SCOTTISH SALMON WATCH

DISEASES

Scottish Ministers
St. Andrew's House
Regent Road
Edinburgh
EH1 3DG
scottish.ministers@gov.scot

5 April 2019

Dear Scottish Ministers,

Surveillance of Salmon Farms, Hatcheries & Ova to Minimise Disease Risks

Will Scottish Ministers commit to a program of increased testing and sampling of farmed salmon (including smolts and ova in hatcheries as well as in sea cages and processing plants) for infectious diseases, pathogens, bacteria, parasites and viruses?

In order to safeguard the health of wild fish (as well as farmed salmon), Scottish Salmon Watch challenges the Scottish Government to establish a strict surveillance regime which would test and report publicly on infectious diseases, pathogens, bacteria, parasites and viruses in the following:

a) Ova imports
b) Smolts in the hatchery prior to transfer to sea-cages
c) Harvest-ready farmed salmon immediately prior to slaughter
d) Market-ready farmed salmon in the processing plant

Scottish Salmon Watch is seriously concerned at the lack of monitoring and sampling of salmon farms, hatcheries and ova imports. The surveillance of emerging viruses and emerging diseases such as Piscine Orthoreovirus (Heart & Skeletal Muscle Inflammation), Amoebic Gill Disease and Pasteurella skyensis appears woefully inadequate and even the surveillance of more established 'Notifiable Diseases' is seriously lacking.

In view of the increasing weight of scientific evidence linking the spread of diseases, pathogens and viruses via vertical transmission, Scottish Salmon Watch views the lack of testing of salmon ova imported into Scotland as the antithesis of the precautionary principle. Indeed, it is unclear whether imported salmon ova and smolts prior to transfer to sea cages are tested at all leaving the door wide open to disease risks.

Scottish Salmon Watch believes there is an urgent need for a robust and rigorous monitoring regime to tackle the growing number of infectious diseases, pathogens, bacteria, parasites and viruses ravaging Scottish salmon farms. The lack of health surveillance is despite the establishment of the Strategic Farmed Fish Health Framework Working Group (co-chaired by Ben Hadfield, MD of Mowi Scotland Ltd, and Professor Colin Moffat, Chief Scientific

Advisor Marine, Marine Scotland) in December 2017. Scotland's 10 Year Farmed Fish Health Framework (May 2018) patently fails to address the issue of surveillance for infectious diseases, pathogens, bacteria, parasites and viruses.

The Case for Increased Surveillance of Ova, Smolts & Farmed Salmon

Case Information and Mortality Information reported by the Scottish Government's Fish Health Inspectorate (FHI) makes for alarming reading in terms of the number of salmon farms and hatcheries affected by infectious diseases, pathogens, bacteria, parasites and viruses.

An analysis by Scottish Salmon Watch of 2018 Case Information published by the FHI - "The State of Scottish Salmon Farming in 2018" (March 2019) cited positive tests for:

Piscine Reovirus (Heart & Skeletal Muscle Inflammation), Salmon gill poxvirus, Piscine myocarditis virus (Cardiomyopathy Syndrome), Neoparamoeba perurans (Amoebic Gill Disease), Epitheliocystis, Proliferative Gill Disease, Enteric Redmouth (Yersinosis), Paranucleospora theridon, Infectious Pancreatic Necrosis virus, Salmonid Alphavirus (Pancreas Disease), Candidatus Branchiomonas cysticola, Candidatus Piscichlamydia salmonis, Candidatus Syngnamydia salmonis, Candidatus Clavochlamydia Salmonicola, Vibrio, Pasteurella skyensis, Moritella toxaemia (Winter Ulcer Disease), Aeromonas salmonicida (Furunculosis), Anaemia, Fungus and Lice

Piscine reovirus (PRV)

Pool Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
P1	18.18	26.13	25.93	26.06	Positive

Salmon gill poxvirus (SGPV)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	21.93	23.26	23.26	23.04	POSITIVE
F2	22.60	23.66	23.22	23.69	POSITIVE
F3	22.40	28.39	28.67	28.63	POSITIVE
F4	22.25	30.55	29.78	30.39	POSITIVE
F5	21.75	32.62	32.18	32.55	POSITIVE

Paranucleospora theridion

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	21.93	30.48	30.66	30.46	POSITIVE
F2	22.60	36.03	36.19	35.55	POSITIVE
F3	22.40	37.26	36.18	36.96	POSITIVE
F4	22.25	36.21	36.14	35.61	POSITIVE
F5	21.75	31.95	31.4	31.5	POSITIVE

Piscine myocarditis virus (CMS)

Pool Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
P1	15.68	23.58	23.60	23.81	POSITIVE

Neoparamoeba perurans (AGD)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	20.32	29.67	29.78	29.86	POSITIVE
F2	20.26	31.65	32.24	32.10	POSITIVE
F3	19.95	28.06	27.96	27.90	POSITIVE
F4	21.29	30.01	29.85	30.15	POSITIVE
F5	20.81	26.92	27.17	27.31	POSITIVE

Infectious pancreatic necrosis virus (IPNV)

Pool Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
P1	16.12	37.37	37.38	37.39	POSITIVE

Candidatus Branchiomonas cysticola

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	22.21	22.60	22.63	22.65	POSITIVE
F2	21.83	20.91	20.91	20.98	POSITIVE
F3	22.04	21.80	21.73	21.78	POSITIVE
F4	20.48	19.35	19.85	20.35	POSITIVE
F5	20.96	20.62	21.06	20.25	POSITIVE

Candidatus Piscichlamydia slamonis

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	22.21	36.32	35.88	36.38	POSITIVE
F2	21.83	34.42	34.19	34.75	POSITIVE
F3	22.04	35.88	35.76	36.20	POSITIVE
F4	20.48	33.51	33.61	33.13	POSITIVE
F5	20.96	34.24	34.82	34.32	POSITIVE

Candidatus Syngnamydia salmonis

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	22.21	27.26	27.27	27.29	POSITIVE
F2	21.83	26.17	25.97	26.15	POSITIVE
F3	22.04	26.88	26.89	26.82	POSITIVE
F4	20.48	28.31	28.25	28.49	POSITIVE
F5	20.96	27.93	27.58	27.80	POSITIVE

Salmonid alphavirus (SAV)

Pool Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
P1	15.65	21.53	21.49	21.57	POSITIVE

In February 2018, the Global Alliance Against Industrial Aquaculture published site specific disease data (obtained via FOI from the Scottish Government) for salmon farms operated by

Scotland's three largest companies (Marine Harvest, Scottish Sea Farms & the Scottish Salmon Company).

Salmon Gill poxvirus, Paranucleospora theridion, gill pathology, complex gill issues, Vibrio anguillarum, Proliferative Gill Disease, Amoebic Gill Disease, Pancreas Disease, fungus, Sardiomyopathy Syndrome, Haemorrhagic Smolt Syndrome, Heart & Skeletal Muscle Inflammation, Enteric Redmouth Disease and Anaemia were reported during 2017.

Data obtained via Freedom of Information from the Scottish Government revealed that Scottish salmon farms during 2017 were not only riddled with lice but also disease-ridden.

Read in detail via Hard Evidence: Dossier of Data on Lice, Diseases & Mortalities at Scottish Salmon Farms

However, the sampling and testing regime for the FHI 'Case Information' reporting since 2013 appears haphazard. For example, Case # 2018-0078 (The Scottish Salmon Company's

Tarbert South site in Loch Fyne) tested five samples for PRV in addition to other diseases and viruses:

Case No:	2018-0078			Date of visit:	21/03/2018		
Site No:	FS0767			Inspector:	JET		

Results Summary	Freq.	Date of Notification						
		Database	Insp	Phone	Insp	Writing	Insp	2nd Insp
MG_IHN	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG_IPN	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG_ISA	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG_SAV	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG_VHS	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG_PMV	0/1	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
MG_PRV	1/1	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_PRV	1/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_SULC	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_SKIN	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_HPAT	1/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_ADHE	5/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_PMCH	5/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_LPAT	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
BACT_VVIS	5/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
BACT_VSPE	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW

The March 2019 report cited:

- "Haemorrhagic necrosis of skeletal muscle", "marked red skeletal muscle degeneration" and lesions on the flank including "a lesion on the ventral surface through which the heart was exposed" reported at The Scottish Salmon Company's Tarbert South site in Loch Fyne in March 2018 (positive tests reported for PRV, Moritella vicosa/Winter Ulcer disease and Vibrio).

Yet Case # 2018-0507 (Nevis C operated by Scottish Sea Farms) does not appear to have tested for PRV at all and only tested two samples for other diseases and viruses:

Case No:	2018-0507		Date of visit:	11/10/2018			
Site No:	FS0546		Inspector:	WJM			
Results Summary	Freq.	Date of Notification					
		Database	Insp	Phone	Insp	Writing	Insp	2nd Insp
MG_IPN	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
MG_VHS	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
MG_IHN	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
MG_ISA	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
MG_SAV	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
AGD QPCR	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
P theridion QPCR	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
Salmon gill pox QPCR	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
Complex gill disease histo	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
AGD histo	1/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
gill pathology	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
post mortem changes	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
PSFL	1/2	30/10/2018	WJM	31/10/2018	WJM	02/11/2018	WJM	SAE

Read in full via ["The State of Scottish Salmon Farming in 2018"]

'Mortality Information' reported by the FHI between March 2017 and November 2018 in relation to 101 mortality events involving over 1.6 million morts at Mowi (formerly Marine Harvest) sites referenced Cardiomyopathy Syndrome (CMS), Anaemia, Piscine Orthoreovirus (PRV), Pasteurella skyensis, Proliferative Gill Disease (PGD), Amoebic Gill Disease (AGD), Pancreas Disease (PD) and complex gill issues.

For example, here's various cases including CMS, PRV, Pasteurella skyensis, AGD, PD and PGD reported by the FHI at Mowi (formerly Marine Harvest) sites in 2017 and 2018:

Marine Harvest Site Name	Date reported:	Mortality rate recorded(%):	If explained, select reason(s):	If unexplained, select observations	Total mortality during event (if available):	Additional information (e.g. action taken):
Ardintoul	22/11/2017	5.63	CMS, Complex gill issues	General Anaemia	51592	Observed a decrease in appetite prior to increase in mortality levels. Combination of factors - fish have tested positive to CMS, PRV and complex gill issues. Cause recorded as anaemia by company
Ardintoul	22/11/2017	2.58	CMS, Complex gill issues	General Anaemia	22330	Observed a decrease in appetite prior to increase in mortality levels. Combination of factors - fish have tested positive to CMS, PRV and complex gill issues. Cause recorded as anaemia by company
Ardintoul	22/11/2017	1.5	CMS, Complex gill issues	General Anaemia	12502	Observed a decrease in appetite prior to increase in mortality levels. Combination of factors - fish have tested positive to CMS, PRV and complex gill issues. Cause recorded as anaemia by company
Ardintoul	22/11/2017	1.4	CMS, Complex gill issues	General Anaemia	11822	Observed a decrease in appetite prior to increase in mortality levels. Combination of factors - fish have tested positive to CMS, PRV and complex gill issues. Cause recorded as anaemia by company
Invasion Bay	25/04/2018	1.43	CMS		7352	Samples taken confiming CMS
Camas Glas	25/04/2018	1.4	P skyensis		7283	Company vet took samples, confirmed diagnosis, antibiotic administered to affected population
Camas Glas	25/04/2018	1.2	P skyensis		6716	Company vet took samples, confirmed diagnosis, antibiotic administered to affected population
Loch Alsh (Sron)	11/10/2017	1.02	CMS		6679	Company vet informed
MacLean's Nose	12/06/2018	2.28	CMS		4812	P Skyensis also diagnosed on site in January.

MacLean's Nose	12/06/2018	1.09	CMS		2345	P Skyensis also diagnosed on site in January.
MacLean's Nose	12/06/2018	1.3	CMS		1955	P Skyensis also diagnosed on site in January.
North Shore	18/10/2017	1.26	AGD, Complex gill issues, PD, PGD			Samples submitted to FVG
North Shore	18/10/2017	1.77	AGD, Complex gill issues, PD, PGD			Samples submitted to FVG
North Shore	18/10/2017	4.9	AGD, Complex gill issues, PD, PGD			Samples submitted to FVG
North Shore	18/10/2017	2.87	AGD, Complex gill issues, PD, PGD			Samples submitted to FVG
North Shore	18/10/2017	2.65	AGD, Complex gill issues, PD, PGD, Pasteurella skyensis			Samples submitted to FVG

Read more via Mowi's Disease-Ridden Mortalities - 1.6 million+ in 101 incidents (2017-2018)

Does "samples submitted to FVG" mean that samples are handled private by the Fish Vet Group rather than tested by the FHI and reported publicly via 'Case Information'?

'Mortality Information' reported by the FHI between 2017 and January 2019 in relation to 300 mortality events at The Scottish Salmon Company involving over 2.46 million morts referenced Amoebic Gill Disease (AGD), Salmonid Alphavirus (SAV), Pancreas Disease (PD), haemorrhagic smolt syndrome (HSS), Cardiomyopathy Syndrome (CMS), Anaemia, Fungus, Vibrio anguillarum, Proliferative Gill Disease (PGD) and Enteric Redmouth Disease (ERM).

Site Name	Start dat	Mortality rate recorded(%	If explained, select reason(s):	Total mortality during event (if available):	Additional information (e.g. action taken):
Vuiabeag	04/09/2017	10.37	AGD, PD, Treatment	97534	
Sgian Dubh	01/08/2016	6.1	treatment	68123	Post salmosan, complex gill issues, lice - accelerated harvest
Loch Odhairn(Gravir)	24/07/2017	9.64	AGD, Complex gill issues, Treatment	64872	Severe gill issues with high levels of AGD present. H2O2 treatment at end of week 29. FW treatment planned for 12/08/17. Vet has been attending weekly and will attend FW treatment.
Loch Odhairn(Gravir)	24/07/2017	9.64	AGD, Complex gill issues, Treatment	64872	Severe gill issues with high levels of AGD present. H2O2 treatment at end of week 29. FW treatment planned for 12/08/17. Vet has been attending weekly and will attend FW treatment.
Meall Mhor Loch Fyne	17/10/2016	4.1	PD, Treatment	49116	Post h202 treatment, complex gill issues and PD runts 2 treatments in period one bath and one hydrolicer
Taranaish	06/08/2016	3.12	Treatment	46000	Post lice treatment, fallow two weeks later
Druimyeon Bay	13/11/2017	8.69	post treatment hydrolicer losses, handling, CMS.	45089	further hydroliser treatment planned, fish on functional feed, harvesting.
North Uiskevagh	03/09/2016	2.5	AGD, Treatment	41000	Complex gill issues, post H202 treatment, AGD
Russel Burn	17/07/2017	4.42	Fungus	40873	Mortality event attributed to fungus post vaccination. Affected stock were treated with formalin and numbers have dropped.

Read more via Mortalities & Disease at The Scottish Salmon Company (2017-2018)

Scottish Salmon Watch is concerned that imported salmon eggs are not tested at all for infectious diseases, viruses, pathogens and parasites. For example, this Fish Health

inspection report for January 2018 (Cases 20180003-20180060 - PDF online here p58-62) does not refer to any testing or report any sampling results:

Case No:	2018-0009			Date of visit:	11/01/2018
Time spent on site:	1h			Main Inspector:	DJT
Site No:	fs0264	Site Name:	Inverpolly		
Business No:	FB0132	Business Name:	Finfish Ltd		
Case Types:	1 IMP	2	3	4	5 6
Water Temp (°C):		Thermometer No:		FHI 045 completed	
Observations:		Region: HI		Water type: F	CoGP MA
Dead/weak/abnormally behaving fish present?	N/A	If yes, see additional information/clinical score sheet.			
Clinical signs of disease observed?	N/A	If yes, see additional information/clinical score sheet.			
Gross pathology observed?	N/A	If yes, see additional information/clinical score sheet.			
Diagnostic samples taken?	N/A				

Additional Case Information:

Inspection at Aberdeen Airport of three boxes of Atlantic salmon containing 87,639 ova from Norway certificate NO-0023283/ INTRA.NO.2018.0000057 inspected, no issues to report. Ova imported by MH (Scotland).

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The Scottish Government
Riaghaltas na h-Alba

[redacted]
Finfish Ltd
Inverpolly
Ullapool
Ross-shire
IV26 2YB
[redacted]

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0132	**DATE OF VISIT**	11/01/2018
SITE NO	FS0264	**SITE NAME**	Inverpolly
INSPECTOR	David Tomlinson	**CASE NO**	20180009

Inspection of a consignment introduced into Scotland

An inspection was conducted at Aberdeen Airport on a consignment of 87,639 Atlanntic salmon ova introduced into Scotland from Norway by Marine Harvest (Scotland) Ltd.

The accompanying health certificate met the requirements of the Aquatic Animal Health (Scotland) Regulations 2009 and the Trade in Animals and Related Products (Scotland) Regulations 2012.

The consignee must retain the original health certificate for at least 3 years.

Please contact myself or the duty inspector should you require any further information or have any queries regarding this report.

Signed: [redacted] Date: 11/01/2018

Fish Health Inspector

Another FHI inspection in February 2018 (PDF online here - p254-255) refers to an "import inspection" and disinfection but does not provide any details on testing or sampling results:

Case No:	2018-0045			Date of visit:	08/02/2018
Time spent on site:	1h			Main Inspector:	DJT
Site No:	FS0681	Site Name:	Ormsary Hatchery		
Business No:	FB0061	Business Name:	Landcatch Natural Selection Ltd		
Case Types:	1 IMP	2	3	4	5 6
Water Temp (°C):		Thermometer No:		FHI 045 completed	
Observations:		Region:	ST	Water type:	F CoGP MA

Dead/weak/abnormally behaving fish present?	n	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	n	If yes, see additional information/clinical score sheet.
Gross pathology observed?	N	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	n	

Additional Case Information:

An import inspection was conducted on a consignment of 1,500,000 Atlantic salmon ova imported from the Kindrum Freshwater Unit operated by Marine Harvest (Ireland) Ltd. Ova was disinfected prior to being laid down for hatching, the health certificate (INTRA.IE.2018.0001697/EXP-2381) was present and completed correctly. No issues raised.

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Scottish Government
Riaghaltas na h-Alba
gov.scot

[redacted]
Landcatch Natural Selection Ltd
Ormsary Fish Farm
Lochgilphead
Argyll
PA31 8PE
[redacted]

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0061	**DATE OF VISIT**	08/02/2018
SITE NO	FS0681	**SITE NAME**	Ormsary Hatchery
INSPECTOR	David Tomlinson	**CASE NO**	20180045

Inspection of a consignment introduced into Scotland

An inspection was conducted at Ormsary Hatchery on a consignment of 1,500,000 Atlantic salmon ova introduced into Scotland from Kindrum Freshwater Unit, operated by Marine Harvest (Ireland) Ltd.

The accompanying health certificate met the requirements of the Aquatic Animal Health (Scotland) Regulations 2009 and the Trade in Animals and Related Products (Scotland) Regulations 2012.

The consignee must retain the original health certificate for at least 3 years.

Please contact myself or the duty inspector should you require any further information or have any queries regarding this report.

Signed: [redacted] Date: 16/02/2018

Fish Health Inspector

It is known via the FHI 'Case Information' (data available since 2013) that salmon farms are using imported ova from companies with known disease problems such as AquaGen in Norway; Stofnfiskur in Iceland and Marine Harvest in Norway.

