



Scottish Affairs Committee

Oral evidence: Salmon farming: growth and sustainability, HC 442

Wednesday 4 December 2024

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Members present: Kirsteen Sullivan (in the Chair); Maureen Burke; Harriet Cross; Lillian Jones; Douglas McAllister; Mr Angus MacDonald; Susan Murray; Elaine Stewart.

In the absence of the Chair, Kirsteen Sullivan was called to the Chair.

Questions 1 - 50

Witnesses

I: Sean Black, Senior Scientific Officer for Aquaculture, RSPCA; and Sarah Evans, Aquaculture Policy Officer, Marine Conservation Society.

II: James Park, Head of Insights, Salmon Scotland; Ben Hadfield, Chief Operating Officer, Farming (Scotland), Mowi; and Anne Anderson, Head of Sustainability & Development, Scottish Sea Farms.



Examination of witnesses

Witnesses: Sean Black and Sarah Evans.

[This evidence was taken by video conference]

Q1 **Chair:** Welcome to this morning's meeting of the Scottish Affairs Select Committee. We are having a one-off session on salmon farming in Scotland: growth and sustainability. In the absence of our Chair, my name is Kirsteen Sullivan and I would like to welcome our panel of witnesses this morning. I will pass over to them to introduce themselves.

Sean Black: I am the Senior Scientific Officer for Aquaculture at the RSPCA.

Sarah Evans: I am an Aquaculture Policy Officer with the Marine Conservation Society.

Q2 **Chair:** Thank you for making the time to join us this morning. I am going to move on quickly. I am aware of time and there is a lot to get through. We have a number of questions for you this morning, and I am going to start by asking if you can briefly outline the overall position that your organisations take in relation to the salmon farming industry in Scotland. Sean, I will pass that to you first.

Sean Black: Thank you. Our position in relation to salmon farming is that, as the RSPCA, my department, the Farm Animals Department, works to improve the lives of farm animals in the UK. That does include farmed fish, so both Atlantic salmon and rainbow trout. We do this primarily through two different mechanisms. One is to advocate for legislative change where necessary. The second way that we work to improve lives of farm animals is through the development of welfare standards.

We work to create, develop and update welfare standards for Atlantic salmon, so that is our position. All we do is develop these welfare standards and then they are implemented on farms in Scotland. For Atlantic salmon, that is through the RSPCA Assured scheme, which is a welfare assurance scheme that goes on to farms to audit them against the welfare standards to ensure that the standards are being upheld. That is how we interact with the industry.

Our position is always to be pushing for more change as it relates to welfare, and to ensure that farmed fish live the best possible lives while they are in farms in the UK.

Sarah Evans: The Marine Conservation Society is an ocean conservation charity. Our role is to try to make aquaculture into a responsibly sourced seafood. We want to work with the industry to see that it works in harmony with nature. In particular for Scottish salmon farming, we see that it has a future. We recognise that the current status quo is not an



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option for its future development and we would like to work with it to implement change.

Q3 Chair: Thank you very much, Sarah. Following on from that, the Marine Conservation Society has previously described salmon farming as a “data poor industry”. Do you think there are still gaps in the data about the industry’s practices and performance that you would like to see rectified?

Sarah Evans: Yes. We need to recognise that data in the salmon farming industry needs to be available, consistent, and it needs to be able to be used by decision makers with confidence.

What we would like to see for data in the salmon farming industry is one repository for all the data. We need it to be using consistent units. It needs to have common terminology available and at the moment we think that can be lacking in certain areas, particularly between the different regulatory bodies in the media that are reporting on it.

I think there can be a little bit of confusion about what is actually happening within the industry. The Scottish Aquaculture website is quite a good opportunity for that to be done, although that website would need development.

Q4 Chair: Thanks very much, Sarah. Sean, if I can come back to you, just touching on the points that you made about welfare standards, I note that the RSPCA’s President, Chris Packham, has publicly raised concerns about fish farming and farmed fish welfare. Does the RSPCA share those concerns?

Sean Black: The RSPCA is proud to have Chris Packham as its President, but the comments that he made at that time were in his personal capacity and are not reflective of the RSPCA.

We do want to improve the lives of all animals, particularly farm animals. There are challenges for all farm animals in the UK, not just farmed fish, but we do want to see further improvements over time. That is why we are involved. If everything was hunky-dory in any farmed animal industry, we would not have to be pushing for further changes.

We do want to see big improvements across all farmed animals, and that does include farmed fish. That is why we have welfare standards and why we work tirelessly in this area to drive forward improvements, identify gaps in knowledge and work to improve that over time.

Chair: Thank you very much. I will now pass over to Elaine Stewart.

Q5 Elaine Stewart: This question is for Sarah. I have three questions for you, Sarah.

In 2018, the Scottish Parliament’s Environment, Climate Change and Land Reform Committee concluded that expanding fish farming could cause “irrecoverable damage” to Scotland’s marine environment. Is that still true today?



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Sarah Evans: Sorry, are you asking me if excluding salmon farming would cause damage?

Elaine Stewart: Expanding.

Sarah Evans: Expanding it. I think it is certainly a possibility. We need to recognise that the industry has been doing quite a lot of innovation in the production system that it is using. What we need to see is effective marine spatial planning to ensure that any expansion of the salmon farming industry is in suitable locations. Those suitable locations are going to be dependent on a number of factors, including the changing environment, the scale of salmon farming that is expected to happen, and the production systems.

There are certain production systems that might be more suitable in certain locations than others. I would say that it is certainly a risk that expanding salmon farming could cause environmental damage, but there are ways to mitigate that if they are taken properly.

Q6 **Elaine Stewart:** Thank you. You kind of answered my second question, so I am not going to ask you that. What progress is the industry making to reduce emissions from chemicals and other waste from farms?

Sarah Evans: The emissions and waste from farms are controlled through a CAR licence through SEPA. It is responsible for setting the limits that the farming industry has to abide by in terms of what they are or are not allowed to emit into the environment. That is the primary way that it is regulated.

In order to work within those restrictions, the industry is trying to innovate in order to avoid having to use these chemicals. An example would be for sea lice. Prevention is always better than cure and that goes for every disease or welfare issue that farmed fish may be facing. The use of cleaner fish is one way to avoid using chemicals, although they have their own issues that need to be addressed. The use of different production systems—we are not really there yet—is something that is being developed. The use of semi-closed or closed production systems has the ability to reduce the impact of sea lice. If there are no sea lice, there is no need to add chemicals to treat them.

Chair: Thank you very much. We will now pass over to Harriet Cross.

Q7 **Harriet Cross:** Good morning. Either of you can take this, but maybe we will start with Sean. The industry and the Scottish Government figures show that mortality has been increasing in recent years among farmed salmon. Do you have a view on what might be causing this and is it different nationally here versus what it would be globally?

Sean Black: Yes. In terms of what has been driving the levels of mortality that have been seen over the last couple of years, primarily the feedback that we have received from our stakeholders and from RSPCA Assured is that a lot of the mortality is being driven by gill health



challenges. In turn that has been driven primarily by a new species of jellyfish that has not previously been seen by the industry here in Scotland, but also by several types of algae or plankton. It does seem to be gill health challenges from the environment that have caused some of the mortality in recent years. There are other infectious disease challenges as well, but primarily it seems to be gill health.

As to how that compares internationally, these challenges have been seen in other locations. Last year Norway had the same string jellyfish in some areas. I am not going to try to pronounce its Latin name, but it caused huge mortality and there has been a lot of discussion recently about increased sightings this year in Norway, which is seeing the same challenges that Scotland is seeing.

It is where these countries are situated and what their water temperatures are that changes the dynamics a little bit. These challenges are obviously in other countries, but it has primarily been gill health in the last couple of years. However, it must be recognised that challenges do evolve over time.

What we want to see is that the industry adapts to these changes and tries to develop systems that mitigate for these in future. As Sarah said before, the status quo is not acceptable so not to adapt to these changes is more problematic than anything else.

Q8 Harriet Cross: Thank you. Sarah, following on from that, whether it is gill health or other reasons why we have seen changes in mortality, from a policy point of view, what have you been looking at that might help?

