



OFFICIAL REPORT
AITHISG OIFIGEIL

DRAFT

Rural Affairs and Islands Committee

Wednesday 2 October 2024

Session 6



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Pàrlamaid na h-Alba

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RURAL AFFAIRS AND ISLANDS COMMITTEE

24th Meeting 2024, Session 6

CONVENER

*Finlay Carson (Galloway and West Dumfries) (Con)

DEPUTY CONVENER

Beatrice Wishart (Shetland Islands) (LD)

COMMITTEE MEMBERS

*Colin Beattie (Midlothian North and Musselburgh) (SNP)

*Ariane Burgess (Highlands and Islands) (Green)

*Rhoda Grant (Highlands and Islands) (Lab)

*Rachael Hamilton (Etrick, Roxburgh and Berwickshire) (Con)

*Emma Harper (South Scotland) (SNP)

*Emma Roddick (Highlands and Islands) (SNP)

Elena Whitham (Carrick, Cumnock and Doon Valley) (SNP)

*attended

THE FOLLOWING ALSO PARTICIPATED:

Dr Ralph Bickerdike (Scottish Sea Farms)

David Brown (Cooke Aquaculture Scotland)

Christine Grahame (Midlothian South, Tweeddale and Lauderdale) (SNP) (Committee Substitute)

Ben Hadfield (Mowi Scotland)

Liam McArthur (Orkney Islands) (LD) (Committee Substitute)

Kimberley McKinnell (Bakkafrost Scotland)

Edward Mountain (Highlands and Islands) (Con)

Constance Pattillo (Wester Ross Fisheries)

Tavish Scott (Salmon Scotland)

CLERK TO THE COMMITTEE

Emma Johnston

LOCATION

The Mary Fairfax Somerville Room (CR2)

Scottish Parliament

Rural Affairs and Islands Committee

Wednesday 2 October 2024

[The Convener opened the meeting at 09:11]

Salmon Farming in Scotland

The Convener (Finlay Carson): Good morning, and welcome to the 24th meeting in 2024 of the Rural Affairs and Islands Committee. Before we begin, I ask everyone to ensure that all electronic devices are switched to silent.

We have apologies from Elena Whitham and Beatrice Wishart. I welcome Christine Grahame and Liam McArthur as substitutes.

Our first item of business is an evidence session with representatives of the salmon farming industry as part of our follow-up inquiry into salmon farming in Scotland. I welcome to the meeting Dr Ralph Bickerdike, head of fish health at Scottish Sea Farms; David Brown, Shetland seawater manager at Cooke Aquaculture Scotland; Ben Hadfield, chief operating officer of farming for Scotland, Ireland, the Faroes and Atlantic Canada from Mowi Scotland; Kimberley McKinnell, head of health at Bakkafrost Scotland; Constance Pattillo, head of farming operations at Wester Ross Fisheries; and Tavish Scott, chief executive of Salmon Scotland.

I also welcome Edward Mountain, who will take part in the discussion.

I ask each of the witnesses to briefly introduce themselves. Please keep your introduction to your role. Everyone will have plenty of opportunity to add further as members start to ask questions. I will start with David Brown and move anticlockwise.

David Brown (Cooke Aquaculture Scotland): Thank you for having me along. I am the Shetland seawater manager for Cooke Scotland. I look after all the production that we do in the Shetland Islands.

Constance Pattillo (Wester Ross Fisheries): I work at Wester Ross Fisheries in Ullapool. Prior to that, I worked in the Western Isles as an area manager.

Kimberley McKinnell (Bakkafrost Scotland): Good morning, and thanks for having us. I am the head of health for Bakkafrost Scotland. I cover seawater and freshwater farming across our estate.

Tavish Scott (Salmon Scotland): Good morning, colleagues. I am the chief executive of Salmon Scotland. Thank you for your words about Beatrice Wishart, convener. A lot of us are thinking about her at this time.

Ben Hadfield (Mowi Scotland): Good morning. Thank you for the invite. I work for Mowi and am responsible for Scotland, Ireland, the Faroes and Atlantic Canada.

Dr Ralph Bickerdike (Scottish Sea Farms): Good morning. I am head of fish health and welfare for Scottish Sea Farms, with oversight of strategic and operational matters regarding fish health and welfare, from egg to harvest. I have worked for Scottish Sea Farms for the past eight years and have worked in the industry for 23 years in total.

The Convener: I am aware that I did not ask Edward Mountain for his declaration of interest.

Edward Mountain (Highlands and Islands) (Con): I remind the committee that my interest in salmon fishing on the River Spey is declared in my entry in the register of members' interests. The fishery employs three people and has been in the family ownership for more than 73 years. I do not believe that it is directly affected by fish farms, because it is on the east coast of Scotland, not the west coast, where most fish farms are located.

09:15

The Convener: Do you wish to declare any interests, Mr McArthur?

Liam McArthur (Orkney Islands) (LD): I do not believe that I have any interest relevant to today's proceedings.

The Convener: Okay.

We will kick off questions. We aim to finish at approximately 11 o'clock.

Over the past week, there have been accusations in the media that, prior to the committee's visit, the fish farm that we visited tried to hide the truth and paint an inaccurate picture of the salmon farming industry. One of the main issues was the quantity of dead fish that were allegedly removed prior to the visit. What quantity of dead fish was removed the morning prior to the visit and what weight was removed from the pen at Dunstaffnage that was shown in video footage?

Tavish Scott: I am happy to take that question directly. It would also be appropriate to hear from Ralph Bickerdike, given his responsibilities at Scottish Sea Farms. We appreciate the opportunity to respond to the BBC's reporting on last week's events, and Ralph will want to share his perspective on that.

The committee and our sector have been subjected to a deliberate, orchestrated and co-ordinated campaign by extreme anti-salmon farming activists, aided and abetted by some in the media. It is an obvious and deliberate attempt to derail the committee's focus on what has changed in Scotland's salmon farming sector since 2018. I refer the committee to the comments on the BBC website yesterday, which again has extensive quotes from an anti-salmon farming activist. I also refer you to the activists' objectives. No member of the committee can be in any doubt as to the motives of those extreme activists.

We deplore what has happened and are very sorry that the committee members have been used in that way. Our people—our men and women, who work in our companies and our extensive supply-chain businesses from Unst in the north all the way down to your home in the south of Scotland, convener—should not have to put up with such behaviour. It is not only us, but Government ministers, civil servants and our regulators who are regularly assailed by abuse and intimidatory tactics from extreme activists. Those people would not just shut down Scotland's salmon farming sector but shut down farming. Read their website. Read their tweets.

We ask the committee to call out that behaviour. If Parliament wants a sector that employs 12,000 people in areas where well-paid work is not so easily found, in which our average salary is £36,000 a year and that produces a great fish that is sought after in 50 countries around the world, now would be a very helpful time to do that.

The fish health inspectorate—the Government's own regulator—wrote to your committee on Friday. It said two things that are important in the context of the question that you asked. First, it said:

"The FHI do not have concerns with the routine mortality removal procedure being undertaken in the video footage."

That is not me saying it; it is the fish health inspectorate saying it. In addition, Charles Allan of the inspectorate gave you evidence in June on mortality more generally. I know that the committee will have rested on that.

Secondly, the letter said:

"The FHI would consider that this procedure would be consistent with the mortality removal procedures on Scottish aquaculture farm sites, although procedures may differ between sites",

which is self-evidently the case.

Ralph, is this an appropriate moment to let you respond to the convener's points?

Dr Bickerdike: I will clarify the situation. On Monday 23 September, media organisations published video footage of daily husbandry procedures and activities taking place at our farm

at Dunstaffnage, which occurred from Saturday 21 September. That included the routine procedure of removing mortalities, which we do every day, when possible, for each of the net enclosures on that farm. It is typically done in the morning as best practice for biosecurity and as a predator control measure to protect from seals.

There was no attempt whatever to cover up. There was no special treatment for the visit. We do that as a routine every day. Any such claim by the anti-fish farming campaigners was incorrect, misleading and made for sensationalist reporting by media organisations.

The number of dead fish that are found in each pen will vary from day to day and between pens, based on a variety of factors such as differences in health status, predation pressures, and changes in tidal currents, which can prevent dead fish from moving to the collecting basket at the bottom of the net.

From pen 1, which was in the video, 250 fish were recovered that day, whereas fewer fish were removed from the other pens. The total mortality rate that day was 0.1 per cent of the farm population of 448,509 fish. The total mortality rate that week—which was last week—was 0.29 per cent, which is well below the 1 per cent threshold for notifying the FHI of mortality events. Therefore, categorically, and contrary to the misleading and sensationalist information that some media organisations published, there was no mass mortality event.

The fish in pen 1 had been treated with fresh water on a wellboat three days previously to the weekend. Unfortunately, any handling of farm animals increases the risk of mortality. Like any farmer, we do everything that we can to minimise that but, regrettably, that is the reality of farming, which is why we are so concerned about the sea lice risk framework proposals by the Scottish Environment Protection Agency, whereby we will be obliged to intervene or treat our fish at low lice burdens not for the welfare needs of our fish but because of a potential risk to wild salmon.

Clearly, a negative impact on the welfare of farm fish can be expected to result from such an increased requirement for intervention—including an increase in the risk of the transfer of disease, and increased mortality rates. That will cause reputational damage to the sector and to Scotland plc.

Overall, we are very disappointed that the anti-fish farming campaign group deliberately tried to influence the important fact-finding work of the committee. We hope that the committee will see that for what it was: an attempt to create misinformation and sensationalise daily husbandry activities by our hard-working farmers.

The Convener: I will tease out one or two things for clarity. You suggested that 250 fish were removed from one pen but that that did not meet the voluntary mortality reporting threshold.

Dr Bickerdike: That is correct.

The Convener: On average, would the figure of 250 for that site be exceptionally high or unusually low?

Dr Bickerdike: It would be typical following a handling event, as we have discussed. It was slightly higher than normal for that individual pen, but it was not exceptional.

The Convener: You said that removing dead fish is part of everyday management. Would the removal of dead fish in that manner be carried out before an inspection from the fish health inspectorate, or would the fish health inspectorate be there to inspect the removal, to confirm farm mortality rates?

Dr Bickerdike: Most fish health inspections occur at the start of the day—from 8 o'clock, starting from the shore base. Mortality removal is not typically carried out before that. If the inspection occurs in the afternoon, the practice would have taken place, as is routine.

The Convener: In your experience, how often has the fish health inspectorate been on site when dead fish have been removed from a pen?

Dr Bickerdike: Personally, I am not able to answer that; I would have to ask my colleagues who have been on farm when the FHI has been there. Alternatively, we could ask the FHI to respond on that matter.

Ben Hadfield: There are frequent visits from the FHI, whose inspectors come on to the sites at their will. In the course of the year, therefore, they will witness many routine mortality removals.

To add to what Ralph Bickerdike said, the Scottish salmon sector publishes all mortality, monthly, through its own website, as well as reporting to the FHI mortality that exceeds the recording thresholds.

Tavish Scott: On Ben Hadfield's last point, no other salmon-farming nation in the world publishes on that basis. I hope that the committee finds that reassuring. Neither do other agricultural sectors publish their mortality rates, as we all know from other walks of life. We are very transparent on the issue, as we have been for a very long time.

The Convener: Is it a regular occurrence for the fish health inspectorate to arrive prior to dead fish being removed? Is that something that you experience? We are interested in how random or unannounced the fish health inspectorate's visits are. What is a normal routine in a normal month or year? How often would the fish health inspectorate

carry out an unannounced visit that might take in the time of day when dead fish are removed from a pen?

Ben Hadfield: As I said, it is fairly routine. We expect that the inspectorate will visit sites two to three times a year, often at short notice. There is not no notice, because the inspectors use our equipment, such as boats and larger vessels, to get out to the sites.

In addition, where there is elevated mortality for whatever reason—whether it is disease or treatment losses—the inspectorate follows up on that. Inspectors often try to get to the sites when the mortalities are being removed, because they want to inspect the fish and take samples. There is quite a degree of co-working on that, because fish farmers are always interested to find out the disease status or the health status of the fish, so samples will often be taken in duplicate and sometimes together.

Dr Bickerdike: The handling of mortalities, which are animal by-products, is covered under specific legislation. All the paperwork that is associated with it, from the recovery to the quantities, is fully recorded, fully audited and inspected by the FHI and by other organisations, including the Animal and Plant Health Agency—APHA. That should be borne in mind.

The Convener: Thank you.

Christine Grahame (Midlothian South, Tweeddale and Lauderdale) (SNP): I am just trying to understand this—I really do want to understand. On Monday, 23 September, 250 fish were removed from pen 1. What percentage was that of pen 1 on that day?

Dr Bickerdike: From memory, it was 0.4 per cent.

Christine Grahame: When you are given notice of a visit—I understand that you are given notice of most inspection visits—how much notice are you given?

Dr Bickerdike: Typically, it depends on the location. Also, if it is a routine visit and not a diagnostic visit, the notice could be more than a week—maybe 10 days. If the location is in the northern isles, for example, time is required for the FHI to arrange travel. If it is a diagnostic visit, we could be given less than 24 hours' notice.

Christine Grahame: Could you explain the difference between routine and diagnostic visits, please?

Dr Bickerdike: That is probably more of a question for the FHI. It carries out routine visits and inspections to cover certain legislative requirements for a risk-based assessment of fish health status on each of the farms, as it also does

for oysters, mussels and other aquaculture species. Some farms have a routine visit every year, while other farms have a visit every year and a half or two years, based on the situation. Those are routine visits. They are for auditing or inspecting against existing legislation.

A diagnostic visit is in response to increased mortality on a farm. The FHI contacts the business to arrange to come out to the farm. As I said, that can happen with as little as less than 24 hours' notice. I have been contacted in the afternoon and had the inspectors on site at 8 am the next day, so it was completely unannounced.

Christine Grahame: Thank you for that clarity.

Tavish Scott: Christine Grahame asks a fair question, but I think that Ralph Bickerdike hinted that that is one of many audits—you might be coming on to this in your questions—that our sea farms see all the time. There are 1,000 audits a year on 210 farms, so we are not lacking audit in that sense. Perhaps that context helps Christine Grahame.

The Convener: I call Emma Roddick.

Emma Roddick (Highlands and Islands) (SNP): With regard to pen 1, what was the survival rate before and after the removal that was covered in the media?

Dr Bickerdike: I do not have that information to hand, so I would have to come back to the committee with that detail. I can say that the site is currently standing at 97 per cent survival—97 per cent in total.

Emma Roddick: Was it a concern before that day?

Dr Bickerdike: No, it was not.

Emma Roddick: It is not a concern now.

Dr Bickerdike: No. The level of mortality that we saw on that day was similar to what we saw from the other pens that we treated with fresh water prior to that. That is why I go back to our concern about the potential for being pushed into a requirement to treat when that is not in the welfare interests of the fish.

Emma Roddick: So far today, we have heard that the removal that was covered in the media and in the video was "routine", "typical" and "not exceptional". If that number of fish being removed in the morning is so unexceptional that it is not worth mentioning after lunch time, is this an industry that can be described as sustainable and that puts priority on the welfare of the animals?

Tavish Scott: Let me start with that, Ms Roddick. At any one time there are 70 million fish in Scotland's sea pens. Ralph Bickerdike has mentioned there being 210 fish farms. He gave the

exact percentage—he answered Christine Grahame's question about the absolute percentage. The situation needs to be seen in the context of the overall numbers.

09:30

Our objective is to reduce mortalities at every possible opportunity. I know that, last Monday, you and other members asked questions of Ralph Bickerdike's colleagues at the sea farm about that, so you heard their answers at that time.

On your broader point, we absolutely strive to reduce mortality in everything that we do. All our fish farmers could speak to that, as could David Brown, Connie Pattillo and everyone else on the panel.

David Brown: It is important to emphasise the care that we have for the animals that we look after. If I might speak personally, I have been a crofter my whole life, looking after animals including sheep, pigs and hens. The same care extends to our fish. All our staff really care for the animals that we look after. We do not want dead fish on our sites at all; we do not seek to have mortalities. We want to give the best care to our fish at all times, and that goes for absolutely everybody. Nobody wants to go in in the morning to take dead fish out of a cage. That is not good for the company or for the staff. It is simply not a very nice job, and we would much prefer not to do it. There needs to be a realisation that a huge number of people out there really care about the fish that are swimming around on fish farms in Scotland.

Ben Hadfield: It is wrong to describe the mortality as unremarkable. It occurred after a treatment for amoebic gill disease, which came into Scotland in 2011 and 2012 and is ubiquitous in our environment. It was in Ireland before then and, as temperatures warmed, it came into Scotland. Affected fish have to be taken into a wellboat and treated with fresh water. In simple terms, that bursts the amoebic cell that lives on their gills. It is a treatment for the fish that makes them healthier. However, a handling event will increase mortality to the levels that you have seen.

