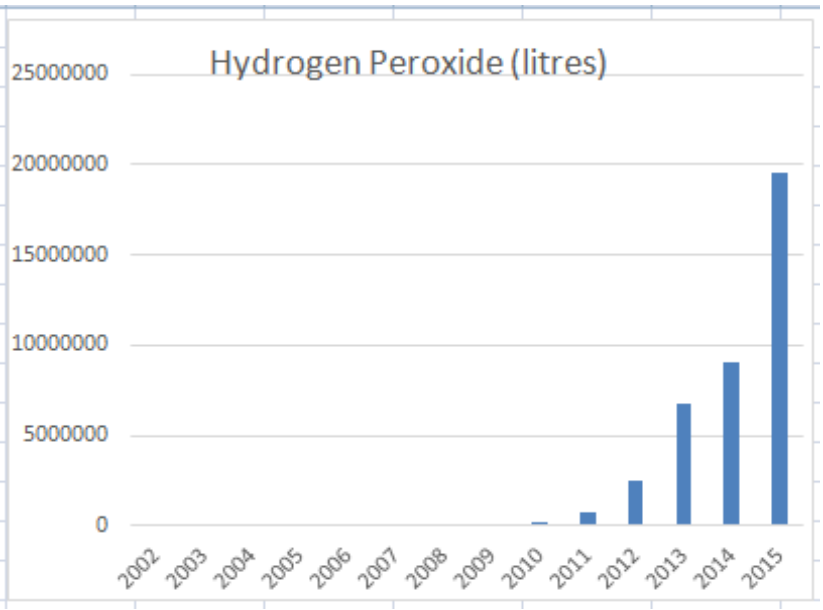
The Global Alliance Against Industrial Aquaculture, 12 February 2017

Sky-Rocketing Chemical Use on Scottish Salmon Farms
- Hydrogen Peroxide use leaps from 19,000 litres in 2005 to 19m litres in 2015

Explosive new data from the Scottish Environment Protection Agency (SEPA) reveals a staggering increase in the use of a "corrosive" chemical on Scottish salmon farms. Data obtained by the Global Alliance Against Industrial Aquaculture (GAAIA) via Freedom of Information (FOI) reveals that the use of Hydrogen Peroxide shot up from 19,200 litres in 2005 to 19.6 million litres in 2015 (an increase of 101,801%) as chemical resistance cripples the Scottish salmon farming industry **[1]**.

Read more via today's Sunday Times: "Record chemical use 'of concern' to salmon giant" **[2]**

Year	Hydrogen Peroxide (litres)
2002	64600
2003	48950
2004	14600
2005	19200
2006	0
2007	0
2008	95000
2009	0
2010	217392
2011	739145
2012	2441625
2013	6788634
2014	9082650
2015	19564988



The exclusive data reveals that Scottish salmon farming's use of Hydrogen Peroxide - used as a propellant in torpedoes and rockets - has exploded since 2009 when not a single drop was used. Hydrogen Peroxide use rapidly rose to 2.4 million litres in 2012, then to 6.8 million litres in 2013 and 9.1 million litres in 2014.

In 2015, a total of 162 salmon farms reported the use of Hydrogen Peroxide with Marine Harvest by far the biggest user at 8.4 million litres followed by the Scottish Salmon Company at 4 million litres and Grieg Seafood at 3.1 million litres. The number of salmon farms in Scotland using Hydrogen Peroxide rose from zero in 2009 to 10 in 2010, 24 in 2011, 94 in 2012, 155 in 2013 and 131 in 2014.

Here's the top 20 salmon farms using Hydrogen Peroxide in 2015 - including over 1 million litres at one lice-infested Marine Harvest salmon farm in Loch Torridon:

Site Name	Operator (at date of submission)	Local Authority	Hydrogen Peroxide (litres)
Camas an Leim (Torridon)	Marine Harvest (Scotland) Ltd	Highland	1018616
Ardintoul	Marine Harvest (Scotland) Ltd	Highland	753450
Creag an Sagairt West	Marine Harvest (Scotland) Ltd	Highland	464529
North Havra	Grieg Seafood Shetland Ltd	Shetland Islands	424000
Easter Score Holm	Grieg Seafood Shetland Ltd	Shetland Islands	417700
East of Langa	Grieg Seafood Shetland Ltd	Shetland Islands	398600
Greanamul	The Scottish Salmon Company Ltd	Eilean Siar	394091
Poll na Gille	Marine Harvest (Scotland) Ltd	Argyll and Bute	387150
Sgeir Dughall	The Scottish Salmon Company Ltd	Highland	382272
Rubh an Trilleachain	Kames Fish Farming Ltd	Argyll and Bute	376000
Isle of Ewe	Marine Harvest (Scotland) Ltd	Highland	369250
Spoose Holm (Oxna)	Grieg Seafood Shetland Ltd	Shetland Islands	368600
Aird Ardheslaig	The Scottish Salmon Company Ltd	Highland	343548
West of Burwick	Grieg Seafood Shetland Ltd	Shetland Islands	335700
Soay Sound	Marine Harvest (Scotland) Ltd	Eilean Siar	287455
Sron	Marine Harvest (Scotland) Ltd	Highland	281700
Papa, East Head of Scalloway	Grieg Seafood Shetland Ltd	Shetland Islands	277000
Stulaigh Island	Marine Harvest (Scotland) Ltd	Eilean Siar	276959
Ardmaddy South	Marine Harvest (Scotland) Ltd	Argyll and Bute	271903
Erisort, North Shore East	Marine Harvest (Scotland) Ltd	Eilean Siar	271215

Download all the data as an Excel spreadsheet online here

"The Scottish salmon farming industry's use of toxic chemicals is exploding due to sea lice resistance," said Don Staniford, Director of the Global Alliance Against Industrial Aquaculture. "Put simply, the drugs don't work. There's more than enough rocket propellant being pumped into Scottish waters to propel this corrosive industry back to Norway. Consumers can blow this toxic industry out of the water by boycotting Scottish salmon".

