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BBSRC to develop novel Oral Vaccine to combat Salmon Lice in Aquaculture Industry

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A multidisciplinary team of scientists led by Moredun Research Institute has been awarded Â£1.5M from the Biotechnology and Biological Sciences Research Council (BBSRC) to combat salmon lice in farmed Atlantic salmon through the development of an oral vaccine. This represents a pivotal step towards a sustainable and effective solution to the pervasive challenges posed by sea lice in the aquaculture industry.

Many marine-farmed fish species are significantly affected by sea lice, impacting their health, welfare, and aquaculture productivity. The salmon louse, Lepeophtheirus salmonis, is an ectoparasite that feeds on the mucus, skin, underlying tissues and blood of farmed Atlantic salmon, and there is no efficacious commercial vaccine. An increase in salmon louse prevalence and disease issues, largely as a result of climate change, has an estimated annual economic impact on the industry of $1bn. Demand for salmon also continues to increase, making the need for the timely development of an effective vaccine, more pressing than ever.

There are major challenges associated with current control approaches against salmon lice that create a barrier against industry expansion, which is worth over Â£1bn annually to the UK economy. Development of a commercial salmon louse vaccine would provide a practical, safe, and eco-friendly approach to tackling the issue while also supporting the goal of the Scottish Government to double the value of Atlantic salmon production between 2016 and 2030.

Tests using traditional methods for administering salmon lice vaccines via injection have shown limited success. As an alternative, a team of internationally renowned experts in the field of ecto-parasitology, molecular biology, bioinformatics, veterinary medicine, and fish immunology led by Moredunâ??s Dr Kim Thompson, are developing an oral vaccine that will generate an effective immune response within the skin of the salmon.

The oral vaccine will be designed to affect the biology of the salmon louse during its parasitic phase, impacting aspects such as attachment, development and/or maturation. The team will utilise state-of-the-art techniques, including reverse vaccinology (RV) and artificial intelligence (AI) via the EpitoPrediktTM platform to quickly identify key biological targets within the salmon louse and predict which candidate antigens are able to stimulate the correct immune response in the fish. The relevant candidates will then be fused together and expressed as a mosaic antigen through the EpitoGenÂ® scaffold technology. The mosaic antigen will form the basis of a suitable vaccine.