

University of Prince Edward Island

Faculty of Veterinary Medicine
Summary of Dissertation

Submitted in Partial Fulfilment
of the Requirements for the

**DEGREE OF MASTER OF SCIENCE IN VETERINARY
MEDICINE**

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**Immunological responses of Atlantic salmon (*Salmo salar*)
against infectious salmon anemia (ISAv) with increasing
temperatures**

The top finfish produced in the Canadian aquaculture industry is Atlantic salmon. Like every other animal agriculture industry, aquaculture is no stranger to viral outbreaks that effect their entire population. Infectious salmon anemia (ISA) remains a major health concern for the industry, with the consequences of the disease being detrimental to a farm. While the industry continues to try to better equip themselves against the virus, the continuing increase in temperatures due to climate change, and the questions of how that will impact virulence of viruses, such as ISAv, is also a very real concern.

The objectives of this thesis were to identify if there is natural resistance and/or vaccine induced resistance to ISAv between distinct family backgrounds under multiple temperature regimes (10°C and 20°C), and to determine if using an mRNA vaccine to induce vaccine induced resistance to ISAv is a possibility.

The first study compared survival between 20 different genetic families at both 10°C and 20°C when cohabitated with Atlantic salmon infected with ISAv, with some being vaccinated, and some being given a sham vaccination. A variation in susceptibility was observed across families at both temperatures, where samples were then analyzed using reverse transcription- quantitative polymerase change reactions (RT-qPCR) to identify genetic markers that could be associated with the differences in observed survival. Significant differences seen with better survival were correlated with certain genes of interest. It was also found that survival was greater at 20°C compared to 10°C, and that the commercial vaccine, Forte VIITM gave no significant difference in survival compared to those given the sham vaccine.

Publications:

Groves, L., Whyte, S.K., Purcell, S.L., Michaud, D., Cai, W.C., Garber, A., Fast, M.D., 2023. Temperature impacts Atlantic salmon's (*salmo salar*) immunological response to infectious salmon anemia virus (ISAv). *Fish and Shellfish Immunology Reports* 4, 100099

Presentations

Groves, L., Whyte, S.K., Purcell, S.L., Garber, A.F., Fast, M.D. Climate change and infectious salmon anemia (ISA): How will the Atlantic salmon (*Salmo salar*) immune system defend against the ISA virus with increasing ocean temperatures? North American Comparative Immunology Workshop in Banff, Alberta (2022) (Oral presentation by Groves).

Groves L, Whyte SK, Purcell SL, Parrish K, Perreira J, Garber A, Fast MD. The effects of climate change on the Atlantic salmon's (*Salmo salar*) immunological response to infectious salmon anemia (ISAv). UPEI Graduate Studies and Research Conference (2021) (Virtual presentation by Groves).

Groves L, Whyte SK, Purcell SL, Parrish K, Perreira J, Garber A, Fast MD. (2021). The effects of climate change on the Atlantic salmon's (*Salmo salar*) immunological response to infectious salmon anemia (ISAv). North American Comparative Immunology Workshop (2021) (Virtual presentation by Groves).

Groves L, Whyte SK, Purcell SL, Parrish K, Perreira J, Garber A, Fast MD. The effects of climate change on the Atlantic salmon's (*Salmo salar*) immunological response to infectious salmon anemia (ISAv). American Fisheries Society Fish Health Section (AFS-FHS) Summer series (2021) (Virtual presentation by Groves).

Biographical Data

Born in Carbonear, Newfoundland

Awards

Department of Path/Micro Graduate Student Scholarship (2020).