SalmoStrong - Drivers of Salmon Robustness

Project summary

Scottish farmed Atlantic salmon is the UK's largest food export and a primary source of regional and national economic prosperity. This industry deploys world-class biosecurity, animal husbandry, monitoring technologies, health management tools, and advanced genetic breeding programs for efficient production with high welfare standards and to limit disease. However, the Scottish salmon industry faces a major challenge of rising mortality levels, currently around 20% during the seawater production phase. Salmon mortalities have been rising in parallel to increasingly complex infectious disease outbreaks, often involving multiple pathogens and novel environmental stressors linked to global warming (e.g. jellyfish and algal blooms). The current level of mortality on Scottish salmon farms is a major cause of shared concern in terms of fish welfare, economic loss, and negative public perception, threatening the sustainability of a key UK animal production sector. With this challenging backdrop, the industry is strongly demanding fish with higher overall robustness, meaning they maintain high performance when challenged by different stressors and pathogens.

SalmoStrong is a new long-term partnership between the Roslin Institute at the University of Edinburgh, and Mowi Scotland. The aim is to make breakthrough advances in scientific understanding that will be applied in practice to enhance salmon robustness, with the long-term mission to reduce current mortality levels by 50% during seawater production over the next decade, establishing fish populations highly adapted to Scottish farming conditions. SalmoStrong primarily focuses on three major health challenges experienced in the Scottish salmon industry, cardiomyopathy syndrome (CMS), complex gill disease (CGD) and salmonid rickettsial septicaemia (SRS), together responsible for extensive mortalities and economic losses in the later stages of seawater production. Led by Dr Nick Wade (UoE) and Prof Herve Migaud (Mowi), the combined project team will include 20-25 academic and industry experts including emerging leaders from each organisation.

The Partnership is organised into four major pillars:

Pillar 1: Integrated Genetics - tackles our first objective, to advance the current state-of-the-art for selective breeding, transferring novel methods into practice that make breeding more accurate while enhancing the robustness of salmon farmed in Scottish conditions.

Pillar 2: Rearing History - tackles our second objective to establish the impact of early rearing temperature on salmon health and robustness from egg to harvest, including by assessments of the immune response, vaccination outcomes and cardiac health. Advanced molecular and cellular methods will be used to understand the effect of temperature on immune development and fitness.

Pillar 3: Robustness Phenotypes - tackles our third objective to more accurately define, measure and dissect robustness in Scottish farmed salmon, identifying new biomarkers of infection for an emerging pathogen or health biomarkers, both applied in complex field situations and in novel experimental systems.

Pillar 4: Talent and People - SalmoStrong is founded on a fourth underpinning objective to nurture the current and next generation of aquaculture specialists to address key challenges facing Scottish salmon farming, benefiting the whole industry and building local skills, capacity and vibrant regional communities.