Sarah Evans: We want to look at the issue of mortality through a climate change lens, and certainly in the context of both the climate and nature emergencies that we are facing. We believe that a lot of these trends in mortality are related to climate change. It is a contributing factor to the increase in micro-jellyfish—which Sean mentioned—gill disease and the lifecycles of sea lice as well. They are all linked to increasing water temperatures.

In terms of policy, we think it is going to be important to co-operate and share data. This is not a Scottish issue. This is an international issue, but we also need to recognise that Scotland is unique in certain ways, in its aquaculture and salmon farming. Compared to places like Norway, the water is typically warmer and shallower, so the challenges that it faces will be unique as well. Therefore, we need Scotland-specific research and Scotland-specific solutions. What we would like to see is aquaculture integrated into climate change policies. That is the key thing I think that we would ask there.

Chair: Thank you. We have a supplementary from our colleague Angus MacDonald.

Q9 Mr Angus MacDonald: Sean, can I ask you: in your paper at 1.11 it



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said 25% mortality a year and in the Salmon Scotland paper it said 2.5% per month, and obviously that is roughly the same. Is it 2.5% or is it 25%?

Sean Black: I think what we see is that the mortality rate per month varies. In the months of autumn, September, October and November, mortality does tend to be a little bit higher and probably north of 2.5% a month. Whereas in early spring, late winter, when the water temperature is a bit lower, mortality is a bit lower, so it probably averages out around 2.5% a month, which in the last two or three years probably comes out at about 25% per year.

To an earlier point that Sarah made, some of the data can be very confusing—as you have highlighted—depending on the different regulators that collect the mortality data. It can be quite confusing to understand completely what is happening, so while 25% is a number that has been produced publicly, you can use other sources of data and come up with a slightly different number.

Q10 **Mr Angus MacDonald:** I do not understand this, and it is a hugely important issue. Say there are 100,000 tonnes a month produced and 2.5% of them die in that month, that equates to 1.2 million tonnes a year—just say 12 months—and then that would still be 2.5%, so I do not understand the figure. Are we seeing 25% of all the fish dying or are we seeing 2.5% of all the fish dying?

Sean Black: Sorry, the 2.5% would be cumulative. It is 2.5% in one month and then another 2.5% would be like 5% of the standard crop, so it is 25% of the standard crop over the year. The 25% is cumulative, and then the 2.5% is for the month. Again, it is a different way of looking at the data. There is 2.5% a month. That number that we have provided is over the year, so it is cumulative and it will vary, if that makes more sense.

Q11 **Harriet Cross:** If I can clear this up, are we saying that the total for the year is one-quarter of stocks die? You have looked at it and have broken it down per month in order to get to the quarter, or is it we have taken each month's mortality and added it up?

Sean Black: You could do it either way.

Harriet Cross: I do not think you can do it either way.

Sean Black: I am not sure about this 2.5% number that Mr MacDonald mentioned. I need to understand where that number has come from. What we are saying is that the 25% is based on the numbers in the Scottish Fish Farm Production Survey. That shows the percentage of smolts that make it all the way through to harvest. It is generally about 25% of fish that do not make it all the way through to harvest, so that is the number that we have used in that regard.

Harriet Cross: You use that as the annual figure?



Sean Black: Yes.

Chair: Thank you very much, Sean, and thanks, Harriet and Angus, for your questions. I am now going to pass on to Maureen Burke.

Q12 **Maureen Burke:** Good morning to both of you and thanks for coming along this morning. I am going to direct my question to you, Sean. Salmon Scotland has said that Scottish salmon farmers provide the highest welfare standards anywhere in the world. Is that a fair assessment?

Sean Black: In terms of third party welfare standards, the welfare standards that the RSPCA has created are continually viewed as world leading. We continue to push the boundary as far as we can for a higher welfare standard. A large majority of the farms in Scotland are signed up to the RSPCA Assured scheme, so in that regard, yes, they are.

There is a little bit of a gap that appears over time. Other countries are bringing in more aquaculture-specific legislation. For example, Norway has an Aquaculture Act, so that is how farms are held to legislation standards. The UK is not keeping up with that but, in terms of third party assurance schemes, yes, the welfare standards created by RSPCA are held as world leaders and many farms do sign up to those. In regard to that, yes, that would be the case.

Q13 **Maureen Burke:** Again, to you, Sean, can the industry learn from practices abroad when it comes to improving fish welfare and tackling issues like sea lice?

Sean Black: Yes, 100%, and part of our work, as the RSPCA, is to look abroad and look at novel technologies. We know many of the farmers are doing the same. Sarah mentioned semi-closed systems and closed systems, which are being used or at least trialled in other countries like Norway, so we want to see Scotland look abroad. Over time we also want to see countries looking towards Scotland for best practice.

We think that data and knowledge sharing with other countries about how to tackle issues such as sea lice and gill disease is the right thing to do. We believe that many companies are doing that and it is certainly something we try to do where possible. I have various discussions with people around the world on how to advance fish welfare and we want to see that done by all stakeholders.

Chair: Thank you, Sean. Susan Murray has another question on the same topic.

Q14 **Susan Murray:** Again, Sean, it is to you, but thanks to both of you for coming along.

It is to do with the individual standards for RSPCA Assured salmon: 1,200 standards seems a huge number and an increase of 269 recently. How is it possible to audit all these standards?



Sean Black: The RSPCA Assured auditors are very well trained and they have a very good relationship with farmers, so when they go on farm they know what to look for. Farmers are very proactive because they buy into the standard and the scheme, so they are able to provide the information that is needed for these audits.

We have a huge number of auditable standards because there is so much that we have to cover that is not covered by legislation. A lot of stuff that we have in the standards is potentially stuff that should be set as a minimum standard in legislation. However, because there isn't any species-specific legislation in regards to welfare for farmed salmon, that is where the standards have to step in. It takes a lot of work from all stakeholders to make sure that those standards are being met on farms. Audits by the RSPCA are pretty thorough, but they do find a very low number of non-conformances day to day.

Q15 **Mr Angus MacDonald:** Sean, there is another question that I want to put forward that is basically about the Assured scheme you have and whether we should be enforcing higher welfare standards. Also, do you want to make a comment about wild fish? Is there any chance that we are putting so many strict regulation requirements on the farmed fish industry, but not on the wild fish industry, thus disadvantaging the farmed fish industry?

Sean Black: That is a good question. It is probably slightly out of my field of expertise, which is farmed fish, and it is outside our area as well. We do hold farmed fish to a high standard in terms of welfare. That is because we feel it has to be. We have concerns about some wild fishery practices —I assume that is what you mean—but it is not our primary focus. We are more focused on farmed fish.

Q16 **Mr Angus MacDonald:** If you go on a fishing boat, there is obviously no timescale to kill them. The boats catch anything, and they do not have any of that requirement. The farm regulation and the farmed fishing is so tight that I wonder if we are effectively in danger of driving the industry away from Scotland to places like Chile.

Sean Black: I see your point, but I think it is only fair that we hold farmed fish to the level that we do at the moment. These are farmed animals that are sentient, and they should be looked after. That probably does highlight that there is more work to be done on wild fisheries, but that is not my area of expertise and it is outside my remit. However, it is only right to hold fish farmers in the UK to those higher levels and, at the same time, we should not be accepting farmed fish, particularly salmon and rainbow trout, into the UK that have lower welfare standards. We should be pushing people towards higher welfare farmed fish where possible.

Mr Angus MacDonald: Can I also make a disclosure, which I did not do? I have a Highland Cinema in Fort William and Mowi is one of the advertisers and supporters of that business. Sorry, I meant to state that



before my question.

Chair: Thank you very much, Angus. Before I bring in Douglas McAllister, do you want to add anything on those points, Sarah?

Sarah Evans: Mortality and welfare, and welfare particularly, is not something that the Marine Conservation Society takes a close look at. I would agree with Sean that higher welfare standards is something we would like to see, and rather than letting them fall to the standards that are sometimes seen in the case of wild capture, we should be pushing for wild capture to be a little bit better. However, welfare is not something that the Marine Conservation Society takes a look at specifically, unfortunately.