Add Fish/Pools - click

	Pool/Fish No			
	Fish nos	1-8	9-16	17-24
	Pool Group			
Stock Details	Species	SAL	SAL	SAL
	Average weight	30g	30g	30g
	Sex	N/A	N/A	N/A
	Water Type	FW	FW	FW
	Stock Origin	Aquagen Norway	Aquagen Norway	Aquagen Norway
	Facility No	C6	D2	E8

Add Fish/Pools - click

	Pool/Fish No			
	Fish nos	1-6	7-12	13-18
	Pool Group			
Stock Details	Species	SAL	SAL	SAL
	Average weight	70g	70g	70g
	Sex	N/A	N/A	N/A
	Water Type	FW	FW	FW
	Stock Origin	Marine Harvest Norway Mowi	Marine Harvest Norway Mowi	Marine Harvest Norway Mowi
	Facility No	4A	3B	2C

Add Fish/Pools - click

	Pool/Fish No			
	Fish nos	1-6	7-12	13-18
	Pool Group			
Stock Details	Species	SAL	SAL	SAL
	Average weight	0.0600	0.0600	0.0600
	Sex	N/A	N/A	N/A
	Water Type	FW	FW	FW
	Stock Origin	Stofnfiskur	Stofnfiskur	Stofnfiskur
	Facility No	R1-1	R2-1	R2-2

There is also evidence for the spread of disease via infected smolts in the hatchery to farmed salmon transferred to sea cages. For example, FHI Case Information for January to March 2018 suggests the transfer of Enteric Redmouth Disease (ERM) from The Scottish Salmon Company's Kinlochmoidary Hatchery to a salmon farm in Loch Fyne (online here - p144):

Case No:	2018-0114	Date of visit:	27/03/2018
Time spent on site:	6 hrs	Main Inspector:	SAE
Site No:	FS0683	Site Name:	Gob a Bharra Loch Fyne
Business No:	FB0169	Business Name:	The Scottish Salmon Company

Case Types: 1 ECI 2 CNI 3 SLI 4 VMD 5 6

Water Temp (°C): 6.9 Thermometer No: T205 FHI 045 completed

Observations: Region: ST Water type: S CoGP MA M-42

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	N	If yes, see additional information/clinical score sheet.
Gross pathology observed?	N	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	N	

Mortality Records

1. Mortality records available for inspection?	Y
2. How are mortalities disposed of?	Whole fish - Dundas Chemicals
If other detail:	
3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	between 250-400 morts per week for the site
5. Evidence of recent increased/atypical mortalities?	Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	slight increase with failed smolts dying post treatment
6. Any other peaks in mortality during period checked?	Y
If yes, detail:	increased grumbling morts on input due to ERM 400-3,900 per week for approximately 10 weeks post input
7. Have increased (unexplained) mortalities been reported to vet or FHI?	Y
If yes, detail action:	ERM diagnosed in October 2017
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	Y

Results of Surveillance

1. Has any animal health surveillance been carried out by, or on behalf of, the business?	Y
2. If yes, are results available for inspection?	Y
3. Any significant results?	Y
If yes, detail (if not detailed under recent disease problems).	ERM

Oct 2017: confirmed ERM as a strong possibility: January 2018: low level Y. ruckeri isolated amongst mixed growth

Records checked between: 15/06/2016 - 27/3/18

Case no: 2018-0114 Site No: FS0683 Date of visit/ Sampling: 27/03/2018 27/

Priority samples: VI BA PA MG HI

Time sampling starts/ends: 18:00:00 18:30:00 Inspector: SAE VMD No. 15

Environmental conditions: 1 Indoors 2 3 4 5

Summary samples HIST BA MG VI PA Total Samples

Add Fish/Pools - click

	Pool/Fish No												
	Fish nos	1	2	3	4	5	6	7	8	9	10	11	12
	Pool Group												
Stock Details	Species	SAL	SAL	SAL	SAL	SAL	SAL	SAL	SAL	SAL	SAL	SAL	SAL
	Average weight	900g	900g	900g	900g	900g	900g	900g	900g	900g	900g	900g	900g
	Sex	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Water Type	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
	Stock Origin	Kinlochmoidart Hatchery	Kinlochmoidart Hatchery	Kinlochmoidart Hatchery	Kinlochmoidart Hatchery	Kinlochmoidart Hatchery	Kinlochmoidart Hatchery	Kinlochmoidart Hatchery	Migdale Loch Shin	Migdale Loch Shin	Migdale Loch Shin	Migdale Loch Shin	Kinlochmoidart Hatchery
	Facility No	1	1	1	1	2	2	2	3	3	3	3	10

Data supplied via FOI/18/01868 and FOI/18/01893 by the Scottish Government in August 2018 reported four 'Mortality Event Reports' due to ERM at the Kinlochmoidart Hatchery operated by The Scottish Salmon Company during June and July 2018:

Mortality Event Report

Mortality Event ID	MRT00691
Site Name:	Kinlochmoidart Hatchery
Site No:	FS0146
Start date of mortality:	04/06/2018
Period of mortality:	Weekly
Percentage mortality:	2.58
Explained/unexplained:	Explained
Reason (if explained):	ERM, stress from spikes in water temperatures
Business Name:	The Scottish Salmon Company
Business Number:	FB0169
Species:	SAL
Water Type:	FW
Weight (site average):	5g to smolting
Weight (affected population average):	8g
Age:	2018 s0
Estimated number of fish lost:	Not provided
Additional information:	Treated with antibiotics
MS action:	

Mortality Event Report

Mortality Event ID	MRT00692
Site Name:	Kinlochmoidart Hatchery
Site No:	FS0146
Start date of mortality:	11/06/2018
Period of mortality:	Weekly
Percentage mortality:	2.46
Explained/unexplained:	Explained
Reason (if explained):	ERM, stress from spikes in water temperatures
Business Name:	The Scottish Salmon Company
Business Number:	FB0169
Species:	SAL
Water Type:	FW
Weight (site average):	5g to smolting
Weight (affected population average):	9g
Age:	2018 s0
Estimated number of fish lost:	Not provided
Additional information:	Treated with antibiotics
MS action:	

Mortality Event Report

Mortality Event ID	MRT00693
Site Name:	Kinlochmoidart Hatchery
Site No:	FS0146
Start date of mortality:	25/06/2018
Period of mortality:	Weekly
Percentage mortality:	1.69
Explained/unexplained:	Explained
Reason (if explained):	ERM, stress from spikes in water temperatures
Business Name:	The Scottish Salmon Company
Business Number:	FB0169
Species:	SAL
Water Type:	FW
Weight (site average):	5g to smolting
Weight (affected population average):	10g
Age:	2018 s0
Estimated number of fish lost:	Not provided
Additional Information:	Treated with antibiotics
MS action:	

Mortality Event Report

Mortality Event ID	MRT00701
Site Name:	Kinlochmoidart Hatchery
Site No:	FS0146
Start date of mortality:	02/07/2018
Period of mortality:	Weekly
Percentage mortality:	1.48
Explained/unexplained:	Explained
Reason (if explained):	ERM, stress from spikes in water temperatures
Business Name:	The Scottish Salmon Company
Business Number:	FB0169
Species:	SAL
Water Type:	FW
Weight (site average):	5g to smolting
Weight (affected population average):	10-12g
Age:	2018 s0
Estimated number of fish lost:	Not provided
Additional Information:	Second antibiotic treatment administered and mortalities now below reporting levels. Plan to cull some of the worst affected tanks
MS action:	No further action, mortalities reducing post treatment and mortality level has reduced below reporting level for the following week

Please note that ERM = Enteric Redmouth Disease which is caused by Yersinia ruckeri (Yersinia pestis is more commonly known as the Black Death Plague). A scientific paper - "Genetic Evidence of Vertical Transmission and Cycling ofYersinia ruckeri in Hatchery-Origin Fall Chinook SalmonOncorhynchus tshawytscha"- published in 2015 reported that:

"Presence of Y. ruckeri DNA in ovarian fluids and unfertilized eggs indicates that vertical transmission of the pathogen from females to their progeny is possible."

In other words, ERM could have originated in the imported ova before being spread via infected smolts in the hatchery to sea cages. Scottish Ministers should be aware of a FOI reply by the Scottish Government in September 2018 (FoI-18-01553) which details imported ova to the Kinlochmoidart Hatchery from Iceland and Norway (sourced from companies with reported disease issues):

Date	Site of destination	Operator	Consignee on certificate (if different from operator)	Species	Stage	Number	Source Country	Source Company
11/01/2017	Kinlochmoidart Hatchery	Sunbeam Aquaculture	The Scottish Salmon Company	Salmon	Ova	785,250	Norway	AquaGen AS
16/02/2017	Kinlochmoidart Hatchery	Sunbeam Aquaculture	The Scottish Salmon Company	Salmon	Ova	562,500	Norway	AquaGen AS
22/11/2017	Kinlochmoidart Hatchery	The Scottish Salmon Company		Salmon	Ova	1,522,500	Iceland	Stofnfiskur
01/03/2018	Kinlochmoidart Hatchery	The Scottish Salmon Company		Salmon	Ova	615,000	Iceland	Stofnfiskur

Data supplied via FOI/18/01868 and FOI/18/01893 by the Scottish Government in August 2018 also suggests the spread of Infectious Pancreatic Necrosis (and potentially Salmonid Alphavirus/Pancreas Disease) from Cooke Aquaculture's Furnace Hatchery on Loch Fyne to a Cooke-operated salmon farm in Shetland (Balta Isle):

Mortality Event Report

Mortality Event ID	MRT00595
Site Name:	Balta Isle
Site No:	FS0717
Start date of mortality:	07/01/2018
Period of mortality:	Weekly
Percentage mortality:	1.6
Explained/unexplained:	Explained
Reason (if explained):	IPN
Business Name:	Cooke Aquaculture Scotland Ltd
Business Number:	FB0095
Species:	SAL
Water Type:	S
Weight (site average):	<750g
Weight (affected population average):	340g
Age:	2017 S0
Estimated number of fish lost:	19025
Additional information:	Suspected IPN. Vet informed. Only affected 1 batch of fish originating from Furnace. No action taken. Mortality rates dropped below reporting threshold after 3rd week.
MS action:	Picked up during inspection (2018-0059). Fish appeared healthy on inspection. Mortality levels 1% for whole of Feb. 18. Company reminded that motalities above certain %'s are to be reported to FHI.

Mortality Event Report

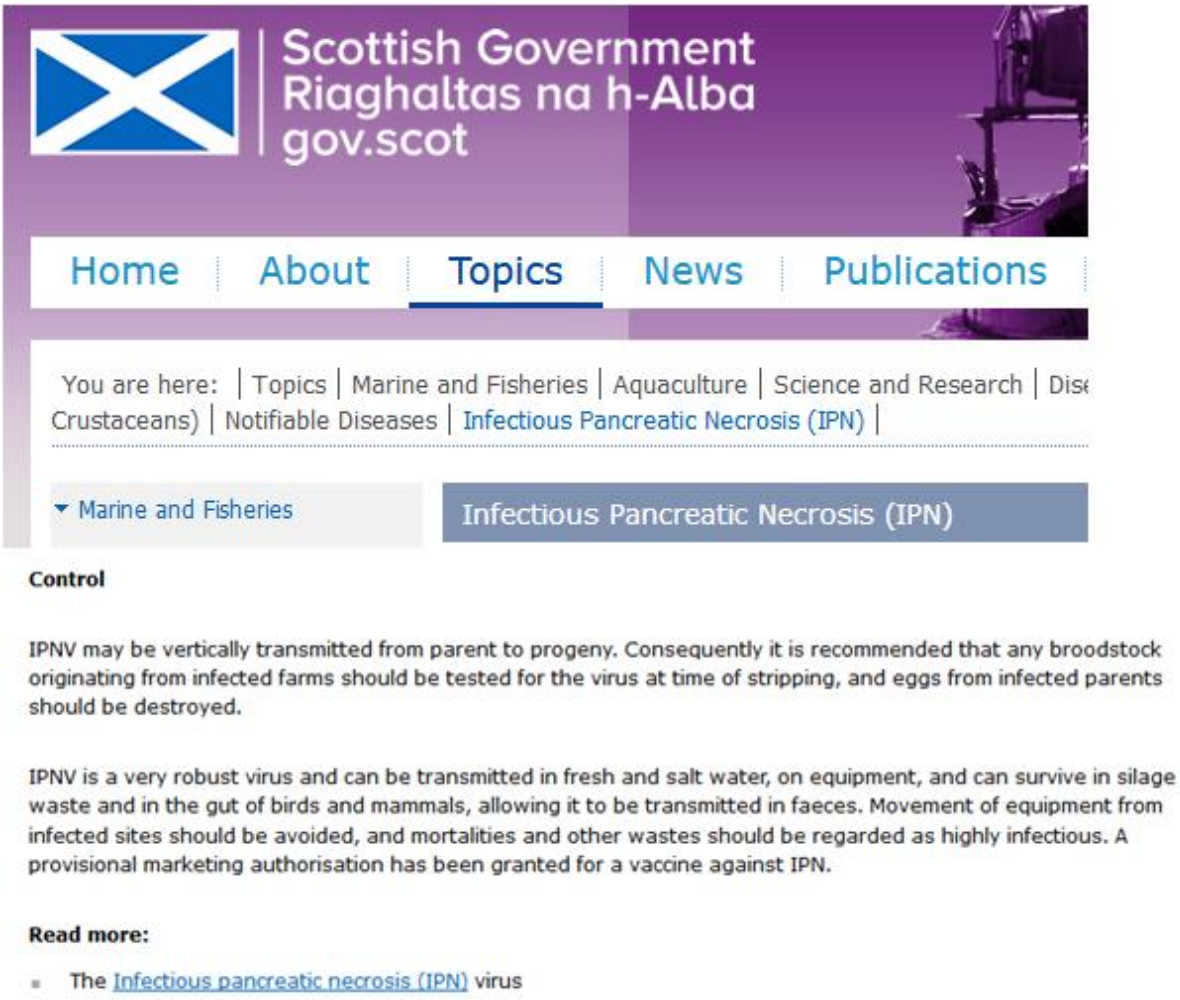
Mortality Event ID	MRT00649
Site Name:	Furnace (FW)
Site No:	FS0339
Start date of mortality:	21/05/2018
Period of mortality:	Weekly
Percentage mortality:	2.16
Explained/unexplained:	Explained
Reason (if explained):	IPN
Business Name:	Cooke Aquaculture (Freshwater) Ltd
Business Number:	FB0235
Species:	SAL
Water Type:	FW
Weight (site average):	<750g
Weight (affected population average):	15g
Age:	S1 2019
Estimated number of fish lost:	41122
Additional information:	Vets have attended site, samples taken, histology analysis shows evidence of IPN. Site is increasing water temperature to 21°C.
MS action:	Diagnostic samples taken 2018-0214 (31/5/18) and numbers updated by SAE.

Mortality Event Report

Mortality Event ID	MRT00651
Site Name:	Furnace (FW)
Site No:	FS0339
Start date of mortality:	28/05/2018
Period of mortality:	Weekly
Percentage mortality:	11.67
Explained/unexplained:	Explained
Reason (if explained):	PD
Business Name:	Cooke Aquaculture (Freshwater) Ltd
Business Number:	FB0235
Species:	SAL
Water Type:	FW
Weight (site average):	<750g
Weight (affected population average):	15g
Age:	S1 2019
Estimated number of fish lost:	163135
Additional information:	Site suspected IPN. Temperature had been increased to try and kill of the virus. From diagnostic (2018-0214) SAV positive result (subtype 1).
MS action:	Diagnostic samples taken 2018-0214 (31/5/18), mortality has come down for week 4-10 June to 0.55%.

IPN = Infectious Pancreatic Necrosis which can kill 80% of infected fish. The Scottish Government reports that:

"IPNV may be vertically transmitted from parent to progeny. Consequently it is recommended that any broodstock originating from infected farms should be tested for the virus at time of stripping, and eggs from infected parents should be destroyed."



Note that PD = Pancreas Disease and SAV = Salmonid Alphavirus. Please note that a scientific study published in 2009 - Studies on the possibility of vertical transmission of Norwegian salmonid Alphavirus in production of Atlantic salmon in Norway - reported:

"At two sites in northern Norway that had received eggs from broodfish companies in Hordaland County, western Norway, 2-4-g fry were positive for SAV3. Hence, it cannot be excluded that vertical transmission could have contributed to the presence of SAV3 in northern Norway."

FHI Case Information for April to June 2018 (Cases 20180166-20180240 - PDF online here p237-250) reported "pathology consistent with IPN and potentially SAV" at Cooke Aquaculture's Furnace Hatchery on Loch Fyne in May 2018:

Case No:	2018-0214			Date of visit:	31/05/2018
Time spent on site:	4hrs			Main Inspector:	SAE
Site No:	FS0339	Site Name:	Furnace (FW)		
Business No:	FB0235	Business Name:	Cooke Aquaculture (Freshwater) Ltd		

Case Types:	1	REP	2	DIA	3		4		5		6	

Water Temp (°C):	20.5	Thermometer No:	Site	FHI 045 completed	
Observations:		Region:	ST	Water type:	F

CoGP MA

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

Additional Case Information:

Company suspects IPN (histology) and has raised the water temperature to 21C for 48 hours, which should kill the virus. 48 hours for Site A are completed the morning of the visit. Issues started in tanks on site C, with histology taken that showed IPN. Water temperature was raised to 21C which seemed to bring mortalities down. Then site A started to experience mortalities, further histology was taken and again showed IPN. Water temperature at site A raised to 21C.

All 3 tanks of site A inspected, one tank on site B inspected. Samples collected from all 3 of the tanks at site A.

Recent (last 4 wks) disease problems?	Y
If yes, detail:	Suspect IPN

Mortality Records

1. Mortality records available for inspection?	Y
2. How are mortalities disposed of?	Ensiled - on site
If other detail:	Hazco collect for incineration
3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	w/b7/5/18 14,349 morts per site at 0.78%; w/b14/5/18 13,096 morts per site at 0.71%; w/b 21/05/2018 41,122 morts per site at 2.16%; w/b 28/5/18 122,733 morts per site at 6.9%
5. Evidence of recent increased/atypical mortalities?	Y

If yes, facility nos/no mortality per facility/no stock per facility/reason:

Site A worst affected 3 tanks stocked there and all 3 tanks are experiencing very high mortalities, Site B low mortalities and Site C slightly elevated mortalities. Site A between 40,000-36,000 for the last 3 days. Tank 1 and 4 morts slowly decreasing, tank 2 slightly increasing.

6. Any other peaks in mortality during period checked?	N
If yes, detail:	
7. Have increased (unexplained) mortalities been reported to vet or FHI?	Y
If yes, detail action:	Contacted Fish health department within Cooke
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	Y

Results of Surveillance

1. Has any animal health surveillance been carried out by, or on behalf of, the business?	Y
2. If yes, are results available for inspection?	Y
3. Any significant results?	Y
If yes, detail (if not detailed under recent disease problems).	pathology consistent with IPN and potentially SAV

some conflicting pathology finding from histology some consistent with SAV and some consistent with IPN.

Records checked between:	27/2/18 - 31/5/18

Add Fish/Pools - click							
	Pool/Fish No	F1	F2	F3	F4	F5	P1
	Fish nos	1	2	3	4	5	1-5
	Pool Group	P1	P1	P1	P1	P1	
Stock Details	Species	SAL	SAL	SAL	SAL	SAL	SAL
	Average weight	13g	13g	13g	13g	13g	13g
	Sex	N/A	N/A	N/A	N/A	N/A	N/A
	Water Type	FW	FW	FW	FW	FW	FW
	Stock Origin	Cairndow (Cooke)	Cairndow (Cooke)	Cairndow (Cooke)	Cairndow (Cooke)	Cairndow (Cooke)	
	Facility No	A4	A2	A2	A1	A1	

marinescotland science

Scottish Government
Riaghaltas na h-Alba
gov.scot

[redacted]
Cooke Aquaculture (Freshwater) Ltd
Crowness Road
Hatston Kirkwall
Orkney
KW15 1RG
[redacted]

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

Business No	FB0235	**Date of Visit**	31/05/2018
Site No	FS0339	**Site Name**	Furnace (FW)
Inspector	Svenja Elwenn	**Case No**	20180214

Section 1: Summary

The site was visited due to the notification of a mortality event on site. Five lethargic and moribund fish were removed for sampling from the worst affected tanks.

Histopathology examination revealed moderate, multifocal to diffuse, skeletal red muscle myositis and mild skeletal white muscle degeneration, mild cardiomyofibre degeneration and loss of pancreatic acinar tissue with minimal inflammatory response. These are some features resembling the pancreas disease (PD) condition. QPCR testing confirmed salmonid alphavirus (SAV), the causative agent of PD and genotype identification determined subtype I from the partial sequencing of E2 gene.

Section 2: Case Detail

Observations

The above site was attended by the Fish Health Inspectorate following the notification of a mortality event on 29 May 2018. The business suspected an outbreak of infectious pancreatic necrosis (IPN) was the cause of the increased mortality. Measures were taken to raise the water temperature to 21˚C for 48 hours to combat the suspected IPN outbreak. Mortality on the site for week 21 was 2.16% and 11.67% for week 22, the week of the visit. Mortalities in the week following the inspection fell to 0.55% for the site. At the time of the visit mortalities were elevated on site C, but particularly high on site A and five fish were collected from the three tanks stocked on site A. Large numbers of lethargic, dead and dying fish were observed in the screened outflow basin of each of the three tanks and five moribund and lethargic fish were removed for diagnostic sampling.

R09

Marine Laboratory, 375 Victoria Road, Aberdeen, AB11 9DB
Tel - 0131 244 3498 Fax - 0131 244 0944 Email - ms.fishhealth@gov.scot
Website - www.gov.scot/Topics/marine/science

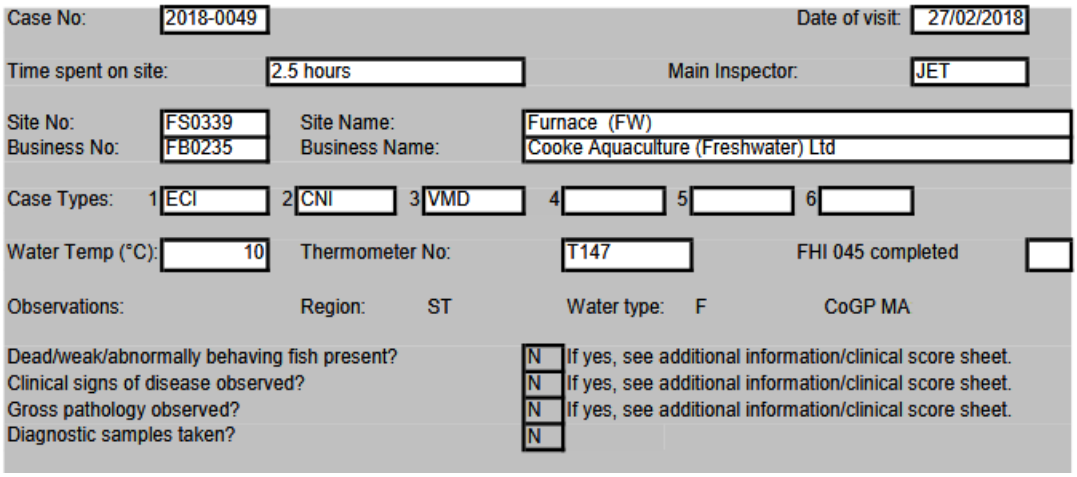
Externally, F3 showed some haemorrhaging to the base of the pectoral fin and had flared opercula. The gills appeared zoned in all five fish. Internally, bloody ascites were observed in F1 and F5. Petechial haemorrhaging on the liver and the pyloric caeca was observed in F4 and F5, with F4 also showing a darker than normal liver colour. Yellow pseudo faeces were present in F2-F3, with no food present in the guts of F1, F4-F5. The kidney appeared slightly grey in F1 and F5.

Virology: Tissue samples were tested for segments of nucleic acid indicative of the presence of the pathogens specified below using real-time PCR (QPCR).

