

RURAL ECONOMY AND CONNECTIVITY COMMITTEE

SALMON FARMING IN SCOTLAND

SUBMISSION FROM BENCHMARK

Background information

Benchmark is a UK-headquartered global aquaculture biotechnology company supplying health products, genetics, advanced nutrition and knowledge services to the industry. The Company has large scale production facilities in 7 countries, covering the main aquaculture regions and supported by a network of R&D and commercial operations in an additional 20 countries.

Since 2013 Benchmark has made investments in Scotland totalling £6.8m. Through a number of its subsidiaries it employs 87 people in Scotland with significant numbers based in areas classed as fragile by Highlands and Islands Enterprise (HIE).

Benchmark's principle subsidiaries active in Scotland:

FAI Aquaculture operates a marine research facility in Ardtoe, Lochaber and produces cleaner fish from production sites at Aultbea, Wester Ross and Sandwick, Shetland.

Fish Vet Group is based in Inverness and provides veterinary consultancy, diagnostic services and benthic (environmental) monitoring to aquaculture producers.

Benchmark Animal Health is based at Bush House, Edinburgh and develops new health products targeted at the industry's most pressing disease challenges.

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?

The environmental and welfare impacts associated with sea lice and their management remains a key challenge to sustainability. However, substantial progress has been made by the industry in recent years with respect to sea lice. Observations by Marine Scotland Science's epidemiologists (Hall and Murray 2018) that average adult and ovigerous female sea lice numbers are at their lowest in four years are in line with the field experience of our veterinary surgeons and technicians working on Scottish sites. This has occurred at the same time as a substantial decline in the number of bath treatments for sea lice performed (within Fish Vet Group's veterinary client base, 50% fewer bath treatments have been prescribed over this period). While declining efficacy of the few licensed veterinary medicines for sea lice has been a driver for the latter, significant advances in cleaner fish husbandry and non-medicinal interventions have allowed some improvement in control of sea lice on Scottish sites.

Gill diseases have been responsible for many of the recent instances of high mortality in the industry. Significant causes are frequently non-infectious in nature (such as phytoplankton blooms, harmful gelatinous zooplankton) and the characterisation and management of these often-complex disease situations are now a major research priority for the industry. Good gill health is critical to the ability of sites to successfully control sea lice, with these two issues intrinsically linked.

Benchmark believes that only a holistic approach to fish health and welfare can ultimately address the challenge of sustainable growth of the industry, and is working in partnership with Scottish Salmon Producers across a number of initiatives either already yielding results (e.g. lumpfish production, salmon genetic selection programmes) or which we are confident will deliver substantial step change improvements in future (e.g. purification systems). Some specific examples are provided below.

(i) Cleaner fish

The deployment of cleaner fish- principally wild-caught Ballan wrasse (*Labrus bergylta*) and cultured lumpfish (*Cyclopterus lumpus*-) has shown success in allowing farms to improve lice control on Scottish farms, thanks to cross-industry initiatives to better understand their behaviour and proper care on deployment. Benchmark's FAI Aquaculture has been rearing and supplying lumpfish since 2016 and research on cleaner fish biology has been a key area for our marine laboratory at Ardtoe for over 20 years.

Sites deploying farmed lumpfish in Scotland have documented a sustained 70% reduction in sea lice burden within 8 weeks of deployment. FAI Aquaculture is working with salmon producer partners and groups such as RSPCA Assured to promote efficacy through positive health and welfare practices. As a relatively new species to aquaculture, many challenges still remain to be addressed in collaboration with Scotland's academic and research communities.

Benchmark's FAI Aquaculture have invested in cleaner fish programmes in Argyll, Wester Ross and Shetland which has exceeded £2m and has capacity to meet a substantial part of the growing industry demand, while supporting 26 skilled jobs across these regions.

More information about Benchmark's work with cleaner fish can be found here: <http://www.benchmarkplc.com/articles/the-curious-looking-lumpfish-is-proving-its-worth-in-the-fight-against-sea-lice/>

(ii) Purification Systems

Preventative rather than reactive health strategies should be foremost in fish health management. However, proper veterinary care of farmed fish requires the availability of efficacious veterinary medicines when required. Presently restrictions

on discharge consents for the few existing licensed veterinary medicines means that proper implementation of integrated sea lice management (ISLM) - including rotation of therapeutants - is challenging and has contributed to the development of resistance. Further to this, the licensing of new veterinary medicines is understandably protracted and difficult due to the need to properly understand and measure their environmental effects if released into the marine environment.

Purification systems- systems which remove therapeutants from treatment water prior to discharge - have been proposed as a solution to this environmental challenge. Benchmark's CleanTreat® system - developed by our team in Scotland - is the culmination of many years of research and investment and is the first of its kind to be used in aquaculture.