Chair: Thank you. I will pass over to Douglas McAllister now.

Q17 **Douglas McAllister:** It is again on the point of welfare. My question is to Sean. Notwithstanding potential suspension from the accreditation scheme, if any member of the industry breaches welfare standards, what enforcement action do you take? What is the frequency of sanctions imposed, for instance, over the year 2023? I am not asking you to comment on any live cases. Does that enforcement action fall on the RSPCA, or is it the SSPCA, or do you work jointly?

Sean Black: I will try to answer your questions as best I can. I don't work for RSPCA Assured, so I could not give you a top level answer and if there is anything further required I am sure we can get that.

If members are found to have non-conformances or non-compliance during inspections, they are usually given a chance to rectify that, if it is something like paperwork that might not be available on the farm at the time because the manager is not there. In more severe cases, where welfare seems to have been compromised, sanctions can be applied and are applied. RSPCA Assured has taken different levels of action against different fish farms and, I should also say, other terrestrial farmed animals as well. That has occurred over the last two or three years, and sanctions can range from taking remedial action to formal warnings and suspension from the scheme. Those have all happened to various salmon farms over the past two years, depending on the non-conformance.

As part of a recent review, this grading of severity of non-conformance is likely to be a little bit stricter and more enforced. Both the RSPCA and RSPCA Assured take very seriously what goes on in these inspections and how they are handled afterwards.

Q18 **Lillian Jones:** Good morning. This question is for both Sarah and Sean. How can industry accelerate progress on reducing its environmental impact and improving fish welfare and mortality?

Sean Black: We see the industry and stakeholders as well doing a lot of work at the moment to cover all those areas. Some of the areas are simply things like better funding or putting money towards new



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technologies, like the salmon process that we are talking about that might reduce the incidence of sea lice. At the same time, we want to see work going on into things like artificial intelligence.

One of the issues is obviously that fish live under the water and it is quite difficult to see what is going on down there sometimes. By using artificial intelligence and camera systems, we can see better what is happening under the water and we can almost track individual fish. There is this really nice work that we want to see rolled out, and more work going on to see that being implemented on farms, but we need to see some of those changes happen pretty quickly in order to see any potential growth or sustainability.

From our organisation's point of view, we would like to see a lot of changes in current practices before as an industry we run headlong into major growth and anything like that. There is some way to go with technology to see those changes made first.

Sarah Evans: Thank you for that question. There are a few areas that I want to cover. If we are talking about improving environmental impacts, again, we would like to see salmon farming incorporated into climate change policies because they are already facing challenges associated with climate change and will increasingly do so as we continue.

There are a few things that the industry can do and can continue doing to try to improve environmental systems. The first one is innovation, which we have talked about briefly. It could be innovation in production systems. We would like to see commercial trialling of semi-closed and closed containment systems. We need to have a higher level of confidence that they are actually addressing some of the issues and not creating new ones.

We think feed is another area where the industry is going to grow. We need to continue to do innovation. If we talk about feed briefly, there is a reliance on fish meal and fish oil in salmon feed, and the industry has done a lot of work in reducing the inclusion rates of those. Fish meal and fish oil are reliant on wild caught fish. If the industry is growing, even though the inclusion rates are down, if the overall level of feed required goes up, then the demand for fish meal and fish oil will also increase, so innovation in feed is something we would like to see.

Progress on alternative ingredients and things like algae oil are increasingly being adopted and there is ongoing work on other alternative protein sources as well to bring them into commercial use. The one thing I would caveat that with is it is very important, when we are looking at alternate feed ingredients, we need to be careful that we are not shifting the environmental impact from marine on to land.

The other thing that I think is key, if we are talking about environmental impact, is for the industry to work closely with the regulators and work towards an ecosystem-based management framework. This is partly



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down to things like increased data transparency that we have briefly spoken about. The regulators need to have access to this data. They need to have confidence in this data and this data should be used in an adaptive way to make sure that we have the best regulation at any given time using the best available evidence.

This fits into my last point, which is marine spatial planning. The salmon farming industry can only be as good environmentally as the location that it is grown in. I think the industry recognises that it needs to work in harmony with nature and not in conflict with it. A healthy environment is needed to support a healthy industry, so ensuring that we have the right farms in the right places is going to be key. Where that is not the case we would like to see these farms being relinquished and those sites returned to nature where that is the most suitable option.

Q19 Lillian Jones: My next question is again to both of you. Environmental protection and animal welfare are both devolved to the Scottish Government. However, could the UK Government also be taking action to support the sector's sustainability?

Sean Black: Yes. I think it can at a UK level. We have also been involved in looking for the UK Government to implement legislation at the time of killing farmed fish. At the moment farmed fish in the UK do not have species-specific legislation in the same way that terrestrial farm animals do, so along with other animal welfare NGOs we have been pushing for that to be implemented by the UK Government.

I know there is work going on on that, but we would advocate that that moves with pace because having that legislative position there gives a lot more confidence to consumers that farmed fish are being treated humanely at the time of slaughter. Farmed fish are the second most commonly farmed animal in the UK, and there is currently this big gap that we would like to see filled in.

From a UK point of view, it is also things like funding opportunities so that, when funding opportunities go out to farmers, salmon farmers are included in those opportunities where possible. As Sarah said, there is a lot of exciting technology out there, and for things like artificial intelligence or whatever, fish farmers should be able to apply to that because we want to see that being trialled on farms. Once it is evidenced, it is the kind of thing that we would be advocating for in the welfare standards and that we would see the industry push towards. If that was at UK level for the Government, I think that would be very useful as well.

Sarah Evans: It is a devolved issue. I think the onus is primarily on the Scottish Government, especially in relation to implementing their vision for sustainable aquaculture. I think the UK is able to support the Scottish Government in that. The UK Government could deliver the commitments made in the UK Fisheries Act 2020 and the Joint Fisheries Statement, which includes things like co-operating in sustainable development of the aquaculture industry. That included things like using an ecosystem-based



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management approach and it included aligning more broadly with the UK's climate change objectives as well.

Chair: Thank you. On the back of that, our colleague Angus has a further question.

Q20 **Mr Angus MacDonald:** Sean, sorry to come back to you on this subject of morts. In point 11 of your paper you said morts are 25% annually. We know there are about 150,000 tonnes of salmon produced a year. Let's take it as 12,500 per month. The industry claimed there are 2.5% of morts in a month. That is 3,750 tonnes a year, so it is 312 tonnes times 12. In your paper you say it is 25%. That is 37,500 tonnes. It is 10 times the amount. That is 1,125 tankers of dead fish. Either we have an extraordinary problem with 25% dying or it is 2.5%. Obviously, if this was a farm with cattle or sheep, this would be an enormous issue. I am reasonably good at numbers, but I do not understand. Either we have 25% dying or we have 2.5% dying.

Sean Black: It is definitely closer towards 20% to 25% over a year, Mr MacDonald. The yearly percentage of mortalities in Scotland has bounced around that 20% for quite a long time. I know the industry wants to drive that down and we are certainly keen to see that driven down as well, and it is through the identification of the challenges. We want to see that driven down over time.

It also has to be remembered that fish are very different from terrestrial farm animals. They have completely different life strategies. They produce a huge amount of eggs and so forth because they have a very high mortality rate at sea and in nature, so it is difficult to compare apples to oranges, if we talk about farmed fish against farmed terrestrial animals. We have to be careful about how we make that comparison, but we do want to see that mortality driven down.

The numbers can be very confusing, as we are demonstrating today, because they come from different sources. As an industry we certainly recognise the 20% rough average over the last 10 years. I should note that that is not dissimilar to what is seen in other countries around the world. Norway is around that level as well, but it is the case that we want to see it driven down and down and down.

We have farms on the RSPCA Assured scheme that are around 10% mortality over a crop. We want to be aiming for: how can we get all farms down towards that level?

Mr Angus MacDonald: I still do not understand it, but we shall ask the industry as well. Thank you.

Chair: I was going to ask if that is a universally agreed figure or if some organisations recognise some figures over another, but I suspect we will come on to that in our next session. I am mindful of time, so we will move on to Douglas McAllister.