Photo: Don Staniford at a Marine Harvest salmon farm on the Isle of Skye - watch a video report via "Marine Harmfest's Bad Case of Chemical Use"

Current annual usage of Hydrogen Peroxide (19.6 million litres in 2015) is enough to fill up 8 Olympic swimming pools. It is little wonder then that sea lice are now becoming resistant. A scientific paper published in February 2017 reported:

"Resistance towards delousing agents including hydrogen peroxide is becoming a problem for salmon lice control..... In an attempt to combat resistant salmon lice, hydrogen peroxide (H_2O_2) has become increasingly used in salmon lice bath treatments. Resistance towards H_2O_2 has however also been detected in both Scottish and Norwegian salmon lice."

Tankers carrying hundreds of litres of the toxic chemical - marked "corrosive" - are now a regular sight across Scotland. Here's a tanker marked "corrosive" Hydrogen Peroxide parked in Ullapool, Wester Ross:

And here's Hydrogen Peroxide trucks at a transport depot in North Uist, Outer Hebrides:

Hydrogen Peroxide is used on salmon farms to kill sea lice and treat Amoebic Gill Disease but it is better known for its use as a propellant in torpedoes and rockets, as a bleaching agent in the textile, pulp and paper industries and as a hair dye (as in 'peroxide blonde'). Hydrogen Peroxide has been used for creating explosives and has been used in attacks including the 2005 London bombings.

According to a safety data sheet published by the Centers for Disease Control and Prevention in 2014, Hydrogen Peroxide is classified as "corrosive", an "oxidizer" and an "environmental hazard":

ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms.

CHEMICAL DANGERS:

The substance decomposes on warming or under influence of light producing oxygen , which increases fire hazard. The substance is a strong oxidant and reacts violently with combustible and reducing materials causing fire and explosion hazard particularly in the presence of metals. Attacks many organic substances, e.g., textile and paper.

EFFECTS OF SHORT-TERM EXPOSURE:

The substance is corrosive to the eyes and the skin. The vapour is irritating to the respiratory tract . Ingestion of this substance may produce oxygen bubbles (embolism) in the blood , resulting in shock .

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

Lungs may be affected by inhalation of high concentrations. The substance may have effects on the hair , resulting in bleaching.

The [safety data sheet for Paramove] (one of the Hydrogen Peroxide trade products used by the salmon farming industry) includes:

Chronic effects

- This product contains ingredients that are considered to be probable or suspected human carcinogens, or confirmed animal carcinogens with unknown relevance to humans (see Section 11 – Chronic).

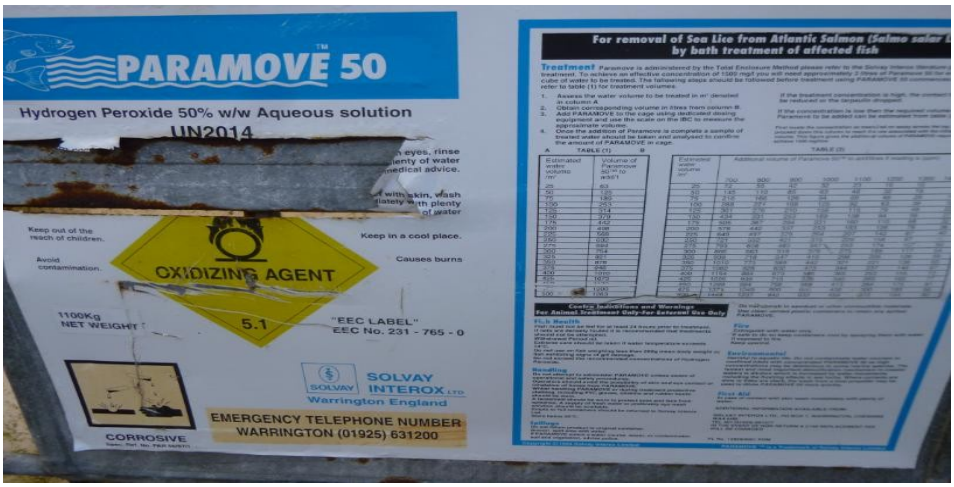
Ingredients	CAS-No.	Rating	Basis
Hydrogen peroxide (H2O2)	7722-84-1	Confirmed animal carcinogen with unknown relevance to humans	ACGIH

Classification

C: Oxidizing Material
D1B:Toxic Material Causing Immediate and Serious Toxic Effects
E:Corrosive Material
F:Dangerously Reactive Material