In the context of salmon mortality, we must remember that, biologically, the fish are strategists. Female salmon produce 10,000 to 15,000 eggs that are fertilised externally, so they are open to the environment. They therefore have a mortality level that is not comparable with levels for poultry, chickens or beef. I think that Edward Mountain, as a beef farmer, struggles with that a little bit. I will spend a bit more time on that point, if I may. To compare those 15,000 eggs from an adult salmon with 36 piglets, 240 eggs or one calf is not correct. Also, other species in the marine

fish farming sector have much higher levels of mortality.

For us, getting mortality down to zero is a strong aspiration, and we do all that we can to achieve that. The range of mortality in farmed salmon is between 10 per cent and 25 per cent, depending on the farming environment.

Emma Roddick: I am glad to hear Tavish Scott mention the questions that were posed on site; I certainly asked quite a few questions about mortality. However, as I said, the removal that happened that morning was not mentioned. I am keen to understand how many dead fish would be a cause for concern. At what point is an investigation merited or are further checks made into how the salmon died?

Tavish Scott: Any number of dead fish is cause for concern, but we are describing context and numbers. We will not repeat all the numbers again, and I think that you have heard the answer in terms of the context.

Ben Hadfield and Ralph Bickerdike have also described to you that when an increased level of intervention is forced upon us by the introduction of regulations—interventions that are not justified in veterinary terms, for looking after the fish—that can lead to increased mortality. Rachael Hamilton put her finger right on that point at an earlier evidence session, back in June.

That is a challenge for us, and we have robust discussions on it with regulators all the time. There is always a trade-off, but the fundamental point is that we are trying to reduce mortality to zero, as Ben Hadfield has just said. That is our sector's absolute objective.

Emma Roddick: What is the trigger point for sending a fish off for further investigation?

Tavish Scott: I am sorry. What kind of investigation do you mean?

Emma Roddick: To find out how it died.

Dr Bickerdike: It is more the case that seeing an increase in the rate of mortality would instigate a follow-up diagnostic visit by health professionals. Obviously, if it gets beyond 1 per cent per week, which is the FHI threshold for weekly reporting, there is a clear defiance of the threshold. For us, the trigger is when mortality rises above 0.5 per cent within a week.

To respond to your earlier question, I say that I understand that during the visit—I was not there myself, unfortunately—the group had to be separated because of numbers on the boats. My colleagues have assured me that there were communications about the daily routines on mortality removal and moribund removal. I am sorry if that did not take place with you, but I

understand that we tried to communicate everything that we do to the committee.

The Convener: I can confirm that.

Emma Roddick: The fish health inspectorate's letter to the committee describes a mortality rate of 0.55 per cent from that week. Is that based on your 447,563 fish or the initial stock?

Dr Bickerdike: The week had not finished by the time the FHI wrote that letter, so I do not think that 0.55 per cent is from that week. I do not have the letter in front of me. I am sorry—we need to clarify that.

Tavish Scott: We can ask the fish health inspectorate.

Dr Bickerdike: I believe that the FHI sent the letter on 27 September, so that was before the week had finished. A reporting week is Monday to Sunday. As I said earlier, the mortality rate was 0.29 per cent for the week.

Emma Roddick: Is the 0.29 per cent based on initial stock or your stock that week?

Dr Bickerdike: It would be based on the stock of the week, as of the opening count on Monday, so it would include the mortality from the Monday.

The Convener: I want to clarify something important. You mentioned the freshwater treatment, delousing and treatment for gill disease. What exactly do those processes entail and what happened? What was the freshwater treatment prior to the visit for? Was it for delousing or was it a gill disease treatment? That is unclear.

Dr Bickerdike: I am sorry. For the pen concerned, it was freshwater treatment to treat the gills for AGD, but we also used a delousing technology that is now commonplace called the fish delousing system—FLS. In that treatment, after the fish have been treated with the fresh water for their gills in the wellboat, they pass through in-water jets of water to dislodge any lice that might be present on their skin before they return to the pen.

That is a significant welfare improvement, because it means doing only one handling event. Prior to that, we would potentially have had to do two: one to treat the gills with fresh water or otherwise and a separate one to do a delousing treatment or a veterinary medicine treatment. We are now able to achieve that outcome with one handling event, which is much more positive for welfare.

I do not know whether any of my colleagues wish to comment on freshwater treatments.

Kimberley McKinnell: I will give a broader view on welfare. We are talking about fairly reactive practices, but we have made fundamental

changes to our welfare practices over the past five years and have moved to more proactive and preventative means of looking after our fish. That has been a complete change in how we manage the health of our animals.

We use more and more novel technologies for monitoring the fish. We are talking here about identifying and investigating mortalities at the point of the fish dying but, in advance of any such issues occurring, we take blood biomarkers, for example. That is the same as when you go to the doctor and get a blood panel. We know whether there is liver damage or damage to the gills in advance of handling events, so we have a really good view of what the health of the fish is like well in advance of those events.

We do regular welfare assessments, in which we examine the physical condition of the fish. We analyse that data and make assessments of how handling events will be tolerated. We monitor the fish in all sorts of ways using cameras and daily observations by our staff to get a good view of the health and welfare of the fish long before we have to go in with a treatment wellboat.

As Ralph Bickerdike mentioned, the treatment wellboats are the state of the art. They are built with welfare as the highest priority. From the pipes and pumps that take the fish on board to the holding wells, everything is thought out for the best welfare of the fish. Those vessels are a game changer for health and welfare because they manage two different parasite issues at the same time, which is a long distance away from where we were five years ago.

Constance Pattillo: I want to touch on welfare at the farm level and what the farmers are doing. The farmers are out every day assessing the welfare of the fish. They are looking at them, whether through cameras or through a visual inspection, and every week we take small samples from the pens, assess them visually and look at lice counts, gill health and physical condition.

The farmers out in the rural communities are well trained and skilled, and they take welfare very seriously, as David Brown mentioned. They are passionate about what they do, they care about what they do and they want to see the salmon thriving. Welfare is at the forefront of their minds, and we have put in daily practices to check the health and welfare of the fish. Farmers are out in all kinds of weather. On a horrible wet day, when you might wonder whether we would go out, we go out and we check the fish because it is so important—it is fundamental to how we farm salmon.

Emma Harper (South Scotland) (SNP): On our visit, the committee saw what looked like healthy fish, externally, in that their gills looked okay and

there were no sea lice. However, what is the trigger number of moribund fish for you to investigate the cause of death?

Dr Bickerdike: It is really about an increase. We do not expect to see—we hope not to see—moribund fish. Moribund fish are poorly fish. We would remove them from the net pen environment to cull humanely. An increase, above a background level, in the rate of moribund fish on a farm would stimulate a health visit, as would be the case with lame sheep, for example. We spoke earlier about the fact that different producers might have different mortality thresholds, but the issue is really about whether we see an upward trajectory.

For example, with regard to amoebic gill disease, we take gill swabs from the salmon on our farms every week to send away for polymerase chain reaction analysis—as we all did during the Covid pandemic. We analyse that information to give us an early and more informed position on when to treat, so that we treat at the right time in order to prevent the negative welfare situations that would result from not catching disease in time.

We are using all the latest technologies, including artificial intelligence in our subsurface feed cameras, which we use to scan fish. I should say that we are in the early days of that trial and we are evaluating it. We scan for potential skin lesions, as an indicator of bacterial disease. That technology is also able to assess maturation rates.

We are putting all that information and all those welfare indicators into our internal database systems and analysing them so that we can follow them up, if we need to. In an ideal world, you would put your smolt into a farm and you would not need to touch them all season, other than to feed them, until harvest. However, unfortunately, that is not the reality of farming.

Emma Harper: Does AI technology help to reduce stress because you are not handling the salmon?

Dr Bickerdike: Yes, exactly: it does reduce stress. However, we are still required to take the fish out of the water on a weekly basis to do the assessments, particularly for sea lice but also to check gills. Regardless of the requirement to monitor sea lice, we would still need to visually inspect gills. AI cameras cannot assess gills because of the gill covers.

Tavish Scott: If it helps Emma Harper, David Brown and Connie Pattillo could speak to what fish farmers do, in practical terms, every week in looking at fish health. David, do you want to describe to the committee what that looks like?

David Brown: Yes, absolutely. It is important to say that there is constant monitoring of fish

through use of cameras and the skill of the stock people on our sites, as Ralph Bickerdike said. A lot has been said about reacting to dead fish. We do not want the fish to die in the first place; we would prefer to get them better before that happens, which is what we seek to do.

There is constant monitoring. We are physically sampling fish out of the cages: we take 10 fish per cage per week for Cooke on every site. That gives us a very good overview of the gills. We look for sea lice at the same time.

09:45

In addition, we monitor feeding behaviour in the fish. We are always looking at how the fish in the cages are reacting to whatever is going on in the environment. It is about early intervention. We are not necessarily looking for dead fish to prompt a health visit on our sites; we are looking for a change in anything on the sites that would trigger a visit. That early visit and the skill of the stock people who work for us are what really make the difference.

We may think that we are important, sitting here in the committee, but the really important people in the company are those who are working daily on the sites and who notice when there is a change in behaviour in the fish. They notice it early and they prevent fish from dying in the first place.

Dr Bickerdike: I emphasise that mortality is a very crude indicator of fish welfare, so we do not use that as the trigger. David Brown covered that very well. Many of our farms carry out welfare assessments on the fish that they are checking, which are sedated—anaesthetised—fish, not only for lice and for gill health, but for a range of welfare indicators involving morphological changes. That has occurred since a landmark peer-reviewed publication on operational welfare indicators, which was produced through a collaboration between Scotland, Norway and other parties. We are now doing that work as a matter of routine—for many of us, it will involve 10 fish per pen per farm every single week. We analyse that information to track where subtle changes start to occur that might indicate a negative welfare direction, and we would then intervene with a diagnostic follow-up. We would not wait for mortality.

The Convener: I call Ariane Burgess.

Ariane Burgess (Highlands and Islands) (Green): I have a couple of questions for clarification. Ralph Bickerdike, in response to the convener's question, you mentioned that pen 1 was treated. Is that correct?

Dr Bickerdike: Yes, that is correct—that was the previous week.

Ariane Burgess: So pen 1 was treated, but I think that there are seven pens there.

Dr Bickerdike: Correct.

Ariane Burgess: So why was only one pen—the one that we went to visit—treated?

Dr Bickerdike: The other pens had been treated earlier, so pen 1 was the last pen to be treated on that farm.

Ariane Burgess: Okay. Is there something that happens that triggers that treatment, such as lice, gill health, morphological changes or something like that? What was the process? Those seven pens were treated over what period of time?

Dr Bickerdike: The seven pens started to be treated on 2 September; the other pens were treated up to 9 September. We were also doing something called a split down, where half the fish are removed for scheduled treatment. It was a scheduled split down—we take half the fish on board a wellboat and treat them with fresh water for their gills. Seasonally, this is the time when amoebic gill disease becomes more prevalent, predominantly because of seawater temperature. This is typically when most farms will be treating most of their fish—if that is required—for amoebic gill disease.

At that time, we took advantage of doing that through one handling event to split down the fish. We took half the fish and put them into—in this case—a different farm, while 50 per cent remained on the original farm. That is a typical practice that one does in order to manage the fish better. At the same time, as I said, we carried out the freshwater treatments.

For that one pen, we attempted to treat it the weekend before the final treatment, but that had to be abandoned due to the weather, hence its actual treatment was three days prior to the visit—I think that it was on Friday 20 September.

Ariane Burgess: Thank you. I think that Ben Hadfield was talking about the daily routine—no, it was not Ben; it was David Brown.

It is good to see you again, David. You were talking about the daily routine, and you mentioned that 10 fish are taken. Is that from a whole farm or per cage?

David Brown: That was a weekly figure—sorry. It is per cage, per site.

Ariane Burgess: Per cage, per site.

David Brown: Yes.

Ariane Burgess: And in each cage, what is the stocking density? It is 10 fish out of how many?

David Brown: Ten fish—sorry?

Ariane Burgess: Out of how many fish in a cage?

David Brown: Basically, the number of fish in a cage will certainly range, but that gives a good overview based on the number of fish that we have in our cages.

Ariane Burgess: What kind of range of numbers of fish inside the cage are we looking at?

David Brown: That very much depends. There are different numbers of fish in cages due to the size of the cages and the depth of the nets. It can range quite a lot. I do not think that the number of fish in the cage is relevant; the stocking density is the same throughout. If the cage is bigger, we will stock it such that the density does not go above a certain level.

Ariane Burgess: I appreciate that you do not think that it is relevant, but I am curious to understand an average range of stocking density.

David Brown: Sorry. In the early part of a fish's life, the stocking density will be very low, but, as a site average, we would not go above 15.

Ariane Burgess: Fifteen—

David Brown: Fifteen kilogrammes per cubic metre. In a cubic metre, there would be 98.5 per cent water to 1.5 per cent fish. That would be at the peak.

Ariane Burgess: At that peak, the 15kg per cubic metre would be how many fish?

David Brown: As I said, it varies.

Ariane Burgess: At their largest size, say.

David Brown: At the largest pen size for us, it is probably up to about 40,000 fish. However, that would vary.

Ariane Burgess: I understand that. Thanks.

Ben Hadfield: I am not trying to dive in to the question, but you asked whether 10 fish is representative of the entire population and whether that is statistically valid. We have studied that with academia over many years and, statistically, it is valid.

If you were looking for the onset of sea lice or the onset of AGD, you might go much further. Ten is an absolute minimum, and that could happen a couple of times a week. However, if you were looking for very low levels of AGD, it would be commonplace to sample a couple of hundred fish, because you are looking for the very early signs. As Ralph Bickerdike said, you would use PCR testing, which picks up whether the DNA of the parasite is there.

Excluding Ireland, Scotland has perhaps the lowest stocking density worldwide. In general, the

average stocking density in salmon farms is about 7kg or 8kg per cube—less than 1 per cent fish, and 99 per cent water—and the fish are free to move around in the pen. In organic production, which is fairly niche in Scotland—it represents no more than 10 per cent of production—maximum stocking density is 10kg a cube. In standard production, it is 15kg per cube, but any one pen can be up to 17kg.

Ariane Burgess: By a “cube”, do you mean a cubic metre?

Ben Hadfield: Yes. Sorry.

Ariane Burgess: I am really grateful when you unpack acronyms and industry jargon.

Ben Hadfield: It is 1m³.

Please do not forget how big the pens are. In a 160m pen, you can fit seven A380 aircraft. Some pens are 200m. The scale of the pens is enormous.

Rachael Hamilton (Ettrick, Roxburgh and Berwickshire) (Con): I think that it was Ralph Bickerdike who talked about freshwater treatment. No, it was Ben Hadfield—you look relieved, Ralph. Between weeks 36 and 37, when that freshwater treatment occurred, is it normal for the mortality rate to increase? It doubled in that circumstance, although it was only from 0.24 to 0.55 per cent, I think. Overall, in the industry, what kind of percentage are we looking at?

Ben Hadfield: Neither Ralph's company nor mine would reschedule or stop a treatment because you were visiting. That was an important visit and you are important people, but if we did not treat the fish for AGD, it would progressively get worse: they would stop feeding, then the mortality rate would elevate significantly. The idea that it is caused by the number of fish in the pens or the scale of fish farming is completely incorrect. It is caused by the winter temperature in Scotland not going down to a level that will prevent AGD from becoming part of the environment. It happens in Tasmania, it happens in Ireland, and it has happened in Scotland since 2012. In simple terms, if we do not treat the fish at least every 3 to 4 weeks in the height of summer, mortality will increase. We have to treat them to maintain good welfare.

The industry has invested enormous amounts of capital investment and operating costs in wellboats. They cost about £25,000 a day; my company has three or four, and Ralph Bickerdike's company has two or three. These boats have come into the industry, and what they do is hold the fish in fresh water, which kills all the amoebas and weakens the sea lice, killing some of them. The well is then pressurised, so the fish can go out gently; the sea lice are removed and filtered out to

ensure that they do not go into the environment; and then the fish are put back.

Rachael Hamilton: Roughly how many salmon would you put through the wellboat? Given your commercial interests, you would want as many to survive as possible, but I presume that work has been done on the process. It just seems reactive to me rather than the preventative, proactive agenda that Kimberley McKinnell was talking about. What survival rate do you want from the process? What can you expect when you carry it out?

Ben Hadfield: Prior to AGD becoming an issue in Scotland—which, as I said, was in 2011 or 2012—the mortality rate was typically around 15 per cent over the cycle. The pressure of AGD has elevated that, and, over the cycle, mortality can be as high as 25 per cent—or higher, in individual cases; I am talking about the average.

There really is no other treatment for AGD than fresh water. You can use hydrogen peroxide, which is an oxidising agent—it is water with an extra oxygen molecule on the end of it—and what that does is make the shell of the amoeba crispy, so it breaks. However, we are talking about a lot of hydrogen peroxide, and a lot of people class it as a chemical—rightly, in the sense that everything is a chemical.