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Q21 **Douglas McAllister:** My questions are to Sarah. Sarah, I noted in your earlier answers that you said that the farms are only as good as their locations. I want to ask you what your principal concerns are in relation to future expansion of the salmon farming industry in Scotland. Is it possible for the industry to expand in a sustainable way and do we have those future locations?

Sarah Evans: Thank you, Mr McAllister. That is a great question. One of the things I would say is that responsibly farmed fish need responsible inputs. That is things like feed. That is effective regulation of chemicals and medicines. It is also having a suitable location in order to cope with the inputs that you are putting in. A big ask for us is recognising the cumulative impacts, not just all aquaculture or salmon sites, but all marine users within a water body. That is something that we are working towards but do not yet have a full understanding of.

If we are talking about the future expansion of the salmon industry, I think that is going to be heavily reliant on understanding the cumulative impacts of sites within that water body and whether or not that water body is capable of handling any increased expansion.

There is potential for further sites. One option is sites in a higher active area with an increased dispersal for inputs that you are adding in. That could be things like having sites in deeper water. It could be in higher activity areas, although a lot of work will need to be done to ensure that we have the infrastructure and equipment that is capable of being situated in these areas and we have covered things like the health and safety of workers who are attempting to go into these areas. We need to make sure that people like SEPA and the regulators have access to these areas when we need them.

I think, yes, there is potential for the salmon farming industry to grow, but I think it is quite unlikely that it will grow to look the same way that it does now in terms of open marine net pens, particularly in some sheltered areas. Different production systems, different sites and a greater understanding of cumulative impacts are all going to be required before we can really answer that properly.

Q22 **Douglas McAllister:** Thank you, Sarah. Finally, climate change: how big a risk is that to the sector's future?

Sarah Evans: It is a huge risk. We are already in a climate crisis. We are already in a nature crisis, and we are already starting to see some of the impacts, particularly around mortalities. Feed is another area where we are likely to see impacts; in particular, the El Niño effects on the South American fisheries that are used to provide fish meal and fish oil have already seen shocks in recent years.

There are challenges that we are facing now, and I think there are challenges that we are not yet sure of, so the industry needs to adapt. It



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needs to adapt rapidly and I think it is going to need support in order to be able to do that.

Chair: Thank you very much. We have come to the end of our questions for you, Sean and Sarah. I want to thank you for joining the Committee this morning and for giving very valuable contributions, particularly ahead of the Committee's visit to the Hebrides next week where we will be visiting Moray. Thank you once again. I will now briefly suspend the session before the next session commences. Thank you.

Examination of witnesses

Witnesses: Anne Anderson, Ben Hadfield and James Park.

Q23 **Chair:** I would like to welcome our guests to the Committee. Can I ask you to introduce yourselves, please, from left to right?

James Park: Good morning. I am Head of Insights at Salmon Scotland.

Ben Hadfield: Good morning. Thank you for the opportunity to speak to you today. I work for Mowi and I look after Scotland, Ireland, Canada, Atlantic Canada and the Faroe Islands farming regions.

Anne Anderson: Good morning. Again, thank you for the invite. I am the Head of Sustainability and Development for Scottish Sea Farms. We operate on the west coast of Scotland and in both the Orkney and Shetland Islands.

Q24 **Chair:** Thank you very much. Again, we do appreciate you taking time out of your busy schedules to join us here today. As I mentioned earlier, we will be paying a visit to the Hebrides next week and we will be visiting Moray.

Without further ado, we are going to move on to our questions and I will start by asking you briefly to outline the contribution that salmon farming makes to Scotland's economy and the communities where the farms are based.

James Park: I will start with that if that is okay. The sector has around 200 active farms, each of those farms acting as its own individual business. The contribution to the economy directly is in the region of £300 million, with an indirect contribution of in excess of £400 million, so getting towards three-quarters of a billion pounds each year in terms of a positive contribution.

We employ 2,500 farmers directly around the west coast, Highlands and Islands, so geographically remote and fragile economies, but the supply chain impact is that we support a further 10,000 jobs across Scotland, impacting each constituency across Scotland.



Q25 **Chair:** Thank you. Salmon makes up the vast majority of the value of Scotland's aquaculture sector, but Scottish Government figures suggest that, while the sector's economic value has indeed increased since 2016, the number of jobs it supports has not. Could you give any information on that? Why do you think that might be?

Ben Hadfield: The company that I work for, Mowi, is one of the largest producers. In 2007 we employed 400 people. Now we employ over 1,600 people, so the jobs have gone up considerably but the vocations within salmon farming have become more technical and more highly paid. We have an average wage through the sector of about £37,000. You will see people who specialise in data management, in AI, in innovation. It has moved away from a large number of staff working on the farms, but the value chain has expanded significantly.

When people want to criticise the industry, they often say, "Well, the number of people working on the farms has remained stationary or not increased or even in some cases gone down". However, for the people working in this sector, which is increasingly complicated and involves processing and all the products that you will see in the supermarket over Christmas, the numbers have gone up dramatically. People do not choose to reference that because they want to present that this is a lower level of employment than it actually is.

Chair: The number of jobs in the whole operation has increased, but perhaps the number of jobs in the actual farms has remained relatively stable?

Ben Hadfield: Yes. If you go back 20 or 30 years, it was a fairly simple industry, crofting based, a large number of sites. Those sites have been consolidated and become more efficient, larger and more automated, but the sectoral employment involves things like well-boats, service vessels and net manufacturing and processing, so it is a long list. That has expanded dramatically, and the value of that sector is incredibly high.

Q26 **Chair:** I guess you have touched upon this already, but what is the industry doing to help deliver new jobs in Scotland, particularly in the more remote and rural communities?

Anne Anderson: One of the key things that the industry has been doing is working closely with the training providers, both in the schools and taking it right through the curriculum into universities, working very closely with Lantra and increasing the number of roles in modern apprenticeships across all businesses.

As Ben has indicated, the diversity of the roles and the range of positions that are now within the sector mean that we can actually access into every element of Scotland. Indeed, our supply chains already do, so every constituency in Scotland has someone who supplies into the salmon sector, but it is specifically around growing our own and bringing



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people through, so investing into rural education, working very closely with secondary schools in the areas that we work.

In my own company, SSF, about 35% of our workforce is specially designated as young persons and we are increasingly expanding in that area with the introduction of more apprenticeship roles. That is giving younger people in rural and remote communities across Scotland the opportunity to return home from education if they choose to go into academia. It also means that you can have returners coming back from other sectors into salmon farming.

That higher average salary is very attractive, and it is very much essential to be able to support livelihoods. It plays a large part in our sector and plays a huge part in mitigating depopulation. One of the key challenges in all this is—as Ben has indicated—we have farms that are spread across the west coast and then across all the islands areas, and identifying and growing those farms, consolidating can also mean concern in terms of loss of roles. However, this is very much about strengthening and building resilience to make sure that we are retaining and growing each of those communities that we are such a central part of ourselves.

We perhaps do not talk enough about what we do at a local level, but definitely in terms of educating and bringing individuals into the sector right from the school age and then supporting right the way through academia such that they can return back into those communities is absolutely essential.

Q27 **Chair:** I know that depopulation is a huge concern, so that is an important point you raise.

Moving on from that, can you tell me a bit more about the skills profiles of the jobs that the sector supports in these communities? Is technology actually affecting the jobs that are now available?

Ben Hadfield: There are about 75 vocations that you can take within aquaculture: obviously finance, the technical side, veterinary health, farming, both in freshwater and seawater processing—it is a long list, but you could encapsulate it into about 75 positions. We employ everyone, from people with PhDs or specialist processing and biotechnology knowledge to people who want to work and use their skills out on a farm in a very hands-on job.

We employ a lot of people in Scotland and when people come and work they stay with the companies. I think all companies will experience a more than 15-year average turnover and in some cases much longer, so people stay, work, and maintain the Highlands and Islands. It is a very important industry that pays quite well in a remote area.

Q28 **Chair:** Quite a broad skillset required, as you would see in other sectors. How do you feel technology is driving the change in opportunities that are available?



