

## **Environment, Climate Change and Land Reform Committee**

### **Environmental impacts of salmon farming**

#### **Written submission from Compassion in World Farming**

This report documents in detail a range of serious environmental problems caused by salmon farming. Unless these problems can be mitigated, the damage is likely to worsen if the industry expands in line with industry proposals. Unfortunately, most of the suggested mitigation methods are either in their development phase or are still being researched. For a great many of the suggested strategies, the report raises questions about their likely effectiveness, for example in the control of parasites and disease.

The report frequently identifies a lack of appropriate research, e.g. on disease transfer between wild and farmed populations, effective strategies against sea lice, benthic monitoring near farms, prediction of effects of long-term usage of chemicals etc. This highlights the need for substantial research on these important issues before the sector is in a position to expand. It also identifies the lack of available data available from government, for example in relation to levels of disease. The industry appears to be under-researched, under-documented and under-enforced.

The authors state that the report is based on peer reviewed papers only in order to maintain objectivity. We also value peer-reviewed research but share the view of other correspondents that, in the absence of effective government collation of data, valuable data could be obtained from salmon industry itself and scientifically assessed by authors of this review. For example, the review fails to comment on the extremely high mortality recently caused by hydrogen peroxide or mechanical sea-lice treatments when applied to diseased fish.

This is a report about the environmental impact of Scottish salmon farming, though animal welfare impacts are occasionally mentioned. However, the impact of the sea lice mitigation strategies on animal welfare is missing from the discussion. For example:

- Use of mechanical treatments such as the Thermolicer result in stressful handling of fish, injuries and, in some cases, very high mortalities
- The welfare of cleaner fish and whether their physiological and behavioural needs can be adequately met in salmon farming systems
- RAS systems are considered as potential solutions for many problems. However, to balance the high cost of these systems, it is likely that salmon would be kept at very high stocking densities which represents a major welfare risk. The public increasingly demand that farm animals are kept in more natural, less intensive environments. Now is not the time to develop intensive systems in unnatural environments for salmon.

During the presentation of the report to the Scottish Parliament, animal welfare was discussed and welfare standards were described as “very high”. Whilst we value the efforts of those in the industry and key certifying bodies (e.g. RSPCA Assured) to improve or maintain welfare, the high levels of disease, parasites, and mortality, and the stress and injury caused by parasite treatments are in no way consistent with “very high” standards.

The high mortalities associated with sea lice clearly indicate that the sector is operating beyond its limits. Compassion in World Farming strongly recommends that expansion of salmon farming, as proposed by industry, should not proceed.

### **Comments on Section 2 - Sea Lice & Disease:**

The decision to rely only on peer reviewed papers (which become quickly outdated due to fast development of industry practices) in the report fails to show the severity of the problems. Gathering and analysing data from the salmon industry (e.g. on levels of parasites, disease and fish mortalities) for the purpose of this review would provide a clearer and more accurate assessment. Recent Freedom of Information data shows extremely high salmon mortalities due to both infestation and treatment for sea lice. For example, 95,400 fish died over two weeks ending 07/08/16 following thermal de-lousing at a salmon farm in Loch Greshornish, on the Isle of Skye. Animal welfare impacts of mitigation methods are not properly discussed.

A key point missing from the report is that official assessment (including animal welfare impact) of sea lice treatments is currently not required by the Scottish government. This risks fish welfare. For example, the Thermolicer requires stressful crowding and handling of fish and is associated with very high fish mortalities, especially when applied to diseased fish. These stressful treatments often have to be repeated (immature sessile lice may survive to mature and reproduce later, and re-infection is likely). However there is no official procedure to assess these risks before the method is used on a large scale. In contrast the Norwegian government does require such assessments, though these need improvement.

There are a range of other treatments which involve the stressful and potentially damaging process of transferring the fish to a vessel and back. These include: The Hydrolicer, The "Skamik" delouser, freshwater immersion (for several hours), and chemical de-lousers (salmon are bathed in insecticide treatments such as azamethiphos and hydrogen peroxide). The last three have all been involved in mass mortality incidents. The first three are considered environmentally friendly but, along with the crowding and pumping, cause substantial stress, pain and injury to the fish. The use of medicines and therapeutics also raises concerns about long-term accumulation of certain compounds (or their breakdown products) and the impacts on non-target crustacean species present on the seafloor beneath fish farm cages and further afield. There is a strong evidence (highlighted in the report) that lice are becoming less susceptible to chemical treatments.

Despite considerable efforts by industry to develop lice control methods there has been no effective solution and salmon mortalities are astonishingly high. This is a complex problem, currently with no clear answer. Any expansion of the industry before this issue can be fully addressed would be nonsensical.

