Thermolicer Backgrounder (6 November 2016):

Summary:

In July & August 2016, 115,283 farmed salmon (460 tonnes) were killed by a £4 million Thermolicer at Marine Harvest's salmon farm in Loch Greshornish costing the company £2.7 million (read FOI documents obtained by GAAIA online here).

Here's a photo of Scotland's first Thermolicer (launched in July 2016) rented from Scottish Sea Farms by Marine Harvest:

Other mass mortalities due to the Thermolicer have been reported in Norway - with 32,700 dead farmed salmon reported in March 2016 at a Marine Harvest site and 29,000 morts reported in April 2016 at Marine Harvest farms at Syltøy and Bull on the west side of Sotra and a further 14,000 morts at Haverøy outside Solsvik in Sotra.

In July 2016, Marine Harvest Scotland claimed that a new Thermolicer and two Hydrolicers "are proving highly effective" but their use still needs to be refined. Steve Bracken, Business Support Manager at Marine Harvest Scotland, told Fish Farming Expert (26 July): "The Hydrolicers are giving good results but as with all new systems it takes time to achieve optimum results."

BBC News reported in July 2016 that farmed salmon were "unharmed" by the Thermolicer. "It works by bathing fish briefly in lukewarm water, capitalising on the parasite's low tolerance for sudden changes in temperature" gushed the BBC. Ralph Bickerdike, head of

fish health for Scottish Sea Farms, told BBC News: "The Thermolicer is the latest step in developing alternative tools to maintain a sustainable solution to fish health management."

In September 2016, Marine Harvest advertised for 'Hydrolicer Technicians' which were "based on a workboat that has the potential to cover all our sites in Scotland".

Last month, the Scottish Government, Scottish Aquaculture Innovation Centre and Highlands & Islands Enterprise were all also keen to point to £2.5 million in European funding - including £1.76 million for novel approaches to sea lice control.

"Amongst the alternative solutions being trialled is hydrolicer technology which uses low pressure water jets to dislodge sea lice; an innovative 'bundle' of technologies that brings best practice approaches into a single system; and a Thermolicer device which capitalises on the parasite's low tolerance to sudden changes in temperature by briefly bathing fish in warmer water," stated a SAIC press release (28 October).

A press release issued by Highlands & Island Enterprise (28 October 2016) announcing a £1.76 million boost for "innovative sea lice control technologies" by the European Maritime Fisheries Fund included a video of the Thermolicer in action:

The video claims: "Steinsvik Thermolicer in action. Kills salmon lice with hot water. No harm to the fish".

Intrafish reported in August 2015 that early results of Thermolicer testing by the Norwegian company Ocea/Steinsvik were "good and highly encouraging".

A presentation by Steinsvik claims the Thermolicer is "simple and environmentally friendly" and has "third party verification of effect and animal welfare".

News & Media Coverage on The Thermolicer:

A press release issued last month (28 October 2016) by the Scottish Aquaculture Innovation Centre following a £1.76 million boost following a successful application to the European Maritime Fisheries Fund stated:

> Amongst the alternative solutions being trialled is hydrolicer technology which uses low pressure water jets to dislodge sea lice; an innovative 'bundle' of technologies that brings best practice approaches into a single system; and a Thermolicer device which capitalises on the parasite's low tolerance to sudden changes in temperature by briefly bathing fish in warmer water.
>
> Comments Jim Gallagher, Managing Director of Scottish Sea Farms and one of the partners involved in the Thermolicer trials: "Everyone is clear on the real and urgent need to reduce sea lice. However significant capital investment is required to trial new solutions. The EMFF award is contributing additional resources to those invested by industry, enabling Scottish trials on a commercial scale. The new equipment will be accessible by many companies in Scotland's salmon sector, supporting the industry's common purpose in accelerating the widespread adoption of effective sea lice controls."
>
> The award will be officially announced today at the Farmed Finfish Summit, hosted by Fergus Ewing MSP, Cabinet Secretary for Rural Economy and Connectivity, as part of a £2.5m European funding boost to support sustainable growth and investment in Scottish aquaculture. Says Mr Ewing: "I am delighted to announce this EMFF funding which will go to pilot non-medicinal interventions and foster operational innovation in Scottish aquaculture. I am sure this will further enhance the environmental sustainability credentials of this key sector."
>
> Coinciding with the EMFF funding announcement, the Scottish Aquaculture 2030 Vision for Growth group – a collective of leading businesses and organisations, including SAIC – has launched its ambitious new strategy for the sector: Aquaculture Growth to 2030 (a copy of which is available to download below).
>
> Says Heather Jones: "The strategy is testament to the growth ambitions of the Scottish aquaculture industry, who recognise the role of innovation as a key driver in the future prosperity of both the sector and Scotland as a whole. We are really looking forward to working with businesses and government alike to see these ambitions realised."

