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University of Maryland, 2113 Animal Science Building
College Park, Maryland 20742-2317
Telephone: 301-405-6085, FAX: 301-314-9412
E-mail: nrac@umd.edu Web: http://www.nrac.umd.edu

Fish Health Inspections: What They Are

Paul R. Bowser, Aquatic Animal Health Program
Department of Microbiology and Immunology
College of Veterinary Medicine
Cornell University, Ithaca, New York 14853

Background

The issue of government fish health inspection is of considerable importance for private producers who must have a thorough knowledge of issues associated with such inspections, especially if they plan to participate in interstate and sometimes, intrastate commerce of live fish or fish products such as eggs. Fish health inspection has attracted national attention in recent years with discoveries of such pathogens as the Viral Hemorrhagic Septicemia Virus (VHSV) in the Great Lakes Basin in 2005. Because VHSV is a reportable pathogen listed by the World Organization for Animal Health, its emergence has led to new federal and state regulations, including the requirement for fish health inspections. This requirement enables the movement of live fish in interstate or international commerce and has a wide range of implications for both commercial and governmental aquaculture. The purpose of this fact sheet, then, is to provide essential information on what constitutes a fish health inspection.

A fish health inspection is conducted to detect the presence of targeted pathogens in a defined population of fish. This knowledge can be used to prevent the introduction of such pathogens into areas where they are not yet present or they can help better manage those pathogens into those areas where they do not presently occur.

A number of serious diseases are caused by organisms that may only survive a very short time outside of the fish they infect; they are termed **obligate pathogens**. Fish health inspections typically look for these obligate pathogen groups. This specificity is because one of the most likely ways that they are spread to new areas is via infected fish.

Another broad group of pathogens is termed **facultative** or **opportunistic pathogens**; these pathogens are commonly found in all aquatic environments and may cause disease when a fish is under environmental stress, for example, from poor water quality, low oxygen, and other disease organisms. Stress weakens the fish's natural defense mechanisms; with its defenses weakened, fish will be more susceptible to infection by pathogenic organisms and subsequent development of disease. Fish health inspections are not generally conducted to detect organisms in the facultative pathogen group.

Authority to regulate interstate shipment of fish in the U.S. normally rests with a state, such as a fish and game agency or a department of agriculture. In some cases, federal agencies, such as the U. S. Fish and Wildlife Service or the USDA's Animal and Plant Inspection Service has jurisdiction. These federal agencies have been given oversight authority because of their responsibility for protecting sport fisheries resources or protecting the health of agricultural animals.

Preventing the introduction of pathogens into new geographic regions has important economic benefits for all concerns. The best method to reduce disease losses is to avoid disease organisms. Avoidance will not only save money in terms of lost fish but also with disease treatments, if treatments are even available. Unfortunately, there are no known effective treatments for numbers of the pathogens for which inspections are conducted. Of the obligate pathogens listed in Table 1, truly effective treatments are known only for *Yersinia ruckeri*[1] and *Aeromonas salmonicida*.

What is a Fish Health Inspection?

A fish health inspection is a procedure whereby a sample of fish is collected from a specific fish population and examined for the presence of certain pathogens specified by the government agency having jurisdiction over fish health. Table 1 lists those pathogens commonly included in the inspection, though the agency with fish health jurisdiction may choose to add or delete pathogens.

The number of fish to be examined is based on statistical principles that consider how many fish are in the population, the expected prevalence of the disease organism, and the desired level of confidence that the pathogen is not present. The fish examination team normally refers to statistical tables, such as those in *Procedures for the Detection and Identification of Certain Fish Pathogens* (Fish Health Section, American Fisheries Society, Bethesda, MD, 2007). Commonly 60 individual fish are examined if the total population in a "lot" exceeds 2000 fish. (A "lot" is a defined population that, once identified, will have no additions of new fish to the population.) **If no pathogens are detected in any of the 60 fish, then the inspection team can state they are 95% confident that if the pathogen is present in any of the remaining fish it is present at a prevalence level of less than 5%.**

If the population under inspection contains fewer than 2000 fish, the percentage to be examined must be increased to obtain the same 95% confidence. For example, in a lot of 250 fish, 50 must be sampled to provide a 95% confidence. Specific sample numbers may be calculated using a statistical equation that takes into account various probabilities and the "power" of the statistical test. The inspection team will either calculate the appropriate number of fish to sample or consult statistical tables.