Salmonid alphavirus (SAV)

Pool Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
P1	15.65	21.53	21.49	21.57	POSITIVE

FHI Case Information for January to March 2018 (Cases 20180003-20180060 - PDF online here) also details "historic issues with salmon gill pox on site" at Cooke Aquaculture's Furnace hatchery on Loch Fyne with salmon fry sourced from Cooke Aquaculture's nearby Cairndow Hatchery.



Case No: 2018-0049 Date of visit: 27/02/2018

Time spent on site: 2.5 hours Main Inspector: JET

Site No: FS0339 Site Name: Furnace (FW)
Business No: FB0235 Business Name: Cooke Aquaculture (Freshwater) Ltd

Case Types: 1 ECI 2 CNI 3 VMD 4 5 6

Water Temp (°C): 10 Thermometer No: T147 FHI 045 completed

Observations: Region: ST Water type: F CoGP MA

Dead/weak/abnormally behaving fish present?	N	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	N	If yes, see additional information/clinical score sheet.
Gross pathology observed?	N	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	N	

Additional Case Information:

Next input of fry due in from Cairndow, site may no longer hatch own eggs due to historic issues with salmon gill pox on site.
Fish vaccinated with PD7 vaccine January 2018
Fish sampled for VMD appeared healthy

Add Fish/Pools - click

	Pool/Fish No							
	Fish nos	1-8	9-16	17-20	21-24	25-28	29-32	33-36
	Pool Group							
Stock Details	Species	SAL	SAL	SAL	SAL	SAL	SAL	SAL
	Average weight	0.1400	0.1400	0.1400	0.1400	0.1400	0.1400	0.1400
	Sex	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Water Type	FW	FW	FW	FW	FW	FW	FW
	Stock Origin	Cairndow Hatchery	Cairndow Hatchery	Cairndow Hatchery	Cairndow Hatchery	Cairndow Hatchery	Cairndow Hatchery	Cairndow Hatchery
	Facility No	B3	A4	A3	A2	A1	B2	B1

FHI Case Information for July to September 2018 (Cases 20180410-20180511 - PDF online here) detailed 117,000 morts at Cooke Aquaculture's hatchery at Furnace on Loch Fyne in August 2018 due to Gill Pox Virus.

Additional Case Information:

Site inspected following report from company of increased mortality.
Gill pox confirmed on site by PCR, samples taken by company biologists. Previous weeks mortality prior to mortality event were 0.1% - 0.2%. Vets due on site for pre-transfer inspection later this week. Transfer date pushed back 1 week, fish due to be sent to sites in Unst.
Tanks that were least affected during mortality event held smaller fish (~50g), these fish had been affected by PD earlier in the year.
No apparent environmental issues picked up during mortality event.
No morts or signs of clinical disease observed during inspection of fish on site, feed response of fish was good.

Recent (last 4 wks) disease problems?	Y
If yes, detail:	Gill pox virus - increased mortality

Mortality Records

1. Mortality records available for inspection?	Y
2. How are mortalities disposed of?	Whole fish - Secanim, Widnes
If other detail:	
3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	117461 across site (8.7%)
5. Evidence of recent increased/atypical mortalities?	Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	
w/b 13/08 Section B tank 3 - 67,335 (4.41% of site) mortalities, attributed to gill pox, all other tanks on site between 100 - 1000 mortalities during the week. w/b 20/08 Section B tank 3 mortalities dropped to 610/week, Section B as a whole had 1465 mortalities for the week. w/b 20/08 Section A mortality of 43,781 (3.1% of site) . Similar mortality across tanks 2 - 4 (1000-3000/day). Mortality has dropped since 25/08 to 0-200/day across the whole site.	
6. Any other peaks in mortality during period checked?	N
If yes, detail:	
7. Have increased (unexplained) mortalities been reported to vet or FHI?	Y
If yes, detail action:	Reported to FHI.
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	Y

A FOI reply by the Scottish Government in September 2018 (FoI-18-01553) reveals that the Cairndow Hatchery imported 6.8 salmon ova in 2017 and 2018 (up to July) from Marine Harvest in Ireland and Norway and Stofnfiskur in Iceland:

Date	Site of destinatio	Operator	Consignee on certificate (if different from operator)	Number	Source Country	Source Company
16/02/2017	Cairndow Hatchery	Lakeland (Cairndow) Ltd	Cooke Aquaculture Freshwater Ltd	1,400,000	Rep of Ireland	Marine Harvest Ireland
08/11/2017	Cairndow Hatchery	Lakeland (Cairndow) Ltd	Cooke Aquaculture Freshwater Ltd	2,500,000	Iceland	Stofnfiskur
21/02/2018	Cairndow Hatchery	Lakeland (Cairndow) Ltd	Cooke Aquaculture Freshwater Ltd	1,100,000	Rep of Ireland	Marine Harvest Ireland
20/03/2018	Cairndow Hatchery	Lakeland (Cairndow) Ltd		1,800,000	Norway	Marine Harvest Norway

Read more via Easter Egg Ban for 'Scottish' Salmon?

Scientific Evidence for Vertical Transmission

Scottish Ministers should note a recent scientific paper - "Emerging Viruses in Aquaculture" - published in the February 2019 issue of Current Opinion in Virology.

ELSEVIER

Current Opinion in Virology

Volume 34, February 2019, Pages 97-103

Emerging viruses in aquaculture

Frederick SB Kibenge ✉

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Highlights

- There is a continuous emergence of viral diseases in aquaculture.
- Emergence of viral diseases in aquaculture may be driven by virus, animal host, environmental and/or anthropogenic factors.
- Examples of emerging viruses in aquaculture include rhabdoviruses, orthomyxoviruses, reoviruses, iridoviruses, nodavirus, and herpesvirus.
- Emergence of viral diseases in aquaculture can be curtailed at the farm level where prevention and control translate into sustainability.

The scientific paper includes:

Carrier status in global movement of live aquatic animals and their products

The potential for dissemination of aquatic viruses because of aquaculture and movements of live cultured aquatic animals or their eggs is extremely high where persistent viral infections occur in the absence of clinical disease (i.e. 'healthy carrier' aquatic animals/subclinical infections in aquatic animals). Although life-long infections are known to occur among herpesvirus infections and retrovirus infections, there are several other virus groups where infection is not cleared by the host and the virus persists in a carrier state including species susceptible to infection without displaying clinical signs, age-related resistance to virus infection (e.g. adult fish), and infection with virus strains of low pathogenicity. There could also be situations of persistent infections where the virus level falls below detectable levels but not completely cleared from the host. All such infected animals are considered 'healthy' and may pass regulatory inspections for movement and/or export. This would be expected not only for new emerging viruses like piscine orthoreovirus (PRV) and tilapia lake virus (TiLV), which have been in existence but unknown until they were discovered [1••], and diagnostic tools developed not only for their detection, but also for re-emerging viruses such as VHSV, infectious haematopoetic necrosis virus (IHNV), infectious pancreatic necrosis virus (IPNV), and infectious salmon anaemia virus (ISAV) that cause persistent viral infections associated with lower virus levels in affected fish that may be difficult to detect through routine surveillance programs [5]. Most recently, 8000 juvenile Atlantic salmon at a commercial hatchery in Washington State-USA had to be destroyed because they tested positive for a strain of PRV found in Iceland. The virus is considered to have originated from fish eggs imported from Iceland. The source company for the eggs reported that they have an optional service of screening against PRV customers may choose as an extra risk measure to avoid vertical transmission (Owen E, 2018. https://salmonbusiness.com/egg-supplier-responds-to-washington-prv-salmon-cull/). In both examples above of new emerging viruses and re-emerging viruses where broodstock would have been persistently infected, the viruses would be disseminated via broodstock, fry or smolt movements, or egg transport into disease free farms, zones or countries. Where apparently 'healthy' aquatic animals are delivered to processing plants, the viruses would be disseminated via global trade in aquaculture products. In areas where these viruses are enzootic, clinical disease may manifest with the introduction of virus in imported aquatic material as for example with IPNV in Ireland where all reported clinical outbreaks were associated with imported IPNV isolates. In case of IHNV, in European countries where the main mode of virus transfer is by trade in infected fish, IHNV may remain undetected once introduced on a farm site [5].

The scientific paper concludes:

Future perspectives

Aquaculture is important now and will continue in the future as a principal source of animal protein for human consumption, as will the global trade in live aquatic animals and their products. Aquatic animal viral diseases are inherent in aquaculture, and they continue to negatively impact aquaculture significantly. Considering that seafood is the most traded commodity globally, it, therefore, virtually impossible to have 'aquatic virus-leakproof' international borders. The implementation of strict biosecurity measures on aquaculture farms on land, in lakes and the sea, and in processing plants or other natural source for aquaculture helps to limit but does not eliminate the risk of dissemination of aquatic viruses. Biosecurity management will remain an on-going effort for the foreseeable future. The best options for keeping abreast of the continuous emergence of viral diseases in aquaculture are ideally at the farm level where better knowledge about the viral diseases and their improved diagnosis, inspection and surveillance programs translate into higher profits for the farmer and, therefore, motivation for a sustainable industry.

A scientific paper - "Indications for a vertical transmission pathway of piscine myocarditis virus in Atlantic salmon (*Salmo salar* L.)" - published in the March 2019 issue of the Journal of Fish Diseases also points to vertical transmission of piscine myocarditis virus (Cardiomyopathy Syndrome).

JOURNAL OF FISH DISEASES

ORIGINAL ARTICLE | Open Access

Indications for a vertical transmission pathway of piscine myocarditis virus in Atlantic salmon (*Salmo salar* L.)

Britt Bang Jensen, Stian Nylund, Julie Christine Svendsen, Paul-Martin R. Ski, Harald Takle

First published: 28 March 2019 | https://doi.org/10.1111/jfd.12990

Abstract

Losses due to cardiomyopathy syndrome (CMS) keep increasing in salmon-producing countries in the North-Atlantic. Recently, Piscine myocarditis virus (PMCV) has been detected in post-smolts shortly after sea-transfer, indicating a possible carry-over from the hatcheries. In addition, there are reports of prevalences of PMCV as high as 70%–90% in certain groups of broodfish, and a recent outbreak of CMS in the Faroe Islands has been linked to the importation of eggs from a CMS-endemic area. Thus, there is a need to investigate whether PMCV can be transmitted vertically from infected broodstock to their progeny. In the present study, samples from eggs, larvae, fingerlings and presmolt originating from PMCV-positive broodstock from two commercial Atlantic salmon producers were tested for PMCV. The prevalence of PMCV in the broodstock was 98% in the hearts, 69% in the roe and 59% in the milt. Piscine myocarditis virus was detected in all stages of the progeny until and including the 40 g stage. Piscine myocarditis virus was also detected in presmolt sampled for tissue tropism. This provides farmers with several options for minimizing the risk of transfer of PMCV from broodstock to progeny, including screening of broodstock and aiming to use only those that are negative for PMCV or have low levels of virus.

Scottish Ministers should not need to be reminded that Piscine Myocarditis virus (Cardiomyopathy Syndrome) has ravaged Scottish salmon farms since first being reported in 1995.

Another scientific paper - "Cardiomyopathy syndrome in Atlantic salmon *Salmo salar* L.: A review of the current state of knowledge" - published in the Journal of Fish Diseases in 2017 included:

6.2 Transmission routes and in-field disease spread

In vivo experiments have shown that PMCV is transmitted from Atlantic salmon injected with the virus to cohabitating fish. The virus shows increased replication over time in the cohabitants, who also develop cardiac changes typical of CMS (Haugland et al., 2011). In a field study from 2014, infection pressure was found to be one of the most important risk factors for disease diagnosis, underlining that CMS is usually spread horizontally, from farm to farm in sea water (Bang Jensen et al., 2013).

Vertical transmission of PMCV has been suspected and is currently investigated in the CMS-Epi Project. In this project, heart samples from 128 of 132 broodfish were PMCV positive, and viral RNA was also detected by real-time PCR in 60% of milt samples and 69% of the roe samples, although only at levels close to cut-off for the method at Ct value of 35 (Bang Jensen, 2017; Nylund, 2015). Furthermore, PMCV was detected by real-time PCR in all stages of the progeny, including smolts both before and after sea transfer. The prevalence of PMCV-positive fish was >25%, and Ct values were close to the cut-off value of the method (Bang Jensen, 2017).

Please note FHI Case Information for July to September 2018 (Cases 20180339-20180409 - PDF online here p159-164) which reports CMS at Cooke Aquaculture's Turness salmon farm in August 2018 and reference to the "stock on site being held for AquaGen and due to be moved off in September":

Case No:	2018-0365	Date of visit:	21/08/2018
Time spent on site:	1.5hrs	Main Inspector:	PMM
Site No:	FS0451	Site Name:	Turness
Business No:	FB0095	Business Name:	Cooke Aquaculture Scotland Ltd

Additional Case Information:

2 cages stocked on site, cage 1 -2,878 2016 S1 Sal @ 11.1kg (female), cage 10- 730 2106 S1 @12.7kg. Stock on site being held for Aquagen and due to be moved off in September - location to be confirmed. Cooke were unsure where the fish were destined for, Aquagen were reportedly trying to source wellboat to move stock.
Fish showed good feeding response, stock worst affected by CMS has been harvested.
No dead, moribund or lethargic fish observed at time of inspection. One cage fitted with partial walkways.

Recent (last 4 wks) disease problems?	Y
If yes, detail:	CMS

Results of Surveillance

1. Has any animal health surveillance been carried out by, or on behalf of, the business?	Y
2. If yes, are results available for inspection?	Y
3. Any significant results?	Y
If yes, detail (if not detailed under recent disease problems).	CMS
Records checked between:	March 2018 to August 2018

Note that AquaGen [took over the operation of the Holywood salmon farm in Dumfries from Scottish Sea Farms in September 2018](#).

Operator Transfers

Operator Transfer

Transfer Date	20/09/2018
Old Operator	Scottish Sea Farms Ltd
New Operator	AquaGen Scotland Ltd

Data supplied by Marine Scotland on 29/03/2019

Site Details

Site ID	FS0614
Site Name	Holywood Breeding Centre
Address	Holywood Salmon Farm Holywood Dumfries DG2 0RJ
Telephone Number	01387 721381
Date Registered	17/01/1992
Operator	AquaGen Scotland Ltd
Aquaculture Type	Fish
Water Type	Freshwater
Species	Atlantic Salmon,Atlantic Salmon,Atlantic Salmon
Health Surveillance Frequency	Medium
Production reported to Marine Scotland within last 3 years?	Yes
National Grid Reference	NX976782
Easting	297600
Northing	578200
Marine Scotland Management Area	Not in a management area
Local Authority	Dumfries and Galloway
Region	Dumfries & Galloway
View on Map	View on map

Data supplied by Marine Scotland on 29/03/2019

FHI Case Information for October to December 2018 (Cases 20180564-20180600 - PDF online here p165) detailed an inspection of AquaGen's Holywood salmon farm in November 2018 noting that "no samples were taken for disease analysis" despite the fact that "the biosecurity measures plan for the site was inspected and found to be inadequately maintained":

Case No:	2018-0584			Date of visit:	14/11/2018
Time spent on site:	2 hours			Main Inspector:	ASM
Site No:	FS0614	Site Name:	Holywood Salmon Farm		
Business No:	FB0572	Business Name:	AquaGen Scotland Ltd		

Additional Case Information:

Site rented from Scottish Seafarms, maybe purchase the site in the future
Not feeding anything on site as the broodstock are only kept on for a short period of time and the ova are moved off the site before they hatch
"Egg room" to be created to keep broodfish and ova separate. The egg room is under construction at the time of the inspection but is expected to be completed by the end of the week
No more broodfish will be moved on for this cycle
Looking to expand the operation in Holywood if the first cycle is successful
Plans to keep the broodfish on the site for about 6-8 weeks.

Chillers now being plumbed in allowing the staff to control water temperature and therefore the development speed of the ova
All fish to arrive on site will be treated with formalin. Bufferdine will be used on the ova before they move off site.
Separate changing area and PPE for egg area and broodstock area.
Stripping of eggs to be conducted in the broodstock room. The products from stripping will be placed in buckets and transferred to the egg room via a hatch.
Althought a contract has been set up to dispose of fish at Dundas Chemicals no movements of dead fish have yet been made, records will be kept when they are moved.

Mortality Records		
1. Mortality records available for inspection?		Y
2. How are mortalities disposed of?	Whole fish - Dundas Chemicals	
If other detail:		
3. Mortality records complete and correctly entered?		Y
4. Recent mortality (last 4 wks):	56 all attributed to transfer mortality (6.4%)	
5. Evidence of recent increased/atypical mortalities?		Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:		
Increased mortality due to transfer, all tanks affected. There were delays in getting the fish from the seawater site to Holywood. These delays meant that lice numbers rose higher than expected and caused some damage to the fish before transport. No lice were observed on the fish at the time of inspection. 6/7 facilities affected, 56 fish dead.		

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gov.scot

[redacted]
AquaGen Scotland Ltd
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Stirling
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[redacted]

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0572	**DATE OF VISIT**	14/11/2018
SITE NO	FS0614	**SITE NAME**	Holywood Salmon Farm
INSPECTOR	Andy Mayes	**CASE NO**	20180584

Inspection under the Aquatic Animal Health (Scotland) Regulations 2009

The above site was inspected, in accordance with the Aquatic Animal Health (Scotland) Regulations 2009, and to meet the requirements of European Community Council Directive 2006/88/EC.

All epidemiological units were inspected. On this occasion no samples were taken for disease analysis. The Inspector did not observe any clinical signs associated with the listed diseases as described in the Aquatic Animal Health (Scotland) Regulations 2009.

The biosecurity measures plan for the site was inspected and found to be inadequately maintained.

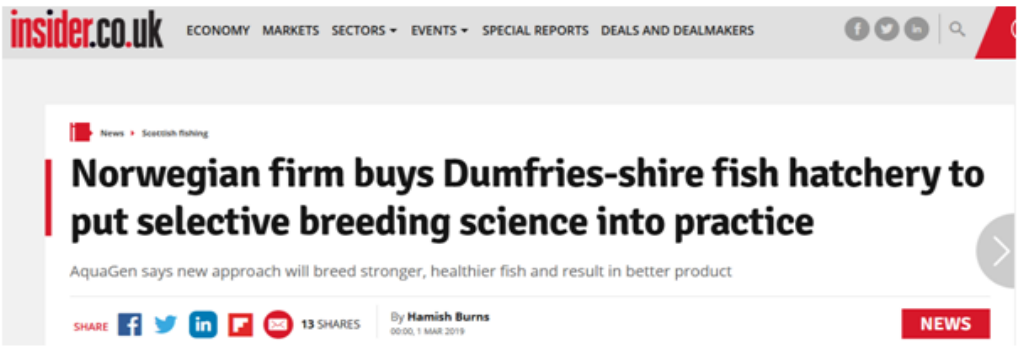
The following points were raised with the site representative during the inspection:

In accordance with regulation 6(2)(b) of the 2009 Regulations, the operator of the APB (aquaculture production business) will follow good bio-security practise at each farm site at which it operates, and must establish, maintain and comply with a bio-security measures plan.

Although a bio-security measures plan was available for inspection, it did not contain the information below:

- **The measures that are in place at the farm site to maintain the physical containment of the aquaculture animals held on the farm site.**

Insider [reported in March 2019](#) that AquaGen had bought Holywood salmon farm:

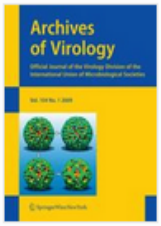


Fergus Ewing, Cabinet Secretary for the Rural Economy, said: "AquaGen's investment speaks volumes of the confidence from the sector of doing business in Scotland and supports the aims of Scotland's 10-year Farmed Fish Health Framework, helping to improve the security of Scotland's ova supply."

Fish Farming Expert reported in March 2019:

> Salmon egg supplier AquaGen has signed a deal to buy Scottish Sea Farms' freshwater hatchery at Holywood near Dumfries in south-west Scotland for an undisclosed fee and revealed long-term plans to produce 50 million ova per year at the facility.
>
> By Gareth Moore
>
> The acquisition follows a successful trial production of eggs under licence in autumn 2018 and will enable the German-owned, Norwegian-based company to offer Scotland's salmon farmers a reliable supply of eggs from locally-farmed AquaGen broodstock, increasing food security, the companies said in a press release.

A scientific paper - "ISA virus in Chile: evidence of vertical transmission" - published in 2009 identified AquaGen (then owned by Marine Harvest and Cermaq) as importing infected eggs into Chile.



Archives of Virology

January 2009, Volume 154, Issue 1, pp 1–8 | Cite as

ISA virus in Chile: evidence of vertical transmission

Authors | Authors and affiliations

Siri Vike, Stian Nylund, Are Nylund

Original Article

First Online: 26 November 2008

3 Shares | 653 Downloads | 50 Citations

The controversial scientific paper reported:

"The best explanation for the Norwegian ISA virus in Chile is transmission via these embryos, i.e. vertical or transgenerational transmission. This supports other studies showing that the ISA virus can be transmitted vertically".

The New York Times reported in 2011:

The New York Times

Norwegians Concede a Role in Chilean Salmon Virus

By ALEXEI BARRIONUEVO JULY 27, 2011

SÃO PAULO, Brazil — A virus that has killed millions of salmon in Chile and ravaged the fish farming industry there was probably brought over from Norway, a major salmon producer has acknowledged.

Cermaq, a state-controlled Norwegian aquaculture company that has become one of the principal exporters of salmon from Chile, has endorsed a scientific study concluding that salmon eggs shipped from Norway to Chile are the "likely reason" for the outbreak of the virus in 2007, according to Lise Bergan, a company spokeswoman.

Read more via "Fish Farmageddon: The Infectious Salmon Aquacalypse" and "ISA - Diary of Disease Disaster"

The Scottish Government warned in 2011 of the spread via vertical transmission of Bacterial Kidney Disease (Renibacterium salmoninarum).