Anne Anderson: Technology plays a huge part right across every aspect of farming operations, right from the process of assessing and identifying the quality of eggs, managing and monitoring water supply. We have remote sensing. We have engineers who are supporting our land-based facilities as much as engineers who are out on our marine-based facilities, and engineers of different types of components as well in all that.

The investment into new technology, increasingly using artificial intelligence to be able to support the eyes of the husbandry staff, whether in freshwater or in marine, is an additional support for farming life. The use of camera work, the use of remote sensing, environmental information sensing, both on the farm and remote from the farm. Then there is a huge amount of technology used to be able to assess the cumulative impacts of salmon farming in its environment, again, whether it is operating within that freshwater part of the farming life or whether it is in the marine, so drawing on the use of remote vehicles.

I made a comment not that long ago to somebody that those that were concerned about their young teens perhaps constantly gaming would find many roles for them in salmon farming because of the abilities of that interaction with screen work and understanding and interpreting. That is an area that has had a huge amount of investment and will continue to have a huge amount of investment because, fundamentally, it assists and aids our ability to farm well, but it can never be a substitute for the ability of farmers in that direct interaction with our animals.

James Park: I would just add to that the range of roles across different sectors as well that are complementary or support other manufacturing sectors or the boat-building sector and packaging companies. There is a huge amount of crossover into other sectors that without one or the other would impact the growth or opportunity across different businesses.

Chair: Thanks very much for that. I will now pass over to Angus.

Q29 **Mr Angus MacDonald:** Just for disclosure, this is the biggest sector in my constituency, and I know all the companies and I know many of the people involved, including Ben Hadfield.

In 2016, there was an indication from the aquaculture sector, including salmon producers, that the industry would double the sector's economic value by 2030. Are we on track to do that?

Ben Hadfield: No, not really. In 2016 there was a proposal to try to double the value of the sector, as you said. Quite a number of people within the activist community—don't get me wrong; we regard them as stakeholders—wanted to present that as doubling production and doubling their version of environmental impact. That was not what was said. It was to double the value to the Scottish economy.



It is already the largest food exporting entity by value in Scotland, so it was to simply double the value over time. We have actually slipped back in volume in terms of production. Around three or four years ago we produced 200,000 tonnes. We have dropped down to around 160,000 tonnes because of the changes in the marine environment, which have increased mortality and caused us a lot of difficulty farming.

We have had to innovate very heavily and invest to manage those challenges, not caused by us, but caused by warming seas. We are coming to the maturation of that investment now and the know-how to cope with the issues that higher temperatures bring—which I am sure we will come on to in further questions—and we see the production is increasing again in Scotland.

Q30 Mr Angus MacDonald: Do you see production moving to other countries, for example, Chile, to the detriment of Scotland over the next few years?

Ben Hadfield: Yes, absolutely. If you go back five or six years, we had a market share of 10%. Now it is 6%. We see that the cost of production in Scotland is a lot higher than most other parts of the world. The regulation is very onerous and strict. I do not say that regulation is a bad thing, but I say that the exaggeration of environmental effect of aquaculture has precipitated more and more regulation, which has made the sector less able to grow and less competitive, and we are losing market share.

Q31 Mr Angus MacDonald: So the result—I do not want to put words in your mouth—is us exporting our food production away from Britain?

Ben Hadfield: Yes, and not just in salmon farming, but we see it in a particularly acute way. Anne has a background in regulation—perhaps you want to add to that, Anne.

Anne Anderson: Yes. What we find is there is a disproportionate focus, as Ben indicated, on that environmental impact. That then sets a tone and a confidence to be able to either expand on an existing location or to be able to move a farm into a more preferable optimal location, because the regimes that we operate under, the planning regime, the environmental regulatory regimes, are very much grounded in the thinking of 50 years ago in terms of a new sector. The assessment and understanding of that impact definitely plays a part in our confidence to invest and the confidence of our investors.

If you are looking at a global context and looking for certainty—obviously for businesses certainty is absolutely prime as we progress forward—that misperception on one area has a dire consequence in terms of time and efficiency to be able to either create and generate a new farm or to move an existing farm and to consolidate, as we wish to do in the programme of work going forward.

It is a global competition that we face, global salmon farming, but we also find differences within the regions within Scotland. It can actually be



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perhaps easier and swifter because of the different way that resources are allocated and mindsets run in different parts of Scotland towards our sector. That obviously makes quite an interesting dynamic for businesses like mine that operate across multi regions.

Certainty and confidence is what is required, and I think we are still facing—as some of the questions I am sure will be posed—that challenge around the misperception of the highly sustainable fish farming sector and I hope to be able to answer some of that later.

James Park: In terms of what Ben is saying, the fact that we are the largest food exporter from the UK, not just Scotland, is based on a pull-demand factor. We have grown based on reputation, the quality and the assurances that can be given. When we talk about exports we are talking about fish that are being exported. Customers want to see the quality that is produced around Scotland in great conditions for growing salmon.

We have achieved that over a number of years, but we cannot rest on that previous success. We work very closely and engage very strongly with both the Scottish and UK Governments in trying to make sure that that success continues going forward. That is through identifying what actions producer companies carry out before putting any fish in the water, for environmental modelling, and all the assurances throughout the supply chain that we heard in the previous session from the RSPCA.

Q32 **Elaine Stewart:** Ben, you spoke about warming seas. What risks does climate change pose to the industry's long-term future, and how can those risks be managed?

Ben Hadfield: Salmon is a bit like wine in the sense it is farmed in two bands in the northern and southern hemisphere, so where you have the right temperatures down in Chile there is big production there. It is same in Norway, across Scotland and in Canada. To put it in context, the temperature in the sea in June 2023 was three degrees warmer than it was in June this year. That is a massive change. That is a marine heatwave that is going to change the environment considerably.

That brought with it algal species that we have not seen. Some of them were toxic. Some of them were very irritating to the gills. They are made of silica; they are very spiky. It brought with it jellyfish that you would normally see down in the Bay of Biscay up in the Hebrides of Scotland and those stung the gills and irritated the fish and caused a lot of mortality.

It is not just climate change that is driving that. I know a little bit about environmental science from my university days. Climate change is having an effect, but it is also the cycles of El Niño and La Niña that are kicking in. It is not going to get to the situation where you cannot farm salmon in Scotland, but it is a situation where it is harder to farm salmon and mortality in what is quite a long cycle, over a year and a half, will increase.



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This is the primary thing that is driving down survival in wild salmon numbers in the British Isles. When people tell you salmon farming is having a big impact, potentially it has a small impact, and we are prepared to discuss that, but the principal thing that is driving down the survival of wild salmon is the same thing that is affecting the survival in our farms. We just have to manage it and cope with it.

When we did a previous inquiry, a member of the Green Party was pushing hard on, "Should we stop salmon farming?" Well, that is a great idea, isn't it? Let us just stop producing our own food and import it and import all our energy and then where are we going to be? Sorry to use such an emotive answer, but the industry has to just cope with this, invest, use the best possible people and the best possible science and deal with the changing environment. We can show you evidence today that that is exactly where we are at and that is what we are doing.

Q33 Elaine Stewart: That follows on to my next question, which is about the industry working with academia and other partners to understand the impacts of that climate change. Is that happening just now?

Ben Hadfield: I can answer that, but Anne is probably a bit closer to the coalface than I am.

Anne Anderson: I think there is a vast array of research and development under way in this space, working with other marine users as well. How do we better make use of the data? We have our own environmental sampling, and every farm has very rigorous daily checks on-farm and within its surrounds. It is about how we understand what is coming towards us, that early warning, the use of satellite imagery, the use of other networks and connections right down the coasts within the UK. I think about the function of this Committee and the roles you have at a UK level; it is that connection between academia from all parts of the UK to better understand what is occurring and the sharing and access to that information, to aid the knowledge but also to ensure that we are not duplicating, so making best use of the finite resources that are there.

There is also, in this space, the locational aspect of where we farm. We are getting better understanding of the consequences, our ability to react to those consequences, and therefore the actions that we need to take. That has included, for example, over the last 10 years my own company has followed 15,000 tonnes of biomass. Over the same period, we only secured 20,000 tonnes of growth, so largely remaining stagnant. They are decisions being taken year in and year out by farmers because we are recognising the best places for our fish to thrive. Where we move to and how we consolidate becomes part of that picture, backed and informed by science.