Authors of the report suggest research into the efficacy of existing lice treatments and their environmental effects should be conducted. We agree, but strongly urge that animal welfare is also given high priority in any such research and development.

### **Comments on Section 3 – Discharge of wastes into the marine environment**

Both the development of Recirculating Aquaculture Systems (RAS) and the suggestion to relocate salmon farms offshore, raise important animal welfare issues not covered in the review. As the review suggests, RAS systems are expensive. To

run economically, they are likely to involve high stocking densities, well above those permitted by welfare schemes such as RSPCA Assured. This risks higher levels of stress and aggression leading to higher levels of injuries such as fin damage (Jones et al, 2011). Increasingly, consumers are demanding less intensive and more free-range methods of production for terrestrial farm animals; it is unlikely that consumers would accept the further intensification of salmon farming as they become more aware of aquaculture issues.

Farming salmon in deep, exposed waters brings a range of welfare risks which we raised in the recent SEPA consultation. Higher currents risk increased stress and exhaustion of fish, and deformation of nets can cause overcrowding and injury. Risk of escapes is also likely to be higher. Accessibility to cages is also likely to be more weather-dependent. This could lead to difficulties in feeding fish, monitoring parasites and disease, and delays in grading (risking aggression to other salmon and cleaner fish) during bad weather.

#### **Comments on Section 4 - Medicines and chemicals:**

Authors of the report clearly acknowledge the negative impact of medical treatment on the environment. We completely agree that the increased production is likely to result in additional use of existing or newly developed chemicals. The mitigation methods mentioned are however doubtful. Although the development of lice-resistant strains of salmon is a good idea there is no indication so far that this can be achieved and used on a commercial scale with any success.

#### **Comments on Section 5 - Escapes:**

As authors of the report highlighted, salmon farms escapes are a serious issue affecting wild populations. Growth of the industry will inevitably lead to more escapes. Once again, the welfare consequences of mitigation proposals are not considered. We have already outlined those associated with RAS (see comments on section 3). The authors of the report also suggest that breeding of sterile (triploid) salmon could be a future solution. However this does not look a promising one when considering the large body of evidence that triploidy causes severe health and welfare problems in Atlantic salmon, including: increased incidence of cataracts (Wall and Richards, 1992), blindness (Wall and Richards, 1992), lethargy (Wall and Richards, 1992), inability to feed (Wall and Richards, 1992), skeletal deformities (Sutterlin and Collier, 1991 cited in Benfey, 2001; O'Flynn et al, 1997; Sadler, Pankhurst and King, 2001), higher proportion of short opercula (gill covers) and absence of primary gill filaments (Sadler et al., 2001), reduced gill surface area (decreasing ability to respire under strenuous exercise or poor environmental conditions) (Sadler et al., 2001), and reduced disease resistance (Ching et al, 2010).

#### **Comments on Section 7 - Emerging Environmental Impacts - Cleaner Fish**

Although cleaner fishes may decrease numbers of sea lice on their hosts, introducing such a partnership under intensive farm conditions may bring about a new set of health problems, such as transfer of bacterial infection and parasites (Gulla et al., 2016; Haughland et al., 2017). The use of cleaner-fish (e.g. wrasse and lumpstickers) is far from being the solution to the sea lice problem.

Further, despite their increasing use in intensive aquaculture systems, the biology, ecology and social dynamics of wrasse are largely unknown. Worryingly, most

cleaner fish fisheries are unregulated (Powell et al., 2017), meaning that the health and welfare of cleaner fishes are not protected and measured against basic standards. As stated by the Farm Animal Welfare Committee (2014), the welfare of cleaner fish is no less important an issue than the welfare of the fishes being farmed for food. Some issues that compromise the welfare of cleaner fishes kept in farmed salmon cages include their requirement for shelter as protection from currents in the water, a lack of supplementary feed when lice numbers are not sufficient, and handling when moving salmon and cleaning cages and nets (Treasurer and Feledi, 2014). It is essential that future guidelines and standards for the welfare of cleaner fishes should be integrated into those of farmed fish species, and to include behavioural and cognitive components as well as physical body condition scores. The recognition of the species-specific needs of different cleaner fishes is also fundamental to safeguarding their welfare.

The full impact of (largely unregulated) wrasse fisheries on wild populations in the coastal waters of Scotland and the SW of England is unknown, but is likely to be considerable. However, lumpfish are now on the IUCN Red List of threatened species as near threatened (NT) (<http://www.iucnredlist.org/details/18237406/1>).

### **Dr Krzysztof Wojtas and Phil Brooke, Compassion in World Farming. February 2018.**

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