The same press release issued by Highlands & Island Enterprise (28 October 2016) included a video of the Thermolicer in action:

The video claims: "Steinsvik Thermolicer in action. Kills salmon lice with hot water. No harm to the fish".

Watch online via "Delicing using Thermolicer"

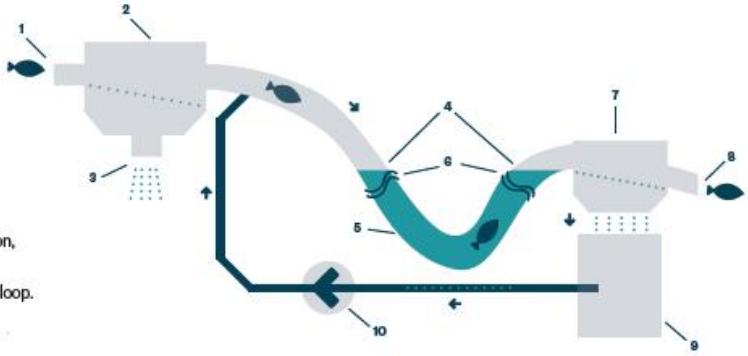
For more information see Steinsvik's web-site.

A [presentation by Steinsvik] includes:

Twin Thermolicer integrated on Bremnes Seashore's M/S Eva Elisabeth.

1. Fish enters Thermolicer after pumping.
2. Water separation.
3. Sea water is filtered and released.
4. The fish is exposed to lukewarm water.
5. Treatment loop.
6. Water surface.
7. Water separator for treatment water.
8. Fish exits the system.
9. Heated water is circulated to water tank for filtration, aeration and reheating.
10. Treatment water is pumped back to the treatment loop.

NB. The water treatment system is not shown.



Full effect with zero chemicals

We at Steinsvik have made it our business to support the fish farming industry with products and solutions that make the farmer's job as easy as possible. We are involved in a number of fields from cameras to software. Our latest addition to our product portfolio is the Thermolicer. Sea lice are currently the biggest challenge for fish farmers in most salmon producing areas.

We at Steinsvik intend to be a part of the solution. We have since 2007 been developing a chemical and drug free treatment system. The Thermolicer is now commercially available and has already been put to use by a number of our customers.

The machine

The Thermolicer is a machine for commercial scale dip or bath treatment of fish. The fish is crowded and pumped into the machine where it passes through the processing loop in 25–30 seconds. Treatment water holds 30–34 degrees depending on ambient sea temperature. The treatment water is filtered, aerated, oxygenated and reused in the system. This simple and environmentally friendly treatment has an effect that goes beyond the expected in traditional treatment agents like chemicals and medicines. The Thermolicer is fitted on a boat or a barge and each machine can treat up to 80 tons per hour, depending on crowding and local conditions. The fish are crowded and pumped through the Thermolicer and then back in the same cage or to an empty cage. Together with the Thermolicer you get training and recommendations to ensure that you can treat your fish whenever needed, and not be dependent on a third party to perform any tasks.