To be proactive, we have upscaled the fleet significantly to tackle both sea lice and amoebic gill disease, and you will see that, this year, mortality levels in Scottish salmon farming have dropped quite a lot over the summer period. That is because, for a start, we have had a colder summer, but also because the scale of the fleet doing the work has increased by a lot. It has taken many years to get that level of investment. My company, which as of today has roughly 40,700 tonnes in the sea, would expect at the height of summer to have to treat most of that biomass with fresh water every three to four weeks. It is an amazing logistical challenge.

Rachael Hamilton: Out of that total, what is the expected survival rate?

Ben Hadfield: In August, we had about 1.4 per cent mortality, and we consider that to be a better year than previous years. With the cooler summer and the move out of the El Niño conditions, which has caused warming in the Atlantic, the environment has been a bit kinder. Moreover, we have upscaled the equipment and the boats to do the work, and we are now seeing lower mortality from gill disease.

Rachael Hamilton: Okay. I just have one more small question for David Brown.

A lot of comparisons have been made today with livestock farming. Quite frankly, I understand

livestock farming more than I understand aquaculture, because I grew up on a farm. However, I was wondering about the fish health inspectorate's reference to a farm management statement. What is that?

David Brown: A farm management statement is basically how we seek to operate the farms, how we work with our neighbours and how we look after the health of the fish on the farm. Basically, it sets out our operating procedures on the farm.

Rachael Hamilton: What if there is a problem? I note from its letter that the fish health inspectorate requires the statement to

“contain provision for the review of the document and the arrangements for sensitivity testing in relation to treatments for parasite management.”

Is that how the inspectorate communicates? Does it leave it up to you or the fish farms to carry out the work that is required, and then the farm management statement is updated?

David Brown: I am sorry, but you read that bit out extremely fast and I did not quite pick it up.

Rachael Hamilton: I am sorry, David. In relation to the farm that the committee visited, the fish health inspectorate was asked:

“Did any of these inspections identify any cause for concern or further regulatory action?”

The letter says:

“The inspection ... identified that to ensure compliance ... the farm management statement required to contain provision for the review of the document and the arrangements for sensitivity testing in relation to treatments for parasite management.”

When there is an issue, what is the process and what happens regarding the farm management statement?

10:00

David Brown: If there was an issue at a site, that would be reported to FHI and there would be correspondence between us and it. We always seek to learn from anything that we do. If any improvement could be made as a result of an incident, that would be implemented by the company.

Rachael Hamilton: Why does the letter mention the farm management statement? Why does the inspectorate rely on that statement? The inspectorate says that it gives advice and deadlines and that you are asked to demonstrate compliance. Why does Ronald Smith of the FHI specifically mention the farm management statement? Can anyone answer that?

Dr Bickerdike: Perhaps I can. The contents of the farm management statement are outlined in the code of good practice. When FHI visits a site

to do an inspection—either routine or diagnostic—the inspectors will request the farm management statement, which outlines what the farm does in key areas, particularly in biosecurity. The inspectors will compare that with what they see on the farm, including the method of mortality removal, which should be as described in the farm management statement, which should be kept up-to-date and accurate at all times.

Farming practices change over time, but if there are any omissions or differences the inspectors will request that the farm management statement be reviewed and updated. That statement could lead into a farm management agreement between different operators within the same farm management area.

David Brown: The statements are reviewed annually.

Rachael Hamilton: By whom?

David Brown: By the company and by the inspectorate.

Rhoda Grant (Highlands and Islands) (Lab): I have been listening to the responses, which make it clear that freshwater treatments have been beneficial, but I am picking up a wee bit of reluctance. I understand that fish handling is an issue, but I am hearing concern that possible future regulation might make that a requirement, rather than something to be done when the need arises.

Tavish Scott: Ralph Bickerdike and Ben Hadfield have spoken about the sea lice risk framework and the implications of extra regulation. They might want to add to that.

Ben Hadfield: The development of freshwater treatment has meant that the ability to filter and remove lice has accelerated in the past few years. I do not like the term, but it is a game changer for fish health. The treatment is very gentle, but any handling of fish will always cause some mortality during crowding or when loading them on to the wellboat. We try to avoid that.

The new risk framework from SEPA is a high-level model that involves a high degree of overprediction. It assumes that all farms in Scotland are at peak biomass at the same time, which does not happen, and it does not make any allowance for the fact that farms use cleaner fish or other treatment strategies. There is also no modelling for the specific characteristics of sea lice larvae.

The model significantly overpredicts, but it says, in essence, that only 19 out of about 250 operational farms are potentially hazardous to wild fish, which is actually quite good. The situation was not presented in that way by the activist community or the newspapers, but the model,

which greatly overpredicts, found no concern about the vast majority of farms. Even with that conservative model, only 19 farms are listed as having the potential to impact wild fish, which means not that the farms are causing mortality but that they might be causing changes to the behaviour of wild fish—for example, changes to their swimming speed. It is fair that we focus on those farms and look at treatment methods and control. Most of them belong to my company, by the way, so we will have to deal with that proactively.

However, it has been argued multiple times in evidence that has been given to the committee that the model should become even more precautionary. It already massively overpredicts and exonerates most farms in relation to their potential impact on wild fish, but the activist community and fisheries interest groups are arguing for a model that is even more precautionary, rather than validating the current model and making it accurate. As Ralph Bickerdike said, that is counterproductive to fish health, because it means that we are grossly overpredicting the need to treat and handle fish, which is pushing up mortality. The same people are creating an absolutely false narrative that mortality is occurring in the industry because we overproduce or stock too much fish, but that is how a fish farmer goes bankrupt—you just do not do that. You do not do it with any livestock, and you certainly do not do it in salmon farming.

We are arguing for a more science-based approach that takes the precaution out of the model and makes it very accurate, so that it can be used as a tool. By the way, I am a fan of the model. It is a good thing, but I do not think that niche activist groups should be allowed to force regulators to make an inaccurate model and enforce treatments.

I am sorry about the length of that answer, convener, but it is important.

The Convener: Christine Grahame has a brief supplementary question that will be directed at Ralph Bickerdike.

Christine Grahame: I am just seeking clarity. Our briefing says:

“Data published by Salmon Scotland shows that Dunstaffnage recorded a mortality rate of 56.5%. In its report of the same story, Scottish Sea Farms told The Guardian that this high mortality was a result of a micro-jellyfish event and the mortality rate in the current production cycle was 3%.”

My question is quite simple. What was the production cycle when the mortality rate was at 56.5 per cent, and what is the production cycle now that it is at 3 per cent?

Dr Bickerdike: The 56 per cent referred to the previous cycle of fish. Typically, farmed Atlantic salmon will be in the sea from input to harvest for an 18-month period.

Christine Grahame: What 18 months was that?

Dr Bickerdike: It would have been the 2022 generation. I would have to come back to you with the exact dates for when they went to sea and when they were harvested. It was not the same fish population that the committee saw last week.

Christine Grahame: I am just trying to get clarity. You are going to write to us about the 18-month period. The mortality rate in that period was 56.5 per cent, and it was caused by an invasion of jellyfish or whatever. Is 3 per cent the current rate?

Dr Bickerdike: That is correct.

Christine Grahame: What period is that for?

Dr Bickerdike: Those fish went to sea in quarter 1 of this year. I will have to come back to you with the exact date when the smolt went to the farm—

Christine Grahame: I just want to know because I felt that there was no context.

The Convener: You can continue, Dr Bickerdike.

Dr Bickerdike: I just want to expand on my response. The detractors tried to use the unfortunately lower survival rate in the previous cycle to put out a more sensationalist story. It is important that we acknowledge the challenges that the sector faced in 2022 and 2023 because of microjellyfish. We had two or three years of la niña caused by climate change, and it turned into el niño last year. Survival rates were higher in the sector—our company had an annual survival rate of more than 90 per cent up to 2022.

Unfortunately, as a result of what happened that year, with the milder winter and elevated seawater temperatures, an influx of naturally occurring microjellyfish, which are just a few millimetres in size, passed through the west coast of Scotland all the way to Shetland and Norway. They have a direct physical impact on gills, and they can present chronic challenges to gill health in both farmed fish and wild fish. That meant that, when we had to do our treatments for amoebic gill disease, which occurs in the autumn, as Ben Hadfield spoke about earlier, the fish had inflamed gills, so we had acute mortality and faced a chronic challenge. That led to a reduction in the performance of those generations into 2023, hence why our survival rate dropped from above 90 per cent down to 83 per cent in 2022 and 82 per cent in 2023.

As was said earlier, the climate has changed, but, since 2018, we have invested just short of £1

billion—in both capital expenditure and operational costs—in fish health and welfare. That covers the breadth of all our activities, from the technology that we spoke about earlier to the changes in husbandry practices and the way that we farm. After 2018, we took a step back and reviewed the biological histories of some of our farms to see whether they were in the right place and stocked in the right way at the right time of the year, to improve farm fish survival.

I assure the committee that the sector has done, and will continue to do, everything that it can to improve the health and welfare of our farm fish.

Christine Grahame: As the climate changes, you are changing production methods and perhaps the amount of stock that you have in pens.

Dr Bickerdike: Yes, as is being done in all land farming.

The Convener: I will bring in Kimberley McKinnell and Constance Pattillo briefly on the same topic.

Kimberley McKinnell: I will add to what Ralph Bickerdike said about microjellyfish. That was a novel challenge across the sector over the past two years, but we have not sat on our hands. We have used the time to characterise the issue and identify solutions to improve the health and welfare of our animals. We are looking at things such as aeration and barrier systems to keep microjellyfish and harmful algal blooms out of our cages, and I am sure that Connie Pattillo can talk about other systems such as bubble curtains.

Constance Pattillo: On the farm base level, climate change and environmental changes have caused an influx of plankton and microjellies, which we are still learning and discovering things about. We started at the coal face by training our staff who are on the farms and assessing the environment every day. Every company has trained its staff to go out every day to sample the water that the fish are in. They take jellyfish and plankton samples and analyse them underneath microscopes. That takes time, but it is really important in allowing us to understand exactly what is going on in the environment that the fish are in at that point in time, so that we can put in place mitigation measures, such as aeration, which involves upwelling water from down in the deep where there are no plankton or jellyfish. Pushing that water up and out creates a space that is no longer a water hazard. We could reduce feeding or stop it completely to encourage the fish to stay in an area where there are no plankton or jellyfish.

As was touched on, we are investing in trialling bubble curtains. That involves having a submerged pipework frame around the entirety of

a farm. Compressed air is pushed through perforated holes in the pipes, which pushes up tiny bubbles that create a wall or barrier around the farm. When a jellyfish bloom comes along, it is pushed away from the farm and passes around it, rather than going through the farm and causing damage to the fish. We are trialling that.

There is a lot of investment in how we monitor the environment. Even if things are clear in the morning, we will do another check of the water in the afternoon. We are constantly monitoring, because we are fully aware that the environment changes. The farmers are very skilled and knowledgeable. If you go to a farm and ask them about plankton, you will be surprised by how much information they can give you. We are checking and monitoring all the time.

We are also carrying out research involving artificial intelligence to see whether we could identify plankton more quickly if the computer did that for us. We are working through that. It is about investment. We are looking at innovation to push us forward and make sure that we are farming to the best of our abilities in the environment that we are in.

The Convener: Just before we move on from the topic, which is focused on the media reports, I have a question. In its letter to the committee, the fish health inspectorate told us that the site was stocked with salmon with an average weight of 2.6kg. It has been suggested that, on the day that the video footage was taken, 1,082kg of biomass was removed from the whole site. From what you have said, we are talking about 250 fish, so we can work out that about 650kg of fish was taken from one pen. There is a suggestion that the video footage showed that more than 250 fish were in the nets.

I am not an expert—I am not very good at guessing how many fish are in a net—but I am looking for absolute clarity. You are suggesting that about 650kg of fish, or 250 individual fish, were taken out of the pen that we are focused on in the morning of our visit, which would suggest that another 750kg were taken out of another pen. Is that correct?

10:15

Dr Bickerdike: Yes, that is correct.

The Convener: Thank you. We will move on to our next theme.

Ariane Burgess: It has been an interesting morning.

I am moving on to the theme of the Rural Economy and Connectivity Committee's recommendations. In 2018, the REC Committee inquiry recommended that

“urgent and meaningful action needs to be taken to address regulatory deficiencies as well as fish health and environmental issues before the industry can expand.”

As I understand it, since 2018, more than 50,000 tons of biomass has been given planning permission, but data from the fish health inspectorate and SEPA shows that in 2022 and 2023, four times more fish died in salmon farms than in 2018. Numbers from the fish health inspectorate show that in 2018, there were 3,782,475 seawater and freshwater deaths, and in 2023, there were 17.4 million seawater and freshwater deaths—the figures are as provided in the Scottish Parliament information centre's briefings. Those numbers are huge underestimates, as they do not include any fish that died in the first six weeks at sea, or any deaths under the FHI's weekly reporting threshold. As we have been discussing, that is 1 per cent of the total fish in a sea farm per week.

Given the REC Committee's recommendation that regulatory deficiencies, fish health and environmental issues needed to be addressed before the industry could expand, why do you think that the industry should be allowed to expand? Why is the industry expanding when the recommendation was that things needed to be taken care of that clearly have not been taken care of?

Tavish Scott: First, I do not agree that things have not been taken care of. I utterly refute that. Secondly, we published a fish health plan for the sector, which we shared with the committee, which demonstrated the £1 billion investment that our companies have made in order to achieve changes in the sector. Those companies are all represented in this meeting, and can talk to that information. The sector today is very different from the sector that existed in 2018 that the REC Committee, as convened by Mr Mountain, reviewed at that time. I am sure that he would recognise that. I am proud of the change that has been achieved.

I think that Ms Burgess was asking about regulation, although I did not quite understand what she was going on about. As the convener well knows, because the committee has taken evidence on it, the Government commissioned an independent assessment of regulation, and we support that assessment. It shows the need for better and improved regulation, rather than there being less regulation. We entirely support that agenda and we work with the regulators in Scotland on that. I am sure that Ben Hadfield could add some detail on the context.

Ben Hadfield: The question is fair, but expansion in the Scottish sector has almost flatlined. The issuing of new licences or consents by SEPA is not proportionate to the number of fish

that are stocked or the tonnage that is produced within the Scottish sector. Broadly speaking, the industry has been producing about 180,000 tons of fish, which is a flat line. No fish farmer wants growth that is not good growth. They want better welfare, lower mortality and higher average weight. First and foremost, we are farmers: we care about the welfare of fish and the livestock that is under our care. We are also businessmen and businesswomen, however, and the way that you make money in salmon aquaculture is by growing great quality salmon and selling them for the highest price that you can achieve.

It is important to know that the industry is evolving and innovating very quickly, so a lot of the applications that are made are on the basis of closing down existing facilities, such as farms that are more inside the sea loch or less able to provide the good oxygen and water quality conditions that we need. A process of closing down less suitable farms and trying to secure more open sea areas is taking place, and that is what most of the concern that has been issued is aimed at, in my view.

Ariane Burgess: It is great to hear that the industry is doing things to tackle the issues and, as we have heard, spending almost £1 billion to do so, including investing in the sea lice treatment vessels, pesticides and cleaner fish. However, the mortality rate between 2018 and 2023 clearly shows that those measures are not really working. I have heard the point that either Ralph Bickerdike or Ben Hadfield raised—I cannot remember who—about the changing conditions, with warmer seawater, *el niño* and *la niña*. However, those issues will not go away; they will keep coming back. The warming of the waters fluctuates and we are having to recognise and face that in many sectors across Scotland.

It was also interesting to hear from Constance Pattillo about bubble curtains and that kind of innovation technology but, to me, those sound—

The Convener: Could we have a question?

Ariane Burgess: Yes, it is coming.

Ben, you were talking about the rate of applications; however, the industry has declared that it wants to double production by 2030. That is the root of my question. How can that be possible with the current rates of mortality, which would have to be halved in order for that overall number of dead fish to even stay at the 16 to 17 million dead per year? The idea is to increase and expand by 2030, but we are facing extreme mortality issues and a fluctuating climate. What more can we do, since it seems that the measures are not really helping?

Ben Hadfield: Again, I appreciate the concern but I do not think that, as a Green MSP, you

should entertain the idea that we do not rise to those challenges and produce the healthiest possible food that we can; not doing so would be akin to a journey of importing energy, which we just should not do, so we must manage our way through those challenges. I hope that you agree.

The narrative that you cannot map your way through the changes and innovate is false: we are doing so and winning against those higher temperatures. The temperature on the west coast was three degrees higher in June this year compared with June last year, which is an enormous difference that creates a real challenge for fish health in relation to gill disease and jellyfish. As we have said, we are broadly staying the same size, with roughly the same number of smolts going to sea every year, and we are investing enormously to make our way through those challenges.