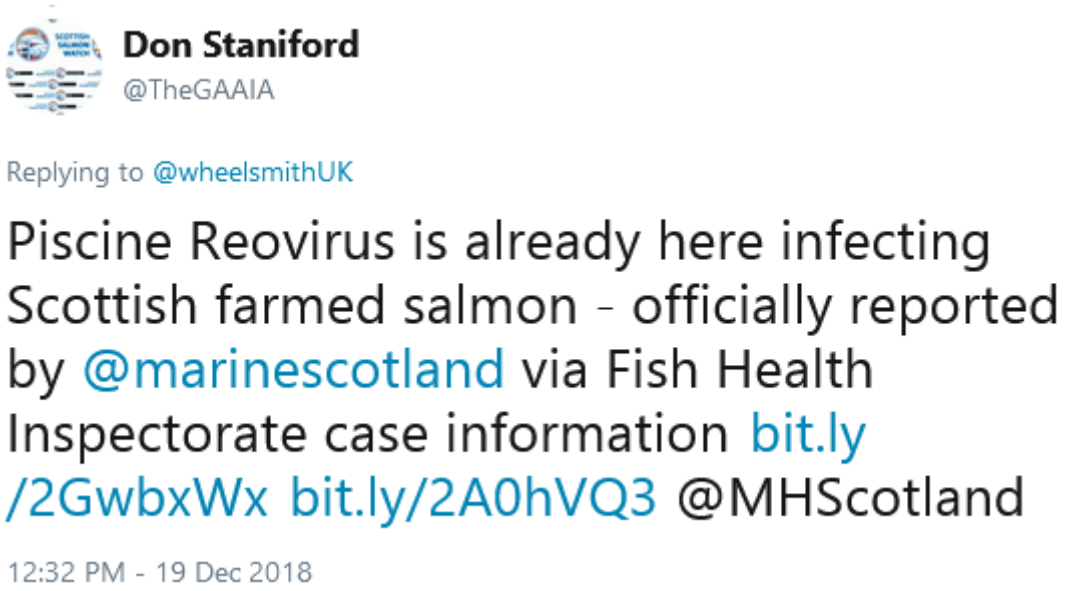
7.2 Vertical Transmission of *R. salmoninarum*

As discussed under epidemiology (Section 3.2), *R. salmoninarum* is a truly vertically transmitted pathogen (Paterson et al. 1981; Evelyn et al. 1986). This means that *R. salmoninarum* could be introduced with imported ova. Some 700,000 to 30M salmon ova are imported each year (Figure 18). The numbers of these imports are increasing with some coming from countries such as Iceland, Norway and the USA where BKD is present. Bacterial kidney disease was reported from salmon broodstock in Norway in 2008; illustrating the possibility of vertical transmission within the salmon industry. Although imports will be certified as *R. salmoninarum* free any failure in this process could represent a risk for the import of infection.

The literature also provides scientific evidence for vertical transmission of Salmonid Alphavirus (Pancreas Disease); scientific evidence for vertical transmission of Infectious Salmon Anaemia virus; and scientific evidence for vertical transmission of Enteric Redmouth Disease (Yersinia ruckeri).

Risks of Piscine Reovirus

Vertical transmission of PRV (Piscine Reovirus) via infected eggs also appears a distinct possibility. Scottish Salmon Watch Tweeted in December 2018:



A FHI Fish Visit report dated November 2017 for Marine Harvest's salmon farm at Caolas A Deas in Loch Shell detailed disease problems including PGD (Proliferatitve Gill Disease), CMS (Cardiomyopathy Syndrome), PRV (Piscine Reovirus) and PD (Pancreas Disease).

FHI 059, Version 11 Issued by: FHI Date of issue: 12/09/2017

Additional Case Information:

Due to finish harvest in a couple of weeks. Will then restock after 4 week fallow with ~450,000 part grown stock from Seaforth for approx 6 months. Next input after that will be late Q3/Q4s smolts in 2018.

CMS, PRV and PD have been confirmed on site. PGD is main cause of mortalities, particularly during treatments. Recent tests for AGD have been negative.

A FHI Fish Visit report dated November 2017 detailed disease problems at Marine Harvest's salmon farm at Ardintoul in Loch Alsh (a Special Area of Conservation protected via the EC Habitats Directive) - including CMS, PRV, AGD, Branchiomonas, Paranucleospora theridon and salmon gill poxvirus.

FHI 059, Version 11 Issued by: FHI Date of issue: 12/09/2017

Additional Case Information:

Report received from company of increased mortality with observed anaemia. Details recorded on mortality events sheet. Increase in mortality observed following decrease in appetite 5 weeks ago. Daily feed dropped from 16 tonnes per day to 8 tonnes per day. Fish feeding deep in cages.

Regular samples how shown a decrease in packed cell volume in sampled fish. In August samples were 20% of fish at 1-20% PCV, 5% at 21-30% PCV, 45% at 31-40% PCV, 20% at 41-50% PCV and 10% at 50+% PCV. In September samples were 25% at 1-20% PCV, 25% at 21-30% PCV and 50% at 31-40% PCV. In October samples were 55% at 1-20% PCV, 20% at 21-30% PCV and 25% at 31-40% PCV.

Samples have tested positive for CMS, PRV, AGD, Branchiomonas, Paranucleospora theridion and salmon gill poxvirus, but negative for PD and piscichlamydia.

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FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0095	DATE OF VISIT	28/06/2016
SITE NO	FS0802	SITE NAME	Kirkabister
INSPECTOR	Svenja Elwenn & David Bradley	CASE NO	20160263

Section 1: Summary

Five moribund and lethargic fish were removed for diagnostic sampling. Histopathological examination revealed evidence of cardiomyopathy syndrome (CMS), which was confirmed by QPCR. This is thought to be the primary cause of morbidity.

Samples were also positive for infectious pancreatic necrosis virus by virology and piscine reovirus by QPCR, these are the causative agents of infectious pancreatic necrosis (IPN) and heart and skeletal muscle inflammation (HSMI) respectively. Two unidentified species of bacteria

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FINAL FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0095	DATE OF VISIT	21/07/2016
SITE NO	FS0656	SITE NAME	Djubawick
INSPECTOR	Andrea Warwick	CASE NO	20160322

Section 1: Summary

Three lethargic fish were removed for diagnostic sampling. Histopathological examination revealed evidence of cardiomyopathy syndrome (CMS) and chronic pancreatic diseases, which were confirmed by QPCR and PCR respectively. Samples were positive for infectious pancreatic necrosis virus by virology and piscine reovirus by QPCR, but no corresponding pathology was observed. These are the causative agents of infectious pancreatic necrosis (IPN) and heart and skeletal muscle inflammation (HSMI) respectively.

This FHI Case Information was summarized in a Scottish Salmon Watch report - "Hard Evidence: Fast-Tracking Disease-Ridden Scottish Salmon" - published in May 2018. The report also included:

PRV (Piscine Reovirus) - which is linked to Heart & Skeletal Muscle Inflammation (HSMI) - has attracted significant media attention in Canada following the discovery in both wild and farmed salmon.

"The disease Heart and Skeletal Muscle Inflammation (HSMI) is causing substantial economic losses to the Norwegian salmon farming industry where the causative agent, piscine orthoreovirus (PRV), is reportedly spreading from farmed to wild Atlantic salmon (*Salmo salar*) with as yet undetermined impacts," reported a scientific paper published by PLOS in December 2017. "These results suggest that PRV transfer is occurring from farmed Atlantic salmon to wild Pacific salmon, that infection in farmed salmon may be influencing infection rates in wild salmon, and that this may pose a risk of reduced fitness in wild salmon impacting their survival and reproduction."

PRV has affected salmon farms in Norway, Chile, Ireland, Canada, United States and Scotland.

Read more via:
"Piscine Reovirus (PRV): An Underestimated Pathogen in the Scottish Salmon Industry?"
"The effect of exposure to farmed salmon on piscine orthoreovirus infection and fitness in wild Pacific salmon in British Columbia, Canada"

"Piscine Orthoreovirus (PRV) and Heart and Skeletal Muscle Inflammation (HSMI)"
"A novel Totivirus and Piscine Reovirus (PRV) in Atlantic Salmon (Salmo salar) with Cardiomyopathy Syndrome (CMS)"
"First description of clinical presentation of piscine orthoreovirus (PRV) infections in salmonid aquaculture in Chile and identification of a second genotype (Genotype II) of PRV"
"An outbreak of disease resembling Heart and Skeletal Muscle Inflammation in Scottish farmed salmon, Salmo salar L., with observations on myocardial regeneration"
"Piscine orthoreovirus (PRV) infects Atlantic salmon erythrocytes"
"Piscine reovirus (PRV) in wild Atlantic salmon, *Salmo salar* L., and sea-trout, *Salmo trutta* L., in Norway"

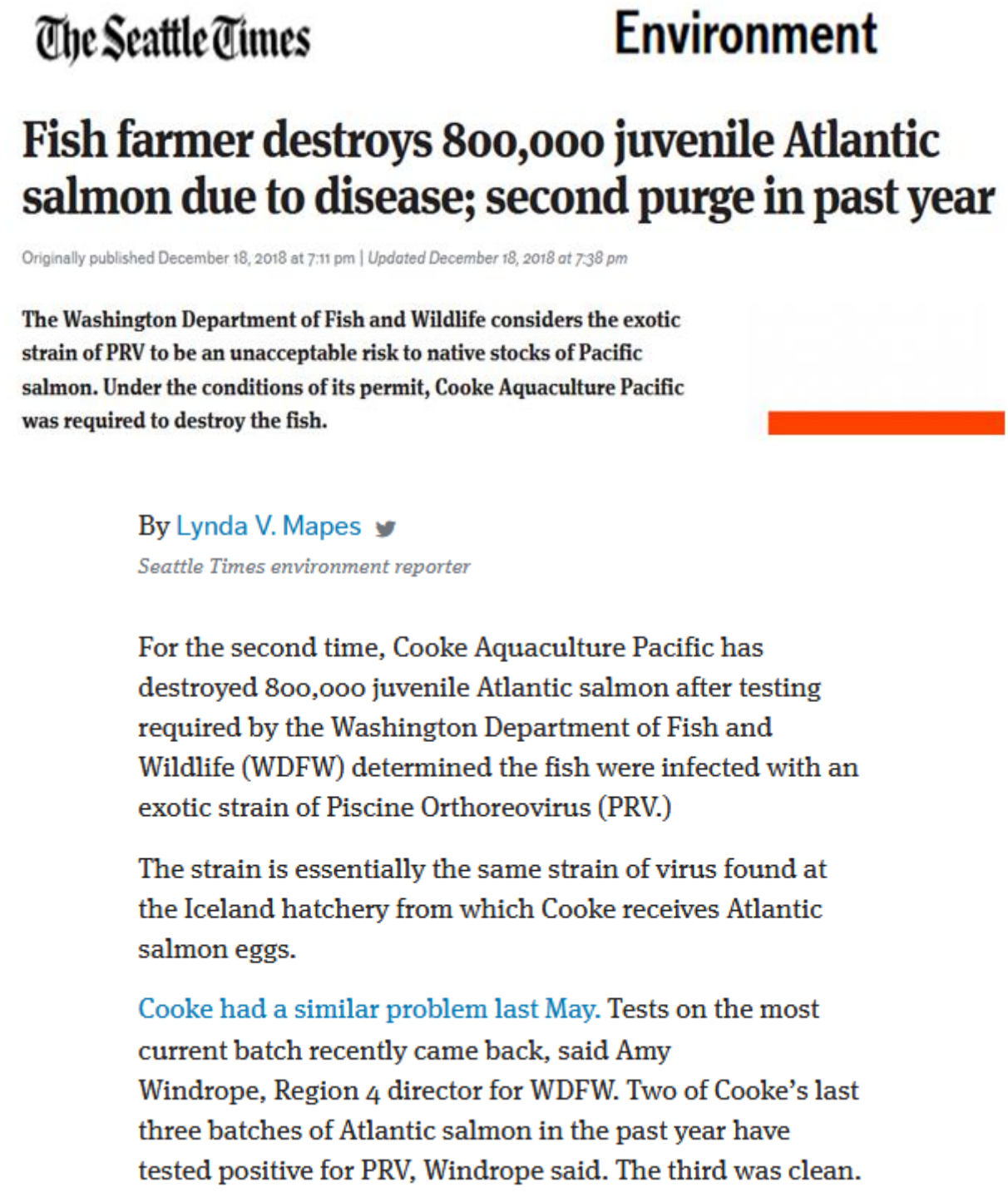
The Fish Site reported in 2015:

> **Current Piscine Reovirus Status of Scottish Salmon**
>
> HSMI has been observed across all farming regions of Scotland, however published information regarding the occurrence of HSMI on Scottish farms is limited to a single report on a suspected outbreak in 2004 and a recent report on HSMI outbreaks in the Shetland Isles from 2005 - 2012.
>
> In the Shetland Isles, the number of HSMI cases from 2005 - 2012 varied between zero and two annually, with resultant mortality reaching 35% during an outbreak on one site. Since testing for this virus became available, some producers have reported up to 95% of their sites consistently testing positive for PRV.
>
> It is believed this virus is fairly ubiquitous across Scottish farms as is the case in Norway. The prevalence of PRV in wild fish populations in Scotland and Ireland remains to be elucidated.
>
> There have been reports of increased downgrades due to discoloured fillet marks in batches of fish subsequent to elevated serum levels of the enzyme creatine kinase (CK). This enzyme can indicate muscle damage and is known to increase during HSMI infection. It is suspected that PRV infection may have been responsible for these elevated CK levels and fillet discolouration however this has not been conclusively established.

Scottish Ministers should be aware of reports of PRV in infected eggs imported from Iceland to the United States. Salmon Business reported in December 2018:

> *"What about PRV in eggs?"*
>
> "That's a good question and we have been arguing about true vertical transfer we think when it's inside the egg – not necessarily in the genome but at least inside the egg and more like the contamination problem carrying the virus with a shipment – not necessarily within the fish at all but the materials in the packaging might get contaminated – this is maybe a very prevalent virus. And we need to state that it has been infected before shipping that's also very difficult," Dale says and adds:
>
> "We should be careful – you need a real good sequence data on that whole genome and need to have enough to compare with – and probably they don't have either. To unravel where a virus comes from is a major job to do."

This followed a [news report in The Seattle Times]:



The Seattle Times Environment

Fish farmer destroys 800,000 juvenile Atlantic salmon due to disease; second purge in past year

Originally published December 18, 2018 at 7:11 pm | *Updated December 18, 2018 at 7:38 pm*

The Washington Department of Fish and Wildlife considers the exotic strain of PRV to be an unacceptable risk to native stocks of Pacific salmon. Under the conditions of its permit, Cooke Aquaculture Pacific was required to destroy the fish.

By Lynda V. Mapes

Seattle Times environment reporter

For the second time, Cooke Aquaculture Pacific has destroyed 800,000 juvenile Atlantic salmon after testing required by the Washington Department of Fish and Wildlife (WDFW) determined the fish were infected with an exotic strain of Piscine Orthoreovirus (PRV.)

The strain is essentially the same strain of virus found at the Iceland hatchery from which Cooke receives Atlantic salmon eggs.

Cooke had a similar problem last May. Tests on the most current batch recently came back, said Amy Windrope, Region 4 director for WDFW. Two of Cooke's last three batches of Atlantic salmon in the past year have tested positive for PRV, Windrope said. The third was clean.

Salmon Business [reported on 20 December 2018]:

Egg supplier responds to Washington PRV salmon cull

News by **Owen Evans** - 20 December 2018

Benchmark Genetics, which supplies eggs to Cooke Aquaculture Pacific, has responded to reports a US salmon cull was due to an 'exotic' strain of Piscine Orthoreovirus (PRV).

As reported on SalmonBusiness yesterday, the salmon farmer Cooke Aquaculture Pacific had to cull 800,000 fish.

The Icelandic company StofnFiskur – a subsidiary of Benchmark Genetics – supplied the eggs to Cooke.

Divisional marketing director Birgitte Sørheim wrote in an email to SalmonBusiness that: "PRV is not a classified disease but a virus commonly found in Atlantic salmon. Fish that carry the virus are not sick but can, under certain circumstances (weak health status/gill status and other factors) develop heart and skeletal muscle inflammation and will then be diagnosed as sick. This was not the case with the juveniles that had to be destroyed in the US. These fish were healthy but were required to be destroyed by the WDFW."

Cooke's hatchery near Rochester tested positive for a form of the fish PRV *piscine orthoreovirus* virus that the WDFW (The Washington Department of Fish and Wildlife) classifies it as "exotic."

Sørheim added that "the total number of fish destroyed was 800,000. PRV was detected by routine sampling in April, and the entire batch of fish was required to be culled."

"The PRV at Cooke may have originated from the ova delivered from Iceland. We have, however, an optional service of screening against PRV that our customers may choose as an extra risk measure to avoid vertical transmission."

"PRV is found in both farmed and wild salmon and is not described as exotic in Europe. The virus is also not listed by OIE or European authorities," she wrote.

The Seattle Times reported in May 2018:

Washington state finds virus in Cooke Atlantic salmon, plans expanded testing

Originally published May 19, 2018 at 6:00 am | *Updated May 19, 2018 at 12:22 pm*

Washington state tested smolt in a Cooke Aquaculture incubator and found the Atlantic salmon had a strain of Icelandic virus. The state denied permission for the company to move the 800,000 fish to an open-water net pen.

By Lynda V. Mapes

Seattle Times environment reporter

After identifying an exotic virus in fish raised by Cooke Aquaculture, Washington state is planning to test at other sites where the pathogen from Atlantic salmon may have been spread.

The virus detected in Cooke's fish is a strain of piscine orthoreovirus (PRV) from the northern Atlantic. Cooke hatched the fish from eggs the company imported from its supplier in Iceland. Those eggs are presumed to be the source of the virus, Warheit said.

In 2018, Wild Fish Conservancy and a coalition of other members of the Our Sound, Our Salmon coalition [wrote to the Washington Department of Fish and Wildlife regarding the testing of salmon smolts]():

Dear WDFW Acting Director Joe Stohr,

We, as members and partnners of a coalition of businesses, organizations, commercial and recreational fishermen, and individuals under the name of Our Sound, Our Salmon, write to respectfully urge the Washington Department of Fish and Wildlife (WDFW) to reconsider the means by which farmed Atlantic salmon and ready-to-transport Atlantic salmon smolts in Washington state hatcheries are to be tested for Piscine Reovirus (PRV).

In the aftermath of the Cypress Island escape last August, PRV was found in every fish that was tested for the virus. Even more shocking were the results of the genetic sequencing, which revealed the origin of the virus to be sub-genotype 1a, or of Norwegian origin, and clustered tightly with a PRV-isolate from Iceland.

This is the first time the Icelandic PRV-isolate has been found in Pacific waters, but it raises a critical question— if the eggs used in Cooke Aquaculture's Atlantic salmon hatchery in Rochester, WA come from Norwegian-born fish raised in Iceland, has the industry been allowed to import PRV-infected eggs and consequently plant infected fish into Washington's public waters?

According to [data disclosed via FOI by the Scottish Government]() in September 2018, Scottish salmon farmers imported at least 16.5 million salmon eggs from Stofnfiskur in Iceland between January 2017 and July 2018 (information relating to Scottish Sea Farms was redacted leading to an appeal to the Scottish Information Commissioner in March 2019).