REFERENCE

We have been fortunate to get the Thermolicer and begin using it in time. Without it we would probably have struggled to keep lice figures down in late June and July. We see great results, there are very few lice, and we are well below the action limit. The Thermolicer is a very useful tool. It's also important to emphasize that we can now treat the fish without using drug treatments. This is gentler for both the fish and the environment, and is very important for Bolaks (07.08.2015, kyst.no).

Tom Olsen | Project Coordinator, Bolaks

FHF
FISKERI- OG HAVBRUKSNÆRINGENS FORSKNINGSFOND

Veterinærinstituttet
Norwegian Veterinary Institute

THIRD PARTY DOCUMENTATION

Together with The Norwegian Seafood Research Fund – FHF, we initiated a project to ensure third party verification of effect and animal welfare. The Norwegian Veterinary Institute (NVI) was given the task of executing the project. The project resulted in the best-documented lice treatment method ever, and the Veterinary Institute's finding was uplifting for the salmon industry as a whole. The project included extensive lice-counting and welfare registrations before, during and weekly follow-ups 4 weeks after treatment. The Thermolicer is recommended by the NVI as an alternative to the traditionally used drugs and chemicals. For more info; see The Norwegian Veterinary Institute.

An 18-page brochure on the Ocea Thermolicer is available to download online here

World Fishing reported in 2014:

Ocea and Bremnes work on 'green' delousing

22 Apr 2014

Norway's Ocea and Bremnes Seashore are to further develop the Ocea Thermolicer, scaling it for Norwegian and North Sea conditions.

The two companies have also signed a contract for a new 400 tonnes feed barge and other products – a contract worth NOK 28m (US$4.6m)

Work began on the Ocea Thermolicer project in 2007. The delousing method was commercialised in Chile, where the company says it's already had good delousing results and low mortality rates three days after treatments, and after 60 days.

The Thermolicer method takes the fish and pumps them in to a lukewarm bath where the lice die from a sudden temperature change

"Ocea Chile has already supplied the Chilean market with delousing services. The method is now ready to be scaled to Norwegian conditions", said Karl Petter Myklebust.

Ocea's method works by pumping fish into a lukewarm bath for around 30 seconds. The lice die from the sudden change in temperature, and the fish is pumped back to the cage lice-free. The company says this method has proven to be gentler on the fish.

"In collaboration with Bremnes, we plan to further develop the process, focusing on animal welfare and increased capacity. We have also engaged the Norwegian veterinary institute to ensure third party documentation of the method in Norway," added Mr Myklebust.

The first commercial Thermolicer for Norway is already being built, and testing will begin this autumn.

Geir Magne Knutsen, head of farming, Bremnes Seashore, explained: "Resistance towards treatments is an increasing issue, and we want to participate in the development of the tools of the future. We are amongst other things working with cleaner fish to keep the number of lice as low as possible, but when we need to actively delouse the fish, we will use the Thermolicer, starting this autumn. The results from Chile are very promising."

Bremnes says the method also works well because it doesn't use any chemicals that could be harmful to the environment, and Norway's fjords in particular.

Ocea says it's already had interest from a number of farmers in Norway and abroad.

Fish Update reported in September 2014:

Ocea Bremnes Seashore double team on sea lice solution – Fishupdate.com

Posted on September 22, 2014 by systemwyvex • 0 Comments

Ocea Bremnes Seashore double team on sea lice solution Published: 22 April, 2014

Ocea Thermolicer

OCEA and Bremnes Seashore recently signed an agreement on the further development of the Ocea Thermolicer.

At the same time the parties also signed a contract for a new 400-tonne feed barge and various other products to a total value of NOK 28 million.

Ocea Chile has for already supplied the Chilean market with delousing services for a select group of costumers, the method is now ready to be scaled to Norwegian conditions, says Karl Petter Myklebust of Ocea.

We have had very good delousing results; we have also had low mortality rates 3 days after treatments, and after 60 days.

