

Sea lice could be eradicated by new treatment at salmon farms

A vaccine aims to protect fish and the environment in battle to beat threat to industry,



Rohese Devereux Taylor reports

A PIONEERING oral vaccine that will treat sea lice in farmed Atlantic salmon is in development after receiving a funding boost.

The new treatment, produced by a team of Scottish and international aquaculture experts, aims to help the industry tackle one of the biggest threats to the welfare of farmed Atlantic salmon, as well as eliminate environmental toxins.

Sea lice are a constant challenge for the global aquaculture industry. Some traditional chemical treatments also pose a threat to the environment.

The two-year project, supported with £260,000 funding provided through the Scottish Aquaculture Innovation Centre (SAIC) and matched by the industry, began in July, developing the treatment which can be delivered through fish feed with minimal disturbance.

The cost of sea lice to the Atlantic salmon production industry is estimated to exceed £50 million per year in Scotland alone.

Project partners include academics from the University of Stirling's Institute of Aquaculture as well as industry specialists from the global fish feed producer BioMar, nanoparticle company SiSaf and vaccinology experts Tethys Aquaculture. The consortium also draws upon the expertise of vaccinologists at the Moredun Research Institute and academic fish immunologists from the University of Maine in the United States.

Polly Douglas, aquaculture innovation manager at SAIC, said: "Addressing environmental and health challenges, including sea lice, is one of SAIC's priority innovation areas and a crucial concern for the global aquaculture industry. The work of this project correlates directly with the Scottish Government's 10-year Farmed Fish Health Framework, aiming to improve fish health, protect the marine environment, and ensure Scotland's main food export grows sustainably."

"Collaborative research and development projects, such as this, harness the expertise of academia, industry partners and salmon producers, and can play a major role in future sustainability of the industry."

Ms Douglas told The Herald that, while vaccinations are used in the industry, usually for bacteria or viruses, the method is much less common for use against a complex parasite like sea lice.

The parasites are currently managed



Fish farms face the constant challenge of keeping their fish free from sea lice as the pest can become resistant to treatments



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and controlled using a range of measures, including veterinary medicines, physical and biological tools for parasite removal, and optimised farm management practices. Despite existing research and prior testing of injectable vaccines, success has so far been limited, with no commercial solution currently available. Veterinary medicines continue to be employed for control. However, sea lice are becoming increasingly resistant to treatment.

In the last 40 years a number of treatments have become available.

Previous dip vaccines were absorbed through the salmon's gills, while hydro and thermal licers used water pressure and warmer water to treat the lice.

Ms Douglas said: "Sea lice are very canny. They become resistant to treatment so it becomes less effective. Different medicines have come and gone. There have been in-feed treatments before and bath treatments where fish are put into smaller areas and the sea lice treatment is put into the water."

"A lot of treatments can stress fish and we're trying to reduce that. This new vaccine could reduce handling of the fish, and them being taken out of the water. It would be put into their feed and improve their welfare. We're working away from chemical treatments as they have an impact on the wider environment."

Cleaner fish, including lumpfish and wrasse, are used to nibble lice from the salmon, a natural solution that is encouraged in the farms.

“A lot of treatments can stress fish and we're trying to reduce that”

The new approach to oral vaccination will deliver the vaccine via specially developed feeds that aim to improve fish resistance to parasites using advanced nanoparticle technology. Bio-engineering tools will also target sea lice by triggering strong immune responses in the skin of fish, rather than delivering it through the bloodstream alone. Sharing approaches employed to control ticks in agriculture, the new vaccine aims to target proteins important for the parasite's survival.

Dr Sean Monaghan, from the Institute of Aquaculture at the University of Stirling, said: "Reducing the impact of sea lice is a major concern for salmon producers around the globe and we are making headway towards finding an effective method for vaccinating fish against this parasite. There is strong evidence to support the use of an oral vaccination, using nanoparticles in feed for vaccine delivery in order to trigger the desired antibody response."