The narrative that the industry wants to double in size is, again, completely false: the industry has said that it wants to double the value and, therefore, its economic contribution, which we should all get behind. However, we do not have a cavalier approach to growth in the face of those difficult challenges; in fact, it is quite the opposite: we are holding broadly stationary with production and making headway through those challenges.

Dr Bickerdike: We are also investing for the future, specifically on topics such as climate change and fish health and welfare. Since the 2018 REC Committee report, we have invested in research and development collaboration with leading academics, in Scotland and further afield, on fish health and welfare, with more than £31.7 million of direct investment from the sector through state-funded projects worth a total of £53.1 million.

We are not alone in this; the last few years have seen significant challenges in other farming sectors, whether it be poor crop yields due to the drought conditions in 2020, when hay had to be exported across the UK; flooding, with yields completely gone in some areas; or the increasingly northerly distribution of bird flu affecting the poultry sector and indeed wild bird populations around Scotland.

Climate change is acknowledged as being associated with altering the spread of disease and pests in many countries, but through the investments that we have been making since 2018 across all of our operations to try to improve the health and welfare of our stock, we believe that we are in a better place in that respect. However, we will continue to invest and try to improve fish health and welfare.

Tavish Scott: A simple point that I would make in response to Ms Burgess's question on mortality is that we have explained—at some length, I

think—what has happened over the past couple of years, and colleagues have talked about all the innovations and technologies that have been introduced. That is all new investment by our companies, but there is also the investment in supply chain businesses the length and breadth of Scotland, which, in turn, is investment in the Scottish economy. Indeed, across our companies, we put £600 million a year into the Scottish economy through those supply chain businesses.

Our survival figures for August, which were released on Monday, are the best that they have been for five years. We appreciate that Ms Burgess and other members have concerns, but things are actually moving in the right direction and we are really proud of that. That is why we are putting in all that investment.

Liam McArthur: Tavish Scott almost picked up the question that I was about to ask. In the conversations that I have had with the sector over a number of years, its particular message has been that it is doing as much as it can, if for no reason other than the enlightened self-interest that Ben Hadfield set out. The question is, where does the drive for innovation come from? Is it sector wide, or does it come from individual companies trying to steal a march on their competitors?

Moreover, how does it sit as far as international comparisons are concerned? It is routinely suggested that the Norwegian industry operates at a higher level than or does things differently from the Scottish sector. I appreciate that the environment and the circumstances for operators here might be different to those in the Norwegian sector, but it would be helpful to understand how the drive for the research and the innovation that Tavish Scott talked about gives some confidence that, in a changing environment, we will continue to see significant investment to improve, rather than a message of, “We’re doing as well as we can—look how well we’re doing,” which I think can come across to some as smacking of complacency. I think, therefore, that a description of how that research and innovation works and what the international comparators are would be helpful.

Tavish Scott: It would be appropriate to get Ralph Bickerdike to talk about Scottish Sea Farms and David Brown to talk about Cooke Aquaculture, as both operate in your constituency and they can speak directly to those points.

Dr Bickerdike: As an example of the sort of research projects that have been taking place since 2018 in response to the environmental challenges that we have been facing, I would highlight one that was funded by the Sustainable Aquaculture Innovation Centre along with Scotland’s Rural College. Based in SRUC, it involved most of the producers across the whole

of Scotland and was specifically targeted at understanding the causes and risk factors of gill health challenges.

As part of that landmark project, which was carried out over more than three years, I believe—we entered it towards the end—we looked at samples taken on individual farms over that period of time, and we collaborated with SRUC academics on developing models that allowed us to practically understand how many fish were statistically significantly required to do gill health samplings. The figure was actually five per pen. Real, practical things come out of such projects. The key driver is to improve fish survival, which comes from improving fish welfare.

Another long-term project in the sector is with the University of Aberdeen and Marine Scotland science to understand the host response to gill health challenges. Gill health is the main cause of mortality in the sector—that is understood completely—and we as a sector have targeted our research investments at key challenges. Likewise, a huge amount has been spent on sea lice, because of the challenges that we faced in that respect, but that is now under control. Gill health is our main issue now.

10:30

David Brown: Do we seek to look further than Scotland? Of course we do. As a worldwide industry, we look to gain knowledge from any country or from anybody who has made an advancement in what they are doing. We are also farming fish in Tasmania, which has a very different temperature profile to Scotland. It is much warmer there than it is here, and fish are still being successfully farmed.

A lot of research is being done in Norway and Canada; we have looked at all of those areas to gain knowledge, and they seek knowledge from us, too. If you are asking whether we are very inward looking and suggesting that we are not looking for solutions elsewhere, I would say that you will find that the industry is very much out there, looking for solutions.

Liam McArthur: I recognise that the make-up of the industry is such that you would expect that to take place. I am just curious as to whether techniques, approaches and technology are being deployed in Norway, for example, that are not being deployed here. If so, is there a rationale for that? Do circumstances mean that such things would not necessarily work in the same way?

David Brown: There is no doubt that if there is technology out there that is working well in another place, we will look to implement it in Scotland where possible.

Constance Pattillo: An example of global connectivity with regard to investment in innovation would be the bubble curtain that I mentioned earlier. It is heavily used in Chile, and colleagues have been there and spoken to people about how that innovation works. They struggle a lot with plankton, which we have identified as a continuing issue. We are certainly looking at other global aquaculture industries to see how we can improve.

During my time with Mowi, we had internal working groups, and we worked with colleagues in Norway and Canada on things such as micro jellyfish, fish escape protocols and so on. A lot of discussion happens between different global bodies. I was also part of an industry-wide working group to deal with micro jellyfish and water quality in Scotland.

A lot of communication takes place, because there is no benefit in getting the upper edge on the industry when it comes to fish welfare and mortality. We are all united in wanting to promote the best fish welfare, and when it comes to improving that situation, we are a lot stronger together, because we can develop and share ideas and trial things. We are much stronger together if we want to benefit fish welfare.

Ben Hadfield: I want to try to answer your question whether Norway does things better or whether the Norwegians have a higher standard than Scotland. It is a wee bit tricky for me, as I work for a Norwegian—now global—salmon farming company. However, I have lived in Norway and spend a lot of time on the farms there, and I know that production there is more intensive than it is in Scotland. Stocking density is higher and the farms are at least twice and often three times the size of what you have here. Innovation is high throughout the sector, with competition between companies, but it is also a sector that is struggling with the challenges of the environment, and it has to innovate very quickly in order to get ahead. Indeed, you have heard about all the things that we are doing.

I would also say that regulation in Scotland is slower than it is in Norway and environmental standards are a lot tighter. For example, in Norway, you are allowed to use more medicine to control parasites than you are in Scotland. In general, Scotland is a harder environment to farm salmon in.

I think that the biggest innovation in both Scotland and Norway is the development of post-smolts, which I realise is industry speak. What it means is that, instead of putting a 100g fish out to sea, you put out a 500g to 800g fish; because that fish is able to grow with just one summer at sea, it misses out the second summer, which is when a lot of the mortality happens and challenges can

arise from the environment. It is a way of increasing the level of fallowing, reducing mortality and increasing production, and most companies are going, or are planning to go, down that route. However, it requires massive investment, often in land-based facilities or other ways of holding those fish until they reach the 500g to 800g point at which you want to release them into the sea.

Liam McArthur: Thanks.

The Convener: I suspend the meeting for approximately five minutes. We will come back at approximately 10.40.

10:34

Meeting suspended.

10:44

On resuming—

The Convener: We continue with our investigation into salmon farming. Rhoda Grant has questions on economic and social benefits.

Rhoda Grant: The Rural Economy and Connectivity Committee's report looked at issues that are common to many industries in rural Scotland, such as the lack of digital infrastructure and housing for staff in the industry. Recommendation 6 asked the Scottish Government to work with enterprise agencies and local authorities to look at how that could be addressed. What progress has been made on that recommendation? What is your experience of digital infrastructure and housing for staff?

Tavish Scott: That is a very good point, Ms Grant. As a Highlands and Islands member, you will know how significant the housing challenge is in the region. In broad terms, our companies in both the supply chain and production face the same challenges as we all do in relation to the availability of housing. Our colleagues who are here today can talk to what they have done on that in a practical sense. On the digital infrastructure, earlier, we talked about how we monitor fish on farms using high-technology cameras. All that needs technical and clever digital infrastructure.

We will try to explain what we are doing to recognise the Government's challenge and play our part to provide housing. We were interested in what Ronan O'Hara said in evidence to the committee the other week, on the Crown Estate fees that we pay to the Government. We are very keen that more of the fees we pay to, as it were, the Government through the Crown Estate are put back into local communities. There are lots of helpful ways that could be done, including the ones that you have just mentioned.

In the context of Applecross, it might be quite good for Kimberley McKinnell to give Rhoda Grant a perspective on what she has done about housing because there is a particular shortage.

Kimberley McKinnell: Absolutely. Housing is a big issue up in our more rural areas. As a primary means of getting over that, we have purchased and rented out properties in certain areas to encourage people into the area and get the staff that we need. Where that is not possible, we have to be a bit clever about how we hire people. We consider different working strategies—two weeks on, two weeks off, for example—so that people can return to a home base and only work in the area for a period of time.

We can try a few things, but it is a continuing issue. It needs to be addressed so that we can get the skilled people that we need up in those highly invested-in areas—Applecross is a multimillion-pound investment to ensure that we can get the best possible robust large smolt out to sea—but we struggle to get people into the area, because the infrastructure is not there to support them.

Constance Pattillo: I can also comment on housing. In Ullapool, which is fairly remote and rural, as you know, we have struggled historically to keep staff because of housing. We have invested in purchasing property, including pods and a variety of different types of housing, to retain the skilled farm staff that we have talked about previously and to enable them to live locally in Ullapool.

Tavish Scott: Ben, do you want to mention Colonsay?

Ben Hadfield: We have just started to regularly include as part of our annual budget several hundred thousand pounds per year to build houses and infrastructure where we work in the islands and on the west coast. We got to the stage where we could no longer wait for local authority or Government action to develop houses where we needed them.

That said, on Colonsay, the company that I work for put up around £1.6 million towards 12 affordable homes, which was matched by the Scottish Government, which gave more than £2.5 million to create 12 houses—some of them were affordable houses and some were for staff working on the fish farms in Colonsay. We have done similar projects on Muck and Rum off the west coast, and I know that other companies are doing this regularly. We are making a strong contribution to housing through the direct action of building houses.

Tavish Scott: Let me be fair. When Emma Roddick was a minister, she did the right thing by having a policy based on tackling rural depopulation. We entirely agree with that

approach and will play every role that we can in it. We hope that the Government—whichever Government is in power—will do more in that area. Although we have been describing what the private sector can do, we are happy to partner with the Government and Parliament on such initiatives.

David Brown: We all take different approaches to housing. On a slightly different tack, Cooke Aquaculture is exploring types of housing just for our workers. However, it is important that people feel that they can come and live in those communities, bring their families with them and enhance what is going on there so that they can become part of them and, for example, their children can go to school there. That all needs to be encouraged as well.

Rhoda Grant: I have a supplementary question to Ben Hadfield's response. I understand that companies are investing in housing and infrastructure, which is welcome. My one concern is that, in the past, we have had issues with tied housing in rural areas. I would worry if our only solution to accommodation was tied housing, because, as David Brown said, we want to bring people into the community and we want them to live there. We want local people to be able to stay, but if the housing is tied to the job they cannot then move around as they would naturally within a community.

Ben Hadfield: That is a very valid point. We are conscious of that aspect, so we do not always operate tied housing. However, if we build houses for employees we cannot just give them all away. We try to make them available to buy, and we help people financially so that they can do that. We can always build more: companies of our size are capitalised to the extent that that is fairly easy and doable. Many projects have an affordable home element, with houses for salmon farm workers and others for community members. We have even built serviced plots and handed those over to communities so that, in time, they can build the houses. Your point is an important one, and we are focused on ensuring that houses are not tied.

Rhoda Grant: Kimberley McKinnell, this question is about the Bakkafröst processing site in Stornoway. We are obviously concerned that it has closed. Can you give us the reasons for that happening? What issues caused the closure, and are they likely to arise in processing more widely? Can we expect more closures?

Kimberley McKinnell: Some of the issues that we have already discussed, such as survivability and other challenges that we have faced over the past few years, have resulted in the majority of our fish production being harvested out over the next 18 months. Unfortunately, that has meant that the

north processing facility has had to be closed for a period of time.

Our overall strategy is to create shared value, and we give significant amounts to the community fund. We have been left in an unfortunate situation, but it is a result of the more challenging circumstances that we have faced. In addition, there is inflexibility within the consenting regime, on the ability to move and to close sites that are no longer acceptable into more acceptable areas where we could perhaps remedy health situations and make the overall survivability better.

Tavish Scott: That last point might be helpful to Rhoda Grant. Recently, the chief executive of Bakkafrost—Kimberley McKinnell's big boss, up in the Faroe Islands—met the cabinet secretary about exactly that issue. The point that the company is making aligns with Ms Grant's agenda, in that reform of the consenting process would improve the efficiency of Bakkafrost's operations in the Western Isles and its sea sites. Bakkafrost and all our other companies need that, so it is very much a shared agenda. I know that the chief executive of Bakkafrost put that to the cabinet secretary when seeking support for that proposal. In fairness, it came out of the independent report into regulatory reform. We are really supportive of that, and we hope that we will see further progress on it. As Kimberley rightly said, that would help progress in the Western Isles, too.

Rhoda Grant: I have one further question. Do you expect the processing site to reopen? I have visited it and have seen the skills of the workforce there. The staff will have moved on and, I hope, found other jobs. How do you protect a workforce with that level of skill and rebuild it after closure?

Kimberley McKinnell: That area is somewhat out of my remit, but we try to assist the workers in relocating to other jobs within the business, where that is appropriate. Unfortunately, I cannot really comment, because I do not know the ins and outs of the situation.

Tavish Scott: If you will forgive me, Kimberley, I can come in on that, just to help Rhoda Grant. The management of the Scottish operation met the Western Isles Council in Stornoway yesterday on exactly those issues. Therefore, please be assured that there are very active discussions on those important matters between the company and, in this case, Highlands and Islands Enterprise and the local authority.

Rhoda Grant: Perhaps we could write to you about that. I am sorry for putting you on the spot but it was worth asking the question while you were here.

Emma Harper: As well as housing, there is community benefit. When the committee did its

inquiry, there was talk of how the industry can provide benefits to communities. The Griggs review also referred to how communities can be better supported. When the committee carried out community engagement in Oban, some people thought that the jobs were piecemeal, whereas Tavish Scott said that there are a lot of jobs and that average earnings are £36,000. Will you talk about the different ways in which communities can be supported?

Ben Hadfield: Sometimes, when you become oversensitive to what is fairly niche activism, the best cure is to go round the farms and visit the communities. When I go out and about on Colonsay, I find that people think that the salmon farm development is largely fantastic because it has created jobs and vibrancy on the island. Average pay is £36,500, people can build a career for life and the company—or all the companies—will help workers in a variety of ways.

I can link your question with the previous question, because the real value of the salmon sector is that it can be done only in certain places. Therefore, companies try to build the value chain. We are obviously concerned about the closure of a plant in Stornoway, but you can rest assured that the company is trying to build the value chain in Scotland. My company has invested in fish feed production and created a lot of jobs in that. It has invested in value adding and created more than 1,000 jobs in Rosyth.

In 2010, Mowi employed 456 people; we now have more than 1,800 people. However, we will still go to community events and hear activists say that there are more people in the rugby team than work in fish farms and that the jobs are not there. Again, that is false. Companies are trying to build the value chain in Scotland, throughout the whole sector, from breeding salmon eggs to producing fish feed to doing value adding. Over time, that will create a lot more well-paid jobs in the sector.

Tavish Scott: That is a great question, Ms Harper. On the supply chain, Ben Hadfield, Ralph Bickerdike, Connie Pattillo and the rest of my colleagues are providing jobs in other areas. I will give the example of DFDS and O'Toole, which haul most of the fish and seafood out of Scotland. DFDS employs at least 150 in Larkhall, in the central belt of Scotland, and seafood is core to its business. Therefore, there are knock-on effects of our export business or our transportation system that result in jobs in different places.

David Brown, do you want to talk about community benefit?

David Brown: Yes. It is important to realise that an awful lot of the jobs are in very remote places—very peripheral areas. That is whaur I come fae—from the very north of Shetland, where we farm

fish. We also farm down the west coast of Scotland and in Orkney.

As I said, the jobs are in very peripheral areas, and we are providing employment for a huge number of people. There are jobs for school leavers, we provide apprenticeships, we look to skill up our people and there are jobs for graduates. We offer a range of jobs. We employ farmers, engineers and fish health specialists, and we employ people in environmental, information technology and sales roles—the list goes on and on.