In collaboration with Bremnes, we plan to further develop the process, focusing on animal welfare and increased capacity.

We have also engaged the Norwegian veterinary institute to ensure third party documentation of the method in Norway.

The first commercial Thermolicer is already being built, and we will test the machine together with Bremnes this autumn.

We at Bremnes Seashore are excited about the Thermolicer, says Geir Magne Knutsen, Head of farming at Bremnes Seashore.

We want early access to the machine to ensure that we have the right tools in our toolkit. Resistance towards treatments is an increasing issue, and we want to participate in the development of the tools of the future.

We are amongst other things working with cleaner fish to keep the number of lice as low as possible, but when we need to actively delouse the fish, we will use the Thermolicer, starting this autumn.

The results from Chile are very promising. It is also an important factor that the method is not using any chemicals harmful to the environment in our fjords.

Together with Ocea, we will use the next months to test the Thermolicer; this will provide us with important experience so that we can be fully prepared for when the delousing period starts.

Karl Petter Myklebust of Ocea, explains that they are working with a select group of customers about delivering a few additional Thermolicers. The industry is clearly very interested in our patented Thermolicer; we have had inquiries from a number of farmers in Norway and abroad.

We know that the machine and the method does work, but we want a controlled approach to the Norwegian conditions. The handling of fish is something we take seriously, and we are going to ensure that the machine and method is as gentle as possible, while also increasing capacity.

Ocea has been working on a thermic delouser since 2007. The start of the project was a lucky coincidence.

Ocea was working on the use of low voltage as a delousing method, an observed that the lice seemed to die instantly when cleaning some tubs used for tests with lukewarm water.

This started a 7-year development process and resulted in a patented method commercialised in Chile.

The Thermolicer is about to be commercialised in Norway and the North Sea area. In Chile the machine has produced very good delousing results, and proved to be gentle on the fish.

The fish is pumped into a lukewarm bath that last about 30 seconds. The lice die from the sudden temperature change, and the fish is pumped back to the cage lice-free. The lice are collected and destroyed.

Intrafish reported in August 2015 that early results of Thermolicer testing were "good and highly encouraging":

Norwegian equipment supplier Ocea results headed in the right direction

Group narrows loss sharply, but bottom line still showed red.

by Joar Grindheim
August 18th, 2015 13:00 GMT Updated May 9th, 2016 19:40 GMT
Share: Facebook Twitter LinkedIn Print E-mail

Norwegian equipment supplier Ocea saw its turnover last year amount to NOK 270.1 million (€29.8 million/$33 million), up from NOK 219 million (€24.1 million/$26.7 million) the previous year.

However the company narrowed its losses considerably, posting an operating loss of NOK 0.1 million (€11,016/$12,202) in 2014 as opposed to a loss of NOK 10.2 million (€1.1 million/$1.2 million) in 2013.

"The year 2014 was typified by significant progress. Generally good conditions contributed positively for most of the product groups," Bjorn Mathias Apeland, chairman of the company wrote in Ocea's annual report.

Apeland is principal shareholder in Steinsvik Group, which acquired Ocea on Dec. 29 last year. Investment group Kverva also bought into Ocea.

In the report Apeland wrote that Ocea's objective is to further develop the group's core product and contribute to enabling customers to achieve enhanced, optimum production and lower production costs.

Ocea Thermolicer was highlighted as an example of the company's investment strategy.

"[We] have great expectations that Ocea Thermolicer will be a beneficial invention for our customers and the company," the board wrote. "So far around 5 million fish have been treated, and the results have been good and highly encouraging."

Nortrade reported in March 2016:

The Delouse Eva Elisabet Christened

Bremnes Seashore's delouse vessel «Eva Elisabeth» with equipment from Steinsvik was christened Saturday 27 February. The special vessel can delouse 150 tons of salmon per hour.

Original author: Steinsvik
Published: 01.03.2016

«Eva Elisabeth» was declared christened by godmother and namesake Eva Elisabeth Walderstedt to music from Moster skulekorps and 200 attendants at the dock.