Q34 Lillian Jones: In 2018, the Scottish Environmental Protection Agency, or SEPA, found that almost one in five salmon farms in Scotland failed to meet the statutory environmental standards. What steps has the industry taken since then to reduce the impact of farms on local marine



ecosystems?

Anne Anderson: If I go back to 2018, the measure of environmental compliance is actually quite different from the measure of environmental impact and environmental monitoring. That question of the one in five relates to the sector's fails on reporting or record keeping, not actually to the impact of environmental harm.

Every farm is monitored. We assess the seabed and the state of the environment that we are looking to place a farm in, and then at the end of every cycle we are assessing exactly the impact of that farm. The most impacted area within any farm is that immediate area around our farming pens, and in the last five years we are circa 98% on environmental compliance with our monitoring of those pens. As I said, it is important to understand what that standard relates to and what that point related to.

Ben Hadfield: I think we can just say to you straight that it is a misleading statement. The environmental compliance of this sector is extremely high. The regulation is extremely tight, and it is very transparent. On data availability, we are the only sector that publishes mortality, disease status, biomass. We all put very complex ESG documents together at the end of the year. This is fully transparent.

People want to try to say that this is not a compliant sector because in a very onerous consent you can point to things that were not delivered on time, but for impacting seabed it is about 96%, 97% compliant, and that is after salmon farmers were allowed to produce a little bit more on the sites to manage through the Covid situation.

Q35 **Lillian Jones:** To what extent do producers share best practice when it comes to reducing farms' environmental impact?

Anne Anderson: Every farming business has environmental colleagues within it. Those individuals regularly meet and share opportunities. They share challenges and they have the discussion with them. One of the key things is around sharing technology and understanding. Of course, critical for farming is sharing the information that supports survival across all farms because we are sharing the same water spaces. What is impacting in one place is likely to impact in the other.

Q36 **Lillian Jones:** Just a final question: what role does Salmon Scotland have in ensuring individual producers contribute to the industry's wider sustainability goals?

James Park: We have a sustainability charter where I think there are 42 active ambitions that cover a range of topics covering environment, people and communities. That is an aggregation of each individual producer's ambitions for mitigating impact.

Q37 **Douglas McAllister:** Can I follow up on one of those answers, because I did not fully understand one of the answers? If SEPA is saying that one in five of Scotland's farms fail the statutory environmental standards, if I



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understood your answer correctly, you were saying that that does not relate to impact or harm. What do SEPA's standards protect that the one in five are failing?

Anne Anderson: The one in five in 2018 related to an environmental compliance assessment scheme that SEPA ran at that time that assesses every element of a licence. There are multiple licence conditions. We heard about the volume of standards that are contained within the RSPCA Assured scheme. Every licence will have in the order of about 60 conditions that are required to be met. There is an exceptionally high element of reporting. There are a few standards that relate directly to our environmental performance. What I was referring to was around the actual environmental impact, so backed by physical sampling of seabeds and environmental assessments of our water spaces, as you would more traditionally think of when you talk of an environmental standard—around the actual space and its impact.

Ben Hadfield: To summarise, impact on the seabed was improved, impact on the water quality was improved, and compliance in that area improved. Around 2016-17 there was an explosion in the complexity of the licences issued by SEPA and the industry lagged behind in some of the reporting and SEPA was critical of that. However, with compliance on damage to the environment, the situation improved. The industry simply had to employ a lot more people to manage the burden of the regulation.

When I joined Mowi 25 years ago there was one person working in the environmental department. That was me. Now we employ 14 smarter people than me to cope with where we have ended up with SEPA.

Q38 **Douglas McAllister:** If all these additional licence conditions imposed by SEPA do not address seabed and sea quality, what do they address and what have you failed on?

Ben Hadfield: There is an enormous reporting requirement to SEPA and we are not failing on them all, what SEPA is pointing out—

Douglas McAllister: One in five have failed, so what are they failing on?

Anne Anderson: In 2018, one in five failed because they failed to complete with submission of a reporting document within a certain time period, or they failed to provide a certain line on a 10 to 15-page document. There is a high volume of what you would term administrative and auditing reports at that point, as Ben has indicated. The licences became more complex. As an ex-environmental regulator, looking at those licences in 2018, I found them more complicated than some of the hazardous waste landfill sites I was dealing with at that time.

My reference to the seabed is around the actual environmental impact. It is really important to understand the actual environmental impact, and our compliance with the environmental quality standard that is set in the spaces that we farm is in those high 90s. In our case, my own company in the last five years had 98% compliance.



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It is also highly recoverable. Farming, like our terrestrial farmers, is all around that balance and ability to go back generation after generation. We have many farms that have been farming in the same place for more than 30 years. I think about the Brundtland definition of sustainable development, and it is the ability for those in future to continue doing what we are doing now. I am very confident that that is the case based on the environmental information that we see for our own facilities and that we discuss across the sector.

Chair: I am mindful of time, so I am going to quickly move on to Susan.

Q39 **Susan Murray:** Thank you very much, everybody, for coming today and for your answers.

Earlier on in the session we talked quite extensively about mortality figures and, of course, the consequence of mortality is that there are dead and dying fish that need to be disposed of. Earlier this year it was reported that a company had buried salmon near a local beach on North Uist, seemingly without the necessary permissions. In general, what reassurance can you give that the disposal of morts, as the technical term is, is not a problem more generally?

Ben Hadfield: With this specific situation, the facility in North Uist is called Whiteshore Cockles. It was a licensed burial site for fallen stock. You have the national fallen stock scheme in terrestrial animals, which is subsidised. In salmon farming it is not, and it is in even more remote areas. They were licensed to bury mortality in the Machair sands, which is not an ideal way to dispose of it but it is a sustainable way. You are sequestering the carbon of that mortality into the sand and there is no significant leachate. It does not look pretty, I totally accept that, but it was the right way to do it at the time and that was a licensed facility.

It is used by a number of companies, including Mowi. The owners of the site invested over £6 million of their own money into developing a circular economy to remove the oil from the fish and create biodiesel and then create a pellet that could be burned as a fuel or could be used as a fertiliser. It has taken them an extraordinary amount of time to license that facility and it has been very difficult for them. They have received licences now, and the plant, from what I was told, broke down. They took a decision to bury some of the mortality in the previous landfill that was licensed, but their licence ended in March. They buried some in May and some other times, which they should not have done. I will not condone that decision, but I do understand why they did it until the plant was back up and running to deal with the mortality that way.

Some activists that were paid by philanthropy filmed it in May and then sat on that film and released it two days before the Scottish parliamentary inquiry. That is the honest context that I can give you. Where we are now is the facility is up and running, it is licensed, it is producing biodiesel, and it is handling mortality in a much more circular and acceptable way.



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Q40 **Susan Murray:** Thank you for that. Perhaps I could ask James then: in general, how are companies able to ensure that disposal of dead fish does not impact on communities and the environment, when clearly there are instances where unanticipated actions need to be taken?

James Park: It is not my area of expertise per se but, as Ben alluded to, there should be a circular economy. No company wants to lose any fish, but when there is a mortality event, they need to be disposed of in a responsible or circular manner so that rather than it just being a mortality, a by-product is created from that unfortunate event.

Q41 **Susan Murray:** Would the industry feel that there should be a mechanism put in place for these—perhaps you would call them exceptional incidents?

Ben Hadfield: The climatic conditions have increased the level of mortality. It is not caused by salmon farmers, but we are the victims of that. We have had to scale up both how we deal with that with treatment for the fish—

Susan Murray: Sorry to interrupt, but it is more about when something happens. This was the consequence of a plant not being available when it was anticipated it would be.

Anne Anderson: Across the sector, the process of managing mortality has obviously changed and evolved over years. You have gone from having small incinerators now into an ensilage situation, where you are able then to make maximum use of that highly valuable organic mortality. Increasingly now we are investing—there are a couple of businesses that support this within the Scottish landscape—both to the north and to the south of Scotland, to be able to then collect that product and then to utilise it in a number of different ways in the circular economy, not just for biodiesel, biofuels, but also increasingly, because of the manner and the investment into this technology, the potential for that product then to be a sea to soil fertiliser, because, of course, it is highly valuable.