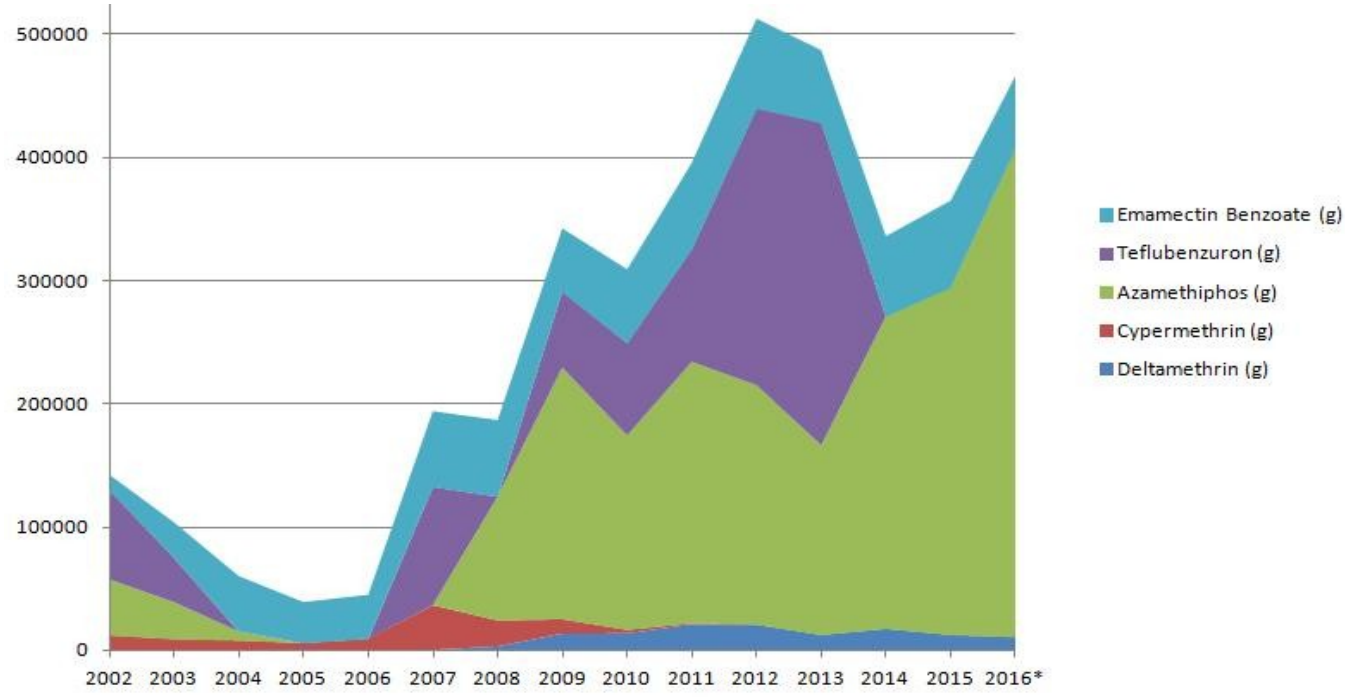
Here's vats of Hydrogen Peroxide in North Uist, Outer Hebrides:

Here's an empty vat of Hydrogen Peroxide outside a Marine Harvest salmon farm in North Uist, Outer Hebrides:



Here's vats of Hydrogen Peroxide loaded up in Ullapool waiting to be loaded onto the ferry to the Outer Hebrides:

Last month, The Sunday Times revealed a ten-fold increase in the use of the toxic chemicals Azamethiphos, Cypermethrin, Deltamethrin, Emamectin benzoate and Teflubenzuron on Scottish salmon farms.



Read more via:

- The Times: "Toxic war on salmon lice soars 1,000%"
- Press Release: Scottish Salmon's Lethal Legacy
- The Sunday Times: "Salmon industry toxins soar by 1000 per cent"

"Chemically embalmed Scottish salmon leaves a bad taste in the mouth," concluded Staniford. "I'd rather drink a bottle of bleach than eat Scottish farmed salmon. Scottish salmon is now so addicted to chemicals that is should come with a Government health warning. Mass mortalities due to chemical treatments is also creating a fish welfare disaster".

Photo: Don Staniford outside Loch Duart's shore base in North Uist, Outer Hebrides - watch a video report via "Loch Duart -- The Toxic Salmon Company"

Mass mortalities due to Hydrogen Peroxide are piling up at salmon farming's door - the deaths include:

126,225 farmed salmon in Norway in 2016 "likely due to the fish being overexposed to hydrogen peroxide" (reported by Norway Today)

80,000 farmed salmon in Norway in 2016 "after delousing them with hydrogen peroxide" (reported by Intrafish)

Norwegian company loses 80,000 salmon after delousing

It says the mortalities happened during a relocation of 200,000 fish.

by IntraFish Media
June 24th, 2018 13:05 GMT Updated June 24th, 2018 12:23 GMT
Share: Facebook Twitter LinkedIn Print E-mail

Ervik Laks og Ørret (Ervik Salmon and Trout) lost about 80,000 salmon after delousing them with hydrogen peroxide aboard the Gåsø Viking, according to Norwegian Food Safety Authority (FSA) documents obtained by **IntraFish**.

The company said the incident happened during the relocation of 200,000 fish from the Raskjæret site to Aursøyva in early May, where there were to be divided between two cages.

