water painted or sealed?

Equipment and Footwear

YES	NO	BIOSECURITY QUESTION
		Is all equipment that comes into contact with aquatic animals or culture/system water cleaned, disinfected, and dried before use with aquatic animals?
		Is equipment used in animal areas, such as nets, kept off the floor?
		Are dip tanks placed in convenient locations to encourage compliance?
		Are dip tanks maintained appropriately (correct disinfectant, concentration, contact time)?
		Is farm-dedicated equipment used whenever possible for animal-rearing areas?
		Are filter beds or mechanical filters frequently backwashed to reduce buildup or pathogen introduction?
		Is footwear cleaned and disinfected before entering and after leaving animal areas?
		Are footwear cleaning areas or footbaths placed near entry and exit points?
		Are foot baths maintained and used correctly (e.g., disinfectant solution changed frequently, solutions kept out of sunlight, required contact time is used)?

Cleaning and Disinfection

YES	NO	BIOSECURITY QUESTION
		Do you remove dirt, debris, and residual water and wash all surfaces before applying a disinfectant?
		Are disinfectants used according to product label instructions (e.g., concentration, rinsing, or neutralization)?

YES	NO	BIOSECURITY QUESTION
		Do you always allow disinfection solution the recommended contact time to “sit” and work?
		Are safety measures (e.g., avoid runoff, wear safety equipment) taken during C&D procedures?
		Are employees trained to use, store, and dispose of chemical products according to the product labeling?

FEED

Food for aquatic animals can be a potential pathway for disease. Several types of feed are available, depending on the species or age being reared. Pathogen contamination (e.g., bacteria, viruses, fungi, parasites) can occur during production, storage, transport, or on-farm handling.

General Biosecurity for Aquatic Animal Feed

YES	NO	BIOSECURITY QUESTION
		Is feed for the farm obtained from reputable suppliers that implement biosecurity measures?
		Are records kept on feed for the farm (e.g., source, date received, expiration date, lot number)?
		Is any equipment used to handle or move food cleaned and disinfected before use?
		Do you have equipment solely dedicated for feeding purposes?
		Do employees wash their hands before and after handling food?

Biosecurity for Live or Aquatic Animal-based Feeds

The most significant risks are from live, semi-processed, raw, or frozen food organisms (e.g., algae, zooplankton, invertebrates, vertebrates, such as live forage minnows) and their transport water. If these food organisms are sourced from infected environments, they can transfer pathogens to your farm stock.

YES	NO	BIOSECURITY QUESTION
		Are live feed sources obtained from sources with biosecurity measures at their facility?
		Are live feed sources tested (when applicable) and confirmed to be free of pathogens of concern for species on your farm?
		Do you try to obtain as fresh as possible frozen or semi-processed feed?
		Do you ensure proper storage of frozen or semi-processed feed?
		Are live food culture containers regularly disinfected?

Biosecurity for Processed Feeds

Manufactured feed products (e.g., pellets, crumbles) are generally lower risk since the production process will kill pathogens. However, improper storage, handling, use beyond the expiration date, or use of contaminated equipment can lead to mold or bacterial growth and/or nutritional degradation, impacting your animal’s susceptibility to disease.

YES	NO	BIOSECURITY QUESTION
		Is processed feed stored according to manufacturer recommendations?
		Is processed feed used before expiration to ensure vitamin and mineral stability?
		Is processed feed kept in a manner to prevent access by vermin or pests (e.g., rodents, birds, insects)?
		Is processed feed checked frequently for mold, deterioration, or contamination?
		Are feed spills in storage areas and around production areas cleaned up immediately?

VECTORS: PEOPLE ON YOUR FARM

People working on or visiting land-based aquaculture farms or hatcheries can carry disease-causing organisms (pathogens) on their hands, body, clothing, shoes, and equipment. This includes farm personnel, family members, aquatic health professionals, nutritionists, and extension or government agency personnel. Farm visitors also include those without aquatic animal contact, such as maintenance staff, groundskeepers, contractors, transport drivers, delivery drivers (e.g., fuel, feed, or packages), tourists, or customers.