At that point it might not be the value we were looking for as businesses— indeed, we are the ones who benefit the most from good fish welfare, reduced mortalities and high survival—but it is about ensuring responsible handling and management and movement. So that process is now rapidly in play across all the producers within Scotland and ideally marine-based to ensure that answer and that question around communities. We are a marine business. We have vessels. Can we transport the mortality in that way directly through that process? Those are the steps that we are on to improve activities in that area.

Q42 **Douglas McAllister:** Can I follow up on that point? The RSPCA advised in its written submission to this Committee that it maintains that mortality in salmon farms is too high at around 25% annually. Now, in fairness to the sector, the report also goes on to advise us that salmon



farming is one of the most transparent industries reporting its data on mortality. Its written submission advises us that many other countries that farm fish develop legislation to safeguard farmed fish welfare throughout the lifecycle and the UK is falling behind these other countries rapidly. Would the sector welcome additional legislation?

Ben Hadfield: No, I do not think we would welcome additional legislation on that. It is in the interest of salmon farmers to have the lowest possible mortality. Mortality has increased because of the difficult marine environment, which we have covered off. We were among the first salmon-producing nations to have full transparency on all the mortality data. I do not see how increased regulation would allow us to deal with this problem quicker. It is about investment. It is about the best farming strategy that you can have. What you can see from the data, which is available publicly, is that the industry has invested, innovated and improved the level of survival coming out of a difficult environmental period.

Douglas McAllister: You do not recognise that comment then, that the UK is falling behind?

Ben Hadfield: It was actually a bit painful to watch them explaining mortality, because it is relatively simple and this data is published. In September last year, the mortality of the fish held in the sea in the Scottish sector was 3.2%, and then in September this year it was 1.82%, so roughly half. In October last year, in a very difficult marine heatwave and dealing with that as a sector, it was 4.8% and now it is 2.5%. Again, roughly half. It is not in the interest of fish farmers to lose stock. It is how you lose money and go bankrupt in fish farming. Every element of profit is about trying to get the best possible environmental and quality conditions for your fish. It is a very sticky message that, if fish die because of environmental change, that must be because the industry is doing something wrong. It is a sticky message, but it is incorrect.

Chair: Harriet has had to leave and she did have some questions on mortality, but I think they have already been addressed. I am going to move on to Maureen now.

Q43 **Maureen Burke:** Thanks for coming this afternoon, I greatly appreciate it. Excuse the croaky throat. James, Salmon Scotland has said its members are “continuously pushing themselves to go beyond their statutory requirements on fish welfare”. What does that mean in practice?

James Park: The regulation that farmers have to adhere to is already very high across Scotland, with a number of different regulators, but from my perspective it comes back to the global reputation of Scottish salmon. In order to highlight to customers, retailers and investors the quality of the salmon, we need to be at the forefront of salmon production—not just in Scotland, but ahead of the competition, essentially, making sure that we are pushing ahead with innovation.



It goes full circle: if we are a successful sector, then there is more money that can be invested towards finding solutions to challenges. As has already been flagged, we had not experienced micro-jellyfish in the sector a couple of years ago. These are challenges that were unforeseen, but as soon as they come around the sector invests money in order to avoid that challenge happening again.

Q44 Maureen Burke: Thank you for that. That takes in the challenges for fish welfare. What impact is the rise in sea temperatures having on them and what you are doing to counteract that?

James Park: Ben may be more expert than me in terms of fish biology, but my understanding is that the challenge is not actually on the fish, it is more the marine environment. In warmer waters, the salmon can thrive.

Ben Hadfield: We farm up in the Faroes and it is just generally a much kinder environment. There is a lot less algae and fewer jellyfish species that would damage the gills of the fish. Scotland used to be more like that 20 years ago, but as things have warmed, you have species in abundance in Scotland that now cause a lot of challenges during the summer. Fish farmers have to innovate to protect the fish against that, so we use semi-closed containments like lice skirts around the pens to deflect the algae and the jellyfish. We use aeration, we use bubble curtains, a ring of defence around the entire farm. When it is really persistent, we can move the fish to other locations.

In the last couple of years, my company moved 1.8 million fish in about 10 days away from the jellyfish, because that is all you can do. You are a farmer. You are here to protect your stock and do whatever it takes, legally and within the law, of course. That is what we do. We move the fish. Anne, do you want to close that?

Anne Anderson: We have done the same. One of the other things is that you cannot move the farm when the jellyfish are there, so then you plan to move the farm. If it is happening regularly enough, it is about finding higher energy water with a higher current speed running through the farm; if something does come into a farm, you want it to get out as quickly as possible.

Part of that evolution and transformation for the sector as we progress forward is moving away from the more traditional sheltered locations, because once something is there it is very difficult for it to move on. You also do not have the depth for the fish then to descend away from that. There is a current situation with water flow and tidal movement that is advantageous, and a depth scenario where the fish can stay at depths. That is supplementary.

That is about the locational benefit of a place that then helps with innovation and investment and all the practical measures that we can do, but it loops back around to that very point. You cannot move a farm quickly. I know I want to move a lot of our farms into different locations



and to consolidate and we have a plan to be able to do that. We are very much at a point where, as a sector, if you think about the economic contributions we make, the social contributions that we make, and that high-quality, low-carbon protein—it is the lowest of the animal protein farmed products that are being produced—to be able to ensure that that has the longevity, you need that ability to be able to move fast.

I am almost at the point in my headspace where I think, actually, salmon pen infrastructure is a real critical infrastructure as much as the roads and the rail networks. What would it look like were we to think of it in that way? Would we have faster movement?

Q45 Maureen Burke: Thank you for that. I am not sure if the next question goes back into some of the comments earlier, but I will ask the question anyway. Ben and Anne, Mowi recently confirmed that over one million fish had died within one production cycle at Loch Seaforth, while Scottish Sea Farms has acknowledged unacceptable lapses in fish welfare at a site at Isle of Mull. What are your organisations doing to learn lessons from these cases?

Ben Hadfield: I took a series of interviews with *The Guardian*, and they were at pains to present that over a million fish died in one site. It is actually one of Scotland's largest fjordic loch systems, and there are three sites in there. The mortality was just over 50% of the fish that were put in, and it was due to the string jellyfish that the RSPCA gentleman Sean referred to before, which is called *Apolemia uvaria*. It is a jellyfish that normally is found at great depths of 200 metres-plus in the ocean. The last couple years it has come to the surface, and it has been pushed into the lochs and it has caused the gills to be damaged to the point where it has killed the fish.

We suffered with that, and we did everything we possibly could to reduce the density, to stop feeding, to try to bathe the fishes' gills in fresh water. We did our absolute best for the fish, as you would, and we still experienced that very high level of mortality. On what we are going to do in the future, we are using AI technology to identify jellyfish species. We are using remote sensing to look over wider areas to see them coming in. We are using the bubble curtains and the aeration that I referred to before, and as Anne said we are seeking to relocate some sites into less vulnerable areas.

What we should not do is stop producing a very sustainable, high-value protein in Scotland. We need to continue production, and we need to find ways to improve the level of survival. We think the level of survival is not high enough in the sector. Every working day, all our teams are focused on that mission to improve welfare and fish survival.

James Park: I think you have the opportunity to see the sector in person next week, because quite often the imagery of the sector is the net pens in nice, still, calm conditions, whereas the amount of technology in the background is quite amazing each year.



Ben Hadfield: When you look into the pens, you mainly see water. Salmon farming in Scotland is no more than 1.5% fish and the rest is water. Actually, in that difficult period over the summer, we may go down to stocking levels that are about 1% fish or less, so it is to give the fish space and chance to move around and shoal naturally. Anne, you were also asked for your view.

Anne Anderson: You referred to the incident on one of our farms in the Sound of Mull. I am incredibly angry about that incident. I spend a lot of my working life going farm to farm and the practices that we saw there were not the best practice that we should be doing day in, day out.