60,000 farmed salmon "killed by hydrogen peroxide being used to treat them for amoebic gill disease at Marine Harvest's fish farm in Soay Sound, off the Isle of Harris" in 2016 (reported by Daily Telegraph, The Ferret and GAAIA).

Here's the 'Mortality Event Report' obtained by GAAIA from the Scottish Government via FOI:

Mortality Event Report

Site Name: Soay

Site No: FS0646

Start date of mortality: week 37

Period of mortality: Weekly

Percentage mortality: 60,000 (13%), Post hydrogen peroxide treatment for AGD

Reason (if explained): «If_explained_select_reasons»

Company: Marine Harvest Scotland - FB0119

Species: SAL

Water Type: SW

Weight (site average): 2.5 kg

Weight (affected population average): 2.5 kg

Age: 2016 Q4

Estimated number of fish lost: 60,000

Additional information: Mortalities have dropped to double figures per cage, a further H_2O_2 treatment is planned for coming weeks.

MS action: PSI conducted and site inspection to be scheduled.

17,000 farmed salmon (70 metric tons) died "while using hydrogen peroxide" in Norway in 2015 (reported by Intrafish)

Marine Harvest loses 70 tons of salmon during sealice treatment

Norwegian Food Safety Authority talks of 'very serious incident,' local media report suggests.

by IntraFish Media
October 14th, 2015 13:09 GMT Updated May 9th, 2018 19:24 GMT
Share: Facebook Twitter LinkedIn Print E-mail

Norwegian salmon farming giant Marine Harvest lost 70 metric tons of salmon while using hydrogen peroxide to treat the fish against sea lice in one of its cages, reported *Bergens Tidende* Wednesday.

Around 17,000 salmon, of about four kilograms in weight each, died during the "very serious incident," as the Norwegian Food Safety Authority (FSA) described it.

The mortality occurred in the locality of Gulesto in Bremanger.

A total of 190,000 salmon were in the cages, and nearly 9 percent died during the treatment.

Read more via "Fewer sea lice on salmon but at what cost to fish health?"

For farmed salmon, the lethal reality of being doused in a bath of Hydrogen Peroxide bath contrasts with the innocuous image presented by the salmon farming industry. Here's Cooke Aquaculture's rose-tinted view of bath time down at the salmon farm:

Hydrogen Peroxide (H_2O_2) Tarp Treatments	Cooke AQUACULTURE SCOTLAND *Refusing to go with the flow*
Standard Operating Procedure (SOP) Number 21 *Revised October 2014*	

A report - "In Too Deep: The Welfare of Intensively Farmed Fish" - published by Compassion In World Farming in 2002 included:

> The third major type of bath treatment, and the one seen as environmentally friendly, is hydrogen peroxide. This chemical is bubbled through porous pipes into the cage containing crowded fish. Its environmentally friendly credentials stem from hydrogen peroxide breaking down chemically during treatment into water and oxygen. It is neither fully effective nor welfare-friendly. Hydrogen peroxide is a well-known irritant. Fish find it very stressful, and its application can cause significant mortality. As well as causing the fish to suffer, it is also not fully effective at removing lice. It works by stunning the lice rather than killing them. Successful treatment relies on the crowded fish knocking against each other or rubbing against the nets to dislodge the stunned lice. Any lice that are not removed simply recover.

The report concluded:

The use of hydrogen peroxide and wrasse as "cleaner fish" for treating sea lice are both unacceptable on welfare grounds.

The Sunday Times reported today:

In 2001, Compassion In World Farming (CIWF) warned that hydrogen peroxide posed "serious animal welfare drawbacks". Philip Lymbery, the chief executive of CIWF, said: "We have long condemned the use of this chemical because it is known to cause suffering to farmed fish."

The University of Bergen reported in 2015:

"Hydrogen peroxide (H2O2) has been used against skin parasites and bacterial gill infections in salmonids. Harsh treatment using H2O2 might cause an adverse impact to the fish innate immunity leaving it so traumatized that it takes a long time for the fish to return to the normal state."

According to a report by the University of Florida: "Several species of fish are known to be sensitive to hydrogen peroxide, and the use of the chemical may be toxic to those species".

Read more about the welfare and environmental impacts of Hydrogen Peroxide use via **[3]** and **[4]**.

Hydrogen Peroxide use has also exploded in Norway along with the use of Azamethiphos, Deltamethrin, Diflubenzuron, Emamectin benzoate and Teflubenzuron **[5].**

Contact:

Don Staniford: 07771 541826 (dstaniford@gaaia.org)

Notes to Editors:

[1] Chemical resistance of sea lice is crippling the salmon farming industry leading to an increase in the use of toxic chemicals. In 2015, Aquaculture Magazine reported:

"Usage of hydrogen peroxide has exploded over the last year, not least due to the increasing resistance in sea lice against chemotherapeutic drugs, such as chitin inhibitors and pyrethroids, as a result of many years' repeated usage."

Resistance to Hydrogen Peroxide has now been reported in both Norway and Scotland. "The current study presents the first case report of reduced sensitivity towards H_2O_2 in salmon lice in Norway," reported scientists in May 2015. This change in sensitivity imposes a threat to the Norwegian fish farming industry and should be monitored closely."