The result of an inspection is an Inspection Report, which will indicate the number of fish examined and the absence, presence, and prevalence of listed pathogens in the sample. If none of the listed pathogens are found, the report will include a statement regarding the confidence that the fish in the population do not harbor specific pathogens. If facultative (non-listed) organisms are found, the production manager will be advised of their presence and will likely be provided with treatment recommendations. If listed pathogens are found, it is likely that permission to ship the fish interstate will be denied. If non-listed pathogens are found, it may be advisable not to ship fish because the additional stress associated with shipment may cause the unacceptable losses of fish in transit and/or pose a threat to aquaculture facilities in the locality where the fish are to be delivered.

Table 1. Pathogens typically included in fish health inspections for shipment of certain fish species. For a comprehensive list, consult with the government agency having jurisdiction over the area to which the fish are to be shipped.

Type	Name	Treatment Available
Virus	Viral Hemorrhagic Septicemia Virus	No
	Infectious Hematopoietic Necrosis Virus	No
	Infectious Pancreatic Necrosis Virus	No
	Spring Viremia of Carp Virus	No
Bacteria	*Renibacterium salmoninarum* Bacterial Kidney Disease organism	No
	Yersinia ruckeri Enteric Redmouth Disease organism	Yes[1]
	Aeromonas salmonicida Furunculosis Disease organism	Yes
Parasites	*Myxobolus cerebralis* Whirling Disease organism	No
	Ceratomyxa shasta	No

Who Conducts the Inspection?

Fish to be examined are collected at the production facility by a qualified individual with no financial interest in the test results. This individual selects fish from each population to be examined. First selected are fish that appear to be diseased, though they may not harbor pathogens on the inspection list. Randomly selected fish make up the remainder of the sample. Samples collected

[1] Although certain antibacterial compounds are effective for the control of *Yersinia ruckeri* infections, none currently have a label granted by the U.S. Food and Drug Administration for that use.

at the production facility are then transported to an appropriately equipped laboratory where they are examined for the presence of pathogenic organisms. Appropriately qualified individuals with education and experience in conducting fish health inspections process the samples and prepare the Fish Health Inspection Report. The government agency with jurisdiction over this report will specify the qualifications required of fish health inspectors.

Fish Health Inspections and Fish Health Certifications

A Fish Health Inspection differs from a Fish Health Certification. An Inspection is a procedure that samples fish from a specific population (or "lot") that is then examined for the presence of certain pathogenic organisms. The resulting Inspection Report states the fish in the population are free of disease organisms for which the inspection was conducted. The result of a Fish Health Inspection is not a statement that the fish are disease free.

A Fish Health Certification means that for fish to be certified as disease free, the population has undergone multiple successive, periodic (e.g., bi-annual or annual) health inspections without detection of any of the listed pathogens and that, during this period, no new fish were introduced into the population. Furthermore, to maintain the health certification, the population must be maintained as a closed population. A population is designated as free of those specific pathogens for which the testing was performed. Efforts are underway in some sectors of the aquaculture community to establish populations of specific pathogen-free fish. This process requires several years to complete.

For More Information

The issues associated with Fish Health Inspections are currently being reviewed by both private and government groups on state and national levels. As knowledge about various fish pathogens improves, regulatory guidelines and inspection methodology are likely to change. It is important that aquaculturists keep current on regulations that must be met for interstate and international shipping. Because information is changing so rapidly, details on availability and cost of inspections will not be provided here. For the most current information, contact your state Aquaculture Extension Specialist, the Northeastern Regional Aquaculture Center (www.nrac.org), government fish and game agencies, or departments of agriculture with jurisdiction over regions to which you plan to ship fish.

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