

## **RURAL ECONOMY AND CONNECTIVITY COMMITTEE**

### **SALMON FARMING IN SCOTLAND**

#### **SUBMISSION FROM DR LAURA DUNN BVM&S MSC MRCVS**

##### **1. Do you have any general views on the current state of the farmed salmon industry in Scotland?**

As a member of the veterinary profession educated in animal welfare and disease, I have a few ongoing concerns about the salmon industry in Scotland:

- Prevalence of sea lice infestation in salmon and resistance to historically used treatments..
  - This concern is twofold: first, for the welfare of the individual salmon. It is appreciated that logistically it is very difficult to appraise individual welfare states due to the volume of fish involved, but it can be confidently argued that the severe soft tissue damage associated with sea lice cause significant pain in affected fish. This is a severe breach of at least one of the five freedoms (freedom from pain, injury and disease).
  - In non-pharmacological interventions such as the thermolicer, large scale mortalities have been associated with treatments. Although it is appreciated that concurrent medical treatments or vaccination may have caused a summative effect in such events, such treatments involve crowding/catching, emersion stress and thermal stress which are poorly acceptable for welfare.
  - I am concerned about the effect of importing wild-caught wrasse for lice control on the local ecosystem from which they are sourced. This option appears to be poorly sustainable due to the numbers of wild fish which would be required to make a meaningful impact on sea lice prevalence. In addition, wrasse mortality rates are often high due to predation by the salmon themselves, and exposure to low temperatures. Lumpfish may be more adaptable to UK conditions and more readily bred in captivity (personal communication) but welfare risks still exist in terms of interactions with predatory salmon within confined penning systems.
  - I am aware of research on non-pharmacological interventions such as lice “light traps” and the effectiveness of fallowing; I would be encouraged to see more research into methods of lice control which preserve salmon welfare and the environment
- Escaped salmon and the risk of interaction with wild fish in terms of disease spread
- Poor environmental profiles and widespread detection of medications, particularly those used for sea lice control e.g. avermectins

- Persecution of marine mammals (namely seals) due to predation on captive fish stocks
- Poor sustainability of ingredients within feed for salmon
  - Salmon are supplemented with omega 3 as intrinsic levels continue to decline. Currently many farms achieve this through usage of feeds containing other fish. This presents food waste concerns as the caloric value of the original feeder fish may be greater if directly consumed by humans, instead of being used in feed for farmed salmon.
- Lack of enrichment, positive welfare and behavioural restriction
  - Salmon naturally travel immense distances as part of their natural behaviour/ethology. This is obviously directly restricted by penning. I am aware that logistically such behaviours are impossible to provide, but it raises concerns for the intense stocking densities currently seen.
  - I appreciate that this subject does not have a significant associated body of research. From my exposure to salmon farming, fish appear to be kept in completely barren and restricted environs. Anecdotal evidence from aquaculture researchers (whom I shadowed as part of my own salmon behavioural research) suggests that even simple measures such as suspending artificial kelp into tanks/pens (strips of tarpaulin) can reduce behavioural signs of stress. My own research on Qualitative Behavioural Assessment (a subjective measurement of emotionality in salmon) supported this observation. Although research is ongoing, this may have economic effects as well if there is correlation with reduced fin biting. I believe that if investment is made into promoting positive welfare and providing terrestrial farm animals with a “life worth living” then the same approach should be made in salmon.

**2. There have been several recent reports<sup>1</sup> which suggest how the farmed salmon industry might be developed. Do you have any views on action that might be taken to help the sector grow in the future?**

I don't believe that the sector should grow beyond its current level. I am strongly supportive of the setting and achievement of certain targets (welfare, disease/biosecurity - particularly sea lice prevalence - and environmental criteria) before the industry plans for further development. Otherwise the management of current problems in salmon aquaculture is made increasingly more challenging. I think that this is the only way that the industry could become more sustainable.

**3. The farmed salmon industry is currently managing a range of fish health and environmental challenges. Do you have any views on how these might be addressed?**

- Sea lice
  - I believe that further investment into non-pharmacological, sustainable and welfare friendly lice control methods are paramount to preserving the UKs' high animal welfare image and international reputation, as well as reducing the environmental impact of aquaculture.
  - Several promising studies have brought forth ideas which could be considered further, including:
    - “Snorkel” setups: This study saw a significant decrease in sea lice infestation when salmon were housed at increasing water depth, as lice are more frequently encountered near the water surface.
    - Light traps - simulation of moving salmon which attract and trap lice under experimental conditions
- More research on basic enrichment and reducing stress for captive fish. This has the potential to reduce disease prevalence with better immunocompetence
- Reducing reliance on wild caught fish for both omega 3 supplementation and sea lice control. Algae sources of omega 3 should be preferentially considered.
- Investigation of non-lethal predator control e.g. deterrent technology for pinnipeds.

**4. Do you feel that the current national collection of data on salmon operations and fish health and related matters is adequate?**

In terms of information that is readily accessible about the industry, I don't think this is adequate. Some areas which I feel are lacking include:

- Precise sea lice prevalence
- Prevalence of other diseases
- Objective impact of escaped farmed fish on wild populations
- Mortality resulting from vaccination and other preventative measures e.g. thermolizer
- Overall mortality figures at different production stages e.g. hatchery, freshwater, seawater holdings
- Numbers of marine predators killed.
- Data on welfare measures e.g. fin damage

**5. Do you have any views on whether the regulatory regime which applies to the farmed salmon industry is sufficiently robust?**

From my understanding, many schemes for good aquaculture practice are part of voluntary schemes. I believe that the statutory regulations for the industry should be guided by welfare standards prioritising health and behavioural needs over maximising stocking densities. Thorough evaluation and development of health and welfare science for salmon should inform such guidelines. Aquaculture science, including fish welfare, should be an area for growth in the future of the industry.

**6. Do you have any comments on how the UK's departure from the European Union might impact on the farmed salmon sector?**

My main concern is preserving salmon welfare and recognising fish used in aquaculture as sentient beings. We should use this opportunity to promote Scotland as a leader in animal welfare.

Dr Laura Dunn  
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