"As a result of the development of reduced sensitivity towards other available chemical treatments, the use of H2O2 for anti-salmon lice treatments has increased since the product was re-introduced to the Norwegian market in 2009," continued the scientific paper. "In 2013, 8262 metric tonnes of H2O2 was applied in treatment while the figure was 2538 metric tonnes the previous year (Norwegian Institute of Public Health, 2014). The outbreak of amoebic gill disease (AGD) may also have contributed to the increased use of H2O2 in 2013. Treatments against AGD will nonetheless simultaneously combat infested salmon lice and therefore impose selection pressure on both parasitic species. Grøntvedt et al. (2014) showed that the most intense H2O2 treatment regime against salmon lice was found in the northern part of Mid-Norway and in the southern part of North-Norway. The development of reduced sensitivity towards H2O2 in these particular areas was therefore not unexpected as repeated treatments provide fast lane evolution towards reduced sensitivity."

Read more via "First report of reduced sensitivity towards hydrogen peroxide found in the salmon louse Lepeophtheirus salmonis in Norway" (Aquaculture Reports, May 2015)

A scientific paper published in February 2017 reported:

"Resistance towards delousing agents including hydrogen peroxide is becoming a problem for salmon lice control..... In an attempt to combat resistant salmon lice, hydrogen peroxide (H_2O_2) has become increasingly used in salmon lice bath treatments. Resistance towards H_2O_2 has however also been detected in both Scottish and Norwegian salmon lice."

Read more via "Increased catalase activity — A possible resistance mechanism in hydrogen peroxide resistant salmon lice (Lepeophtheirus salmonis)" (Aquaculture, February 2017)

"Resistance of sea lice, Lepeophtheirus salmonis (Krøyer), to hydrogen peroxide on farmed Atlantic salmon, Salmo salar L." (Aquaculture, November 2000)

Fish Farming Expert reported (2 February 2017):

"Despite a dramatic reduction in the use of delousing drugs last year, the parasites are still developing greater resistance to a number of treatments, according to Kari Olli Helgesen from Norway's National Veterinary Institute (NVI). Speaking at Frisk Fisk conference in Bergen yesterday, she revealed that the amount of hydrogen peroxide used by the aquaculture industry in Norway halved between 2015 and 2016, while azametifos and pyrethroids prescriptions were down to 60 per cent of the level of the year before.

"Overall, we are talking about a reduction of 41 % from 2015 to 2016," said Helgesen. The only drug that was used in greater volumes was emamectin, while non-medicinal treatments had rocketed. "Drug-free treatments rose by 535 % – ie more than five times more," she said.

NVI also follows the development of resistance of salmon lice around fish farms. "There is resistance to organophosphates, pyrethroids and emamectin along the coast. We see some variation within regions, and we see a tendency that lice are more sensitive in the far north and the very south," said Helgesen.

"The resistance is so firmly ingrained in the lice population that it is difficult to get rid of it, even if there is a reduction in drug use," she added.

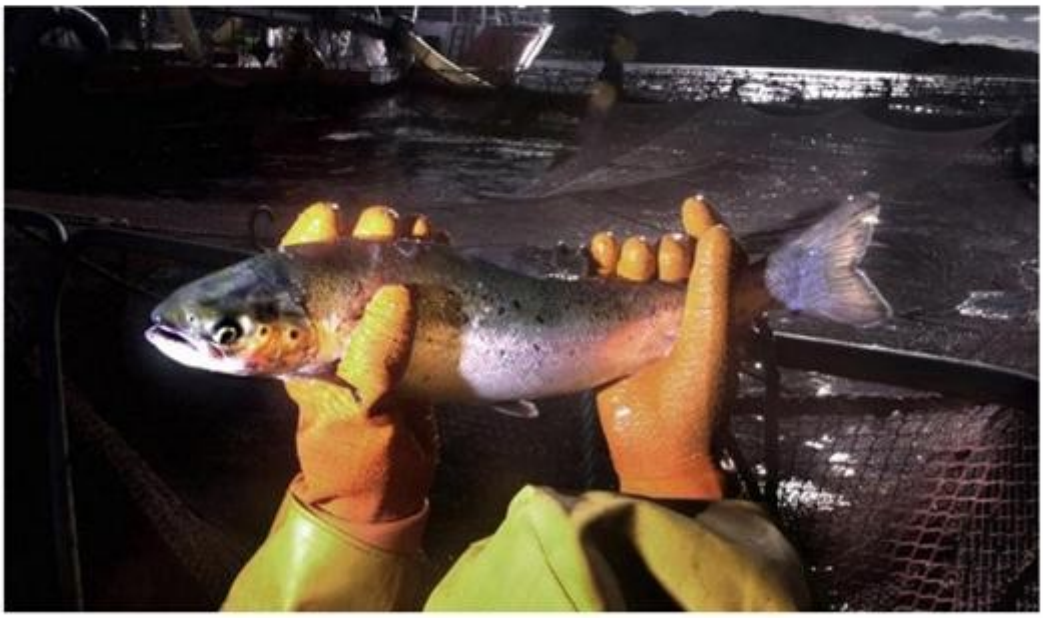
The veterinarian pointed out that there is least resistance to hydrogen peroxide, presumably as it has only been widely used relatively recently."

Read more via: "Resistance rises despite reduced drug use"

[2] Here's The Sunday Times article in full: "Record chemical use 'of concern' to salmon giant" (12 February 2017)

THE SUNDAY TIMES

Record chemical use 'of concern' to salmon giant



Hydrogen peroxide tackles parasites but weakens the fish

DAVID CHESKIN/PA ARCHIVE

The world's largest salmon farmer has expressed "concern" over the use of chemicals to fight disease after a record 20m litres of hydrogen peroxide — a substance harmful to fish — were dumped into coastal waters around Scotland.