Date	Site of destination	Operator	Consignee on certificate (if different from operator)	Species	Stage	Number	Source Country	Source Company
11/01/2017	Tullich Hatchery	The Scottish Salmon Company		Salmon	Ova	1,176,000	Iceland	Stofnfiskur
15/02/2017	Geocrab Hatchery	The Scottish Salmon Company		Salmon	Ova	876,000	Iceland	Stofnfiskur
23/02/2017	Geocrab Hatchery	The Scottish Salmon Company		Salmon	Ova	55,000	Iceland	Stofnfiskur
04/04/2017	Furnace Hatchery	Cooke Aquaculture (Freshwater) Ltd		Salmon	Ova	1,000,000	Iceland	Stofnfiskur
23/08/2017	Inst of Medical Sciences	University of Aberdeen		Salmon	Ova	3,000	Iceland	Stofnfiskur
04/10/2017	Girlsta Hatchery	Grieg Seafood Shetland Ltd (Hatchery)		Salmon	Ova	1,500,000	Iceland	Stofnfiskur
08/11/2017	Cairndow Hatchery	Lakeland (Cairndow) Ltd	Cooke Aquaculture Freshwater Ltd	Salmon	Ova	2,500,000	Iceland	Stofnfiskur
09/11/2017	Tullich Hatchery	The Scottish Salmon Company		Salmon	Ova	2,714,250	Iceland	Stofnfiskur
22/11/2017	Kinlochmoidart Hatchery	The Scottish Salmon Company		Salmon	Ova	1,522,500	Iceland	Stofnfiskur
15/11/2017	Barvas Hatchery	The Scottish Salmon Company		Salmon	Ova	172,000	Iceland	Stofnfiskur
15/11/2017	Mingarry Hatchery	Hebridean Smolts Ltd	The Scottish Salmon Company	Salmon	Ova	918,750	Iceland	Stofnfiskur
01/02/2018	Tullich Hatchery	The Scottish Salmon Company		Salmon	Ova	1,360,000	Iceland	Stofnfiskur
01/03/2018	Kinlochmoidart Hatchery	The Scottish Salmon Company		Salmon	Ova	615,000	Iceland	Stofnfiskur
01/03/2018	Ormsary Hatchery	Landcatch Natural Selection Ltd	The Scottish Salmon Company	Salmon	Ova	575,000	Iceland	Stofnfiskur
12/04/2018	The Roslin Institute	the Roslin Institute		Salmon	Ova	3,200	Iceland	Stofnfiskur
08/06/2018	Girlsta Hatchery	Grieg Seafood Shetland Ltd (Hatchery)		Salmon	Ova	1,500,000	Iceland	Stofnfiskur

Between January 2017 and March 2018, The Scottish Salmon Company imported 10.3 million ova from Iceland and Norway (including ISA-infected AquaGen and PRV-infected Stofnfiskur):

Date	Site of destination	Operator	Consignee on certificate (if different from operator)	Number	Source Country	Source Company
01/03/2017	Geocrab Hatchery	The Scottish Salmon Company		396,000	Norway	AquaGen AS
23/02/2017	Geocrab Hatchery	The Scottish Salmon Company		55,000	Iceland	Stofnfiskur
09/11/2017	Tullich Hatchery	The Scottish Salmon Company		2,714,250	Iceland	Stofnfiskur
22/11/2017	Kinlochmoidart Hatchery	The Scottish Salmon Company		1,522,500	Iceland	Stofnfiskur
15/11/2017	Barvas Hatchery	The Scottish Salmon Company		172,000	Iceland	Stofnfiskur
15/11/2017	Mingarry Hatchery	Hebridean Smolts Ltd	The Scottish Salmon Company	918,750	Iceland	Stofnfiskur
01/02/2018	Tullich Hatchery	The Scottish Salmon Company		1,360,000	Iceland	Stofnfiskur
30/01/2018	Barvas Hatchery	The Scottish Salmon Company		1,047,500	Norway	Salmobreed
30/01/2018	Amhuinnsuidhe Hatchery	The Scottish Salmon Company		400,000	Norway	Salmobreed
01/03/2018	Kinlochmoidart Hatchery	The Scottish Salmon Company		615,000	Iceland	Stofnfiskur
01/03/2018	Ormsary Hatchery	Landcatch Natural Selection Ltd	The Scottish Salmon Company	575,000	Iceland	Stofnfiskur
27/02/2018	Geocrab Hatchery	The Scottish Salmon Company		508,000	Norway	Salmobreed

Between January 2017 and February 2018, Cooke Aquaculture imported 7.6 million ova from Iceland, Ireland and Norway (including ISA-infected AquaGen and PRV-infected Stofnfiskur):

Date	Site of destination	Operator	Consignee on certificate (if different from operator)	Number	Source Country	Source Company
16/02/2017	Ardtaraig Hatchery	Cooke Aquaculture (Freshwater) Ltd		400,000	Norway	AquaGen AS
16/02/2017	Cairndow Hatchery	Lakeland (Cairndow) Ltd	Cooke Aquaculture Freshwater	1,400,000	Rep of Ireland	Marine Harvest Ireland
09/03/2017	Rysa Incubation Unit	Rysa Salmon Farm	Cooke Aquaculture Freshwater	170,000	Norway	AquaGen AS
04/04/2017	Furnace Hatchery	Cooke Aquaculture (Freshwater) Ltd		1,000,000	Iceland	Stofnfiskur
08/11/2017	Cairndow Hatchery	Lakeland (Cairndow) Ltd	Cooke Aquaculture Freshwater	2,500,000	Iceland	Stofnfiskur
14/02/2018	Wester Fearn	Highland Salmon Company Ltd	Cooke Aquaculture Freshwater	700,000	Rep of Ireland	Marine Harvest Ireland
21/02/2018	Cairndow Hatchery	Lakeland (Cairndow) Ltd	Cooke Aquaculture Freshwater	1,100,000	Rep of Ireland	Marine Harvest Ireland
27/02/2018	Ardtaraig Hatchery	Cooke Aquaculture (Freshwater) Ltd		350,000	Norway	Marine Harvest Norway

How many salmon eggs imported into Scotland were tested for PRV and other viruses, pathogens and infectious diseases such as ISA?

Disease Risks from Imported Ova

According to data disclosed via FOI by the Scottish Government in November 2018, Scottish salmon farmers imported at least 5.3 million salmon eggs from Stofnfiskur in Iceland during 2016 as well as millions of salmon ova from AquaGen, Salmobreed and Marine Harvest in Norway (information relating to Scottish Sea Farms was redacted).

Date	Site of destination	Operator	Consignee on certificate (if different from operator)	Species	Stage	Number	Source Country	Source Company
04/02/2016	Knock Hatchery	Scottish Sea Farms Ltd		Salmon	Ova	1,100,000	<REDACTED>	<REDACTED>
10/02/2016	Couldoran Incubation Unit	Scottish Sea Farms Ltd		Salmon	Ova	150,000	<REDACTED>	<REDACTED>
18/02/2016	<REDACTED>	<REDACTED>	Scottish Sea Farms Ltd	Salmon	Ova	2,100,000	<REDACTED>	<REDACTED>
03/03/2016	<REDACTED>	<REDACTED>	Scottish Sea Farms Ltd	Salmon	Ova	144,000	<REDACTED>	<REDACTED>
08/12/2016	<REDACTED>	<REDACTED>	Scottish Sea Farms Ltd	Salmon	Ova	988,000	<REDACTED>	<REDACTED>
14/01/2016	Tullich Hatchery	The Scottish Salmon Company		Salmon	Ova	1,200,000	Iceland	Stofnfiskur
09/11/2016	Tullich Hatchery	The Scottish Salmon Company		Salmon	Ova	2,640,000	Iceland	Stofnfiskur
23/11/2016	Geocrab Hatchery	The Scottish Salmon Company		Salmon	Ova	1,008,000	Iceland	Stofnfiskur
23/11/2016	Barvas Hatchery	The Scottish Salmon Company		Salmon	Ova	441,000	Iceland	Stofnfiskur
01/12/2016	Geocrab Hatchery	The Scottish Salmon Company		Salmon	Ova	35,000	Iceland	Stofnfiskur
14/01/2016	Mill Burn	Kintail Hatchery	Marine Harvest (Scotland)	Salmon	Ova	2,000,000	Norway	Aquagen AS
05/01/2016	Quoys Hatchery	Cooke Aquaculture Scotland Ltd		Salmon	Ova	550,000	Norway	Aquagen AS
20/01/2016	Howietoun Hatchery	Howietoun Fishery	The Scottish Salmon Company	Salmon	Ova	400,000	Norway	Aquagen AS
20/01/2016	Barvas Hatchery	The Scottish Salmon Company		Salmon	Ova	1,908,540	Norway	Aquagen AS
21/01/2016	Lochailort Recirculation Ur	Marine Harvest (Scotland)		Salmon	Ova	3,000,000	Norway	Marine Harvest (Norway)
10/02/2016	Lochailort Recirculation Ur	Marine Harvest (Scotland)		Salmon	Ova	200,000	Norway	Marine Harvest (Norway)
10/02/2016	Ardtaraig Hatchery	Cooke Aquaculture (Freshwater) Ltd		Salmon	Ova	400,000	Norway	Aquagen AS
17/02/2016	Girlsta Hatchery	Grieg Seafood Shetland Ltd (Hatchery)		Salmon	Ova	1,545,000	Norway	Salmobreed
24/02/2016	Geocrab Hatchery	The Scottish Salmon Company		Salmon	Ova	461,160	Norway	Aquagen AS
24/02/2016	Mingarry Hatchery	Hebridean Smolts Ltd	The Scottish Salmon Company	Salmon	Ova	564,375	Norway	Aquagen AS
24/02/2016	Allt Mor Hatchery	JS Salmon Ltd	Kames Fish Farming Ltd	Salmon	Ova	500,000	Norway	Aquagen AS
02/03/2016	Kinlochmoidart Hatchery	Sunbeam Aquaculture	The Scottish Salmon Company	Salmon	Ova	575,000	Norway	Aquagen AS
02/03/2016	Amhuinnsuidhe Hatchery	The Scottish Salmon Company		Salmon	Ova	275,000	Norway	Aquagen AS
02/03/2016	Quoys Hatchery	Cooke Aquaculture Scotland Ltd		Salmon	Ova	70,000	Norway	Aquagen AS

FOI documents disclosed by the Scottish Government to Scottish Salmon Watch on 1 February 2019 reveal that Scottish salmon and trout farmers received ova during the 2016/2017 season from broodstock held at a ISA suspected site operated by AquaGen at Tingvoll:

From: <REDACTED> (MARLAB)
Sent: 11 July 2017 15:08
To: <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>
Cc: <REDACTED>@gov.scot>
Subject: ISA suspected at AquaGen Tingvoll

http://aquagen.no/en/2017/07/10/ila-mistanke-hos-aquagen-tingvoll/

Please see report from AquaGen that ISA has been detected at one of their broodfish production sites at Tingvoll. I have spoken with <REDACTED>and there has been no associated mortality, this is from their routine surveillance testing. Results in April, May and June were negative. Fish are likely to be culled out, but the result has not been confirmed yet by the competent authority (PCR only).

Scottish producers have received salmon and rainbow trout ova during the 2016/2017 season which originated from broodstock held at Tingvoll. The 2017/2018 season ova will be sourced from their other broodstock population held at Hemne.

<REDACTED>

In July 2017, Hendrix Genetics (owners of Landcatch) asked the Scottish Government "if the ISA outbreaks in Norway, in particular Aquagen, would have any effect on their ability to export eggs into Scotland":

From: <REDACTED> <REDACTED>@hendrix-genetics.com
Sent: 11 July 2017 13:19
To: <REDACTED> (MARLAB)
Subject: ISA in Norway

Hi <REDACTED>

I was just wondering if the ISA outbreaks in Norway, in particular Aquagen, would have any effect on their ability to export eggs into Scotland this year.
Where does Marine Scotland stand on this issue.

Any information would be gratefully received.

Kind Regards

<REDACTED>

From: <REDACTED> <REDACTED>@hendrix-genetics.com
Sent: 19 July 2017 10:02
To: <REDACTED> (MARLAB)
Subject: Aquagen eggs

Hi <REDACTED>

I was just wondering what your thoughts are on the Aquagen situation now that the site at Hemne also seems to be affected. Can MS ask for 100% testing for ISA on all broodfish parents of eggs destined for Scotland or are you still reliant on the Norwegians to say they are free of the disease.

Kind Regards

<REDACTED>

<REDACTED>
<REDACTED>
Atlantic Salmon

T <REDACTED>
M <REDACTED>475
<REDACTED>
W www.landcatch.co.uk

HENDRIX GENETICS

Landcatch Natural Selection Ltd
Ormsary Fish Farm, Lochgilphead
Argyll, PA31 8PE, Scotland, UK-EU

Read more via:
[Restrictions due to ISA suspicion also attached to AquaGens' broodfish departments at the Vestseøra site in Hemne municipality]
[ISA detected at salmon broodstock sites]
[Aquagen ISA outbreak: cause unknown, but damage contained]

Salmon Business [reported in January 2018]:

ISA in roe could create supply bottleneck

In just half a year, three Norwegian brood facilities have shown signs of infectious salmon anemia, or ISA.

It was just after Christmas, when a report came in that ISA was suspected at the Profunda facility in Oersta township.

Just weeks earlier, ISA was identified at a SalMar brood facility in Rauma township. In the summer, ISA showed up at AquaGen Tingvoll.

Problematic

Does this affect AquaGen's exports to, say, Scotland?

"We have found another solution. We lost the one export permit to Scotland and found another solution this year with a partner that delivers to Scotland. We'll be back with deliveries to Scotland in mid-2018," AquaGen's Nina Santi told *SalmonBusiness*.

Three ISA cases in half a year. Does that threaten roe deliveries abroad?

"Yes, you have to have a special permit for an area historically ISA-free or been monitored for two years. Many facilities have that status or are on the way to getting it. Should too many lose their certificates it might become problematic," she said.

The following email supplied by the Scottish Government on 1 February 2019 via FOI/18/03773 states that the Scottish Government "inspect a percentage [of ova] on arrival":

From: <REDACTED> (MARLAB)
Sent: 14 November 2018 14:15
To: <REDACTED> (MARLAB) <REDACTED> @gov.scot>; <REDACTED> (MARLAB) <REDACTED> @gov.scot>; <REDACTED>@gov.scot>; <REDACTED> (MARLAB<REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>
Cc: <REDACTED>@gov.scot>; <REDACTED>@gov.scot>;

<REDACTED>@gov.scot>
Subject: RE: Approved Compartment Declaration Rimstad Norway

Hi <REDACTED>

Just to answer a couple of your questions from a few emails ago.

I replied to <REDACTED> at AquaGen on 7 November when I received his initial email letting us know of the plan export and asked him for an update on the approval process as queries had been raised about the application. I haven't received a reply from him yet and I have sent him a further email today (copied to <REDACTED> at AquaGen) asking him for an update. If the UKs query has only been submitted today then maybe issues have yet to be raised with AquaGen or Mattilsynet.

I have emailed SSF today to make arrangements to inspect the consignment on arrival (we inspect a percentage on arrival) and to inform them that the ISA free declaration for Rimstad has not gone through yet and if there are any delays in the process then the import cannot proceed next week as the site would not meet the standard to export to the UK.

If the declaration is not confirmed on Monday then the export should not proceed as Mattilsynet cannot issue a health certificate that meets the health requirements of the UK. If the eggs arrive and the declaration isn't confirmed, we could issue a notice under Regulation 30(2) of TARP as the animals do not comply with the requirements of article 3 of Directive 90/425. They would fail to satisfy the requirements of Directive 2006/88 as per article 3 (1a) (movement from Category II to Category I is not allowed). This notice requires the ova either to be destroyed or returned to source (with approval of Mattilsynet).

Thanks

<REDACTED>

What percentage of imported ova are routinely inspected by the Scottish Government?

The following email supplied by the Scottish Government on 1 February 2019 via FOI/18/03773 refers to "testing requirements of the EU" and inspections:

From: <REDACTED> (MARLAB)
Sent: 09 August 2017 12:10
To: <REDACTED>@hendrix-genetics.com>
Subject: RE: Aquagen eggs

We are unable to receive consignments of ISA susceptible species unless they originate from an ISA free area. As long as a country or compartment has been declared free of ISA (and any other relevant diseases) then no additional testing is required.

Scotland follows the testing requirements of the EU. The EU standards for surveillance and diagnostic testing are laid out in decision 2015/1554. The inspection and testing requirements to demonstrate freedom from ISA are laid out in table 3.A. Sites are subject to 6 inspections per year with sampling of 75 fish twice per year over the two year surveillance period.

If a whole country is declared free, such as Great Britain, continued testing (targeted surveillance) can be discontinued as long as conditions are conducive to clinical expression of the disease (article 52 of directive 2006/88). If targeted surveillance is required to maintain the ISA free zone (i.e. disease free compartments within non-disease free countries) then inspections and testing are conducted in accordance with table 3B in decision 2015/1554. The frequency and number of inspections and tests are determined by the risk level attributed to the site with high risk sites sampled twice per year, medium risk once per year and low risk sites once every two years. The sample size is 30 fish and the screening method is RT-qPCR.

Another email supplied by the Scottish Government on 1 February 2019 via FOI/18/03773 refers to "individual testing of all stocks transferred on to site" and "continued targeted surveillance" but it is not clear if this refers only to Norway (as the source of the ova):

From: <REDACTED>
Sent: 10 August 2018 14:10
To: <REDACTED> (Cefas)'; <REDACTED> (DEFRA); <REDACTED> (MARLAB); <REDACTED> (Cefas)
Cc: <REDACTED> (Cefas); <REDACTED> (Cefas); <REDACTED> (MARLAB); <REDACTED> (MARLAB); <REDACTED> (MARLAB); <REDACTED> (MARLAB); <REDACTED> (MARLAB)
Subject: RE: For information: PAFF AHW-CIC July 2018 - Norway

We also agree that that the individual testing of all stocks transferred on to site would provide assurances on the health status of the site, providing that the time period,

sampling, detection method(s) and environmental conditions between stocking and sampling allowed for the expression of the disease. The potential risk to the transfer of disease should become apparent, should the C, D & F have been inadequate, thus protecting receiving sites. The continued targeted surveillance required under Article 52 would presumably be done and continue to provide this level of assurance.

This email supplied by the Scottish Government on 1 February 2019 via FOI/18/03773 refers to "follow up surveillance":

From: <REDACTED> (MARLAB)
Sent: 12 July 2017 13:49
To: <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>
Cc: <REDACTED> (MARLAB) <REDACTED>@gov.scot>
Subject: FW: Information update

Hi

This is the information from <REDACTED> on the ISA detection at Aquagen.

In summary, Aquagen have detected ISA at the seawater broodstock site Merraberget and the freshwater site at Rimstad, Tingvoll which received broodstock from Merraberget in May. This is to be confirmed by Mattilsynet. Samples taken in April, May and June by a private laboratory for ISA were negative, but the July samples were positive.

Scottish sites received ova in 2016/2017 from both Hemne (unconnected location) and Tingvoll hatcheries but the broodstock stripped for the 2016/2017 season were held previously at a sea site known as Hegebergetroa, not the currently affected site. I don't know the relation of the two sea sites to one another, but the reports state that Merraberget is more than 10km from any other site.

Andy has provided a list of the source hatcheries for all of the 2016/2017 consignments delivered to Scotland. Do we need to conduct any follow up surveillance at this point or do we need to contact Mattilsynet for further information?

Thanks

<REDACTED>

However, a FOI reply from the Scottish Government in March 2019 (FOI-19-00420) suggests a lack of testing of imported ova:

> For your information, there is no statutory sampling conducted with respect to ova and smolts prior to their entry into sea water, either in relation to imported or domestically produced animals.
>
> I have explained to you, through responses to other FoI requests, for example see the response issued in relation to FoI/18/03773, that trade with EU member states and third countries can occur in accordance with the current regulations. Trade can only take place between countries, zones or compartments of equal health status or from an area of higher health status into an area of lower health status. This follows the principles of allowing free trade and movement with the provision of appropriate risk mitigation measures, to prevent the introduction of disease with aquatic animal consignements. The process is subject to the appropriate certification by the competent authority in the exporting country and the issuing of a valid health certificate with the relevant assurances made concerning health status.
>
> With respect to domestically produced ova and smolts, Scotland is presently recognised as disease free from all of the listed pathogens within Annex IV Part II of Council Directive 2006/88/EC. Historically, statutory sampling was undertaken from fish farms around Scotland to test for the presence of pathogens which are the causative agents of listed diseases. The results of such testing have proved negative and have supported the application for disease free status which was subsequently approved through the European Commission.

Testing of imported ova by the UK Government (via DEFRA and CEFAS) points to testing of imported ova in England and Wales. Here's a FOI reply from CEFAS in February 2019.

From: Fish Health Inspectorate [mailto:fish.health.inspectorate@cefas.co.uk]
Sent: 21 February 2019 14:23
To: Don Staniford
Subject: RE: FOI re. inspections, surveillance & testing of ova & smolts for disease/pathogens/viruses since 1 January 2017

Dear Mr Staniford.

Many thanks for your requests for information which were sent to us on 6th and 7th February 2019 to both core Defra and Cefas. As both organisations are the same legal entity under the FOIA and therefore you will receive one response. We have discussed the response with Core Defra to ensure they have had the opportunity to comment.

We can confirm that core Defra does not hold any further information in relation to this request other than what is already in the public domain here:

https://www.gov.scot/binaries/content/documents/govscot/publications/foi-eir-release/2019/02/foi-18-03773/documents/foi-18-03773-information-requested/foi-18-03773-information-requested/govscot%3Adocument

This includes the responses and correspondence with Cefas staff. As the information is reasonably accessible to you by other means, section 21 of the FOIA exempts Defra and Cefas from providing a copy of the information with this response to your request.

All imports of Atlantic salmon into England and Wales are of salmon Ova, there are no imports of any other life stages of live salmon.

In 2016 there were 4 imports of salmon ova for commercial purposes. One originated from Ireland, One from Norway and two from Iceland. All arrived to England with full signed health certification from the appropriate competent authority. Three of these samples were tested in full accordance with the Cefas surveillance programme – each was tested at 6 weeks post hatch for appropriate viral pathogens (VHS, IHN, ISA and IPN) and all were found to be negative for the tests undertaken. The testing programme operates on the basis of testing each source site once per season. In addition there were three small scale imports (under 5000 eggs) for the purpose of scientific research, again full health certification was presented and these animals were not destined to leave the facility to which they were imported.

In 2017 there were two imports of salmon ova from Iceland, again full health certification was provided and both shipments were tested at 6 weeks post hatch. All test results were negative

In 2018 there were three imports of salmon ova, one from Ireland and two from Iceland. Full health certification was provided and testing is due to take place early in 2019.

We cannot provide any more data with regard to these imports as they are commercial transactions, all imports fall under the requirements of the EU trade agreements. Imports of live salmon to the UK are required to have full health certification against the controlled diseases (ISA, IHN, VHS) while we also test for IPN during our routine import surveillance programme. During the routine surveillance the Inspectors will examine the overall health of the animals and upon suspicion of a problem they will expand the testing to include any other fish pathogens and potentially any new and emerging

diseases. Since the 1st Jan 2016 there have been no disease concerns regarding Salmon imports or production in England and Wales.

As of 1st January 2019 there were 24 sites authorised to farm Atlantic salmon in England and Wales, Production from these is either destined for salmon farms in Scotland or for stock enhancement purposes in rivers in England and Wales. Site visits are undertaken on a risk ranking basis in accordance with The Aquatic Animal Health (England and Wales) Regulations 2009 and commission decisions 2006/88/EC and 20089/1251/EC. England, Wales and Scotland trade as one disease free zone. Visits are generally annual or up to twice a year and samples will be taken upon suspicion of disease, since 2017 to the end of 2018 there were 51 visits to sites Authorised to farm salmon with the only samples taken as a result of the routine screening for imported ova, there were no health issues identified during these visits. No differentiation is made between specifically smolts or other development stages of salmon as all stages are susceptible to the diseases controlled in the UK. We are unable to provide copies of the import certificates as they contain both commercial and personal information of the involved parties, however, for all imports the Certification is checked in full accordance with EU procedures.