I know that that footage does not reflect what happens on those farms that I see, but the fact that I know that is not enough. The fact that it happened once is not acceptable. The steps that we have taken across our company are to refresh, renew, reinforce and to confirm fully the RSPCA code in respect to the handling of moribund fish as was shown, and to ensure that all farmers have the equipment to hand at all times so that they can quickly euthanise sick animals.

It is much more than that. It is not something that is reflective of the farms that I see and have visited in my years of farming, and it is not something that I am expecting that in any way, shape or form we should be anywhere near. Actions have been taken within the company and we will continue to monitor and to ensure that that does not happen.

Q46 **Douglas McAllister:** My question is to James. What opportunities does the UK Government's Brand Scotland programme present for Scotland's salmon producers?

James Park: Yes, I think the opportunity is significant. It all goes hand in hand with the upstream challenges with regulatory process. There is a lot of Scottish Government engagement that is required in order to make sure there is a suitable supply, and we export annually to over 50 different markets. That is definitely a pull factor from those international markets wanting Scottish salmon, seeing it as one of the most premium salmon available, and that is something we want to grow.

We are in the lucky position that we have greater global demand than supply, but opening up new markets is still something that all our companies would be keen to do to make sure that we get to consumers around the globe. Making sure that the supply chain is as fast and efficient as possible is key to that, to make sure that customers get fish in the most pristine condition possible.

We are working with the Department for Business and Trade quite extensively on trade negotiations and opportunities there. Given the balance of supply and demand, if trade barriers can come down, then that is very welcome. We are very supportive of the warmer relationship with the European Union and looking to support any work that we can on a future SPS agreement to reduce the amount of sampling that goes on



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on entering Europe, as well as the development of electronic export health certificates that would speed up a process that needs to be just-in-time for getting product to consumers. The opportunity is there. We need to have the base of a good level of supply in order to meet those demands globally.

Anne Anderson: I would like to add to that. If you look in the round, in the last half century Scottish salmon is an extraordinary Scottish success story, but it is also a UK one. Where Scottish salmon goes, the UK goes. If you think about the biggest exports—energy, whisky, salmon—in the US, if you think about Scotland, for example, they will probably say tartan to start with, but whisky, salmon and golf probably all feature there. For the future, there is a vast amount of sea space and we are moving outwards into it. Therefore, there is a vast opportunity within the UK coastal waters, never mind obviously our own Scottish coastal waters, for growth, enabling us to make many more million plates of healthy food. It is positive.

Q47 **Chair:** We will just move on to the final questions from myself. We have already spoken a bit about or heard from yourselves around the work that you are doing with Governments. Can I ask what industry is doing to take advantage of the opportunities in emerging and high-growth export markets, for example, in Asia?

Ben Hadfield: First of all, we need to produce more in a sustainable way and make all the improvements that we are challenged to do. We need to be fairly knowledgeable about some of the attacks on the sector and where they come from. Quite a bit of this comes from the vegan sector, and while I fully respect the way that they want to live their life and the foods they want to eat, most people want to eat healthy proteins, and salmon is a superfood. When you go to Asia, and there are 4.7 billion people in Asia now, they want to eat really healthy proteins, and salmon fits all those bills on the nutritional profile and the health and the desirability. We obviously want to tap into that.

To come to the point, the US market is particularly attractive, and we want to do more there because the cachet of Scottish salmon is really high and the price that you can achieve for the quality is very good. The Asian market, which I referenced before, has amazing potential, particularly China, Taiwan and Japan. We also have a very strong UK domestic market. About 40% of what we produce stays in the UK, and that is a feature of all the UK retailers.

Anne Anderson: I do not think I can add much more to that.

Q48 **Chair:** Can I just ask what demonstrable measures or steps you are taking to take advantage of these opportunities that you have identified?

Ben Hadfield: We have to produce more in the best possible way, and we are committed to that. Often there is this perception that we extract profit from Scotland, but actually the investment that comes in from



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foreign ownership or structural financial ownership has been really high in Scotland. The companies believe in Scotland as a production area but also as an area where you can get higher value for what is a higher quality product and has that provenance.

We are maintaining that journey and then at the same time focusing on opening up new markets and working with Government to try to ease the way. Brexit was a nightmare for us. We had no option but to get through it, but it has made exporting to the EU much more complicated. If we can roll back from that and ease the situation, then the potential in France, Germany and Italy is enormous for Scottish salmon because it trades much higher than other origins on the provenance, the history and the quality.

Q49 **Chair:** Going back to the first point you made about the produce having to increase, is it that the demand is there, the opportunities are there, but you need to increase production?

James Park: About a decade ago, we were about 10% of global production. Now we are 5.5% of global production. In the last 10 years or so, the Norwegian sector has added on an additional whole Scotland of salmon production to their volumes. There has also been strong growth in Iceland and in the Faroes as well, so we need to compete internationally. The challenge we have with volumes is that relationships and customers need to have their demands met, so if you are looking to open up a new market, you need to take that product away from someone else, and relationships are an important part of exporting.

I was in France last week at the UK embassy there, and I was told that they solely serve Scottish salmon with the Label Rouge mark, which is a great way to promote and serve Scottish salmon. That was a welcome ambition.

Ben Hadfield: The simplest way to increase production is to reduce mortality, which is the number one focus, and grow the fish a kilo bigger. That would make a big improvement, and that is what we are focused on. If the Scottish Government and the UK Government really want to help and support, then they should evaluate the headwinds that the industry has been subject to over the last four or five years and try to ease those up, while still maintaining the highest standards of production and environmental management, which is what we have in Scotland. It is much higher than the rest of the world.

There is often too much talk about, "Are we doing it badly? What can we learn from others?" Well, historically, we have done fantastically. The product quality is revered. We just need to back ourselves and set about producing more, keeping more of that wealth creation within Scotland, and we do a fantastic job of that with communities. Both Scottish and UK Governments need to seriously think, "How can we help this industry to succeed by taking down some of the headwinds?" because it has been too much over the last decade now.



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Q50 **Chair:** That takes me nicely into my final question, and I will ask you to be brief. I am really mindful of time this morning. Can you be explicit in what you mean by the headwinds? Because my question was how Government can help Scottish producers compete with international suppliers such as Norway that you have already mentioned a few times.

Ben Hadfield: Norway has a scale that you do not find in Scotland, both in its environment and in its industry. The way that we can compete is having provenance and higher quality and higher price achievement. We have made it on that.

The headwinds that have come in are the increasing regulation, partly in response to a fairly niche group of activism. I do not say that their views are not important and we should not listen to them. We do, but we should not react by showing the regulatory teeth every time. That is what regulators have been doing and it is reducing the competitiveness of Scotland in other areas. I work in salmon farming around the world, and I see that Scotland has the highest standards, the most robust regulation. We should be more proud of what we do and just tone down the headwinds.

Anne Anderson: I would say that the biggest risk to Scottish salmon's part of Brand Scotland is slow growth. We as an industry need to work better with our regulators and with Government. There are aspects on both sides for improving that relationship, and having been on both sides of the table it is essential that we understand and really do delve in and address the points that Ben has made. It is not really that complicated to overcome; it is just about investing the time to understand.

The problem we have is brought to us within the seas. That impacts on everything we do. It means that we can be less efficient as farmers, as we are then managing to deal with the issues. Of course, that then impacts on that bottom line in terms of the tonnage that is then produced. We need to move in regulatory terms and move our minds around what the sector actually is. That is one of the key things here, the value that it can bring, but we need to do it right now. That movement, physical movement of farm and mental movement of minds to enable it, really does need to occur with both industry regulators and parliamentarians. That is a conversation we all have a part to play to be able to deliver it.

James Park: Finally, we are a hugely—and quite rightly—robustly regulated sector and we support that, but I think there can be a huge amount of streamlining and efficiencies made, and I think that has been appreciated by regulators and the Government in Scotland. We need to be careful not to just become a sector that is exporting higher production costs. We should be exporting on that price point because it is a justifiable premium rather than just because it is a necessity to export based on higher costs.

Chair: James, Ben and Anne, thank you very much for your time this



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morning and for the contributions you have made. You have brought a lot of insight into the industry. Thank you once again, and I will now bring this public session to a close.