More than 160 farms resorted to the chemical in 2015 to tackle parasites such as sea lice, according to the Scottish Environment Protection Agency (Sepa).

Enough hydrogen peroxide was used to fill eight Olympic-size swimming pools, including more than 1m litres at a site operated by Marine Harvest, the Norwegian-owned firm.

On Friday, Marine Harvest said it is "concerned" by the industry's "increased use of medicines" to tackle parasites, which it said have flourished in recent years due to warmer coastal waters. The multibillion-pound firm said it is exploring new ways to protect farmed fish from deadly infections such as amoebic gill disease.

Hydrogen peroxide is regarded as environmentally safe as it quickly breaks down into its constituent parts of hydrogen and oxygen. The chemical does not kill parasites, but stuns them. As farmed fish knock against each other in crowded pens, the parasites fall off.

There is, however, evidence that the chemical harms fish. Academics from Bergen University in Norway recently presented a report showing that hydrogen peroxide weakens the immune system of fish by damaging gill tissue and protective mucosal layers. They warned that fish need at least two weeks to recover during which time they are susceptible to aquatic pathogens. In 2001, Compassion In World Farming (CIWF) warned that hydrogen peroxide posed "serious animal welfare drawbacks".

The Sepa data, obtained by the Global Alliance Against Industrial Aquaculture, shows that hydrogen peroxide was used sparingly on Scottish salmon farms from 2002-2005, followed by two years when it was not used. In 2008, 95,000 litres were deployed and 2009 was another "blank" year.

However, since 2010, the chemical has been used in increasing quantities, sometimes with devastating effects. Last year, 60,000 salmon reportedly perished on Marine Harvest's fish farm in Soay Sound, off the Isle of Harris, after the chemical was used to treat the parasites that cause amoebic gill disease.

In 2015, the latest year for which figures are available, 19.6m litres of hydrogen peroxide were used by Scottish fish farms. Marine Harvest depended most heavily on the chemical (8.4m litres) followed by the Scottish Salmon Company (4m litres) and Grieg Seafood (3.1m litres).

The biggest quantity used at a single site was just over 1m litres at Marine Harvest's Camas an Leim farm at Loch Torridon, on the west coast of Scotland. A Marine Harvest spokesman said the company used less hydrogen peroxide in 2016 (6.3m litres) despite farming more fish than in previous years.

He added: "We are concerned by the increased use of medicines and have taken steps to broaden non-medicinal treatment methods in salmon farming."

Grant Cumming, managing director at Grieg Seafood Shetland Ltd, said its increased use of hydrogen peroxide had been "driven by our desire to treat our salmon for sea lice at lower levels, which has meant more treatments, and our wish to minimise the use
of medicines, which may persist for some time in
the environment".

Philip Lymbery, the chief executive of CIWF, said: "We have long condemned the use of this chemical because it is known to cause suffering to farmed fish."

[3] Scientific papers have long reported toxicity of Hydrogen Peroxide to fish - including mortality and trauma of farmed Atlantic salmon.

Read more via:

"Acute toxicity of hydrogen peroxide treatments to selected lifestages of cold-, cool-, and warmwater fish" - published in Aquaculture in 1999.

"Effect of Species, Life Stage, and Water Temperature on the Toxicity of Hydrogen Peroxide to Fish" - published in Progressive Fish-Culturist in 1997.

"Laboratory investigations on the efficacy of hydrogen peroxide against the salmon louse *Lepeophtheirus salmonis* and its toxicological and histopathological effects on Atlantic salmon *Salmo salar* and chinook salmon *Oncorhynchus tshawytscha*" - published in Diseases of Aquatic Organisms in 1993.

Fisheries & Oceans Canada reported on a research project in 2011:

Hydrogen peroxide bath effects on salmon skin epithelium

Hydrogen peroxide is used widely for the treatment of sea lice by the salmon industry at the current time. Field sea lice counts seem to indicate that fish treated with hydrogen peroxide suffer from a higher copepodid-chalimus re-infestation than fish treated with other bath chemicals. Our hypothesis is that hydrogen peroxide may affect the ultrastructure of the skin epithelium and subsequently the composition of the mucous layer, thus making it easier for sea lice reattachment. Damage to the dermis from this treatment may also release semiochemicals or chemo-attractants causing sea lice to be overly "attracted" to these fish. If results are positive, industry must then consider adjusting the timing of the hydrogen peroxide treatments in order to reduce the chance of reinfestation. This adjustment would also lead to fewer treatments throughout the year.