If you have any queries regarding this response please contact us at the Fish Health Inspectorate.

Yours Sincerely

Peter Dunn

Peter Dunn
Authorisation Officer
Barrack Road, Weymouth, Dorset, DT4 8UB, UK
Tel: +44(0) 1305 206700 | Email: fhi@cefas.co.uk
Web: www.gov.uk/cefas/fhi

Centre for Environment Fisheries & Aquaculture Science

CUSTOMER SERVICE EXCELLENCE CSE

Surveillance During Second Year of Production

In July 2018, Scottish Salmon Watch called for focussed testing and sampling at salmon farms in the second year of production (i.e. at the end of the harvest cycle when disease problems are at their height after higher Summer temperatures). To quote from Scottish Salmon Watch's letter dated 13 July 2018 to Police Scotland and APHA (Scottish Ministers were copied into the letter):

Scottish Salmon Watch firmly believes that the damning photographic evidence published by The Ferret in June 2018 and case information via Fisheries Health Inspectorate reports are merely the tip of an iceberg. Enhanced inspections and an increased number of inspections at salmon farms towards the end of their harvest cycle would surely uncover further damning evidence of welfare abuse.

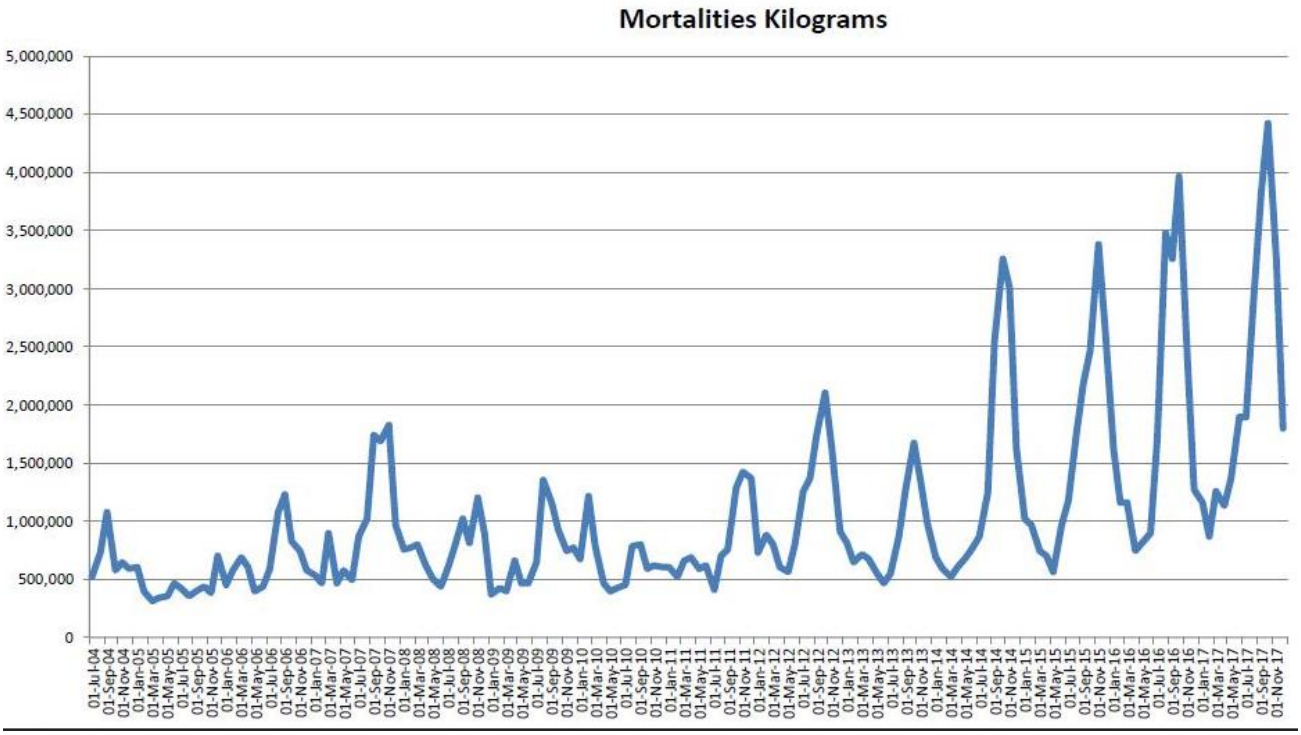
With mass mortalities, infectious disease and welfare problems expected to peak in late Summer and early Autumn, Scottish Salmon Watch recommends that Police Scotland and

APHA conduct targeted inspections at salmon farms reaching maximum biomass and in the last few months of their harvest cycle.

For example, of the 20 worst salmon farm sites for mortalities (by weight and month) between 2002 and 2017 17 occurred in September, October, November and December:

1	Year	Mortalities (Kg)	Submitted By	Site Name	Local Authority
2	01-Dec-15	640812	Grieg Seafood Shetland Ltd	Cole Deep	Shetland Islands
3	01-Feb-10	564900	Rysa Farm Salmon	Pegal Bay	Orkney Islands
4	01-Oct-17	527936	Cooke Aquaculture Scotland	Stead of Aithness	Shetland Islands
5	01-Oct-13	494652.3731	Marine Harvest (Scotland) Ltd	Portnalong	Highland
6	01-Nov-17	487622	The Scottish Salmon Company Ltd	Druimyeon Bay	Argyll and Bute
7	01-Apr-02	423165	Scottish Sea Farms Ltd	Sand Sound, Bixter	Shetland Islands
8	01-Nov-17	422946	Cooke Aquaculture Scotland	Stead of Aithness	Shetland Islands
9	01-Oct-16	396461	The Scottish Salmon Company Ltd	Trilleachan Mor	Eilean Siar
10	01-Oct-14	392856.0973	Marine Harvest (Scotland) Ltd	Greshornish	Highland
11	01-Oct-14	361742.2665	Marine Harvest (Scotland) Ltd	Marulaig Bay	Eilean Siar
12	01-Oct-12	340000	Hjaltland Seafarms Ltd	Setterness South	Shetland Islands
13	01-Nov-14	330998.5855	Marine Harvest (Scotland) Ltd	Eilean Raineach	Eilean Siar
14	01-Aug-02	326520	Lewis Salmon Ltd	Arbhair	Eilean Siar
15	01-Sep-17	319615	The Scottish Salmon Company Ltd	Tuath (Rubha na Gall)	Argyll and Bute
16	01-Aug-08	317940	Scottish Sea Farms Ltd	Fiunary	Highland
17	01-Nov-14	294281.1441	Marine Harvest (Scotland) Ltd	Greshornish	Highland
18	01-Oct-11	291056	The Scottish Salmon Company Ltd	St Molios	North Ayrshire
19	01-Sep-16	289180.2091	Marine Harvest (Scotland) Ltd	Soay Sound	Eilean Siar
20	01-Nov-14	285003.843	Marine Harvest (Scotland) Ltd	Scotasay	Eilean Siar
21	01-Oct-16	283830.0231	Marine Harvest (Scotland) Ltd	Noster	Eilean Siar

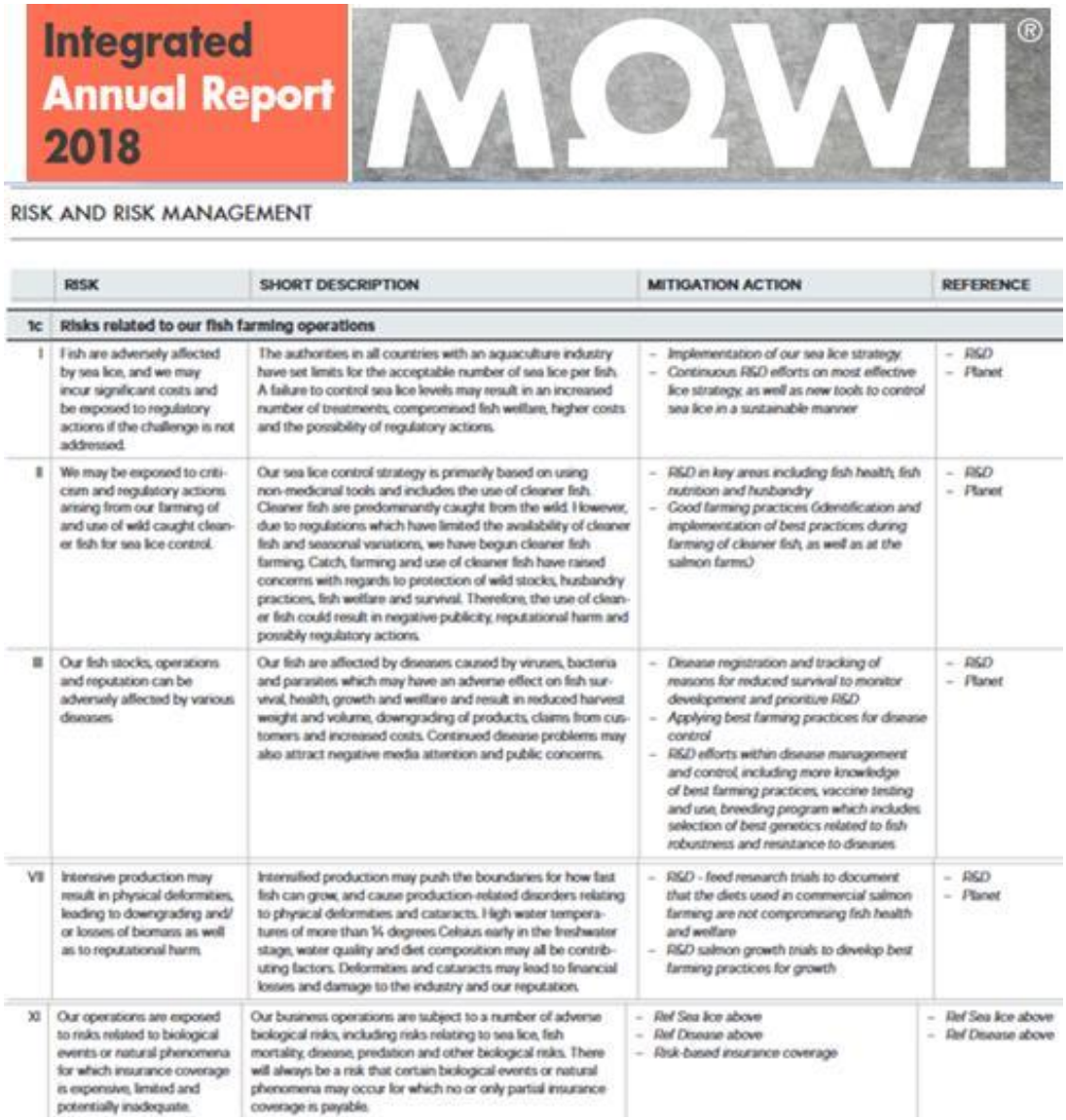
Notice the spikes in mortalities in late Summer and Autumn:



Read more via "Legal Complaint Vs Breaches of Animal Health & Welfare (Scotland) Act"

Disease Risks Highlighted by Mowi (Marine Harvest)

The salmon farming industry is all too well aware of the risks posed by infectious diseases and viruses. Mowi's Integrated Annual Report 2018 (published on 27 March 2019) identified "diseases caused by viruses, bacteria and parasites" as an ongoing risk conceding that "continued disease problems may also attract negative media attention and public concerns".



Integrated Annual Report 2018

MOWI

RISK AND RISK MANAGEMENT

	RISK	SHORT DESCRIPTION	MITIGATION ACTION	REFERENCE
1c	**Risks related to our fish farming operations**			
I	Fish are adversely affected by sea lice, and we may incur significant costs and be exposed to regulatory actions if the challenge is not addressed.	The authorities in all countries with an aquaculture industry have set limits for the acceptable number of sea lice per fish. A failure to control sea lice levels may result in an increased number of treatments, compromised fish welfare, higher costs and the possibility of regulatory actions.	– *Implementation of our sea lice strategy* – *Continuous R&D efforts on most effective lice strategy, as well as new tools to control sea lice in a sustainable manner*	– *R&D* – *Planet*
II	We may be exposed to criticism and regulatory actions arising from our farming of and use of wild caught cleaner fish for sea lice control.	Our sea lice control strategy is primarily based on using non-medicinal tools and includes the use of cleaner fish. Cleaner fish are predominantly caught from the wild. However, due to regulations which have limited the availability of cleaner fish and seasonal variations, we have begun cleaner fish farming. Catch, farming and use of cleaner fish have raised concerns with regards to protection of wild stocks, husbandry practices, fish welfare and survival. Therefore, the use of cleaner fish could result in negative publicity, reputational harm and possibly regulatory actions.	– *R&D in key areas including fish health, fish nutrition and husbandry* – *Good farming practices (identification and implementation of best practices during farming of cleaner fish, as well as at the salmon farms)*	– *R&D* – *Planet*
III	Our fish stocks, operations and reputation can be adversely affected by various diseases.	Our fish are affected by diseases caused by viruses, bacteria and parasites which may have an adverse effect on fish survival, health, growth and welfare and result in reduced harvest weight and volume, downgrading of products, claims from customers and increased costs. Continued disease problems may also attract negative media attention and public concerns.	– *Disease registration and tracking of reasons for reduced survival to monitor development and prioritize R&D* – *Applying best farming practices for disease control* – *R&D efforts within disease management and control, including more knowledge of best farming practices, vaccine testing and use, breeding program which includes selection of best genetics related to fish robustness and resistance to diseases*	– *R&D* – *Planet*
VII	Intensive production may result in physical deformities, leading to downgrading and/or losses of biomass as well as to reputational harm.	Intensified production may push the boundaries for how fast fish can grow, and cause production-related disorders relating to physical deformities and cataracts. High water temperatures of more than 14 degrees Celsius early in the freshwater stage, water quality and diet composition may all be contributing factors. Deformities and cataracts may lead to financial losses and damage to the industry and our reputation.	– *R&D - feed research trials to document that the diets used in commercial salmon farming are not compromising fish health and welfare* – *R&D salmon growth trials to develop best farming practices for growth*	– *R&D* – *Planet*
XI	Our operations are exposed to risks related to biological events or natural phenomena for which insurance coverage is expensive, limited and potentially inadequate.	Our business operations are subject to a number of adverse biological risks, including risks relating to sea lice, fish mortality, disease, predation and other biological risks. There will always be a risk that certain biological events or natural phenomena may occur for which no or only partial insurance coverage is payable.	– *Ref Sea lice above* – *Ref Disease above* – *Risk-based insurance coverage*	– *Ref Sea lice above* – *Ref Disease above*

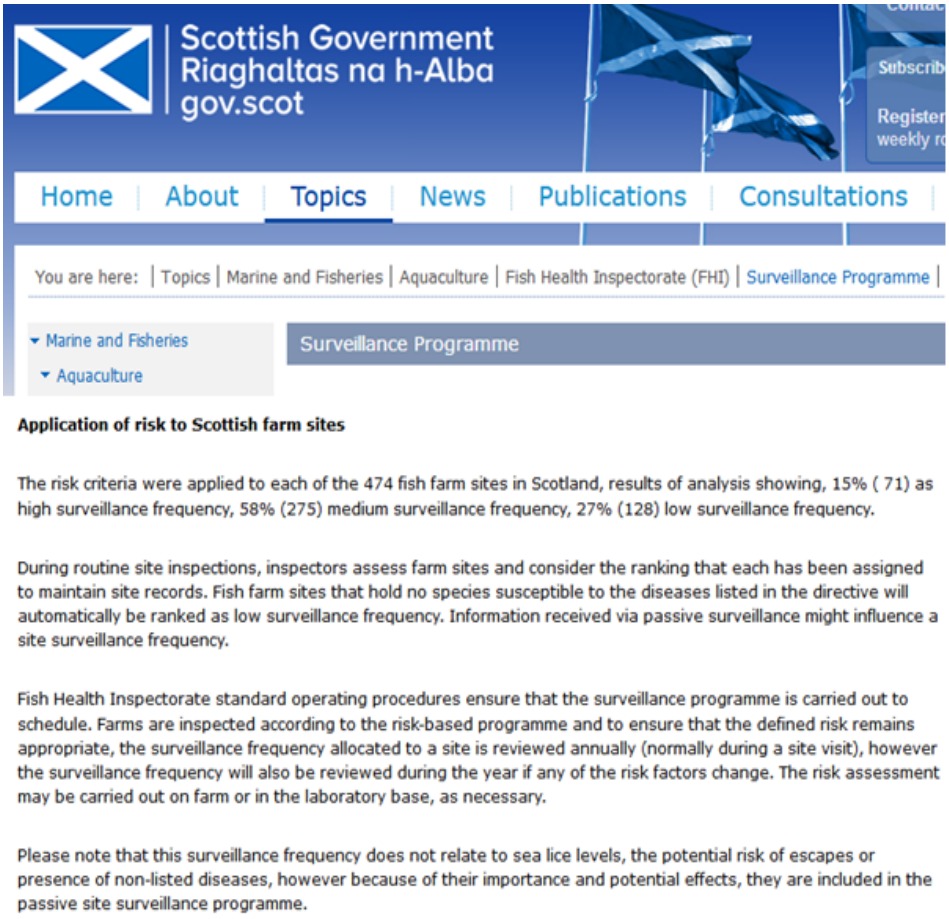
11:32 AM - 27 Mar 2019

Conclusion - Close the Net on Scottish Salmon Farming

In conclusion, the Scottish Government's 'Surveillance Programme' for salmon farming is woefully inadequate and is allowing virus-laden farmed salmon (in both the hatchery and in sea cages) to slip through the net.

In a FOI reply dated 6 March 2019 (FOI/19/00420), the Scottish Government admitted that "there is no statutory sampling conducted with respect to ova and smolts prior to their entry into sea water, either in relation to imported or domestically produced animals". The Scottish Government also conceded that "there are no statutory disease controls for pathogens which are not listed within the regulations as either listed or emerging diseases, except for domestic controls in place for clinical cases of Bacterial Kidney Disease".

Scottish Salmon Watch finds it shocking that only 15% of fish farms are assessed as "high surveillance frequency" with some salmon farms not inspected at all during a harvest cycle (which due to disease problems has fallen from ca. 20 months a decade ago to ca. 16 months).



Scottish Salmon Watch is pleased to see that 'Unannounced Site Inspections' are required but asks Scottish Ministers what percentage of site inspections at salmon farms during the last five years were 'unannounced' rather than 'announced'?

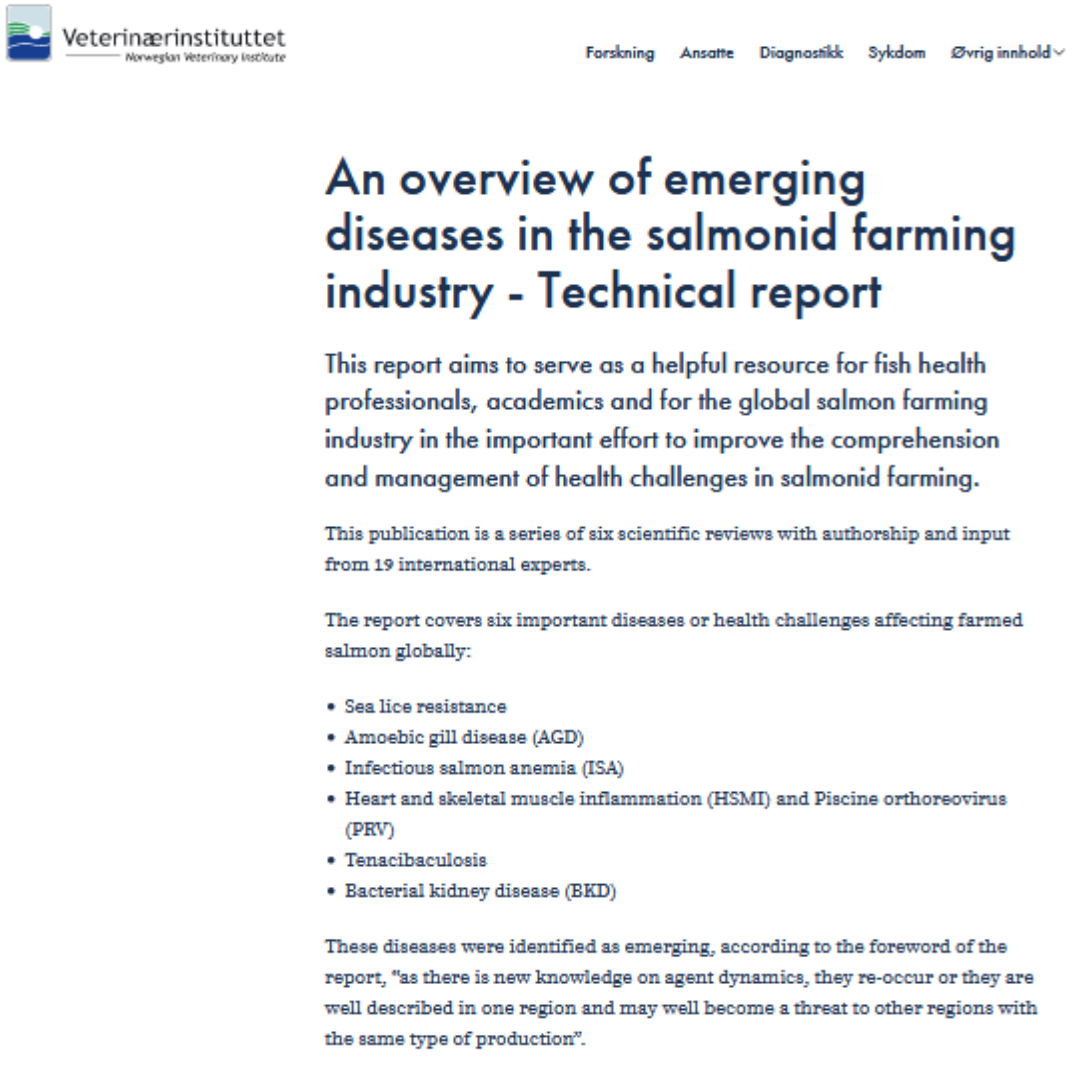
Scottish Salmon Watch would be surprised if the Scottish Government's 'unannounced site inspections' were any more than those carried out (or not as the case may be) by SEPA.