As an example of what we do in Shetland, we farm fish in Yell, Unst and Fetlar, which are the north isles of Shetland—they are the outer isles of the outer isles. We employ more than 100 people in that community. The population of that community is around 1,500, and the working population is much lower, so we are employing a massive percentage of the people there. We are not providing the only jobs up there, but we are certainly one of the main employers.

11:00

It is a similar scenario in Westray, in Orkney, where we employ 35 people, 30 of whom are resident in Westray. The community has a population of about 600 people, with a working population that is much lower. We find that there are ageing populations in those areas, and we need economic activity there.

It is not just about the jobs that we provide directly—there are also the supplier jobs that Tavish Scott spoke about. I can take a drive through Lerwick and look at the engineering firms there, and the names on the doors; we are providing money to all those firms and to local shops—to every part of the community.

The community aspect is very important, and it goes beyond jobs. It is about what our people give back to the communities in which they are living. We can point to emergency services, where things are run by volunteers. For example, we have Dennis Johnson up in Unst, who has just retired after 30 years' experience in HM Coastguard in Shetland. He has been available at all times throughout his working life to jump to any emergency in the isles. I could also point to Kevin Sinclair or Fraser Paul, as retained firefighters on Yell and Unst—it is the same scenario. We also have ambulance drivers who work as part of our team.

The volunteering not only takes place in emergency services; it extends to the running of local halls, where volunteer committees have to be put in place. Michelle Johnson, who works for us, volunteers at Mid Yell public hall, where she puts

in a huge amount of her own time; that hall provides facilities for the whole community to use.

It is also important to look at schools in the areas where we operate. In Unst, for example, we recently looked at who was in the school, and we found that 20 per cent of the school population were directly related to people whom we employ. The situation is exactly the same in Westray. We look to do partnerships with those schools. In the next few weeks, I will do mock interviews with pupils in secondary 4 in some of the local schools—one of them will probably be my son, which might be a bit embarrassing for him, but that is okay. We have also looked at working with Developing the Young Workforce to get more people into employment.

That is what our people do, but it is also about the companies themselves. Our companies all have community benefit funds, and we put hundreds of thousands of pounds into communities every year. Cooke does that, and I know that Scottish Sea Farms does some excellent work through its heart of the community fund. Mowi and Bakkafrøst do similar work, too.

It is a shame that Liam McArthur has left the meeting, because I want to mention the island games, which are going to be in Orkney in 2025. I know that Bakkafrøst is the main sponsor for the Western Isles team, and Cooke has sponsored the Orkney and Shetland teams. I hope that Shetland will get a better medal haul than Orkney, but that is by the by.

Basically, given everything that I am speaking about, I am very proud to work in this industry. I feel that we put a lot back into communities, and I really feel that the industry is part of the fabric of the communities where we operate.

Emma Harper: I have a wee final supplementary. That reminds me that we visited Dumfries and Galloway, which has a hatchery, so it isnae just the Western Isles that are benefiting in terms of employment. That was an interesting visit.

Tavish Scott: Thank you for mentioning that, Ms Harper, because that is right. AquaGen Scotland is a significant player in the Scottish market and an important part of the wider salmon family, and it employs people in the south of Scotland. I do not think that there is a constituency or region in this country that does not have some part of our supply chain in it, and that very much includes the central belt as well as, for example, the areas that David Brown just described. That is a very fair point.

The Convener: Christine Grahame has a supplementary.

Christine Grahame: I may have missed this, but do we have separate figures for the local economic advantages for Shetland and Orkney? I declare an interest, as I have a sister who lives in Orkney. Do we also have figures for the contribution that is made to the various organisations—the charitable stuff? It would be interesting to know the economic impact on those local areas, which really need employment activity.

Tavish Scott: We do have those figures, Ms Grahame, and we will make sure that they are in your inbox within the hour.

Christine Grahame: It is for the committee, not just for me.

Tavish Scott: Well, I know that you want the Orkney figures, so we will make sure that you get those ones, and the committee can have the breakdown that we produce across the whole of Scotland.

Christine Grahame: That would be useful.

Ariane Burgess: Salmon Scotland's "Community Engagement Charter" says:

"We believe that salmon farming companies should take a 'good neighbour' approach with local communities by operating with transparency and integrity and adopting best practice methods of engagement",

and that

"where relevant, we will engage communities in a vote to allow the local people to have a direct say in what is happening."

It goes on to say that Salmon Scotland will

"Consider putting the decision to a community vote—it is the ultimate test of whether the case has been made for a site and has the support of the wider population."

Have you ever put a vote to the community?

Ben Hadfield: I favour that method. Salmon farming businesses should be absolutely transparent about the wealth that they create at the national and local level. They should also be transparent about the impact that they have on the environment and how that is mitigated.

We have put almost all our new developments to a community vote. We had a positive outcome on Muck, twice on Rum, on Colonsay and on a number of other locations where the community has looked up all the information, including comprehensive environmental impact assessments, economic studies and the arrangement with the community on developing housing and infrastructure and has decided to go ahead with it.

On one occasion, we proposed a site on the Isle of Canna, which was a great location for a farm. The vote narrowly went against us. That was, I think, because most of the people who voted

against it were employed by the National Trust for Scotland and were encouraged to vote against it. The people who were not voted in favour. We did not have a majority, so we did not proceed at that time. We like to bring communities with us and to bring a positive multiplier effect to them.

Ariane Burgess: You mentioned a number of islands. What about the new feed barge at Mowi? I do not think that that went to a vote. However, I understand from talking to local people that there was a lot of opposition to it. At a meeting, Mowi said that it is not obliged to inform the community about the expansion plans for the feed barge. Since then, Mowi has withdrawn the application.

My sense from talking to communities is that they feel that they should have the right to know about full expansion plans for salmon farms that operate in their waters. At what point does the industry consider community objection to a particular planning application to be legitimate? If I take the feed barge application as an example, once a community has rejected an application, surely that should be the point at which the industry accepts that, takes notice and lets go of it. However, communities feel that applications get rejected but then the industry comes back with another one. There was a recent example of that happening on Skye.

There is an issue with the charter if industry says, for example, that it wants to listen to communities, that it respects them and that it might put its plans to a vote, but then it doubles down on its plans. Is that because it believes that that is the right place for something to happen for industry? One thing that we heard at the community event was that the community cannot move; they cannot leave that place.

Ben Hadfield: If I may, convener—

The Convener: Constance Pattillo indicated that she wanted to come in, but I am happy for Ben Hadfield to respond.

Ben Hadfield: We are in team player mode. I was going to answer part of that question, and then Connie Pattillo, who held the meeting that was referred to, is best placed to respond on that.

With respect, I suspect that you take feedback from quite a narrow segment of the community. The broader segment where we work is, in the majority, supportive of aquaculture, but it wants things to be done in the most sustainable and best possible way.

On the Corry application in Ullapool, Mowi has not put in new barges. We have worked with the company and given it a lot of autonomy. It has a fantastic brand in the US where it sells artisan salmon and it has really high demand. We are

very keen to work with the community and to keep it on side.

We held a public meeting and there was negativity towards a feed barge going in. We then withdrew the application. We had a couple of meetings at which we listened to the community. We are going to reconvene and propose a route towards automating the feed-in that meets the community's requirements.

Connie, you promised the community a certain route. What is the plan at Wester Ross?

Constance Pattillo: It is important to highlight that we engaged with the community. We held three meetings over a short period, listened to what people has to say and withdrew the application. We are taking on board the feedback that people gave and the concerns that they raised at those meetings. We believe that we have found a solution that will promote best feeding practice that is good for the environment and for fish welfare while alleviating community concerns. We plan to have another community meeting to bring that concept to them so that we can discuss it prior to putting in the application. We will take those steps in the next few weeks.

Ben Hadfield: You have listened to the community, paused the application and withdrawn your desire to put in a feed barge. You are now working with the community to put in place something that is not a feed barge but that will feed the fish well and keep welfare good. I think that that is positive.

Tavish Scott: I will make another observation to conclude that point. Most of my colleagues here live in the Highlands and Islands. I hope that no one is suggesting that we do not know what is happening. David Brown spoke eloquently about the reality of living in Shetland and being an active member of his community. I am sure that Ariane Burgess would accept that we all care deeply about the places where we live and that that is an important part of how we make those assessments.

Ariane Burgess: I have a brief follow-up question for Ben Hadfield. You said that you have a plan for appropriate feeding. Will you describe that?

Ben Hadfield: Concerns were raised about the potential for microplastics to come from the feed pipe. We are concerned about that, but that is not the main part of the microplastics issue that we face. We are working to change to very durable plastic that does not produce microscopic particles. Also, rather than using an air feeding system, we are looking at using a water feeding system—that moves the feed in water—which uses less power and makes less noise. We have used that in several locations.

The other option is to have a hybrid system of hand feeding and mechanical feeding. There would be hoppers on every pen, with some level of automation. It would be a combination of people filling the hopper and hand feeding. I think that we will go down that route.

Basically, we want to be a good neighbour and improve our business, while working with communities, having a good dynamic and finding a friendly way to improve relations between businesses and communities, which are intertwined.

Ariane Burgess: I have a brief supplementary question for David Brown, picking up on the question from my colleague Rhoda Grant about housing and infrastructure. Would Cooke Aquaculture Scotland, and the industry in general, be interested in supporting the call from Yell and Unst for fixed links to mainland Shetland? That is as an important element of the infrastructure, which I know that the salmon farming industry relies on.

David Brown: We rely heavily on interisland ferries in Shetland. All our fish are processed on the island of Yell, so not only do those fish have to catch a ferry south from Lerwick to Aberdeen every night, they also have to catch several interisland ferries through Shetland itself. The inclusion of tunnels in Shetland would be fantastic and would really help to reinvigorate communities. If that happened, I think that we would find people moving back to the islands. People do not necessarily want to have to get a ferry to go to work—it adds a huge amount of time to their working day. There is no doubt that those islands would benefit if such things were put in place,

Ariane Burgess: For clarity, my question—

The Convener: Ariane, we are very tight for time, and you have moved significantly away from the purpose of this meeting.

Ariane Burgess: I am just trying to understand if the industry would invest in that.

The Convener: We could be here for an awfully long time if we all took the liberty of asking people questions that do not relate to the recommendations from the previous committee.

At this stage, it is appropriate to let members know that, as a result of the additional hour that we—quite rightly—spent discussing media reports about the salmon industry, we are running about an hour late. I am minded to push on but want to check how that would work with the witnesses' plans for today.

Tavish Scott: I would very much appreciate getting away by 12.

The Convener: I will suspend the meeting briefly to discuss that so that we can decide the way forward.

11:15

Meeting suspended.

11:17

On resuming—

The Convener: We move on to theme 4, which is environmental impacts.

Colin Beattie (Midlothian North and Musselburgh) (SNP): A key development that has taken place since the publication of the REC Committee report is the introduction of SEPA's new fin-fish aquaculture regulatory framework, which came in on 1 June 2019. That brought in a new and tighter standard for organic waste deposited by fish farms. What key actions has the industry made to address the environmental issues related to waste and chemical discharges that were identified by the RECC inquiry?

Tavish Scott: That is a very good question, and you made exactly the right point about the introduction of that 2019 scheme. My colleagues can talk about the specifics of what individual companies have done.

Salmon Scotland agreed with the introduction of the new regulatory framework, which requires much more sophisticated modelling of our farms prior to consenting, using updated modelling software. Once a farm is consented, that software allows much more extensive marine monitoring of the sea bed. That plays exactly to your point. Do we know what is happening on the sea bed? Yes, we do, and the model helps us to do that. It is a step forward.

Things have changed dramatically since 2018 and the earlier report. To support the more rapid assessment of the sea bed, we have supported several projects to assess benthic biodiversity, and we work with SEPA and national and international academic partners to deliver those projects. I hope that that assures you that we address the issue head-on. It is important to us. Actually, doing so is an advantage to our fish farms.

I am sure that Ralph Bickerdike or Ben Hadfield can speak further on the practicalities, if that would be helpful.

Ben Hadfield: Salmon farmers require high water quality, so we have to have a relatively minimal level of organic enrichment underneath the farm. The new SEPA regulation has tightened that. There has also been a significant reduction in

bath treatment medicines and in-feed medicines—their use is markedly down.

Compliance with SEPA sea bed criteria is increased—it actually increased after the industry temporarily held more fish during Covid. Generally, it is a very good picture, with a high level of compliance and demonstrable sustainability criteria.

Colin Beattie: Just to clarify, what evidence is there for the assertion that there has been a reduction in the amount of chemicals and waste as a result of the framework? Do we have any evidence, and if so, who is collecting it?

Dr Bickerdike: SEPA collects that information from all the producers. It is important to point out that every consent of every farm is assessed by SEPA, through modelling, to determine the acceptable biomass that can be permitted on the farm that would cause no significant harm. That is assessed by SEPA, and the evidence is provided for it through the samples that are taken on farm. So far, there has been very high compliance.

Unfortunately, as was referenced by the witness from SEPA, it had a cyberattack back in 2019, and we are still yet to have a system through which that information is published. Other activities seem to be prioritised in SEPA.

Ben Hadfield: All the information is published by the companies individually, and then it is published by Salmon Scotland.

Tavish Scott: We would welcome SEPA publishing it. We look to SEPA to publish it, because it had a system in place previously. As Ralph Bickerdike rightly said, the cyberattack stopped that. We absolutely support that approach to publication.

Colin Beattie: At the moment, does the information come from the companies?

Tavish Scott: SEPA collects it.

Colin Beattie: SEPA collects it, but does not publish it. Therefore, the only publicly available information is from the companies.

Ben Hadfield: Yes, but all or most of the companies have institutional investors such as pension funds, so they have to be absolutely transparent. The information is published in companies' sustainability reports, and other companies audit it. The Aquaculture Stewardship Council audits it, and the Coller Farm Animal Investment Risk and Return—FAIRR—Initiative ranks the reporting and transparency. You can be very confident that the information is accurate. It is warts and all, and the situation has improved a lot.

David Brown: Under the new framework, the monitoring requirements of the farms have changed. As it used to be, we monitored a farm at

peak biomass on a single transect in the direction of the tidal flow, and seven stations were reviewed on every site—basically, a grab sample of the sea bed was taken up and analysed to see what was living down there.

Under the new framework, 28 samples are taken from four different transects on a site. The areas are specifically designed around the modelling that is done on each site, so it is a much more predictive model and should accurately show what impact the farm is having on the environment.

Colin Beattie: Yet there has been criticism of SEPA's capacity to do the analysis.

Tavish Scott: I feel a bit sorry for SEPA, because it gets it in the neck all the time from both sides. We support it in this work, as we have suggested today, because it is really important that it gets the data and is able to publish it. We will work with SEPA to achieve that. That is all that we can add to that point.

You had SEPA in front of you back in June, did you not?

Colin Beattie: Yes. I am sure that somebody will be picking that up.

The Scottish Government's analysis as part of its consultation on new standards for the use of emamectin benzoate found that farmers generally prefer to use the chemical as an in-feed medicine, because it is easy to administer and does not require fish to undergo special handling and all the rest of it. The industry expressed concern about the potential for tighter standards around its use, because that would have a negative impact on fish welfare and mortality. Do you still have those concerns?

Ben Hadfield: We still have those concerns, but we have to accept the situation and move forward with the best healthcare that we can in other ways. That is why you have heard so much about fresh water and the FLS treatments that gently remove sea lice through filtration.

What happened with emamectin benzoate—its trade name is Slice—is that there was a lot of focus from specific stakeholders. Although we respect the fact that they are stakeholders, they are quite niche in the way that they focus on claiming that there has been environmental impact. To my knowledge, nobody has shown that there is any environmental impact beneath farms or in the near-field area of farms through emamectin use. However, those stakeholders lobbied extremely hard, and SEPA revisited the standard for emamectin.

When a level is set for a medicinal treatment or a pesticide—depending on what you want to call it—there is normally a hundredfold safety factor. In

other words, you find out what level would affect the most vulnerable animal—in this case, that is in the sediment, because that is where it goes—and you have a hundredfold safety factor. SEPA put in place a thousandfold safety factor, which drastically reduced the amount that could be used. It also chose to use a freshwater animal, which was much more vulnerable, which tightened the amount that could be used significantly.

We complained about that, because we did not think that the science was sound. SEPA referred the matter back to an independent group called the Water Research Centre, which told SEPA that it had got it wrong by a factor of 20 or 30. That was a Scottish Government process. SEPA was then instructed to take the level back up, but it was still a lot lower than the previous level.

We all want to protect the environment, and we all want to do that through the strongest possible science, but when a very niche group of activists pressurises SEPA intensely to overreact, with the result that it takes away a vital medicine that is administered with great welfare benefits for the fish, and then the industry is beaten down on and told that its mortality is too high, how can we win?