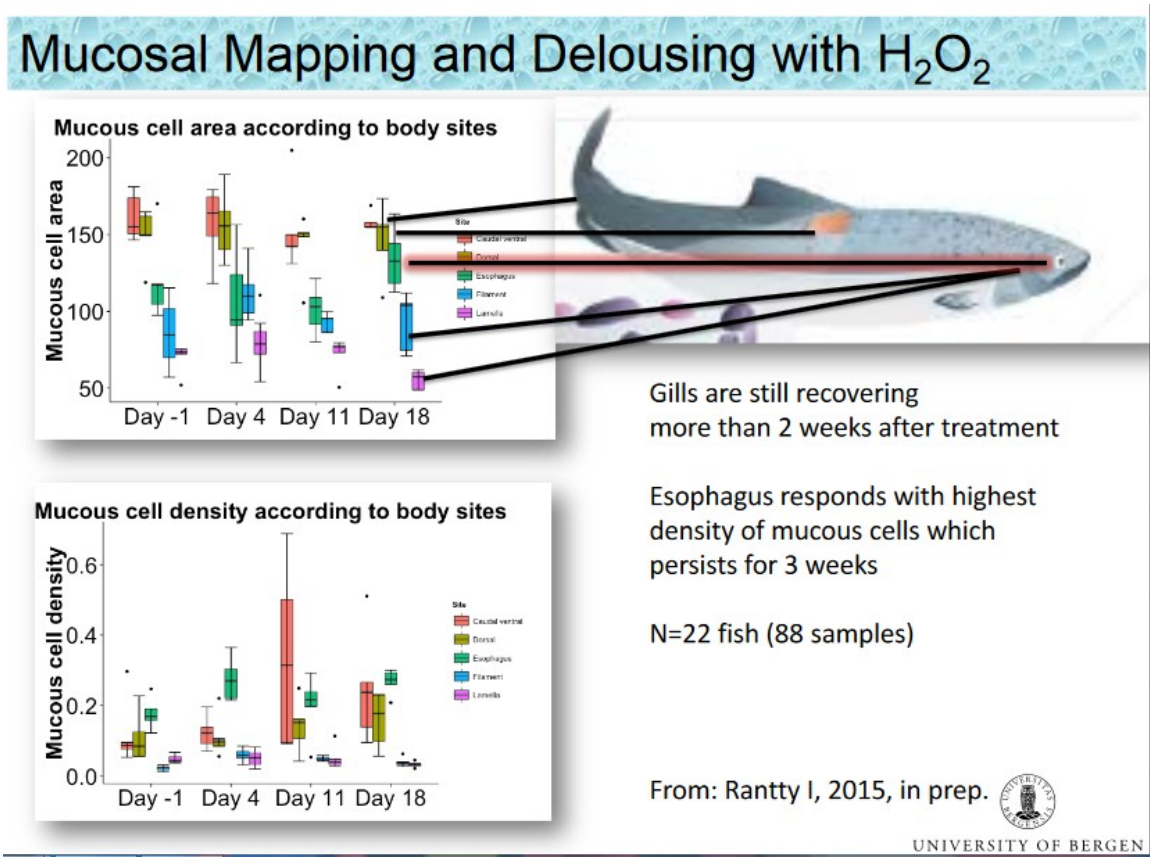
Treated Atlantic Salmon - Photo: M. Fast (UPEI)

Jan. 2011 – Jan. 2012 • Funded by: Department of Agriculture, Aquaculture and Fisheries of New Brunswick, TDF, Novartis Animal Health Inc., AVC-UPEI
Project team:Mike Beattie (NBDAAF), Mark Fast (AVC-UPEI), Bruce Thorpe (NBDAAF), Kathy Brewer-Dalton (NBDAAF), Jiselle Bakker (DFO – SABS), Jennifer Covello (AVC-UPEI), Sara Purcell (AVC-UPEI), Novartis Animal Health Inc.
Contact: Mike Beattie (✉ Mike.beattie@gnb.ca), Mark Fast (✉ mfast@upei.ca)

The University of Bergen reported in 2015:

"Hydrogen peroxide (H2O2) has been used against skin parasites and bacterial gill infections in salmonids. Harsh treatment using H2O2 might cause an adverse impact to the fish innate immunity leaving it so traumatized that it takes a long time for the fish to return to the normal state."

A presentation to the European Aquaculture Society in 2016 referred to salmon gills "still recovering more than 2 weeks after treatment":



Fish Farming Expert [reported](#) in September 2016:

H2O2 treatment concerns

Researchers from Quantidoc AS in Norway presented new results in Edinburgh this week which showed that delousing treatments with hydrogen peroxide (H2O2) may compromise the health of fish for up to 2 weeks.

Author: Laura Braden, PhD

A healthy mucosa means a healthy fish, and a new technology developed University of Bergen Professor Karin Pittman is allowing researchers to investigate the mucosa-damaging effects of many common aquaculture-associated stressors.

One example is the effects of delousing treatments with hydrogen peroxide on the skin, gill and gut health of salmon.

Deemed an important tool in the integrated pest management control strategies of the parasitic salmon louse, hydrogen peroxide offers farmers a method to remove lice from their fish without chemotherapeutants (eg SLICE). And because it degrades rapidly in the environment, treatment with hydrogen peroxide is seen as a much more environmentally friendly way to treat fish.

However, exposure to an oxidizing agent can be harmful to the fish, especially the mucosal barriers of the gills, skin and gut.

Using mucosal mapping tools, researchers have determined that harmful effects caused by hydrogen peroxide include damage to the delicate gill tissue and associated mucosal layers. Moreover the research reveals that the fish need at least 2 weeks to recover to a normal state – during this time, the animals might be more susceptible to aquatic pathogens as their primary immune defence (the mucosa) is compromised.

