

Diagnostics of immune competence of Atlantic salmon smolts and growers: multigene assay

RESEARCH QUESTION:

Many immune genes are downregulated in salmon smolts. Suppression continues during several months after the seawater transfer. Apparently healthy fish may have problems. Timely diagnostics of immune status can predict performance of fish in the sea and detect problems in the production of smolts.

DURATION: 2017-2019

FISH SIZE TESTED: From 30 g to 3.5 kg

HIGHLIGHTS:

- Based on long-term Nofima research in fish genomics, 44 most informative immune and stress genes were selected for the immune competence (ImCom) assay, which also includes gene – markers of smoltification.
- ImCom has been extensively tested on fish material from controlled experiments and commercial aquaculture. Gill is preferred as an informative tissue, which can be sampled without harm to fish, but analyses can be carried out on other tissues as well. The immune status is assessed by comparison with the reference – large data set from high quality salmon. Three types of problems have been identified:
 - o (i) immune suppression – massive downregulation of genes,
 - o (ii) unhealthy stimulation with high expression of gene markers of acute inflammation and stress, and
 - o (iii) imbalance – up and downregulation of many genes outside norm.
- ImCom assay has been used for assessment of smolt production methods

in CtrlAQUA project BENCHMARK, feeds for smolts and vaccination regimens, monitoring of salmon cohorts reared in traditional and recirculation systems and comparison of smolt batches with good, intermediate and poor performance, studies of remote consequences of oxidative stress and other.

RECOMMENDATION:

- ImCom is recommended for evaluation of smolt batches.
- New production methods and protocols, treatments and feeds may affect robustness of salmon. ImCom helps to assess risks and identify bottlenecks.
- To use ImCom , contact Fish Health group in Nofima



READ MORE:

- Krasnov, A., et al., Multigene Expression Assay for Assessment of the Immune Status of Atlantic Salmon. *Genes (Basel)*, 2020. 11(11).
- Lund, H., et al., Evaluation of Immune Status in Two Cohorts of Atlantic Salmon Raised in Different Aquaculture Systems (Case Study). *Genes (Basel)*, 2022. 13(5).
- Ytrestøyl, T., et al., Photoperiod in recirculation aquaculture systems and timing of seawater transfer affect seawater growth performance of Atlantic salmon

The factsheet is ready for commercial implementation

(*Salmo salar*). *Journal of the World Aquaculture Society*, 2022.

- Bakke, A.F., et al., Effect of two constant light regimens on antibody profiles and immune gene expression in Atlantic salmon following vaccination and experimental challenge with salmonid alphavirus. *Fish Shellfish Immunol*, 2021. 118: p. 188-196.