We have had to accept the decision. We are not happy about it, but we have complied in full, and we have innovated to bring in other treatment methods. Let us compare our situation with that of another livestock or farming situation. Ivermectin, which is the same as avermectin, which is in Slice, is widely available in all forms of terrestrial farming. In most cases, you do not even need a vet to prescribe it—you can buy it over the counter at a Harbro store. That shows not only how tightly aquaculture is regulated, but how the regulators can overreact when activism focuses in on an activity in that way. That can be difficult for us to deal with.

Colin Beattie: It is clear that that is an on-going issue. How will the situation be resolved? Is dialogue taking place between the interested parties? How will that play out?

Tavish Scott: In truth, the Government has made its decision on that, and the position is now set. You ask a very good question. We would, of course, be open to more dialogue, for the reasons that Ben Hadfield has illustrated, but the position has been determined, and, as Ben said, we comply with that.

Ben Hadfield: I think that the process has been wrong. We have had to accept it, but we are talking about a medicine that is very effective in aquaculture, which has been taken away because someone has overegged a potential effect, even though there is a huge database that says there is little or no evidence of effect. How would you feel if

a vital human medicine, such as a cancer drug, was taken away in that way?

We are a little bit angry about what has happened, but we simply have to accept it. We care for the welfare of our fish, so we will innovate and find a different route.

Colin Beattie: You talked about bringing in other medicines or chemicals to act with emamectin. Would that create another problem?

Ben Hadfield: We are not planning to bring in new medicines in aquaculture to replace the compound in question. We are using fresh water and the other treatment methods that we have talked about.

The Convener: Emma Roddick has a supplementary.

Emma Roddick: One serious concern that has been raised about the use of chemicals in salmon farming is the impact on lobster larvae. In research that was conducted in Norway, deltamethrin has been shown to be lethal to European lobster. It is used in Scotland—it is allowed to be used in Scotland for farms that have organic certification. Is work being done to reduce the use of deltamethrin? Is there concern in the industry about the impact on lobster?

Ben Hadfield: There is no concern in the industry about the use of it and the consequential impact on lobster larvae. All such medicinal compounds can have an impact on crustaceans, because they are designed to kill sea lice, which are crustaceans.

Scotland has by far the tightest regulatory framework—only very limited amounts are allowed to be used, and there has to be a very large mixing area. The traces in the environment are well below a threshold that would cause impact. In places such as Norway, you can use 300 per cent of the dose rate in Slice, and the same goes for Canada. In fact, I am going to Canada tomorrow, and I would just note that the Bay of Fundy is one of the largest lobster harvesting areas and is full of fish farms, too. When you speak to local people, they will tell you that they can catch under the pens, and the bay produces so many lobster, partly because of all the structure that is in there. You can twist science a bit, but I do not think that we have any concern.

11:30

Emma Roddick: But it is not really twisting science to say that there is an impact. The impact and the relationship in that respect have been noted in scientific research, and we know that the half-life of the chemical is 140 days and that it can spread 39km, so is there really no concern?

Ben Hadfield: Are you talking about the half-life of emamectin or the half-life of deltamethrin?

Emma Roddick: Deltamethrin.

Ben Hadfield: I do not actually think that the half-life is that high. It binds very quickly to anything organic; in other words, when you treat a pen of fish, it binds to the fish and the organic material on the nets, so a lot less than has been put in the pen gets released. Then you have the mixing zone, which guarantees that the level of dilution is way below a threshold that could impact a non-target organism like a lobster larva.

You are asking me whether I am confident, and my answer is yes, I am. To be fair to SEPA, it has a very stringent and rigorous way of working this out. I would also point out that the amount of medicine that Scotland can use is the least of all the geographies.

The Convener: Just very briefly, we heard during our community engagement that the level of emamectin benzoate that you are allowed to use is now so low that it is effectively ineffective and is, in fact, being used less and less by the industry. Is that correct?

Dr Bickerdike: Yes, that is correct, and to go back to the previous question, I make it clear that we are concerned on the impacts of that on health and welfare. Typically, we would use Slice or emamectin benzoate in the early stage of the cycle—say, up to 1kg of size. Ideally, you do not want to touch young fish, because of the potential impact that we talked about at length earlier.

Separate to that, though, Slice is critical in treating another situation that occurs in mid-summer. Caligus is similar to the main sea louse, but it is carried by migratory marine fish such as herring and mackerel. Suddenly, in the month of August, multiple farms in a whole farming area will see significant numbers of caligus arriving, and we need to have access to an in-feed medicine that, through prescribing and with veterinary advice and direction, we can administer to multiple populations at once. It is highly effective. These lice are very naive—very sensitive to the medicine—and it provides a complete treatment without having to touch the fish. Without the availability of Slice, we would have to go in and handle the fish or find other ways of trying to remove the caligus. When you have multiple farms requiring that level of intervention, it becomes challenging.

We are still very concerned about the impacts of these levels. We will do everything that we possibly can to mitigate them, but it is a concern.

The Convener: Thank you. I call Rhoda Grant.

Rhoda Grant: Salmon Scotland has lodged a service complaint to SEPA about the timeframes

for dealing with licensing applications. Obviously, they were expected sooner. Has the issue been resolved, or is it on-going?

Tavish Scott: It would be fair to say that the issue has been overtaken by the Griggs review of the consenting regime, which provides evidence on the determination periods for all the different regulatory bodies. The period is longer than we would all wish; indeed, I think that the committee has had evidence on that, and not just from us. I saw that Fisheries Management Scotland wrote to the committee yesterday to make exactly the same point about the regulatory system.

The common view is that the system could be more efficient and effective, and we would like the approach to become much more efficient and the time periods to be much more aligned among the many different regulators that we deal with. I suppose that the strong answer, therefore, is that we are now dealing with the matter in a slightly different way as a result of Russel Griggs's report from February 2022.

Rhoda Grant: Thank you.

The Convener: We move on to the next section, on which Rachael Hamilton has a series of questions.

Rachael Hamilton: My questions are about sea lice regulatory reform and wild salmon interactions overall. In a previous committee session, WildFish expressed concern about the reliability of the sea lice count data. How often do you carry out sea lice monitoring? How reliable is that data? Will you comment on the assertion that there is a big gap in the data when it comes to sea lice reporting?

Tavish Scott: I do not think that we recognise that there is a big gap in the data at all. I would gently suggest that WildFish has an agenda here. It is not in favour of our industry at all—indeed, quite the reverse. It is an anti-salmon farming campaign organisation. It is quite entitled to be so, and it is a stakeholder, but its evidence to you came from that perspective.

All our companies deal with sea lice and monitor very regularly. David and Connie could start by describing exactly what they do.

Constance Pattillo: We do weekly lice counts. We report that data every week. We are required to report that data, and we actively want to report that data. The farm guys are trained on site by a fish health vet in our company, or through online training and on-site training, so the staff are very well educated in the different stages of sea lice. We are required to track that data. It is beneficial for us to do it weekly—we could do it more than once a week, if we wanted to—to see the progression of sea lice. Collecting sea lice data gives us a lot more information, which enables us

to take informed decisions about how to move forward with our farming practices.

David Brown: There might be occasional weeks when we do not get a sea lice count done—please forgive us if it is blowing a force 12 in Shetland and we do not want people to die doing it. There are occasional real-life scenarios in which we cannot get counts done. If a gap should appear for that reason, I do not apologise for that, but it is a requirement that we do weekly lice counts for Marine Scotland.

Tavish Scott: Kimberley can add to that, if that would be helpful.

Kimberley McKinnell: I make it clear that we do not count sea lice only because it is a regulatory requirement; we do it for our own information. As Connie said, we collect that information a minimum of once a week from every enclosure on every farm. However, when we have higher pressure or in situations in which we might need to intervene, we might do that more frequently. On some of our farms, we have checked fish every day to see what the trend was and whether we needed to get a vessel in quickly to commence an intervention. We collect that data for our own benefit, not just because there is a piece of legislation that says that we have to.

Rachael Hamilton: I want to address Tavish Scott's point. WildFish has also criticised the lack of data to make decisions, which has been exacerbated by the gap of 20 per cent in data counts since 2021.

Ben Hadfield: I can help on that issue, because I am a bit closer to it. It is absolutely in salmon farmers' interests to know what is going on with sea lice. I can see reports on a per-pen basis for every farm that we operate in Scotland, and we operate quite a lot. The idea that we would not accurately report the sea lice count is not funny—it is a serious issue—but when you hear people say that, you think, "Gosh, you used to say that we did not have transparency. We gave you transparency in spades, and now you say that the data is not robust enough."

We have invested millions and millions of pounds, so the data is crucial. The integrity and the accuracy of the data are of primary importance to us. We have modelling programmes and algorithms that we can use to predict sea lice issues, how those will occur and at what stage, and we can predict the effect of treatments. It is really complex stuff, because, first of all, we are striving for the best animal welfare, and we have tens and tens of millions—in fact, hundreds of millions—of pounds invested, so we have to get it right.

The data reporting in the Scottish sector is very good, but there are some days when, because of

weather or because you were doing a treatment, you would not count sea lice and that would not be recorded.

Rachael Hamilton: Okay. We had a very long discussion on the gill health situation, which seems to be a huge problem. In a previous evidence session, Professor Martin said that, in such circumstances, the treatments that all the witnesses have spoken about could not be used to treat sea lice, and that secondary infection would therefore become the reason for mortality.

Do you think that we are now overly focused on sea lice and that we should be looking at the issues with gill health? I do not want to suggest that there should be more reporting, but how is gill health reported? Are issues with gill health overtaking the issues of sea lice?

Dr Bickerdike: Yes. We spoke earlier about the fact that gill health is by far our greatest challenge for fish health and welfare. It varies, it is seasonal and we can keep certain aspects of it—such as amoebic gill disease—under control.

With regard to the categories of things that cause mortality, the effect of sea lice is so low that it is below the 1 per cent threshold—it does not even appear on the pie chart. As was said earlier, fish should not die of sea lice. With regard to what that witness said, if you ever had a fish population that had another health condition that meant that you were unable to treat the fish for a sea lice challenge, those fish would be harvested out as quickly as possible. They would be removed as a last resort.

Our reporting on sea lice is highly transparent. To add to that conversation, our farmers were counting and recording sea lice way before there was any legislation or code of good practice, because they wanted to know what the trends were in order to make informed decisions about the treatments. That was back in the 1980s and 1990s, so it has always been done. That is good husbandry, as one would carry out in other sectors.

Rachael Hamilton: However, earlier, you talked about the risk of lowering the sea lice burden—I wrote that down because it caught my attention. You spoke about it as a risk.

Dr Bickerdike: Exactly, yes.

Rachael Hamilton: What did you mean by that?

Dr Bickerdike: If the sea lice threshold burden for intervention was lower, we would have to intervene and do a treatment on a population of fish when that would not be for their welfare—it would not be in their interest. That would result in a higher risk of harm and the potential for mortality. We are concerned about a treatment that is not for the benefit of the fish. It is a

perceived benefit with regard to the potential risk of transfer of sea lice to wild salmon.

Ben Hadfield: A wild adult salmon in the sea, or when it enters a river, will often have 10-plus sea lice on it, so it is normal for maturing fish to have that level of sea lice. If you argued that that level should be pushed down to zero for salmon, you would be forcing a level of treatment regime that would elevate mortality and compromise welfare.

The salmon interactions working group tried to take the heat out of the situation between the wild sector and the farm sector. As part of that work, we felt that we needed a model that predicted the appropriate level for the threshold burden on farms, when smolts are very simply swimming through that estuary or pathway, so that you do not overtreat and compromise welfare but so that you also do not let levels rise on a farm to a point at which they could create a hazard. That is a very sensible approach.

The risk framework has largely done that. It showed that, of 250 or so farms, only 19 have a potential for impact, which is a good thing. We should just make sure that that model is as accurate as possible, because, to go back to Ralph Bickerdike's point, if you keep aiming for absolutely no risk whatsoever and overenthusiasm with regard to the precautionary principle, which people do, you will end up with a model that forces treatment of livestock that is counterproductive to welfare.

Rachael Hamilton: I understand that, but what about the salmon farms that you mentioned where there is a no-deterioration policy? Do you not believe that that, for them, is a standstill policy, which does nothing to support the objectives of improving the environment?

Ben Hadfield: As I mentioned before, most of the farms are with the company that I work for, Mowi, and some are with other companies that are here.

You have identified a small number of farms that could, in certain parts of the year, provide a level of sea lice that would become a hazard—not to cause mortality but to cause undesirable behaviour in wild smolts. We do not want that. We feel that, provided that the model is validated and made accurate, a progressive system is about homing in on those farms and changing the farming situation—for example, by changing the cycle time, putting larger smolts to sea, so that they can be cut off, or being fallow when the wild smolts go out.

I think that the industry, SEPA and the interactions working group are on to something that will improve the situation. We just need to watch out for fisheries interests insisting on ultra-

precaution, because then the model becomes unrealistic in its output.

11:45

The Convener: Kimberley McKinnell indicated that she wanted to come in on the back of Rachael Hamilton's previous question.

Kimberley McKinnell: I wanted to add that the industry sea lice figures at the moment are the lowest that they have been in the past five years. Certainly, within Bakkafrost, we have to look back a decade to see lice figures as low as the current ones.

As Ralph Bickerdike was saying, if we get pressed into lower and lower thresholds, that takes away some of the veterinary decision making that is currently in place to ensure the welfare of the fish. There has to be a balance there—that is really important.

David Brown: Very briefly, I live—and we operate our farms—in an area where there are no wild salmon, in Shetland and Orkney. That needs to be taken into account. If national legislation were to come in, it would need to take into account the fact that there are differing situations in different places.

Rachael Hamilton: Ben Hadfield, you talked about the compromising of fish health. Professor Martin also talked about breaking the life cycle of sea lice.

SEPA is rolling out the regulatory framework, and we will not see that full roll-out until 2027. I have learned a lot today about how things are changing because of the climate and other aspects. Do you believe that, as things develop, some of the regulatory framework will adapt to take into account the issues that we are seeing and include things such as measures to break the life cycle of sea lice, as well as what salmon farms are doing?

Ben Hadfield: Those practices already exist. Most salmon farmers will follow an individual site and follow a hydrographic area with a contiguous fallow to break the lice life cycle.

If it is developed in a robust, validated, scientific way, the model will become an important tool to answer the question whether the lice level on the farms is a potential risk to wild fish. That is incredibly important. A game is being played by the wild fish sector and the activists to make the model architecture as ultra-precautionary possible, so that it prevents farming in certain locations. Personally, I do not think that it is wise to get into that situation. We should use the model to make sure we have the most robust prediction of potential hazard to wild fish and then manage the farms by changing the farming cycle or relocating

the farm, by closing that farm down and expanding elsewhere. That is the goal of most enlightened people who are involved in the model's development.

Rachael Hamilton: I have one last question.

The Convener: Please make it brief.

Rachael Hamilton: I do not know whether anyone can answer this question, but do you believe that it is right that new farms should not be granted authorisation, particularly if they are not reaching the standards? What are your views on the sea lice numbers in those places that are not getting on top of the problem?

Ben Hadfield: I am sorry if I am answering all the questions, but I am a bit of a geek on the area. The model is now in place and it prevents any farm being developed or expanded in an area where it would be a potential hazard to wild fish, but the model architecture massively overpredicts the effect by a scale of about four or five. I think that the model should not overpredict and should be accurate, because we are talking about wealth creation and jobs and having a vibrant industry, but I like the safeguards in the model that is now in place.

Tavish Scott: Can I add to that? It is a very fair question. The other side to it is the point that we discussed earlier with the committee, which is that the consenting regime needs to adapt and change to take that into account. The desire of our companies across the piece is to look at different sites and different areas—at deeper water and more exposed sites, for example. That all plays exactly to Rachael Hamilton's question, and we need that progress on the consenting regime. If the committee is minded to agree with that, that would be helpful for us, too.

Rhoda Grant: Fisheries Management Scotland told the committee that it continues to receive reports about escaped juveniles from freshwater farms appearing in rivers, yet no escapes have been reported to the fish health inspectorate. Can you explain that discrepancy, and what action the industry is taking to prevent such escapes?

Ben Hadfield: I will answer the specifics of that case towards the end of my reply but, for context, and as quickly as I can, I will explain that, as part of the work of the interactions group to bring together the two sectors—farmed fish and wild fish—we agreed that we would make a rapid transition to the strongest possible containment standards, be that the Norwegian technical standard or the Scottish technical standard. A lot of the equipment that holds farmed fish was upgraded very quickly, which has culminated in the fact that escape levels have dropped massively—to one fish, out of all the fish that are held in Scotland.

The specific situation that is referred to by FMS is on the River Shin. It does not involve my company, but I have been involved in discussions. There are no reports of escapes, but there are two farms in Loch Shin and the fisheries trust is finding farmed smolts in the river. All three bodies have to come together much more quickly and find a way of identifying the smolts from one farm—they can be marked with various biomarkers—put that in place and then make sure that the containment standard is as good in that area as it has been in the rest of the industry of late.

Rhoda Grant: Okay, but the farm did not know that the fish had escaped. It did not report an escape.

