

RURAL ECONOMY AND CONNECTIVITY COMMITTEE

SALMON FARMING IN SCOTLAND

SUBMISSION FROM PROFESSOR RANDOLPH RICHARDS

I have already commented on the SAMS Consortium document “Review of the Environmental Impacts of Salmon Farming in Scotland”. My expertise is in the area of fish health, having spent the last 43 years working at the Institute of Aquaculture of the University of Stirling. I have chaired a number of government/industry working groups and was, for 6 years, a member of the Veterinary Products Committee, to which the Veterinary Medicines Directorate reports and which licenses animal medicines in the UK. Approval of almost all currently licensed fish medicines took place during my VPC tenure.

Generically, the SAMS consortium has carried out a fair assessment of the available scientific literature and highlighted gaps in knowledge. However the SAMS consortium lacked specific fish health expertise. Many of the highlighted gaps are impossible to fill because of lack of sufficient numbers to sample or extreme complexity of interactions. In such cases, risk assessment is commonly used to address policy issues. Expertise within Marine Scotland and from other outside agencies has been utilised to provide the required information. Unfortunately, the ECCLRC response to the SAMS review has highlighted the use of the ‘precautionary principle’ rather than the application of risk assessment to address areas where data may be lacking or impossible to obtain. Increased regulation is also suggested despite the fact that Scottish salmon farming is the most highly regulated salmon industry in the world, placing the industry at a competitive disadvantage. Risk assessment utilises the application of safety factors in the absence of complete data-sets to evaluate a range of safety areas such as that of predicted environmental safety. This is used by the Veterinary Medicines Directorate in the licensing process for registration of fish medicines and parallels the approach taken by the Medicines commission in the licensing of human medicines through the evaluation of safety, quality and efficacy. The cost of obtaining a license for a sea lice medicine is higher than that for any animal medicine because of the extensive environmental data required. Use of medicines is regulated by SEPA on a site-by-site basis using modelling following the provision of extensive oceanographic data, funded by the individual fish farm. This is then backed up by regular measurements of significant parameters at each site during the production cycle in order to allow the effective use of medicines. Modification to discharge consents or reduction in site biomass may be applied if any negative effects are seen.

I would also offer the observation that published scientific literature, utilised in the SAMS review, represents only part of the story surrounding the development of the Scottish salmon farming industry. There are many other sources of information, including from the regulatory agencies and from within the industry itself which, taken

together, paint a more comprehensive and accurate picture of salmon farming in the 21st century. A lot of poorly informed statements have been made about salmon farming which, in my opinion, fail to recognise the good that it does, while significantly exaggerating claims about unacceptable impacts on the environment. I also believe that the regulatory authorities are carrying out efficient and effective regulation of the industry.

Sea Lice & Disease Impacts on Wild & Farmed Stocks

Sea Lice Impacts

The question is posed as to whether transfer occurs from farmed to wild fish and whether significant harm occurs to populations of wild salmon. There is no clear evidence from research carried out in Scotland that significant harm has occurred to wild salmon populations from sea lice in farmed fish. However, there have been population declines in salmon stocks on the east coast of Scotland and, more recently, in England and Wales, where marine salmon farming is not occurring. In fact, declines in populations have been described across the entire natural range of the Atlantic salmon. Work quoted from other countries, which often utilises various forms of mathematical modelling, varies dramatically in terms of possible effects on wild fish.

The SAMS review describes the legislation used to control sea lice numbers in farmed fish and its oversight by the Fish Health Inspectorate. Treatment triggers indicated in the CoGP have been developed to reduce the possible spread of lice from farmed to wild fish rather than to protect farmed fish welfare. The 2016 Review of one aspect of the Aquaculture and Fisheries (Scotland) Act 2007 prompted a new policy on reporting levels. The review authors queried why levels are cited above the CoGP current levels suggesting treatment. In individual sites, it may not always be possible to carry out effective treatment because of a range of environmentally-induced factors including gill damage resulting from algal blooms. In individual cases, this causes levels of sea lice to increase above those anticipated in the CoGP applied controls. Notification to the regulatory authorities (the Fish Health Inspectorate) ensures that rapid action is taken to reduce lice levels but in some cases, this can only be achieved through an early harvest which results in reductions in site tonnage produced.

The SAMS review also comments on the need for improved treatments. The industry is proactive in achieving this through the development of both medicinal and non-medicinal intervention including 'engineering' methods such as the use of elevated temperatures, salinity modification and washing systems with removal of dislodged lice from the water. Systems are also being used or developed which prevent access of fish to the surface layers of sea water which contain the infective copepodid stages of the sea lice. through the use of so-called 'snorkel' cages or the development of vessels which hold fish and pump water from deeper layers. Fine

mesh skirts are also available which are placed around the upper layer of net-pens to prevent access to the infectious stages.

Biological controls, through the use of wrasse and lumpfish as 'cleaner fish' and use of selective breeding for salmon resistant to sea lice infection also figure in the industry's approach to integrated lice management and control. Concern is expressed by ECCLRC that there are dangers to wild stocks of such cleaner fish, but official controls are being put in place to ensure that wrasse populations are not being overexploited and lumpsuckers are all being supplied as hatchery reared stock. Some new medicines are also in development, but there have been problems in obtaining SEPA consents to carry out field trials, and this has contributed to delays in new medicines being introduced. Parasites are particularly effective at developing resistance to medicines, an issue which affects the farming of all food-producing animals. International activity in sharing results of new developments is promoted through regular meetings of groups such as the Multi-Nation Sea Lice Group.

Diseases and other parasites.

While the consequences of disease for farmed fish populations may not be comprehensively recorded in the published literature, they are very well understood by farm health teams and their veterinary advisors. Farm records also attribute cause to mortalities where this has been verified. Multivalent vaccines are also given to salmon prior to saltwater transfer. This controls a number of important viral diseases and has been particularly successful at controlling bacterial disease. This has resulted in a dramatic reduction in the use of antibiotics and lack of resistance development, an issue of particular public interest at the present time.

In the first paragraph of page 18 of the SAMS report, the review suggests that 'when there are increased levels of outbreaks, they can be demonstrated to negatively impact wild salmonids'. However, no publication is cited in support of this statement, nor is any other supporting evidence provided.

The SAMS review quotes the Wallace et al (2017) review concerning 6 key pathogens in wild fish of a number of species. Of these, *Aeromonas salmonicida*, IPN and SAV are all controlled in farmed salmon through vaccination. VHSV does not affect Atlantic salmon and *Renibacterium salmoninarum* and ISAV are both notifiable diseases, rare in Scotland and effectively controlled through movement control and slaughter policies by the regulatory body, Marine Scotland. The conclusion of the paper was that, despite the large number of samples taken, there was limited evidence for clinical disease in wild fish due to these pathogens and they are likely to have had a minimal impact on Scottish wild fish. Similarly, the SAMS consortium review reports that in Norway, there is limited infection of wild fish with most viral and bacterial pathogens experienced on farms and researchers have assessed this aspect to be of low risk to wild fish.

An area highlighted under 'research needs' in this area is the use of eDNA sampling. Whilst this technology may provide interesting information, it is important to remember that presence of pathogen does not indicate the presence of disease. Clinical judgement is effectively used by the veterinary profession during regular site visits and sampling and forms the basis of veterinary health plans and decision-making on treatments. An important consideration is also the welfare of the farmed fish, as is the case with land-based agricultural production.

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