Diseases of Finfish — REPORTABLE

Infectious salmon anaemia (ISA)

Causative agent: Infectious Salmon Anaemia Virus (ISAV) (Family Orthomyxoviridae, Genus Isavirus). There are pathogenic and non-pathogenic strains of ISAV. Pathogenic strains include strains that are highly pathogenic and those that are of low pathogenicity. All strains are reportable.

Distribution in Canada: Outbreaks of ISA have occurred in Atlantic salmon cultured in New Brunswick in the Bay of Fundy. However, the last detection of a pathogenic strain of ISAV in this area occurred in 2007. Since then, only a non-pathogenic strain of ISAV has been periodically detected. Single, small outbreaks have also been reported in the past in Nova Scotia and PEI but the occurrence of non-pathogenic strains of ISAV has not been reported from these 2 provinces since the outbreaks occurred.

Global distribution: Outbreaks and detections of ISAV have been reported in cultured Atlantic salmon or Rainbow trout in Chile, Faroes Islands, Ireland, Norway, Scotland (including Shetland Islands), and the Cobscook Bay area of Maine in the United States of America.

ISAV has been detected by PCR methodology in wild Atlantic salmon, Atlantic cod, brown trout and pollack harvested from European or North American (Maine, USA) waters but not confirmed.

Susceptible species: Susceptible species means a species of aquatic animal in which infection or infestation has been demonstrated by natural cases or by experimental exposures to the disease agent that mimics the natural pathways for infection or infestation. This includes animals denoted as “carriers” (an aquatic animal of a susceptible species that shows no clinical signs of disease but carries the infectious agent of disease and is capable of transmitting the agent to others because of active shedding of the disease agent).

Table 1 lists the species known to be susceptible to ISAV.

Affected life stages: ISAV is infectious for all life stages in Atlantic salmon (except eggs). ISAV has been reported in Atlantic salmon fry and parr in freshwater hatcheries. Life stage susceptibility in other species is not well documented.

Signs of disease:

Mortality statistics, clinical signs, and post-mortem lesions are described for cultured Atlantic salmon (*Salmo salar*).

Aquatic animals with disease may show one or more of the signs below; disease may still be present in the absence of any signs.

Aquatic animals not previously identified as susceptible to this disease may show one or more signs that differ from the signs noted below.

Signs in the population:

Mortality:

- Initially, mortality rate is low and may occur over a prolonged period.
- Cumulative mortality can be up to 90% (varies with strain).

Morbidity (behaviour):

- Inappetence (decrease in feed conversion ratio)
- Abnormal swimming patterns: slow swimming; swim slowly at the surface
- Congregation at edges or outlets of holding units
- Fish gasp at the surface

Signs in an infected animal:

- Grey gills
- Distended abdomen
- Ecchymotic and petechial hemorrhages may be present ventrally

Gross necropsy signs in an infected animal:

- Kidney, liver, and spleen are swollen and dark
- Petechial hemorrhages in visceral fat
- Hemorrhages in pyloric cecae and intestines (Figure 1)
- Hemorrhages in liver
- Pale heart
- Ascites: serosanguinous
- Pericardial fluid: serosanguinous

Epidemiology:

- ISA occurs in spring or early summer in water temperatures from 3˚C to 15˚C.
- Severity of infection in the population:
    - in enzootic areas, infection severity relates to farm local husbandry (moving fish between pens) and frequency of removal of infected fish; and
    - strain of virus.
- Risk of infection is increased with
    - proximity to infected farms
    - multiple year classes held on the same site.

An adult Atlantic salmon (*Salmo salar*) with typical signs of ISAV. Left: Pale gills; Center and Right: Petechial hemorrhaging of the musculature, a swollen/irregular kidney, an enlarged liver with hemorrhaging, enlarged spleen; (Photos: V. Pederson).

Transmission:

- Transmission of ISAV is horizontal and indirect via contaminated water:
  - The virus is shed in epidermal mucus, urine, feces, and reproductive fluids.
  - Primary portals of entry are unknown, but the gills are suspected.
  - Direct transmission has not been thoroughly investigated.
- Vertical transmission has not been demonstrated; egg surface-associated transmission does occur.
- Spread of ISAV via fomites can occur during
  - movement of equipment between farms.
  - discharge of organic waste from fish-processing plants, without effluent treatment, into the marine environment.
- The role of vectors in ISAV transmission is unknown.

Survival of ISAV in the environment:

- ISAV can survive in 6˚C seawater for at least 20 hours.
- ISAV can survive in carcasses for at least 4 hours at 6˚C.
- Survival of ISAV in freshwater has not been reported.

Differential diagnosis:

Reportable diseases

- Viral haemorrhagic septicaemia (regionally enzootic in Canada)
- Infectious haemorrhagic necrosis (regionally enzootic in Canada)
- Infectious pancreatic necrosis (regionally enzootic in Canada)

Annually Notifiable diseases

- Enteric red mouth disease (*Yersinia ruckeri*) (enzootic in Canada)
- Furunculosis (*Aeromonas salmonicida*) (enzootic in Canada)

Table 1: List of species susceptible to ISAV that **occur** in the natural environment in Canada. Finfish may have several common names, but this list refers to only one.
Note: Species coloured in blue have not been confirmed as susceptible to ISAV.

Scientific Name	Common Name	Scientific Name	Common Name
Alosa pseudoharengus	Alewife	*Pollachius virens*	Pollack
Clupea harengus	Atlantic herring	*Salmo salar*	Atlantic salmon
Gadus morhua	Atlantic cod	*Salmo trutta*	Sea trout
Oncorhynchus kisutch	Coho salmon	*Salvelinus alpinus*	Arctic char
Oncorhynchus mykiss	Rainbow trout		

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