116. The Committee asked SEPA how many unannounced visits it had made to fish farms. In revised follow up evidence SEPA provided percentages in relation to the total number of unannounced visits which translate into the following numbers which shows a decline in the annual number of both visits and unannounced visits since 2015:

- In 2015, 14% of 174 visits were unannounced (24 unannounced visits)
- In 2016, 13% of 152 visits were unannounced (20 unannounced visits)
- In 2017, 9% of 160 visits were unannounced (14 unannounced visits)

Read more via "SEPA's Shame on Salmon Farming"

Scottish Ministers are encouraged to read a technical report - "An overview of emerging diseases in the salmonid farming industry" - published earlier this week by the Norwegian Veterinary Institute (the omission of information on Scottish salmon farming is striking).



The report includes:

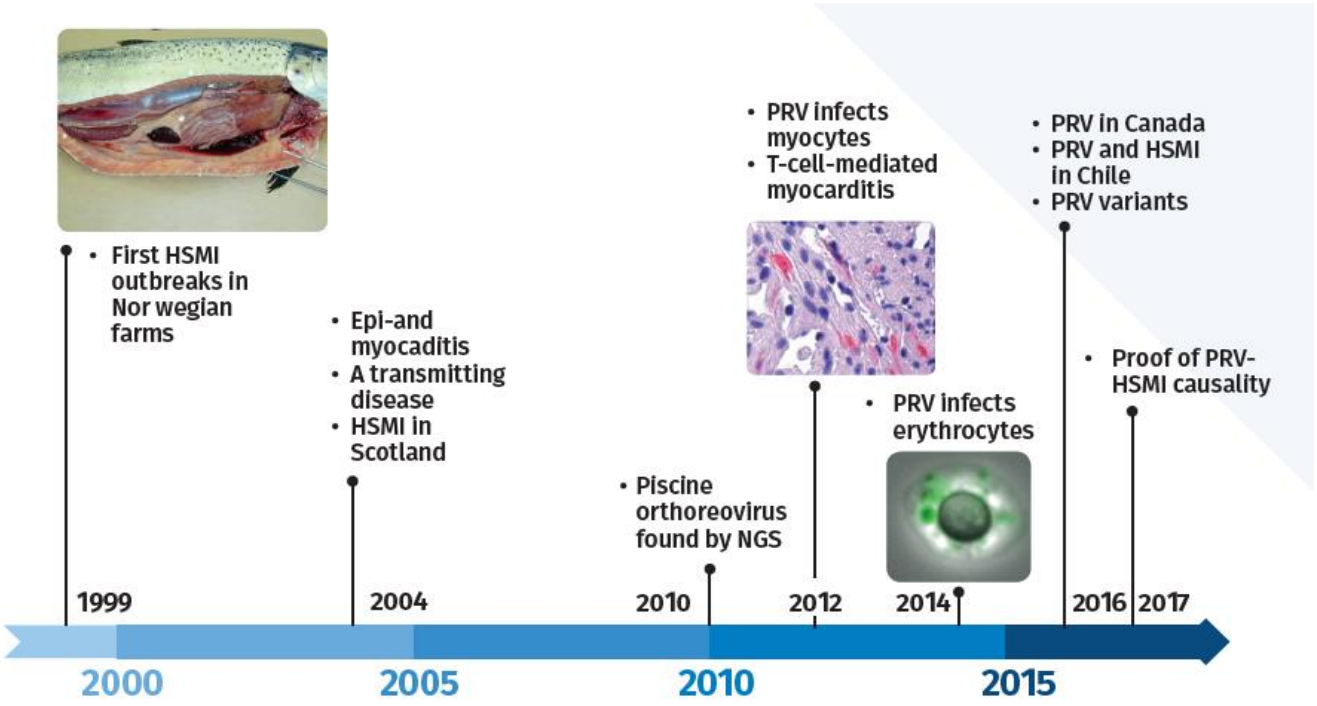


Figure 1. The timeline of some important findings linked to heart and skeletal muscle inflammation (HSMI) and Piscine orthoreovirus (PRV). NGS: Next generation sequencing. Photos: Trygve Poppe and Øystein Wessel.

Although PRV was originally considered a seawater agent and HSMI a disease occurring only after sea transfer of Atlantic salmon, this picture has changed in Norway in recent years. PRV is commonly found infecting young fish in fresh water facilities prior to smoltification (Wiik-Nielsen, Ski et al. 2012), and several HSMI outbreaks have been reported in hatcheries (Hjeltnes, Bornø et al. 2017). Following a questionnaire to Norwegian smolt producers in 2016, HSMI was reported as an important disease problem in several fresh water facilities (Hjeltnes, Bornø et al. 2017). PRV is also common in freshwater in Chile, and outbreaks are also seen there, although bacterial and fungal coinfections confund the picture.

HSMI can also be induced in pre-smolts experimentally, and although HSMI can develop at most stages, a study has indicated that the host transcriptional response to PRV infection differs in pre- and post-smolts, and that the immune responses mounted in pre-smolts may be more effective in eradicating virus (Johansen, Dahle et al. 2016).

The report also states:

> The possibility of vertical transmission has not been extensively studied, and although it is apparently not the main mechanism of transmission, it should be considered until proven otherwise (Wiik-Nielsen et al., 2012a).

Download the technical report [online here]

Undercurrent News reported (2 April 2019):

ucn HOME › PRICES › SPECIES › COMPANIES › DOWNSTREAM › UPSTREAM

Global team issues report on emerging farmed salmonid diseases

By Undercurrent News April 2, 2019 09:49 BST

A A Comment

A global group of research bodies has issued a new report into the emerging diseases in salmonid aquaculture, which is now available.

Elanco Animal Health -- in collaboration with the Norwegian Veterinary Institute and the British Columbia Centre of Aquatic Health Sciences -- recently published the technical report for farmed salmonids, titled "An overview of emerging diseases in the salmonid farming industry".

This recent publication is a series of six scientific reviews with authorship and input from 19 international experts, made possible through strong collaboration between the authors and three leading institutions.

The 70-page report covers six emerging diseases and health challenges affecting farmed salmon globally: sea lice resistance, amoebic gill disease (AGD), infectious salmon anemia (ISA), heart and skeletal muscle inflammation (HSMI) and piscine orthoreovirus (PRV), tenacibaculosis and bacterial kidney disease (BKD).

Further context on this vital issue is available via the Appendix:

FOI re. PRV/HSMI testing, sampling & data since 1 January 2018 - filed on 24 March 2019

FOI re. historical statutory sampling from fish farms to test for pathogens which are the causative agents of listed diseases - filed on 7 March 2019

FOI re. inspections, surveillance & testing of ova & smolts for disease/pathogens/viruses since 1 January 2017 - filed on 7 February 2019

Previous correspondence is available via:

"Ban Imported Salmon Eggs (Ova) from Norway Due to Disease & Genetic Risks" (Letter to Cabinet Secretary for Environment, Climate Change and Land Reform and

Cabinet Secretary for Rural Economy & Connectivity, 31 May 2018)

Finally, it is not just farmed salmon, smolts and ova which require disease testing but also effluents from salmon farming operations. As Scottish Salmon Watch wrote in a letter to the Cabinet Secretary for Environment, Climate Change and Land Reform and Cabinet Secretary for Rural Economy & Connectivity dated 7 May 2018:

"Given the raft of infectious diseases, viruses, pathogens and bacteria lurking in Scottish farmed salmon it seems incomprehensible that the Scottish Government does not test effluents. Allowing salmon farms and processing plants to slip through the net represents the antithesis of the precautionary principle. In the absence of testing, Scottish salmon should surely come stamped with a Government health warning?"

In a letter dated 21 August 2018, the Scottish Government admitted that fish processing effluents or land based farm flow through were not tested for pathogens:

> The Scottish Government does not test fish processing effluent or land based farm flow through for fish pathogens. Many fish pathogens are present within the wider aquatic environment and it is important that any risks identified are proportionately managed.
>
> As has been outlined previously, CAR licences do not control for fish pathogens. Processing plants may pose a risk of concentrating fish pathogens in the environment and these risks can be mitigated by biosecurity protocols.

This reiterated the Scottish Government's position detailed in a letter dated 7 June 2018 (following a petition signed by over 43,000 people organised by Sum Of Us):

marinescotland

Scottish Government
Riaghaltas na h-Alba
gov.scot

T: +44 (0)131 244 7007 F: +44 (0)131 244
E: jill.barber@gov.scot

Mr Don Staniford
By email; salmonfarmingkills@gmail.com

Our ref: 2018/0015316
07 June 2018

Mr Staniford

'Letter re. Infectious Diseases, Viruses, Pathogens & Bacteria in Salmon Farms and Processing Plant Effluents'

and

SumOfUs petition 'Test effluent from commercial salmon farms for deadly viruses'

Thank you for your letter of 8 May and for your submission of the SumOfUs petition referenced above to the Scottish Government on 9 May.

You are aware that the Scottish Government does not conduct testing of processing effluent for fish viruses, nor does it test flow through water of on land fish farms.

We have considered the petition submitted with the Scottish Environment Protection Agency and are of the opinion that the current regulatory framework addresses risks appropriately and proportionately.

The policy position on this has been outlined to you previously, however I have included it here for ease of reference.

Water which passes through a fish farm poses different risks to effluent leaving a processing facility. Most diseases of farmed fish originate in the aquatic environment and therefore many infections which can be carried by farmed fish are present naturally within the wider environment. The Scottish Government conducts a fish health surveillance regime and where fish show signs of disease, will conduct diagnostic testing of the fish themselves, rather than the water flowing through the system. This is in addition to daily fish health monitoring by company fish health staff, including private veterinary care.

Processing plants may pose a risk of concentrating fish pathogens in the environment and these risks can be mitigated by biosecurity protocols. Controls are in place to control discharges at processing plants under The Water Environment (Controlled Activities) (Scotland) Regulations 2011. The purpose of the CAR licence is to control any chemicals in the discharge and any impacts on environmental parameters such as biological oxygen

demand and temperature. CAR licences do not control for fish pathogens, however the processes in place within processing plants have the ability to inactivate many pathogens. The Code of Good Practice for Scottish Finfish Aquaculture contains a chapter on processing sites and states that drainage from areas where effluent and fish by-products are generated should feed into a disinfection facility, with subsequent treatment and discharge in accordance with CAR license conditions.

Scottish Government's Fish Health Inspectorate (FHI) produced disinfection guidance in 2008 which should be regarded as best practice at fish farm sites and processing plants. The guide can be found online; http://www.gov.scot/Topics/marine/Fish-Shellfish/FHI/healthpractice.

Separately, processing plants handling fish culled for disease control purposes (these are diseases listed by EU Directive) must strictly be authorised by Scottish Government's Fish Health Inspectorate (FHI) under the Aquatic Animal Health (Scotland) Regulations 2009 to ensure that biosecurity on site is adequate.

You may wish to consider submitting the petition to the Scottish Parliament. Guidance on the steps to be taken are available online; http://www.parliament.scot/S5_PublicPetitionsCommittee/General%20Documents/Petitions_leaflet_-_May_2018_-_FINAL(1).pdf

Yours sincerely

Jill Barber

Aquaculture Health, Welfare and Innovation Policy Manager

Read more via:
[Campaigners at Scottish parliament call for wastewater testing at salmon farming operations to save wild fish]
[Salmon farms are turning Scotland's seas into an open sewer, claim campaigners]
[42,000 sign petition for tougher Scottish salmon farm testing]
[Scottish salmon farming petition signed by 30,500]

In the absence of Scottish Government testing, Scottish Salmon Watch will be sampling salmon farming effluents during 2019 and would encourage greater scrutiny and surveillance of salmon farms.

Yours sincerely,

Don Staniford

Director of Scottish Salmon Watch

SCOTTISH SALMON WATCH

VIRUSES

Cc:

Fish Health Inspectorate: ms.fishhealth@gov.scot
Marine Scotland: marinescotland@gov.scot

Appendix:

Includes:

1) FOI re. PRV/HSMI testing, sampling & data since 1 January 2018 - filed on 24 March 2019

2) FOI re. historical statutory sampling from fish farms to test for pathogens which are the causative agents of listed diseases - filed on 7 March 2019

3) FOI re. inspections, surveillance & testing of ova & smolts for disease/pathogens/viruses since 1 January 2017 - filed on 7 February 2019

From: Don Staniford [mailto:salmonfarmingkills@gmail.com]
Sent: 24 March 2019 07:22
To: 'ceu@scotland.gsi.gov.uk'
Cc: 'Neil.Purvis@gov.scot'; 'Helen.McGregor@gov.scot'
Subject: FOI re. PRV/HSMI testing, sampling & data since 1 January 2018

Please provide information on Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI) since 1 January 2018.

Please include data on sampling and testing for Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI) in farmed salmon, seawater and processing plant effluent (and any other sampling and testing).

Please specify how many samples of farmed salmon and water samples have been tested for Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI).

Please include any photos, emails, letters, copies of scientific papers and other information to and from the Marine Laboratory, salmon farming companies, veterinarians (e.g. Fish Vet Group), other Governments and other parties in relation to Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI).

As context, please find enclosed below five cases where Piscine Reovirus (PRV) and/or Heart & Skeletal Muscle Inflammation (HSMI) were cited in the Scottish Government's 2018 FHI Case Information (it seems that PRV was tested for in Case # 2018-0078 - The Scottish Salmon Company at Tarbert South - but may not have been tested for in all other cases):

1) October to December 2018: Cases 20180392-20180509 (PDF online here)

Scottish Sea Farms at Nevis C

Case No:	2018-0507			Date of visit:	11/10/2018
Time spent on site:	8 Hrs			Main Inspector:	WJM
Site No:	FS0546	Site Name:	Nevis C (Ardintigh)		
Business No:	FB0125	Business Name:	Scottish Sea Farms Ltd		

Case Types:	1	REP	2	DIA	3		4		5		6	

Water Temp (°C):	12.9	Thermometer No:	Site	FHI 045 completed	
Observations:		Region:	HI	Water type:	S

CoGP MA M-23

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	N	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

Additional Case Information:

FHI notified of mortality on site post H2O2 treatment. There had been a drop in feed activity and gill scores between 2-3 so decision was made to carry out H2O2 treatment.

Site mortalities for weeks 35 - 39 averaged 0.37 for whole site per week. Pens 4, 9, 10, 11 & 12 treated on 05/10/2018. Pens 2, 6 & 8 treated on 06/10/2018. Pen 1 treated on 10/10/208 and remaining 2 pens (3 & 5) treated on 11/10/2018.

Mortalities for each pen from 05/10 - 11/10/2018 as follows:
1 - 1375, 2 - 102, 3 - 90, 4 - 56, 5 - 38, 6 - 14,892, 8 - 12,713, 9 - 18,920, 10 - 1675, 11 - 8081, 12 - 1139.

Site confused why only certain pens showed such a jump in mortalities post treatment while others didn't. Fish on site appeared in good health and feeding well on inspection. A few fish appeared slightly lethargic in pen 1 but had just been treated 24 hrs earlier. No external damage and no internal signs of disease. Gills on fish 1 slightly pale. Sea lice levels at 0.03/fish of all stages.

Histo samples taken on 27/09/2018 by FVG. Report noted variable gill disease ranging from mild to severe, suggesting previous AGD. Heart disease of an inflammatory nature from fish from pen 1. low grade HSMI possible. PCR samples collected 10/10/2018 by FVG.

2 batches of H2O2 used on 05/10/2018. Company having it checked for any potential issues.

Recent (last 4 wks) disease problems?	Y
If yes, detail:	AGD/ gill issues present.

Mortality Records

1. Mortality records available for inspection?	Y
2. How are mortalities disposed of?	Incinerated - on site
If other detail:	
3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	Weeks 38 - 41: 0.08%, 0.31%, 10.45%, 11.14%
5. Evidence of recent increased/atypical mortalities?	Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	
Pens 6 (14,892), 8 (12,713), 9 (18,920) & 11 (8,081) post H2O2 treatment 05/10 - 11/10/2018	
6. Any other peaks in mortality during period checked?	N
If yes, detail:	
7. Have increased (unexplained) mortalities been reported to vet or FHI?	Y
If yes, detail action:	FHI notified, site inspected.
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	Y

Case No:	2018-0507	Date of visit:	11/10/2018
Site No:	FS0546	Inspector:	WJM

Results Summary	Freq.	Date of Notification						
		Database	Insp	Phone	Insp	Writing	Insp	2nd Insp
MG_IPN	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
MG_VHS	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
MG_IHN	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
MG_ISA	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
MG_SAV	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
AGD QPCR	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
P theridion QPCR	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
Salmon gill pox QPCR	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
Complex gill disease histo	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
AGD histo	1/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
gill pathology	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
post mortem changes	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
PSFL	1/2	30/10/2018	WJM	31/10/2018	WJM	02/11/2018	WJM	SAE

marinescotland science

Scottish Government
Riaghaltas na h-Alba
gov.scot

[redacted]
Scottish Sea Farms Ltd
Laurel House
Laurelhill Business Park
Polmaise Road Stirling
FK7 9JQ
[redacted]

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0125	**DATE OF VISIT**	11/10/2018
SITE NO	FS0546	**SITE NAME**	Nevis C (Ardintigh)
INSPECTOR	Warren Murray	**CASE NO**	20180507

Section 1: Summary

The above site was inspected following a report from Scottish Sea Farms of a recent increase in mortalities. On inspection of the site, a small number of fish appeared lethargic. Two lethargic fish were removed for examination and subsequent diagnostic sampling.

Histopathology examination revealed mild to moderate complex gill pathology with mild to moderate proliferative gill hyperplasia along with evidence of amoebic cells (the causative agent of amoebic gill disease) and samples tested positive for *Paranucleospora theridion* (syn, *Desmozoon lepeophtherii*) by qPCR.

Due to the gill health issues reported on site, samples were screened for salmon gill poxvirus and *Paranucleospora theridion* (syn, *Desmozoon lepeophtherii*). Samples tested positive for all two pathogens.

Pseudomonas fluorescens was isolated. The light growth would not suggest bacteria to be the primary source of morbidity.

Section 2: Case Detail

Observations

The site was stocked with 237,723 2018 S1 Atlantic salmon at an average weight of 1.04 kg. Mortality rate had jumped from 0.31% in week 39 to 10.45% in week 40. The increase in mortality occurred post treatment but was confined to only four of the pens treated. Samples had been taken prior to the event with gill disease being confirmed.

R09
Marine Laboratory, 375 Victoria Road, Aberdeen, AB11 9DB
Tel – 0131 244 3498 Fax – 0131 244 0944 Email – ms.fishhealth@gov.scot
Website - www.gov.scot/Topics/marine/science

[redacted]

During the inspection a number of lethargic Atlantic salmon were observed. Two lethargic fish were removed from the pens for further examination and subsequent diagnostic sampling. The gills of fish 1 and 2 were pale.

Bacteriology: Kidney and gill material from fish 1 and 2 were inoculated onto appropriate media for the isolation of bacteria.

The following bacteria were isolated :

- *Pseudomonas fluorescens* (F1 gills)

Virology: Tissue samples were tested for segments of nucleic acid indicative of the presence of the pathogens specified below using real-time PCR (QPCR).

Salmon gill poxvirus (SGPV)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	21.36	35.02	34.47	34.76	Positive
F2	22.14	28.83	28.89	28.78	Positive

The samples tested negative for infectious haematopoietic necrosis virus (IHNV), infectious pancreatic necrosis virus (IPNV), infectious salmon anaemia virus (ISAV), salmonid alphavirus (SAV) and viral haemorrhagic septicemia virus (VHSV).

Parasitology: Tissue samples were tested for segments of nucleic acid indicative of the presence of the parasites specified below using real-time PCR (QPCR).

Neoparamoeba perurans (AGD)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	21.36	35.26	35.34	35.84	Positive
F2	22.14	30.29	30.18	30.09	Positive

Paranucleospora theridion (syn, *Desmozoon lepeophtherii*)

R09
Marine Laboratory, 375 Victoria Road, Aberdeen, AB11 9DB
Tel - 0131 244 3498 Fax - 0131 244 0944 Email - ms.fishhealth@gov.scot
Website - www.gov.scot/Topics/marine/science

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	21.36	30.02	30.66	30.61	Positive
F2	22.14	29.61	29.37	29.32	Positive

Histology: Tissue samples of gill, skin and skeletal muscle, heart, pyloric caeca, pancreas, hind gut, liver, spleen and kidney were taken from fish 1 and 2. The tissue samples were fixed in 10% neutral buffered formalin.

Histopathological examination revealed the following:

Gill: Mild to moderate multifocal interlamellar hyperplasia with spaces (lacunae) occasionally filled with cell debris (F1-F2), few lamellar thrombi, prominent goblet cells noted in all fish, small foci of cell necrosis on the hyperplasic plaques noted in F1 and several amoebic cells resembling *Neoparamoeba perurans* were noted in F2. Generalized epithelial lifting likely associated with post-mortem artefact.

2) July to September 2018: Cases 20180276-20180338 (PDF online here)

Scottish Sea Farms at Lismore North

Case No:	2018-0289							Date of visit:	11/09/2018
Time spent on site:	6 hours						Main Inspector:		AJW
Site No:	FS0745	Site Name:	Lismore North						
Business No:	FB0125	Business Name:	Scottish Sea Farms Ltd						
Case Types:	1 ECI	2 CNI	3 SLI	4 VMD	5 DIA	6			
Water Temp (°C):	13.8	Thermometer No:		T146			FHI 045 completed		
Observations:		Region:	ST	Water type:	S		CoGP MA		M-36

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

Additional Case Information:

Cleaner fish on site; Baleen wrasse from Otterferry and Machrihanish. Vaccination ridgeway biological

Morts generally incinerated on site but recent increase in morts has required collection by Billy Bowie for disposal.