Ben Hadfield: It is a legal requirement to note an escape or a suspicion of an escape. The two companies that farm in Loch Shin have not done that, so they almost certainly do not know whether an escape has taken place. However, the fisheries trust has found what it thinks are farmed smolts. The logical step is for the two companies to agree some form of marker and improve the containment standards even further. Then, if farmed fish are found in the river, they can be traced back to the farmed source.

The Convener: Briefly, what technological improvements are being made to marine cages, to address some of the escape issues?

Constance Pattillo: We have put in place a variety of innovations to reduce fish escapes. That goes down to basic farm handling, such as stretching a net between a boat and a pen, thus creating a protective barrier as fish are transferred across. That is a simple-scale, everyday farming practice to minimise fish escapes.

We have also increased our capacity to net check. As you can imagine, it is hard to see what goes on underwater, but it is vital that we understand the condition of our nets. We have improved our practices through the use of remotely operated vehicles and we are changing net material to sturdier Seal Pro nets. Our net cleaners have cameras so, as they clean the pens, they are also assessing the nets for any potential damage. We use environets—basically, two nets stitched together—and swing the pens so that the fish stay where they are but the fish farmer is able to manually assess the pens. Feed cameras and ROV cameras give us a greater understanding of what goes on. We also service our nets and they are strength tested between cycles. Therefore, the net—that key containment area for the fish—undergoes rigorous observation to ensure that it is strong enough to withstand its environment.

There are other examples. That is just a small selection.

The Convener: Thank you. We move to theme 6, which is fish health and animal welfare.

Emma Roddick: The Rural Economy and Connectivity Committee recommended that

“no expansion should be permitted at sites which report high or significantly increased levels of mortalities”.

Mortalities continue to be a problem. What is the industry learning from incidents of high mortality, and how are those lessons being applied to actions to prevent recurrence?

Tavish Scott: It would be fair to say that we have spent almost the whole morning on this. We have answered heaps of questions on mortality, and we have explained at great length all the technological changes and innovations that the industry is investing in. It is a very fair question, but in terms of time, we have pretty well done it to death. We are very confident that we have moved this industry forward enormously. We have spent nearly £1 billion on fish health and welfare, to answer Emma Roddick’s very fair point, and we are in a very different place now than we were.

I forget who mentioned it earlier, but mortality levels this year are significantly lower. We are very proud of that. It is good progress.

Emma Roddick: In 2023, the fish health inspectorate data showed 17 million salmon deaths, which was the most ever recorded. In 2022, the figure was also record-breaking. You expect this year’s figures to be drastically improved.

Tavish Scott: Well, they are improved. You have asked a fair question but we have explained at some considerable length why that was. We can go over it again, convener, if you want, but I am very conscious that we have answered that very fully already.

The Convener: If Emma Roddick has some specific points and she would like to go over them again—

Tavish Scott: Of course. I am very happy to.

Emma Roddick: I would like to dig more into welfare. We have heard a few times today that mortality is just one and possibly not the most important indicator of fish welfare. I am aware that the welfare standards used by fish farms are the same as those that are used for land-based farmed animals. What is the reason behind that? Is that a good enough indicator of welfare?

One of the standards is that animals should be allowed to conduct their instinctive behaviours. Could you describe what those are for salmon and how they are able to do them in a cage?

Tavish Scott: That is a very good question. Ben, do you want to have a first cut at that, or

should we go back to Kimberley? Let us start with Kimberley.

Kimberley McKinnell: On being able to enact their natural behaviour, salmon are a schooling animal, so they will swim around in a shoal with members of a cohort of the same species. They are, in fact, taking part in that natural behaviour every day.

We supply them with all other aspects of welfare. We feed them an appropriate diet to an appropriate level, and that is monitored using cameras and by feeding operatives. We have already discussed at great length the treatment interventions that we make to ensure that their health is maintained. We use novel diagnostic techniques to pick up the presence of pathogens very early, so that we can intervene and take management decisions at the earliest possible point.

We have just spoken about escapes and containment and how we are keeping predators out of the cages. All the aspects of welfare—the five freedoms—have been well covered in answers to some of the other questions this morning.

Emma Roddick: We can expect that one in four salmon in a farm will die early. Is that good enough welfare? Do you believe that salmon living in cages currently have high welfare standards?

Ben Hadfield: Yes, absolutely. The survival rate for farmed salmon is massively higher than that of wild salmon. That is because they are cared for, given feed and protected from predation. We are not in any way satisfied that mortality has gone up in Scotland over the last decade. We want to reduce that.

To go into the question you are asking, would you stock a farm with half a million fish, have a mortality event and then decide to put more in next time? That is not the way that we operate. We try to balance the stocking level to the best possible outcome for welfare and growth. There is no way that you would try to solve a problem by stocking more fish on the site.

However, in salmon farming it can happen that an area that has always produced great fish suddenly gets a toxic algal bloom that washes in from the open ocean, or a jellyfish that causes 80 per cent plus mortality overnight. That can occur.

Emma Roddick: The fish health plan was raised earlier. I was grateful to Salmon Scotland for circulating it ahead of our visit a couple of weeks ago. Very little space in that document is given over to fish health. Before you get to the commitments, you have to read quite a lot about the economic benefits of salmon farming and the number of jobs that it sustains. Is there a reason

why the focus of the fish health plan is not on fish health?

Tavish Scott: I respectfully suggest that that is not the case. I forget now how big that document is, but there is a lot in there about fish health, Ms Roddick. Could we change the order of what is in there? If you would like us to change the order, we will do so, but in general we are trying to help the committee by providing a lot of information.

We have provided heaps of information again this morning on all that, and any suggestion that we are not absolutely passionate about fish health could not be further from the truth. I do not know whether any of my colleagues want to speak to that. Perhaps David Brown can say something.

12:00

David Brown: It comes back to what I said earlier—it is almost as if you are saying that we do not care. How on earth do we not care? We look after these animals—we do care for them. We give our staff training on welfare—everybody is trained on that. People who come in to work for us are people like me, who have been crofters for our whole lives, who have an intrinsic understanding of animals and care for their welfare.

We really do care—it almost feels like you feel that we do not, and that could not be further from the truth.

Ben Hadfield: You have to remember that some of the interests in the wild-fish sector, and some environmental activists—while they are stakeholders, and we give them respect—have cottoned on to the message, which is sticky but false, that mortality occurs in salmon farming because people are doing it badly, by overstocking and so on. It is a sticky message, but it is absolutely false.

The way to make money in salmon farming and to have a good, vibrant business is to improve growth, drive down mortality and increase the average weight. You have to understand that. Everything that we do, as David Brown said, is about trying to prevent mortality and get the best possible welfare in place. I think that we have been incredibly transparent and open about how difficult that has been in the Scottish marine environment over the past few years.

Emma Roddick: I want to clarify—

The Convener: I just caution everyone that I think that we are revisiting statements that we have already heard. If we could try to consider whether there is any new information that we need, that would be helpful. I appreciate where you are going, Ms Roddick, but we are getting the same responses.

Emma Roddick: Yes. I clarify that I am not suggesting that any individual does not care. I am recognising as a fact that documents on fish health that were sent to this committee initially were about economic impact. That is what was given to us—it was not my creation.

The commitments in the “Fish Health Plan 2024”—which, incidentally, do not feature in the condensed version—include a commitment,

“Where appropriate”,

to

“introduce long-term strategic changes to how we farm our fish”.

What long-term strategic changes have been brought in since the publication of the plan?

Tavish Scott: The plan that was published was a summation of everything that we are doing and what we are going to do, which I think that we explained to you just the other week. The plan is very much live right now—it is an active document.

Far more important than what I may think of the plan, or how you may interpret it, is the actual action that all our companies are taking, which we have talked about for three hours this morning. We have demonstrated that in terms of money and investment, and the care for our fish that David Brown just talked about, time and again. We have laid all that out, so I am at a bit of a loss. I am not quite sure that I understand the concern here, because we have done our very best to provide reassurance.

The Convener: I will bring in Ralph Bickerdike.

Dr Bickerdike: I want to respond specifically to Emma Roddick’s question. One of the key changes that we have made in the farming strategy and the fundamentals has involved the use of investment in freshwater facilities—the recirculated aquaculture centres. In those centres, we are able to control the conditions that affect growth of salmon while they are in fresh water, such as temperature and light, and protect our fish from predators. That allows for exceptional quality when the fish are transferred to sea. They are also a larger size, which means that they will be at sea for potentially at least two months less than they would otherwise have been with traditional methods, which in turn means that they will face fewer environmental challenges. That means that we will potentially be using veterinary medicines less, which means that there will be less discharge in the environment, even though it has been assessed that that does not cause any significant harm with any of our farms.

That is a fundamental change since 2018. A number of producers have now invested tens of

millions of pounds in those facilities. That is one change, but I could go on.

Constance Pattillo: I will briefly add to what Ralph Bickerdike has said. Investments such as larger fish going to the sea, developing broodstock facilities and examining the future of salmon farming are not quick things to do. Those are examples of what we mean by long-term investment. They are aspects where we can see future benefits, but it will take time to get to that point. Those are a couple of examples of how we will see longevity from improving welfare.

Emma Roddick: There is also a commitment to undertake a comprehensive review of the code of good practice. Could someone give us more information on that review?

Tavish Scott: We could write to the committee on that, if that would be helpful. A review is going on—we review the code from time to time, to reflect the changes in the sector that we have described at great length today. We would be happy to furnish the committee with more information on that if that would be of interest, convener.

The Convener: Having timescales and so on would be helpful.

Tavish Scott: Certainly.

The Convener: Before we move to a question from Ariane Burgess, I remind everyone that some of our questions will almost certainly have been answered already. We should be conscious not to repeat the responses that we have had.

Ariane Burgess: The committee has heard growing evidence that warmer sea temperatures due to climate change are a key cause of increased mortality and fish health issues. This morning, we have discussed the detail of that at length. The committee would be interested to hear whether open-net fish farming has a long-term future, given that sea temperatures are predicted to continue to increase, or whether the industry will need to move to semi-closed or closed containment.

Tavish Scott: The answer is yes. Open-net sea-pen farming will continue.

The Convener: Okay. That is on the record.

Emma Harper has a question on a similar topic.

Emma Harper: I will be really quick. Ben Hadfield, you mentioned that stocking densities have been lower in Scotland compared with those in Norway, on the back of the difference in sea temperatures. Are you considering reducing the stocking density here because of the changes in water temperature?

Ben Hadfield: I think that everybody has already done that. The number quoted—the 15kg per cubic metre—is the maximum. Given the increased water temperature, most people have tried to go through the summer at 5kg to 10kg per cubic metre. To go back to Emma Roddick’s point, that is just to give the fish a chance to choose where they want to be within the pen. At that point, there is so much room that they are just a shoal within a massive pen. We have had to have additional capacity to give the fish a lower stocking density.

Emma Harper: I have another quick question. You have already mentioned post-smolts, and the situation where salmon spend less time in the open pens—one summer instead of two. I see that Mowi has just released the first post-smolts in Loch Etive to the Isle of Muck. Is the industry considering adopting that approach more widely?

Tavish Scott: I think that all our companies can speak to that. Yes is the short answer, but there is a longer one.

Ben Hadfield: I will try to answer that quickly. The idea is that if we can hold fish on land, or in an area where they are not subject to summer pressures—in our case, it is in Loch Etive; in others it is on land—it looks as though we can reduce mortality by up to 50 per cent through the fish having only one summer at sea. That is an obvious goal that everyone is chasing down.

David Brown: At Cooke we do something similar to what Mowi is doing in Loch Etive. We target what we call nursery sites, which have smaller fish—they are of the size when they first go to sea—that we later move into what we call grower sites.

Tavish Scott: Kimberley McKinnell mentioned Applecross previously, but she might want to corroborate those responses to Emma Harper’s question.

Kimberley McKinnell: Absolutely. The goal of putting larger, more robust smolt out to avoid their having two high-risk periods in the sea is to circumvent challenges from micro jellyfish, plankton and high water temperatures in that second season when the fish are at slightly higher risk.

The Convener: Christine Grahame has a brief supplementary.

Christine Grahame: This is not in any way an attack on you, or your presentations as witnesses, but I point out that someone has sent me something supplementary to my question about mortalities at Dunstaffnage. I mention it in fairness to you, because this is being circulated, and you should have the opportunity to answer it.

They say that they decided to check the figures for mortalities on the Government’s website. In brief, they say that the publication of figures is very slow and that nothing has been posted since June 2024. They also attach a spreadsheet. They say that the short cycle is “puzzling” and the operators should be asked to explain. They also say that it looks as though 706 tonnes of reasonably mature salmon have been brought in from elsewhere and survivors removed “after very high mortalities.”

I am not saying that that is the case; I am simply giving you the opportunity to answer.

Tavish Scott: Thank you. I really appreciate that. Can I just ask who said that?

Christine Grahame: I do not think that it is appropriate that I give the name just now, because it is not authorised. I am not saying that they are right or wrong. I am just asking you to answer the point.

Tavish Scott: Well, I am not sure that we have to start answering—

Christine Grahame: If you cannot answer now, you could write with an answer, because the information is taken from the fish data pages on <https://aquaculture.scotland.gov.uk>.

Tavish Scott: Convener, if the committee would like to write to us, we will respond.

Christine Grahame: It is on the record, so, in fairness to you, because it is out there, I am giving you the chance to answer. I am sure that the convener will be happy to forward the information to you.

Tavish Scott: I totally accept that. We will write back.

The Convener: The question is about whether the rates of mortality and whatever are also taken into consideration. High volumes of fish might be brought into the farm during a cycle. We will not put you on the spot at the moment, because you obviously do not have the figures in front of you that we have, so we will write to you and, hopefully, you can respond to that in the future.

Christine Grahame: I thought that, to be fair, I should put the issue to you, Mr Scott, because it will be recycled round everybody.

Tavish Scott: I understand.

Emma Roddick: I am keen to ask about wrasse. The fish health inspectorate told the committee that its primary concern was that the mortality of cleaner fish is higher than it would like. The committee is also aware of concerns regarding the sustainability of wild wrasse fisheries. How are you responding to those concerns and what action is the industry taking to improve the welfare of those fish?

Constance Pattillo: I can answer on the cleaner fish.

We have put a lot of investment into how we manage the cleaner fish stock on site. We have talked about the new state-of-the-art wellboats that are being developed and rolled out. They all have a dewatering system, which allows the cleaner fish—the wrasse or lumpfish—to fall through the bars and be pumped into a holding tank to be returned to the pens. That directs them away from going into the well and gives a level of divide.

Not only that, but there is a lot of effort at the farms to recapture the cleaner fish prior to treatment to prevent them from passing through the treatment. We put in hides and additional enrichment so that the cleaner fish are not just put into cages and left. We look after them too, so we put in kelp or barrels, depending on the species that are at each farm.

We also provide a specific diet. The diet has changed, and, rather than using a universal diet, we now use one by World Feeds that is tailored to cleaner fish. We are looking at the nutrients that they need. That diet also comes with a clever feeding mechanism that allows you to know when you need to restock the feed block.

You mentioned wild fish, particularly wrasse, which we capture. All the wrasse fishermen we use require licences from the marine directorate—they have to go through that policy, record their data and give it to the marine directorate.

We are also investing in facilities that farm wrasse, so that we can produce farmed wrasse to further reduce our reliance on wild-caught fish. As we progress with that, our numbers of wild catch will decrease.

Emma Roddick: There must be concerns about sustainability if the industry is trying to move to fish that are not wild caught.

Constance Pattillo: It gives us greater control. You want to have control over what you put into the pens. You always want to reduce your impact on the environment. Having the facility to farm wrasse means that we can further reduce our wild catch where we can as part of being sustainable. That is a facet of reducing pressures on the environment.

Ben Hadfield: As with any fishery, there is a sustainable maximum that you can fish from. We are not clear where that is for wild wrasse, but the companies have started to farm wrasse so that we do not need to take from the wild.

Tavish Scott: We have also funded a PhD study into the matter with the University of Aberdeen to try to understand it more fully with academic partners.

Dr Bickerdike: A scientific report that Marine Scotland science produced in 2016—the reference for which we can forward—estimated the quantity of wrasse that was consumed by seals in the wild. That was 3,454 tonnes. The quantity consumed by otters was 400 tonnes. The annual volume of wrasse that is wild harvested for our sector is between 40 and 90 tonnes, to put that in perspective.

12:15

Emma Roddick: But in respect of those that are being eaten by seals and other aquatic life, that is just natural, right? They are not being farmed for human purposes.

Ben Hadfield: It is just nature, but we probably should have said that, before they were used on farms, they were used as bait for lobster pots. We want a scientifically sustainable level of catch from the wild and an increasing amount of farmed wrasse. That is where we are going, and I think that we will be there in the next couple of years.