A paper - "[Hydrogen peroxide treatment in Atlantic salmon induces stress and detoxification response in a daily manner](#)" published by Chronobiology International in 2016 stated:

"Altogether, this study provides first evidence of chronotoxicity in Atlantic salmon treated with H2O2 and suggests increased sublethal toxic effect during the first half of the day."

Fish Farming Expert reported in November 2016

Gill assessment vital prior to peroxide

The importance of assessing the health of fish gills prior to delousing with H_2O_2 should not be underestimated.

Author: Pål Mugaas Jensen

This was the key message delivered by Sintef Researcher Johanne Arff, at a sea louse seminar in Norway last week.

"We were surprised that so many producers failed to investigate gill health ahead of delousing with hydrogen peroxide, as we found that gill problems increase mortality using H_2O_2," she said.

Arff has led a project that resulted in the report "Delousing with hydrogen peroxide and environmental factors." The project was put in place following reports of unexplained mortality associated with H_2O_2 treatments in the autumn of 2013.

Researchers found harmful algae and jellyfish in many of the morts submitted for testing, and wondered if there could be a correlation – therefore initiated a data collection and analysis of existing data on the topic from various databases.

"We know that gill damage is a contraindication for the use of H_2O_2. Phytoplankton stress the fish, especially when they appear in high densities for long periods, such as in the fjords where algal blooms can last for weeks. Some algae produce toxins while others can cause physical gill damage. It may also well be that certain algae produce toxins when they are exposed to H_2O_2," said Arff.

"We found that there was little collection of algal samples, so little is known about algae status before delousing. We also found that gill health is not regularly examined except in those areas with AGD issues. It's something to think about when gill injuries cited as a contraindication for treatment with H_2O_2" she pointed out.

Read more via "Delousing with hydrogen peroxide and environmental factors "

[4] According to a report by the University of Florida: "Hydrogen peroxide is a highly reactive, strong oxidizing and bleaching (whitening) agent that is classified as corrosive at concentrations higher than 20%.....Several species of fish are known to be sensitive to hydrogen peroxide, and the use of the chemical may be toxic to those species".

A paper - "Degradation of hydrogen peroxide in seawater using the anti-sea louse formulation Interox® Paramove™50" published in 2014 by Fisheries & Oceans Canada reported:

"It was expected that H2O2 would degrade quickly during the treatment period but real time monitoring indicated that the concentration of H2O2 stayed at or near the treatment level. Treatment impacts on non-target organisms are dependent on the fate of anti-louse formulations in the environment."

For an environmental review please read a report - "Environmental Assessment for the Use of Hydrogen Peroxide in Aquaculture for Treating External Fungal and Bacterial Diseases of Cultured Fish and Fish Eggs" - published by the U.S. Food & Drug Administration in 2006 and a paper - "Hydrogen Peroxide Environmental Impact and Toxicity" - published in 2001.

[5] Data published for chemical use on Norwegian salmon farms (2006-2015) reveals staggering increases - including Hydrogen Peroxide:

Tabell 2. Midler mot lakselus (kg aktiv substans)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
azametifos			66	1884	3346	2437	4059	3037	4630	3904
cypermetrin	49	30	32	88	107	48	232	211	162	85
deltametrin	23	29	39	62	61	54	121	136	158	115
diflubenzuron	-	-	-	1413	1839	704	1611	3264	5016	5896
emamektin	60	73	81	41	22	105	36	51	172	259
teflubenzuron	-	-	-	2028	1080	26	751	1704	2 674	2509
hydrogen-peroksid (100%) (tonn)				308	3071	3144	2538	8262	31577	43246

Data for 2016 is expected to be published soon - a preview of the data indicates significant reductions in use. Fish Farming Expert reported (2 February 2017) that "the amount of hydrogen peroxide used by the aquaculture industry in Norway halved between 2015 and 2016, while azametifos and pyrethroids prescriptions were down to 60 per cent of the level of the year before" (read more via: "Resistance rises despite reduced drug use").

[6] In 2014, The Sunday Times reported:

"More than 15m litres of treatments containing hydrogen peroxide, a key ingredient in rocket fuel and bleach, was used by Scottish salmon farms last year. The amount — enough to fill six Olympic swimming pools — was about five times more than the 2.7m litres used by the industry in 2012. In 2011, about 500,000 litres was used."

Read more via "Chemical war on sea lice attacked" (The Sunday Times, 16 February 2014)

However, the new data from the Scottish Environment Protection Agency released for 2002-2015 details several treatments of Hydrogen Peroxide containing various levels ranging from 35%, to 50% and 100% Hydrogen Peroxide. Hence the actual use of Hydrogen Peroxide can now be quantified for the first time.

Tony Andrews of the Atlantic Salmon Trust told The Courier in 2014:

“The process of treating salmon with hydrogen peroxide is far from ideal and certainly not the method preferred by salmon farmers because it causes stress in the fish with consequent high levels of lactic acid it is also time-consuming, weather-dependent and expensive.”

Read more via: "‘Fighting a losing battle’ Scottish salmon industry under threat from sea lice treatment" (The Courier, 17 February 2014)

For more background read:

"Eye-watering figures reveal five-fold increase in use of Hydrogen Peroxide (H2O2) at Scottish fish farms in 2012" (Outer Hebrides Against Fish Farms, 26 March 2013)

"Increase in fish farm hydrogen peroxide use" (Stornoway Gazette, 16 April 2013)