CleanTreat® ensures the safe use of compounds in the marine environment by removing therapeutants in discharge water following treatment to undetectable levels. CleanTreat® will be used in conjunction with Benchmark's next generation sea lice treatment, which is currently undergoing field trials in Norway. This represents a transformational change in the battle against one of the industry's greatest challenges, and a big step towards a future where no medicinal residues are discharged directly into the oceans. CleanTreat® can be used on well boats, tankers and platforms, is effective against most available bath treatments for sea lice and prevents treated lice from going back into the environment so that they do not contribute to resistance. More information can be found here:

<http://www.benchmarkplc.com/articles/cleantreat-by-benchmark/>

(iii) Resilient Genetics

Our experience in both terrestrial farming and aquaculture shows that incremental improvements across multiple aspects of farming systems frequently amount to step change improvements in health and sustainability parameters. A specific example of the success of such a holistic approach in the livestock sector can be found here:

<http://veterinaryrecord.bmj.com/content/early/2014/06/20/vr.102161>

A recent World Bank Report* opined that production growth of 30% can be achieved without physical expansion of the farming infrastructure. Central to this sustainable advance and growth of salmonid aquaculture is optimising the natural process of genetic selection. By way of example, the identification of the infectious pancreatic necrosis (IPN) quantitative trait loci (QTL) for disease resistance and its inclusion in selective breeding programmes in the past 10 years have been shown to reduce mortality due to this disease from 25% to close to zero.

Key areas of current work for Benchmark's genetics group which we expect to continue to deliver improvement to the health of Scottish farmed fish stocks include amoebic gill disease (AGD) resistance, sea lice and infectious viral myopathies.

More information about Benchmark's work with genetics can be found here:

<http://www.benchmarkplc.com/genetics/>

* <http://www.fao.org/docrep/019/i3640e/i3640e.pdf>

iv) Knowledge

The broadening of both the range of fish health research areas and the academic organisations beginning to work in Scottish aquaculture has been heartening, and this trend needs to be fostered. Benchmark's Fish Vet Group have been part of an industry-led research proposal involving Scotland's Agricultural College (SRUC) which intends to identify evidence-based management strategies for complex gill disease in Scotland. Gill disease has been identified by the industry as a major priority for research investment and the Scottish Aquaculture Innovation Centre (SAIC) recently announced the first of a suite of projects in this area.

Benchmark also sponsored the first pathology residency with particular focus on aquatic disease at the Royal (Dick) School of Veterinary Studies, which completed at the end of 2017. Further collaborations are ongoing with the Moredun Research Institute (MRI), and the Universities of Stirling, Glasgow and St Andrews and are typical of what we see as growing and welcome engagement between Scotland's academic institutions and the aquaculture industry.

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

Benchmark is aware of the wide-ranging debate around data and we are working with partners in Scotland. In an attempt to help contextualise this debate there are a number of global frameworks which are gaining traction in the food industry such as the sustainable development goals

<https://www.un.org/sustainabledevelopment/sustainable-development-goals/>,

planetary boundaries <http://www.stockholmresilience.org/research/planetary-boundaries.html> together with reporting systems such as

<https://www.globalreporting.org/Pages/default.aspx>.

In Benchmark's consultancy programmes, sustainability outcome measures based on such frameworks have been used in food chains for over 15 years. Helping clients to understand and quantify the impacts food systems and supply chains have on people, animals and the environment and most importantly to innovate and demonstrate progress. Most effective results in our experience are where government and food chains work together towards a defined common goal.

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

The impact could be negative or positive depending on how this report is received and implemented. Brexit provides the opportunity to reform food policies and showcase Scotland as a leader in genuine sustainable food production as many

companies and in particular individual farmers within these companies are largely meeting such standards – the knowhow is available and requires wider implementation.

If Scotland is to increase biomass and become a world leader it is vital that the animal welfare and environmental issues referenced in the report and solutions such as those highlighted above are tackled together with maintaining competitive production and a quality product.

The challenge is to create a leadership model for the twenty first century, in which farmers thrive, citizens eat well, nature's equilibrium is restored, and a dynamic market supports production and innovation. This will also protect Scottish food businesses in the medium term. In short this is an opportunity for the Scottish salmon industry to secure its place as a world leader in salmon farming.

Benchmark, in collaboration with Farmwel, an NGO which advocates policies to enable a transition to sustainable and accountable mainstream agriculture and aquaculture, developed a blueprint for post-Brexit agricultural land use and food production which was referenced in the UK government's recent command paper, Health and Harmony: the future for food, farming and the environment in a Green Brexit.

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