Peak in morts;5/9/18 -1421 morts for day/site - wb/3/9/18 - 6904 morts/week - 3.08%

Cages 10, 12 and 14 worst effected by morts and loss of apatite. Over summer morts for site had been about 200/site/week. Increased; 3/9/18;739, 4/9;882, 5/9; 1421, 6/9;1341, 7/9;1267, 8/9;1047, 9/9 946 10/9; 1047

Gill scores have been high but are improving. - increase thought to be in part due to net cleaning. Currently scores are 1 or 2. vet report;AGD, Branchiomonas, Paranucleospora theridion, salmon gill pox; complex gill pathology

moritella toxaemia - report 4/9/18 Piscine reovirus (HSMI) in report 4/9/18 - CMS negative - SAV negative - IPN negative; results from MS via fish vet group.

SLICE for caligus, finished 2 days ago. 31/8-8/9. 500 degree day withdrawal.

Previous crop had issues with lice. This crop wrasse on site. 4 slice treatments since input and lice skirts. Getting more wrasse from Machrihanish this month. Lice levels current 1.4 adult female. Just treated with slice. Caligus 1.83 average. 10/9/18.

Results of Surveillance	
1. Has any animal health surveillance been carried out by, or on behalf of, the business?	Y
2. If yes, are results available for inspection?	Y
3. Any significant results?	Y
If yes, detail (if not detailed under recent disease problems).	
complex gill issues and HSMI	
Records checked between:	29/11/16- 11/9/18

3) April - June 2018: Cases 20180166-20180240 (PDF online here - p60)

(The Scottish Salmon Company at Ardcastle Bay

Case No:	2018-0193								Date of visit:	23/05/2018	
Time spent on site:	5 hrs							Main Inspector:		WJM	
Site No:	FS0818	Site Name:	Ardcastle Bay								
Business No:	FB0169	Business Name:	The Scottish Salmon Company								
Case Types:	1 ECI	2 CNI	3 SLI	4 VMD	5	6					
Water Temp (°C):	9.9	Thermometer No:	Site				FHI 045 completed				
Observations:		Region:	ST	Water type:	S		CoGP MA:	M-42			
Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.									
Clinical signs of disease observed?	N	If yes, see additional information/clinical score sheet.									
Gross pathology observed?	N	If yes, see additional information/clinical score sheet.									
Diagnostic samples taken?	N										

Additional Case Information:

Site stocked September 2017 from Russel Burn. Mortalities staying below 0.05%/week for whole site. Slight increase in mortalities during weeks 13 & 14 2018, this was down to increased seal activity. Extra anti-predator measures deployed and numbers quickly reduced. Sea lice levels have been below CoGP criteria since input. Lumpfish to be put onto site June 2018.

Recent veterinary reports suggest signs of pancreas disease and pcr results positive for piscine reovirus but no increase in mortalities. Fish sampled for VMD looked healthy.

Results of Surveillance	
1. Has any animal health surveillance been carried out by, or on behalf of, the business?	Y
2. If yes, are results available for inspection?	Y
3. Any significant results?	Y
If yes, detail (if not detailed under recent disease problems).	Symptoms suggestive of chronic pancreas disease. PCR positive for PRV
Records checked between:	29/01/2015 - 23/05/2018

4) April - June 2018: Cases 20180166-20180240 (PDF online here)

Loch Duart at Lochmaddy:

Case No:	2018-0219								Date of visit:	06/06/2018	
Time spent on site:	4 hours							Main Inspector:		JET	
Site No:	FS0853	Site Name:	Lochmaddy								
Business No:	FB0398	Business Name:	Loch Duart Ltd								
Case Types:	1 REP	2 DIA	3	4	5	6					
Water Temp (°C):	10	Thermometer No:	T147				FHI 045 completed				
Observations:		Region:	WI	Water type:	S		CoGP MA	W-12			
Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.									
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.									
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.									
Diagnostic samples taken?	Y										

Additional Case Information:

Locally caught wild wrasse on site
No movements on or off site since last inspection.
Fish graded 31/05 and 01/06. No increased mortality following grade.
During inspection a number of lethargic fish were observed, 5 fish were removed for diagnostic sampling.
Fish sampled for VMD appeared healthy.

Recent (last 4 wks) disease problems?	Y
If yes, detail:	PD (SAV 4) - first confirmed on site February 2018

Mortality Records

1. Mortality records available for inspection?	Y
2. How are mortalities disposed of?	Other (detail)
If other detail:	White shore cockles
3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	w/b 07/05 - 6707 (1.76%), w/b 14/05 - 2056 (0.58%), w/b 21/05 - 3664 (1.09%), w/b 28/05 - 932 (0.32%)
5. Evidence of recent increased/atypical mortalities?	Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	
See above details. PD thought to be main cause of increased mortality.	
6. Any other peaks in mortality during period checked?	N
If yes, detail:	
7. Have increased (unexplained) mortalities been reported to vet or FHI?	Y
If yes, detail action:	FVG visited site and took samples
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	Y

Results of Surveillance

1. Has any animal health surveillance been carried out by, or on behalf of, the business?	Y
2. If yes, are results available for inspection?	Y
3. Any significant results?	Y
If yes, detail (if not detailed under recent disease problems).	PD (SAV 4) confirmed on site, HSMI was also identified via histology in March 2018, but hasn't been observed since.
Records checked between:	31/08/2017 - 06/06/2018

5) January to March 2018: Cases 20180064-20180100 (PDF online here - p98-117)

The Scottish Salmon Company at Tarbert South

Case No:	2018-0078							Date of visit:	21/03/2018		
Time spent on site:	6 hours							Main Inspector:	JET		
Site No:	FS0767	Site Name:	Tarbert South								
Business No:	FB0169	Business Name:	The Scottish Salmon Company								
Case Types:	1 ECI	2 CNI	3 SLI	4 VMD	5 DIA	6					
Water Temp (°C):	10	Thermometer No:	T147				FHI 045 completed				
Observations:		Region:	ST	Water type:	S		CoGP MA	M-42			
Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.									
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.									
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.									
Diagnostic samples taken?	Y										

Additional Case Information:

Harvesting strategy - live haul to Ardyne harvest station, then dead haul to Cairndow processing plant.
Adult female sea lice numbers below suggested criteria for treatment throughout this production cycle, prophylactic slice treatments carried out 04/12/2017 and 05/02/2018.
Input of wild caught wrasse due in April 2018.
Several moribund fish with lesions on flank observed during inspection of cages. 5 fish removed and diagnostic samples taken.
Fish sampled for VMD appeared healthy.

Additional comments:
F3 - anterior ventral lesion through which the heart was exposed. F4 – Heart was not identified within cavity, no heart sample taken. Enlarged gall bladder observed underneath liver, see attched photos.

Photos online here - including:

F1-3. F3 had anterior ventral lesion through which the heart was exposed.

Read more via "EXPOSED: Gruesome Photos of Deformed & Diseased Scottish Salmon"

Case No:	2018-0078	Date of visit:	21/03/2018
Site No:	FS0767	Inspector:	JET

Results Summary	Freq.	Date of Notification						
		Database	Insp	Phone	Insp	Writing	Insp	2nd Insp
MG_IHN	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG_IPN	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG_ISA	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG_SAV	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG_VHS	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG_PMV	0/1	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
MG_PRV	1/1	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_PRV	1/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_SULC	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_SKIN	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_HPAT	1/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_ADHE	5/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_PMCH	5/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_LPAT	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
BACT_VVIS	5/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
BACT_VSPE	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW

marinescotland science

Scottish Government
Riaghaltas na h-Alba
gov.scot

[redacted]
The Scottish Salmon Company
1 Smithy Lane
Lochgilphead
Argyll
PA31 8TA
[redacted]

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

Business No	FB0169	**Date of Visit**	21/03/2018
Site No	FS0767	**Site Name**	Tarbert South
Inspector	Joe Triscott	**Case No**	20180078

Section 1: Summary

During a routine inspection of the above site, several moribund fish were observed. Five fish were removed for further examination and subsequent diagnostic sampling.

Histopathology examination revealed dermatitis, ulcers, marked presence of bacteria and skeletal muscle haemorrhagic necrosis (likely associated with *Moritella* sp.). *Moritella viscosa* was isolated by bacteriology testing from kidney and gill material of 5/5 fish and lesion material of 3/4 fish. *Moritella viscosa* is a known fish pathogen and the level and purity of growth, along with the histopathology observations would suggest that it is implicated in fish morbidity.
Fish 5 also showed marked myocarditis and red skeletal myositis resembling heart and skeletal muscle inflammation (HSMI) and the presence of the causative agent, piscine reovirus (PRV), was confirmed by real-time PCR (QPCR). Mild hepatic degeneration and necrosis also noted. Fish were generally poor doing.

Section 2: Case Detail

Observations

During a routine inspection, several lethargic and moribund fish were observed across all stocked cages. The majority of these fish also had visible lesions. Five moribund fish were removed for further examination and subsequent diagnostic sampling.

There had been no recent significant or unexplained mortality recorded at the site, inspection of the site mortality records showed 0.2% mortality for the previous four weeks. Those mortalities had been attributed to poor doing fish.

R09

Marine Laboratory, 375 Victoria Road, Aberdeen, AB11 9DB
Tel - 0131 244 3498 Fax - 01224 295620 Email - ms.fishhealth@gov.scot
Website - www.gov.scot/Topics/marine/science

External examination of the fish showed lesions on the flanks of fish 1, 3 and 4. Fish 3 also had a lesion on the ventral surface through which the heart was exposed. Fish 5 had a lesion on the head. The eyes of fish 2 were exophthalmic.

Internal examination showed clear ascites present in fish 1. Petechial haemorrhaging of the liver was observed in fish 2 and 4, moderate liver tissue breakdown was apparent in fish 3 and 4. The kidney tissue of fish 2 and 5 appeared slightly liquefied. The gall bladder of fish 4 was enlarged.

Results

Bacteriology: Kidney and gill material from fish 1-5 and lesion material from fish 1, 3, 4 and 5 were inoculated onto appropriate media for the isolation of bacteria.

The following bacteria were isolated:

*Moritella viscosa (*gill and kidney of fish 1-5, lesion of fish 3-5)

Vibrio sp. (gill of fish 1 and 2, kidney of fish 1-3, lesion of fish 1 and 4)

From the tests conducted, we do not have evidence of resistance to amoxycillin, oxytetracycline, cotrimoxazole or florfenicol for *Moritella viscosa*.

Virology: Tissue samples were tested for segments of nucleic acid indicative of the presence of the pathogens specified below using real-time PCR (QPCR).

Piscine reovirus (PRV)

Pool Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
P1	18.18	26.13	25.93	26.06	Positive

Histology: Tissue samples of gill, skin and skeletal muscle, heart, pyloric caeca, pancreas, hind gut, liver, spleen and kidney were taken from fish 1-5. The tissue samples were fixed in 10% neutral buffered formalin.

Histopathological examination revealed the following:

Gill: Some lamellar congestion and lamellar epithelial hypertrophy (F1 and F4), mild to moderate, focal to diffuse presence of aneurysmal dilation/telangiectasia (F1-F5) and generalized epithelial lifting (likely post mortem artefact).

Skin & Muscle: Partial to absence of epidermal and dermal layer (F1, F3-F5), mild dermal oedema with mild leucocyte infiltration and presence of mixed bacteria that stained gram negative (F1, F3-F5), haemorrhagic necrosis of skeletal muscle (F1, F3-F5). F5 also showed marked red skeletal muscle degeneration and infiltration of inflammatory cells (myositis).

Heart: Moderate pericarditis (F5) and marked myocardial degeneration and cell infiltration of the compact and spongy layer of ventricle (F5).

Gut and pyloric caeca: Adipose tissue showed fibrous adhesions likely associated with vaccine administration (F1-F5), mild to moderate cell sloughing (F1-F5) (likely post mortem artefact).

Pancreas: Fibrous adhesions associated with peripancreatic tissue (likely vaccine administration).

Liver: Mild to moderate multifocal sinusoidal congestion (F2, F4 and F5) surrounded by some melanin deposits (F2), one small foci of hepatocyte necrosis (F4) and marked presence of hepatic apoptotic cells and pyknotic nuclei noted in F5.

Kidney: Slight increase of melanomacrophages aggregates (MMA) (F1), few renal tubules with dilated lumen and few shrunken glomeruli (F1).

Spleen: Slightly congested (F1, F3 and F5).

Signed: [redacted] Date: 12/04/2018

Please consider this a request for information under the relevant Freedom of Information and Environmental Information Regulations including both the Freedom of Information (Scotland) Act 2002 and the Environmental Information (Scotland) Regulations 2004 (as well as any other new or other regulations which may be appropriate).

Please provide this information electronically via email.

Please acknowledge receipt of this FOI request.

Many thanks and I look forward to a response shortly.

Best fishes,

Don

Don Staniford

Director, Scottish Salmon Watch: https://scottishsalmonwatch.org/

From: Don Staniford [mailto:salmonfarmingkills@gmail.com]
Sent: 07 March 2019 09:55
To: 'ceu@scotland.gsi.gov.uk'
Cc: 'Neil.Purvis@gov.scot'; 'Helen.McGregor@gov.scot'
Subject: FOI on historical statutory sampling from fish farms to test for pathogens which are the causative agents of listed diseases

Further to FOI-19-00420 (attached and enclosed below), please provide information on historical statutory sampling from fish farms to test for pathogens which are the causative agents of listed diseases.

The attached letter states that "the results of such testing have proved negative":

> With respect to domestically produced ova and smolts, Scotland is presently recognised as disease free from all of the listed pathogens within Annex IV Part II of Council Directive 2006/88/EC. Historically, statutory sampling was undertaken from fish farms around Scotland to test for the presence of pathogens which are the causative agents of listed diseases. The results of such testing have proved negative and have supported the application for disease free status which was subsequently approved through the European Commission.

Please include information on those negative tests.

Please also include information on the "disease free status which was subsequently approved through the European Commission".

Please consider this a request for information under the relevant Freedom of Information and Environmental Information Regulations including both the Freedom of Information (Scotland) Act 2002 and the Environmental Information (Scotland) Regulations 2004 (as well as any other new or other regulations which may be appropriate).

Please provide this information electronically via email.

Please acknowledge receipt of this FOI request.

Many thanks and I look forward to a response shortly.

Best fishes,

Don

Don Staniford

Director, Scottish Salmon Watch: https://scottishsalmonwatch.org/

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From: Don Staniford [mailto:salmonfarmingkills@gmail.com]
Sent: 07 February 2019 00:46
To: 'ceu@scotland.gsi.gov.uk'
Cc: 'Neil.Purvis@gov.scot'; 'Helen.McGregor@gov.scot'
Subject: FOI re. inspections, surveillance & testing of ova & smolts for disease/pathogens/viruses since 1 January 2017

Please provide information on inspections, surveillance and testing of ova and smolts for diseases, pathogens and viruses since 1 January 2017.

Please include information relating to inspections, surveillance and testing of imported ova and domestically produced ova.

Please include information relating to inspections, surveillance and testing of imported smolts and domestically produced smolts.

For example, are smolts tested for diseases, pathogens and viruses prior to entry to the sea-water phase of salmon farming production?

If so, are smolts tested for ISA, PRV, HSMI, VHS and any other diseases, pathogens and viruses?

The following email supplied by the Scottish Government on 1 February 2019 via FOI/18/03773 states that the Scottish Government "inspect a percentage [of ova] on arrival":

From: <REDACTED> (MARLAB)
Sent: 14 November 2018 14:15
To: <REDACTED> (MARLAB) <REDACTED> @gov.scot>; <REDACTED> (MARLAB) <REDACTED> @gov.scot>; <REDACTED>@gov.scot>; <REDACTED> (MARLAB<REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>
Cc: <REDACTED>@gov.scot>; <REDACTED>@gov.scot>;

<REDACTED>@gov.scot>
Subject: RE: Approved Compartment Declaration Rimstad Norway

Hi <REDACTED>

Just to answer a couple of your questions from a few emails ago.

I replied to <REDACTED> at AquaGen on 7 November when I received his initial email letting us know of the plan export and asked him for an update on the approval process as queries had been raised about the application. I haven't received a reply from him yet and I have sent him a further email today (copied to <REDACTED> at AquaGen) asking him for an update. If the UKs query has only been submitted today then maybe issues have yet to be raised with AquaGen or Mattilsynet.

I have emailed SSF today to make arrangements to inspect the consignment on arrival (we inspect a percentage on arrival) and to inform them that the ISA free declaration for Rimstad has not gone through yet and if there are any delays in the process then the import cannot proceed next week as the site would not meet the standard to export to the UK.

If the declaration is not confirmed on Monday then the export should not proceed as Mattilsynet cannot issue a health certificate that meets the health requirements of the UK. If the eggs arrive and the declaration isn't confirmed, we could issue a notice under Regulation 30(2) of TARP as the animals do not comply with the requirements of article 3 of Directive 90/425. They would fail to satisfy the requirements of Directive 2006/88 as per article 3 (1a) (movement from Category II to Category I is not allowed). This notice requires the ova either to be destroyed or returned to source (with approval of Mattilsynet).

Thanks

<REDACTED>

What percentage of imported ova are routinely inspected?

Please provide data and testing results of inspections since 1 January 2017.

The following email also supplied by the Scottish Government on 1 February 2019 via FOI/18/03773 refers to "testing requirements of the EU" and inspections:

From: <REDACTED> (MARLAB)
Sent: 09 August 2017 12:10
To: <REDACTED>@hendrix-genetics.com>
Subject: RE: Aquagen eggs

We are unable to receive consignments of ISA susceptible species unless they originate from an ISA free area. As long as a country or compartment has been declared free of ISA (and any other relevant diseases) then no additional testing is required.

Scotland follows the testing requirements of the EU. The EU standards for surveillance and diagnostic testing are laid out in decision 2015/1554. The inspection and testing requirements to demonstrate freedom from ISA are laid out in table 3.A. Sites are subject to 6 inspections per year with sampling of 75 fish twice per year over the two year surveillance period.

If a whole country is declared free, such as Great Britain, continued testing (targeted surveillance) can be discontinued as long as conditions are conducive to clinical expression of the disease (article 52 of directive 2006/88). If targeted surveillance is required to maintain the ISA free zone (i.e. disease free compartments within non-disease free countries) then inspections and testing are conducted in accordance with table 3B in decision 2015/1554. The frequency and number of inspections and tests are determined by the risk level attributed to the site with high risk sites sampled twice per year, medium risk once per year and low risk sites once every two years. The sample size is 30 fish and the screening method is RT-qPCR.

Another email supplied by the Scottish Government on 1 February 2019 via FOI/18/03773 refers to "individual testing of all stocks transferred on to site" and "continued targeted surveillance" but it is not clear if this refers only to Norway (as the source of the ova):

From: <REDACTED>
Sent: 10 August 2018 14:10
To: <REDACTED> (Cefas)'; <REDACTED> (DEFRA); <REDACTED> (MARLAB); <REDACTED> (Cefas)
Cc: <REDACTED> (Cefas); <REDACTED> (Cefas); <REDACTED> (MARLAB); <REDACTED> (MARLAB); <REDACTED> (MARLAB); <REDACTED> (MARLAB)
Subject: RE: For information: PAFF AHW-CIC July 2018 - Norway

We also agree that that the individual testing of all stocks transferred on to site would provide assurances on the health status of the site, providing that the time period,

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sampling, detection method(s) and environmental conditions between stocking and sampling allowed for the expression of the disease. The potential risk to the transfer of disease should become apparent, should the C, D & F have been inadequate, thus protecting receiving sites. The continued targeted surveillance required under Article 52 would presumably be done and continue to provide this level of assurance.

This email supplied by the Scottish Government on 1 February 2019 via FOI/18/03773 refers to "follow up surveillance":

From: <REDACTED> (MARLAB)
Sent: 12 July 2017 13:49
To: <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>; <REDACTED> (MARLAB) <REDACTED>@gov.scot>
Cc: <REDACTED> (MARLAB) <REDACTED>@gov.scot>
Subject: FW: Information update

Hi

This is the information from <REDACTED> on the ISA detection at Aquagen.

In summary, Aquagen have detected ISA at the seawater broodstock site Merraberget and the freshwater site at Rimstad, Tingvoll which received broodstock from Merraberget in May. This is to be confirmed by Mattilsynet. Samples taken in April, May and June by a private laboratory for ISA were negative, but the July samples were positive.

Scottish sites received ova in 2016/2017 from both Hemne (unconnected location) and Tingvoll hatcheries but the broodstock stripped for the 2016/2017 season were held previously at a sea site known as Hegebergetroa, not the currently affected site. I don't know the relation of the two sea sites to one another, but the reports state that Merraberget is more than 10km from any other site.

Andy has provided a list of the source hatcheries for all of the 2016/2017 consignments delivered to Scotland. Do we need to conduct any follow up surveillance at this point or do we need to contact Mattilsynet for further information?

Thanks

<REDACTED>

Please therefore provide information on any surveillance as well as inspections and testing of ova and smolts for diseases, pathogens and viruses since 1 January 2017.

Please consider this a request for information under the relevant Freedom of Information and Environmental Information Regulations including both the Freedom of Information (Scotland) Act 2002 and the Environmental Information (Scotland) Regulations 2004 (as well as any other new or other regulations which may be appropriate).

Please provide this information electronically via email.

Please acknowledge receipt of this FOI request.

Many thanks and I look forward to a response shortly.

Best fishes,

Don

Don Staniford