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Fish Health Inspections: What Are They?

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Background

The topic of fish health inspections has received significant attention in the northeast region of the United States in recent years. The requirement for fish health inspections to enable the movement of live fish in interstate commerce has a wide range of implications on both commercial and governmental aquaculture. The purpose of this document is to describe, for the private producer, what a health inspection is and what it is not. A thorough knowledge of the issues associated with fish health inspections is crucial for any individual who might plan to participate in the interstate commerce of live fish or fish products (i.e. eggs).

The primary purpose of a fish health inspection is to detect the presence of certain fish pathogens in a defined population of fish. Such knowledge can be used to prevent the introduction of serious fish diseases into areas where they do not presently occur and to better manage those diseases. A number of serious diseases are caused by organisms that can survive for only a very short period of time outside of the fish they infect. These organisms are termed **obligate pathogens**. Fish health inspections are conducted to detect organisms in this obligate pathogen group. This is because one of the most likely methods by which obligate pathogens are spread to new geographic areas is in infected fish. Another broad group of pathogens are termed **facultative pathogens**. They are commonly found in all aquatic environments and may cause disease when the host fish is stressed. Stress results in a weakened capability of the natural defense mechanisms of the fish. A fish with its disease defense mechanisms weakened is more susceptible to infection by pathogenic organisms. Fish health inspections are not typically conducted to detect organisms in the facultative pathogen group.

Authority to regulate interstate shipment of fish in the United States normally rests with state fish and game agencies. The U. S. Fish and Wildlife Service oversees international shipments. These governmental agencies have historically been given this authority because of their responsibility to protect sport fish resources and due to their long-standing activity in fish culture.

Preventing the introduction of pathogens into new geographic regions has important economic benefits for both the governmental agencies and commercial aquaculture. The best method to reduce disease losses is to avoid the disease organisms. Avoidance will not only save money in terms of lost fish, but also in terms of subsequent disease treatments, if treatments are available. It should be noted that there are no known effective treatments for many of the pathogens for which inspections are conducted. Of those obligate pathogens listed in Table 1, truly effective treatments are known only for *Yersinia ruckeri* and *Aeromonas salmonicida*.

What is a Fish Health Impaction?

A fish health inspection is a procedure by which a sample of fish is collected from a defined fish population and examined for the presence of certain specific pathogens. The pathogens included in the inspection are specified by the governmental agency having jurisdiction over the inspection. Pathogens commonly included in fish health inspections are listed in Table 1. However, a particular governmental agency may choose to add pathogens to or delete pathogens from those listed in Table 1. Presently, fish health inspections are conducted primarily on shipments of salmonids.

The number of fish selected and examined is determined by statistical principles that consider number of fish in the population expected incidence of the disease organism and desired level of confidence that the pathogen is not present. The number of fish to be sampled is determined by the inspection team by examining various statistical tables, such as that found in *Procedures for the Detection and Identification of Certain Fish Pathogens* (Amos ed. 1985, Fish Health Section, American Fisheries Society, Bethesda MD). Commonly, 60 individual fish are examined if the total population exceeds 2000 fish. **If a pathogen is not found in any of the 60 fish then the inspection team can state that they are 95% confident that if the pathogen is present in any of the remaining fish it is present at an incidence level less than 5%.** If the population being inspected contains fewer than 2000 fish, the percentage of fish examined must be increased to

obtain the same 95% confidence. As an example, 50 fish must be sampled from a population of 250 fish to obtain test results that will provide a 95% confidence. The specific number may be calculated by a complex 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 a statistical table.

The result of an inspection is an inspection report. The report will indicate the number of fish examined and the results regarding the absence, presence and prevalence of listed pathogens found 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 a treatment recommendation. 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 unacceptable losses of fish in transit and/or pose a threat to aquaculture facilities in the locality where the fish will be delivered.

Who Conducts The Inspection?

Fish health inspections are conducted by individuals with the proper education, training, equipment and facilities. The governmental jurisdiction (state or federal government) usually maintains a list of individuals qualified to conduct an inspection. It is important that the inspector be an impartial individual who has no potential of personal gain dependent upon the outcome of the inspection.

How Are Fish Inspected?

Fish to be examined are collected by an inspector or inspection team at the production facility. The inspector selects fish from each population to be examined. First selected are fish that appear diseased. These fish may or may not harbor pathogens that are on the inspection list. Randomly selected fish make up the remainder of the sample. Samples collected at the production facility are transported to an appropriately equipped laboratory where they are examined for the presence of pathogenic organisms.

Fish Health Inspections vs. Certifications

Confusion exists regarding the difference between a **Fish Health Inspection** and a **Fish Health Certification**. An Inspection is a procedure whereby a sample of fish from a population is selected and examined for the presence of certain pathogenic organisms. The inspection results in an Inspection Report stating the probability that 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 Certification has a much different legal connotation and implies that all fish in a population are **disease-free**. The only method to assure that every fish is **disease-free** is to examine individually every fish in the popula-

tion. Under current inspection methods, this requires that all fish be killed. Because of this requirement, Certification is rarely done.

The More Information

The **issues** associated with Fish Health Inspections are currently being reviewed by both private and governmental groups on a state and national level. As knowledge of various fish pathogens improves, changes in regulatory guidelines and inspection methodology are likely to occur. It is important for the aquaculturist to keep current on the regulations that must be met for particular states or countries to which fish may be shipped. 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 or the governmental fish and game agency with jurisdiction over the area to which you wish to ship fish.

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Table 1. Pathogens that are typically included in fish health inspections for shipment of salmonid fishes. For a specific list, consult with the governmental agency having jurisdiction over the area to which the fish are to be shipped.

Type	Name	Treatment available
virus	Viral Hemorrhagic septicemia (VHS)	No
	Infectious Hematopoietic Necrosis (IHN)	No
	Infectious Pancreatic Necrosis (IPN)	No
Bacteria	<i>Renibacterium salmoninarum</i> (Bacterial Kidney Disease organism)	No
	<i>Yersinia ruckeri</i> (Emetic Redmouth Disease organism)	yes ¹
	<i>Aeromonas salmonicida</i> (Furunculosis Disease organism)	Yes
Parasites	<i>Myxobolus cerebralis</i> (Whirling Disease organism)	No
	<i>Ceratomyxa shasta</i> (Ceratomyxiasis Disease organism)	No

¹although certain antibacterial compounds are effective for the control of *Yersinia ruckeri* infections, none currently are approved for that use by the U. S. Food and Drug Administration.