Control, Limit, or Restrict Access to Animal Areas

YES	NO	BIOSECURITY QUESTION
		Do you limit the number of entry points onto your farm?
		Are gates placed at farm entrances?
		Do you have an established biosecurity perimeter for animal production areas (e.g., fencing, signage) clearly designating areas that are off-limits or where protective clothing is required?
		Do you limit people allowed on your farm, particularly those accessing animal areas?
		Do you have signs posted to inform visitors of farm biosecurity procedures?
		Are signs available in languages understood by visitors?
		Is a designated parking area away from animal areas available for visitors and employees?
		Do you require visitors to check in with farm personnel upon arrival?
		Do you require that all visitors sign a log sheet when allowed to enter the farm?

People And Employees Accessing Aquatic Animal Areas

YES	NO	BIOSECURITY QUESTION
		Do you have a clearly visible biosecurity (clean-dirty) line at animal production area entrances?
		Do you require that visitors and employees wear clean clothing and footwear/waders/dive gear when working with animals?
		Do you provide foot baths, farm-dedicated footwear, waders, or dive gear?
		Do you provide a disinfection area for these items to be cleaned and disinfected?

YES	NO	BIOSECURITY QUESTION
		Do you require cleaning and disinfection of items before and after access to animal areas?
		Do you provide handwashing stations for those allowed access to animals or animal areas?
		Do you post signs promoting handwashing before and after animal contact?
		Are employees trained on the farm biosecurity plan and procedures, and their responsibility for its implementation, including farm visitor policies?
		Do you have a staff member designated as a farm biosecurity manager?
		Do employees care for the most susceptible classes of animals first?
		Are signs posted for animal containment units with disease or undergoing treatment?

Find downloadable log sheets and farm access signs on the aquaculture biosecurity website.

VECTORS: NON-PRODUCTION ANIMALS

Vectors – living organisms, such as predators, scavengers, vermin and pests (e.g., rodents, insects), domestic animals, and wildlife and wild birds – can transport pathogens onto and within aquaculture farms. Some shed pathogens in their urine and feces, contaminating water sources or feed. Others can transfer pathogens on their bodies or feet to new locations. Scavengers can translocate dead or diseased animals or parts to other locations. Mitigation and control efforts can reduce disease spread.

Vector Management and Prevention

YES	NO	BIOSECURITY QUESTION
		Do you know the possible disease vectors for your farm or geographical area?
		Do you monitor for potential vector species?
		Are nets, fences, and other barriers installed and maintained to prevent entry and access by wild animals and birds?
		Are areas where birds perch and nest minimized?
		Are outdoor containment units regularly cleaned to reduce potential vectors?
		Is feed kept secure and enclosed to prevent access by wild animals and birds?
		Are feed spills in storage areas or around production units cleaned up promptly?
		Is trash removed often to reduce the attraction of wildlife vectors?
		Do you have a plan to control scavenger and pest species?
		Have you contacted USDA APHIS Wildlife Services to determine the best vector or predator control options?
		Are local, State, and Federal regulations regarding predator control measures followed?
		Are domestic animals (e.g., dogs, cats, livestock, poultry) kept away from animal areas?

NEXT STEPS

Once you have completed this questionnaire, use the information to create a written biosecurity plan (**Step 3: Biosecurity Plan Template for Land-Based Aquaculture Farms**) and record biosecurity processes used on your farm or hatchery. This fully customizable biosecurity plan template will help you quickly get started on a site-specific, written biosecurity plan. The form is free and can be printed and completed by hand or edited on an electronic device. A video explaining how to use and modify the plan template is available.

ADDITIONAL RESOURCES

Visit the aquaculture biosecurity website to find a library of free tools and resources for land-based aquaculture operations, including pathogen transmission pathway tip sheets and videos, and farm biosecurity signs. All materials are available in English and Spanish.

- **Transmission Pathways Tip Sheets and Videos:**
  These resources include short handouts and videos that overview infectious disease risks and possible biosecurity actions for land-based aquaculture farms.
- **Step 1: Identify Pathogen Transmission Pathways (Critical Control Points):**
  This document helps you identify potential pathogen entry points and transmission pathways unique to your operation. It is the first step when developing a biosecurity plan.
- **Step 2: Biosecurity Self-Assessment Checklist:**
  This checklist walks you through the six pathogen transmission pathways to help you identify areas of concern and preventative actions you can take for your farm or hatchery.

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