Emma Roddick: I am aware that wrasse struggle more with the likes of freshwater treatment than salmon do, and that it is just not possible to fully separate them before such treatments are administered. Is that fair to the wrasse? Is that not a welfare concern?

Tavish Scott: I think that Connie Pattillo has described the mechanisms by which we are achieving that separation. Is that not right?

Constance Pattillo: Yes.

Ben Hadfield: But it is a welfare concern. We try to remove as many of the wrasse as possible before the freshwater treatment takes place. The new wellboats have been designed with a system to grade off the wrasse and take them through another treatment system; after all, they, too, have AGD—amoebic gill disease—on their gills, and you do not want to treat the salmon, get things to zero and then pop the wrasse back in with them. You want to treat both at the same time. Again, this is all high-paced innovation and investment, but it is coming for that reason.

Emma Roddick: I have just one final question. Throughout this evidence session, we have had disagreements on statistics, yet we have also heard that the data being published on mortality and fish welfare is robust. Can that be the case if one set of data that the committee has received this week on mortality from the fish health inspectorate is now being challenged by yourselves? Is that robust data?

Tavish Scott: I am not sure that we are challenging the fish health inspectorate in any way on anything. They are figures based on what we provide. You are absolutely right about the

principle, which is that we want consistent data. We are usually accountable for that through the regulations that we fish under, and that is a very fair point, but I do not think that there is any difference between us and the fish health inspectorate in terms of what you describe.

Emma Roddick: Earlier, I quoted from the fish health inspectorate letter that the figure for mortality was 0.55 the week of the visit, and you have said that it was 0.29. That is a discrepancy, is it not?

The Convener: I think that that is because of the reporting period. I think that the answer that we got was that the fish health inspectorate did not report the full week.

Emma Roddick: On that week, it did.

Dr Bickerdike: The fish health inspectorate sent the letter on 27 September, which was a Friday. The working week runs from Monday to Sunday, so it would not have included the mortality from the weekend.

Emma Roddick: But that was not the most recent week reported in the letter.

Dr Bickerdike: Okay—I am sorry. I would need to come back to the matter and respond by letter, then.

The Convener: I think that it is probably more a discrepancy in what we think we are talking about than a natural discrepancy. Once again, though, we can follow that up with a letter to the witnesses and the fish health inspectorate.

I call Colin Beattie.

Colin Beattie: This question is maybe a wee bit off the wall. When you were talking earlier about the impact of jellyfish, it brought to mind a similar situation that has been resolved elsewhere. The cross-party group on space, of which I am convener, discussed this very same problem in relation to power stations. Power stations require the satellite tracking of jellyfish; they need to know days in advance that the jellyfish are coming down the line so that they can prepare and close up to prevent them from being taken into the intake ducts. Apparently, the technology is very simple and already in place. Would something like that not be useful for the salmon industry? It would give you knowledge days in advance of where the jellyfish are and where they are coming from; their migratory routes and everything else would be tracked; and you would have plenty of time to prepare.

Constance Pattillo: I can answer this one. The jellyfish that we are talking about are micro jellyfish, which are hard to see with satellite imagery. They are tiny; in fact, they are probably smaller than a pinhead, and it would be incredibly

challenging to track them with satellites. We can use satellite imagery for things such as plankton and plankton blooms, and there are some websites and information that we can use in that respect, although cloud cover often makes it quite challenging to see that, and, given that we are in Scotland, there is quite a bit of cloud cover. However, the micro jellyfish that we are talking about are harder to see. You cannot see the bloom in quite the same way as you can with large common jellyfish or barrel jellyfish, the size of which can be significant—30cm—which makes them easy to see in large blooms. With micro jellyfish, if you took 1ml of water, you might be able to see a couple or maybe 30 jellyfish in it. Fundamentally, it is quite hard to track that using satellite imagery.

Colin Beattie: The point that was made was that jellyfish tend to form a cloud, for want of a better word. There will be a whole pack of them together. The power stations boast that, in the aggregate, they can track almost anything.

Kimberley McKinnell: I think that you are referring to the big blooms of moon jellyfish. They occur in many thousands, and they can clearly be seen from satellites and all the rest of it. The micro jellyfish that we are talking about—specifically, the one that has been the most harmful to the industry—is almost completely transparent, so it is very difficult to see, even under the microscope.

Some of the other tools that we are looking at, such as the use of environmental DNA—eDNA—to find indicator species that might give us a heads-up that a bloom of something else will come along a couple of weeks down the line, might help us to get to the point of having an early warning system, so to speak, whereby we would be able to understand what the patterns might be in future months.

Ben Hadfield: What we look for is really clear water, because when the micro jellyfish are blooming, sometimes the density will be so high that they have eaten all the phytoplankton. The water will be really clear and will look great, although that will not be the case.

You are right in what you say—the technology can be developed further.

The Convener: Our final theme is planning consent, on which Emma Harper will kick off the questions.

Emma Harper: The Griggs review identified issues around planning and consenting. Has the industry seen an improvement with regard to the creation of a streamlined, flexible and adaptive planning and consenting process? That relates not only to resiting away from migratory routes for wild salmon but to resiting if there is a fish health issue

in certain pen sites. Is the process streamlined enough to allow for that?

Ben Hadfield: We are disappointed that that recommendation has not been acted on quickly by the regulators. There is no mechanism for dealing with a situation in which it has been identified that the relocation of a site would bring about a series of environmental or economic gains. There is no process for that. In the absence of one, companies have created their own process and have made proposals through the existing system.

It would be beneficial for that recommendation to be acted on quickly and for such a process to be set up.

The Convener: Emma, do you have a question about migratory routes?

Emma Harper: No—I rolled my questions together. It sounds as though the planning system needs to be enabled to achieve the aim of moving pens, where that is necessary.

The Convener: We are aware that the potential exists for salmon farms to be sited further offshore in the future, which will reduce some of the environmental impacts that have been set out during today's session. That will lead to the need for more automation, because of how uncomfortable it will be for humans to operate further out to sea. How can it be ensured that the welfare of fish is maintained if additional automation is required to enable fish health and wellbeing to continue to be monitored?

Tavish Scott: David Brown's company is already doing that. The answer probably involves the use of technology and cameras, but David is much more knowledgeable on that subject.

David Brown: Off the island of Westray in Orkney, we have moved some sites further offshore. The ability to do that has come about because of technical improvements and as a result of our having a better understanding of the modelling of the sea and tidal conditions. We have put out wave-rider buoys. Before anything goes out there, full analysis of the moorings of the site is done to ensure that we will be able to sustain what goes on out there. We seek to look after those fish in the same way that we seek to look after any other fish that we have on our sites. We invest in boats that are capable of being used to look after the fish out there. I see no reason why we would not be able to look after the fish in such locations as well as we look after the fish anywhere else.

The Convener: Edward Mountain is next.

Edward Mountain: Ah, finally. I thought that I would have to ask all my questions when Tavish Scott was out of the room, convener. I am glad that he is back because he is going to get some of them.

Ben Hadfield, I would like to take you back mentally to 2 May 2018—I cannot take you back physically. I have no doubt that you will have looked back on that date, because you were in a meeting of the Rural Economy and Connectivity Committee with Scott Landsburgh, talking about salmon farming. I think that Scott said that it was a “difficult and challenging” environment but that it was getting better. To paraphrase your words, Ben, I think that you said that there was a “perfect storm” of mortality, increased temperature and resistance to medication but that mortality would decrease at sea and that you would get it to below 5 per cent. Was that wishful thinking? If it was not wishful thinking, for how long are we going to be sitting at between 20 and 25 per cent mortality at sea?

Ben Hadfield: Edward Mountain's question is fair. What we have presented today is the fact that sea lice levels and escapes are drastically reduced. Antibiotics have not been a major issue in agriculture since the 1990s. Their use is massively reduced and under control, and we are developing vaccines. I am particularly proud of all the industry's successes.

I understand your negativity. I think that much of it is misplaced, but we have had a very troubling rise in surface sea water temperatures, which has caused the mortality rate of farmed salmon to become elevated. Incidentally, it has caused the mortality rate of wild salmon to become seriously elevated. I firmly believe that the biggest challenge for wild salmon in the British Isles is climate change, and we do not gain anything by suggesting that all the companies that are represented here are not focused on absolutely delivering—

Edward Mountain: With respect, Ben, I have not mentioned wild salmon and I have not been negative. On the basis of your comments to the REC Committee on 2 May 2018, I asked you whether you thought that that was a reasonable comment to make and, if it was, how long you thought that we would have a mortality rate of between 20 and 25 per cent. I never mentioned sea lice and I do not accept that sea lice are the biggest problem that you face. As you have made clear this morning, there are other problems. Therefore, will you answer the question of how long you think that the industry will sit at between 20 and 25 per cent mortality of fish at sea?

Please do not think that I am being negative. In the last committee meeting, I tried to stop a moratorium, and that is what happened. Give me a little bit of leeway, Ben.

Ben Hadfield: I do try.

We are focused on bringing the level of mortality down. If we could achieve the rate that we had

post-amoebic gill disease in 2012, which was 10 to 15 per cent—at least in the sector that I am familiar with—that would be a major achievement. Sometimes, I get a little tense when a question is phrased in a certain way—it is like asking an arable farmer what he is going to do to improve a situation in a drought. We are trying incredibly hard to farm fish in the best possible way with all the innovation that we can, and I think that we are making progress, but we are obviously disappointed when one of our key performance indicators is out of kilter—that is not good. The rates for sea lice and escapes are down, as is the rate for CO₂ emissions—this industry is a very sustainable industry. We can make it better by reducing mortality, which is what we are focused on.

Edward Mountain: Ben, I would suggest that Mowi will be doing budgets for the next 10 years, if it is like any other business, and I am trying to work out how long you are budgeting to have a mortality rate of 20 to 25 per cent at sea. I accept that the industry has made changes, and I was delighted to go to the Bakka Frost facility—I will put that on the record—to see the wonderful hatchery that it is developing at Kishorn. I was grateful for that visit and the knowledge that it gave me. I am trying. Try to answer my question, please, Ben.

Ben Hadfield: Specifically, we are budgeting for a modest reduction in mortality in the region of about 2 per cent per year over the next five years, to bring us back down to those levels. We want to achieve it through expanding the treatment resource—we discussed that at length today with regard to fresh water—through using post-smolts and through all the innovation that we have. That is the main ask of anyone who is employed by the companies that are before you today.

Edward Mountain: That is helpful. So, are you are saying that, in 10 years, we should be down to a mortality rate of about 15 per cent? Do not get me wrong, I know that no one wants to lose a fish—I am a farmer. I do not want to lose a calf or any animal, and I understand the care that goes into doing those things, because it also affects your bottom line.

12:30

Ben Hadfield: I am saying that we will put all the plans in place and make all the effort that we can to achieve that.

Edward Mountain: My next question is a general one about sea lice. I tend to agree with you; I do not think that sea lice are as much of a problem as they were, and I acknowledge that the industry has taken huge efforts to address that. However, people feel that there is a problem with you putting your smolts to sea when they are at

their most vulnerable—when they are young and their skin is changing—after your having vaccinated them and treated them in preparation for going to sea. The problem is that people who represent wild fish interests might feel that they do not know whether the wild smolts that go past fish farms are affected by sea lice, because no one knows what happens to them—they disappear into the wild blue yonder. Do you think that it would be a good thing for the industry to work with organisations that represent those interests to try to iron out that lack of knowledge?

Tavish Scott: That is a fair point. We are working with the wild fish industry. Mr Mountain is aware that Jon Gibb from the River Lochy works with us. He is a really experienced fisheries manager who is widely known and respected across the sector. He is super for us, because he helps us to make the contacts that you would expect us to make. Some of that work takes place as a quiet discussion, rather than being on the front page of the Lochaber paper, or any other papers. We are making steady progress through that quiet diplomacy. Is there more to be done? Yes, of course there is.

Earlier, I referenced a couple of things that were in Fisheries Management Scotland's letter to the committee this week, which I think were really helpful and I agreed with. There is a strong desire for people to come together to work together. You are right that we do not understand or know some things. It is in our interests to find them out.

Edward Mountain: In my mind, the bit that we do not know about is whether, when the wild smolts travel out to sea and are in the coastal range before they travel beyond that, they would be clear of sea lice.

Tavish Scott: We have the west coast tracking project. I would be happy to send details of that to the committee. I am not sure that we learned much from it, if I may be blunt. We helped to fund that, as did the Government.

Edward Mountain: I think that we do learn some things from tracking projects. David Brown would probably reflect that there are wild salmon near Shetland, because some salmon go up past there on their way north.

Tavish, if I may, I note that, when you came into the meeting, you were quite aggressive to the members who challenged you on a particular point. Do you think that it is right for people to have an ability to challenge you and to question whether what the industry is doing is right? You were pretty forceful against them.

Tavish Scott: I absolutely accept that we have stakeholders who have every right to say what they like. I have the absolute right, on behalf of the 12,000 people whom I represent, to point out that

anti-salmon farming campaign organisations are here to put us all out of a job. Edward—excuse me, Mr Mountain—I think that, as a cattle farmer, you should be worried about the possibility that, once they have got rid of us, they will move on to farming; as a sheep farmer, my daughter is worried about that. I really believe that we need to call out those groups of people.

We need the committee's support in recognising that salmon farming is a great industry that does great things for Scotland and employs many people all over the country. We are very proud of that and we are very committed to it. We are committed to working with the Parliament and the Government of the day on the reforms that we need, accepting the transparency of our decision making and how we operate our businesses. We need a little bit of help to push back on the utter nonsense that we are subjected to every single day.

Edward Mountain: My final point to you is that I think that I reasonably question you and I reasonably challenge the industry.

Tavish Scott: I agree.

Edward Mountain: On 25 October 2023, at 14:30, when you came into my office, one of your comments, which I note word for word, because it was taken down for me, was:

“This issue and your attitude are top of the agenda for the next Board meeting. The Board are very unhappy with you and are willing to take action against you, unless you retract your comments in the Parliament.”

The Convener: Mr Mountain.

Edward Mountain: Do you think that that is a respectful way to engage with the Parliament?

The Convener: Mr Mountain, as a former convener of this committee, you know that, when the convener speaks, members do not speak. I do not think that your comments relate to the evidence that we are taking at the moment, so I caution you against saying something that you might regret. We are looking at a report into progress in the salmon industry and not at something that happened privately in your office. Unless you have a line of questioning that relates to the inquiry, I ask you to move on to your next question.

Tavish Scott: I did not know that a private discussion was being taped, but I do now.

Edward Mountain: It was not taped—it was recorded by hand.

The Convener: This is not appropriate at the moment.

Edward Mountain: I am happy to leave it there. If I may, I was trying to identify that people have a right to challenge the industry and question it, so

that we can make the industry in Scotland the industry that we want it to be and one that contributes to our export industry. However, I find it difficult when I am being physically or verbally attacked for doing just that.

I will leave it there. I apologise if I spoke over you, convener.

Ben Hadfield: We all agree that a multitude of stakeholders are here, and everybody has the right to criticise aquaculture, to ask questions and to expect full transparency. We strive for that as an industry.

There is an obvious tension with salmon anglers and salmon fishing interests. I come from that background—I am a keen angler, so I try to find an edge to take the tension down over time.

We need to have full transparency; to pull everything out of the box that we can to tackle mortality, levels of which have risen in difficult environmental conditions; to innovate and keep sea lice and escapes to the lowest level possible; and to be open, transparent and respect everybody's concerns. That is what we are focused on doing. I hope that you have seen that from this panel of witnesses, although it has sometimes been a little tense.

The Convener: Thank you for that. This committee is absolutely committed to ensuring that we hear voices from every aspect—for and against the salmon industry.

As part of the work that we are doing, we will produce a report in which we carefully consider all the evidence—positive and negative—that we have heard, and we will form our decisions at that point.

We have had an intense session that has run over time, but I hope that the witnesses will appreciate how important it was to respond to challenges in the media, and I thank them for attending.

The committee had originally planned to conclude its evidence taking at next week's meeting by hearing from the Scottish Government, but, unfortunately, due to member availability, we are not able to do so. We have decided to reschedule that evidence session to a future date, which will be confirmed in due course.

12:37

Meeting suspended.

12:40

On resuming—

United Kingdom Subordinate Legislation

Official Controls (Extension of Transitional Periods) and Plant Health (Frequency of Checks) (Miscellaneous Amendments) Regulations 2024

The Convener: Our second item of business is consideration of a UK statutory instrument consent notification. If members have no comments to make, are we content to agree with the Scottish Government's decision to consent to the provisions set out in the notification being included in UK rather than Scottish subordinate legislation?

Members *indicated agreement.*

The Convener: That concludes our business in public. We move into private session.

12:41

Meeting continued in private until 13:01.

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Edinburgh
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The deadline for corrections to this edition is:

Monday 4 November 2024

Published in Edinburgh by the Scottish Parliamentary Corporate Body, the Scottish Parliament, Edinburgh, EH99 1SP

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