The boat is built with a Thermolicer solution from Steinsvik. «Eva Elisabeth» has two Thermolicers integrated, and therefore has a large capacity and can easily move between locations.

Interested spectators got to board the boat which was docked outside of Scandic Maritim.

Watch a video of the Eva Elisabeth Thermolicer boat in action online here

Eva Elisabeth with Thermolicer in action

from **Steinsvik** PLUS 8 months ago

More from **Steinsvik**

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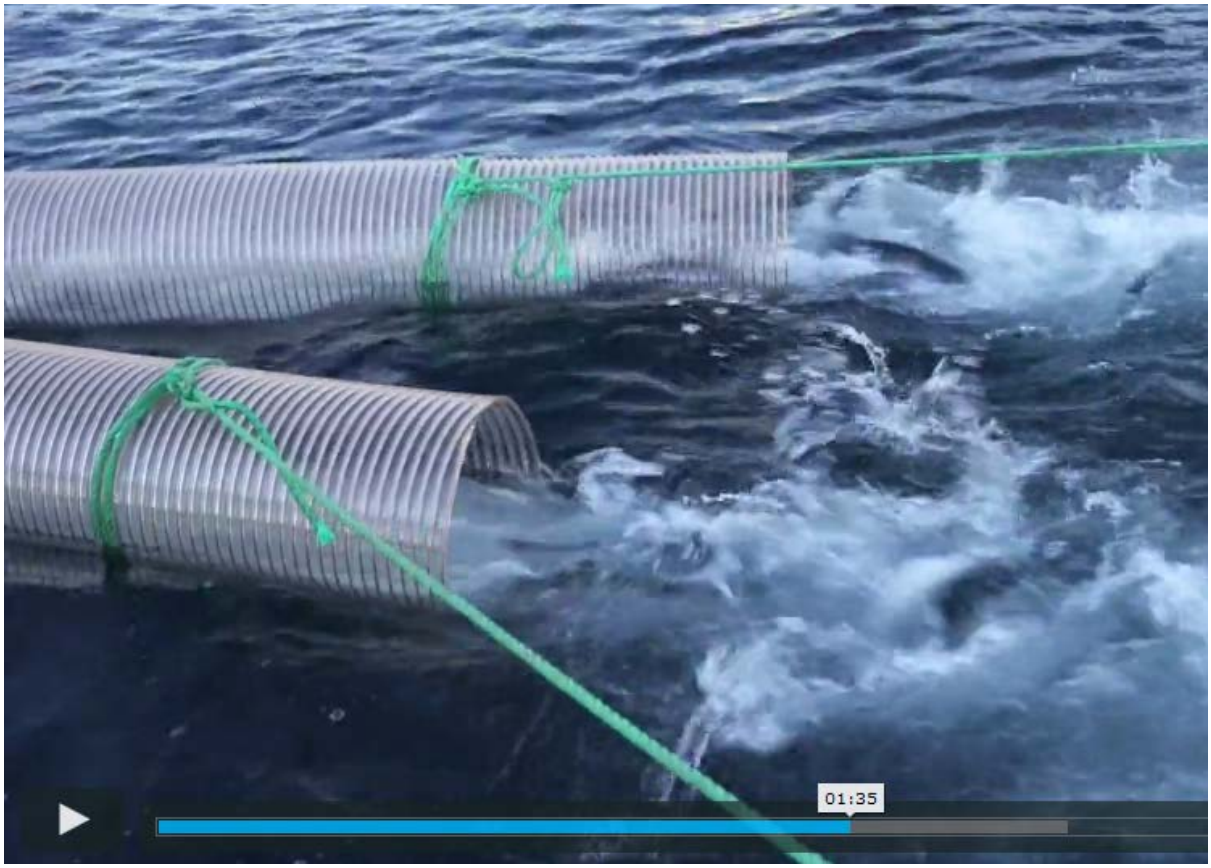
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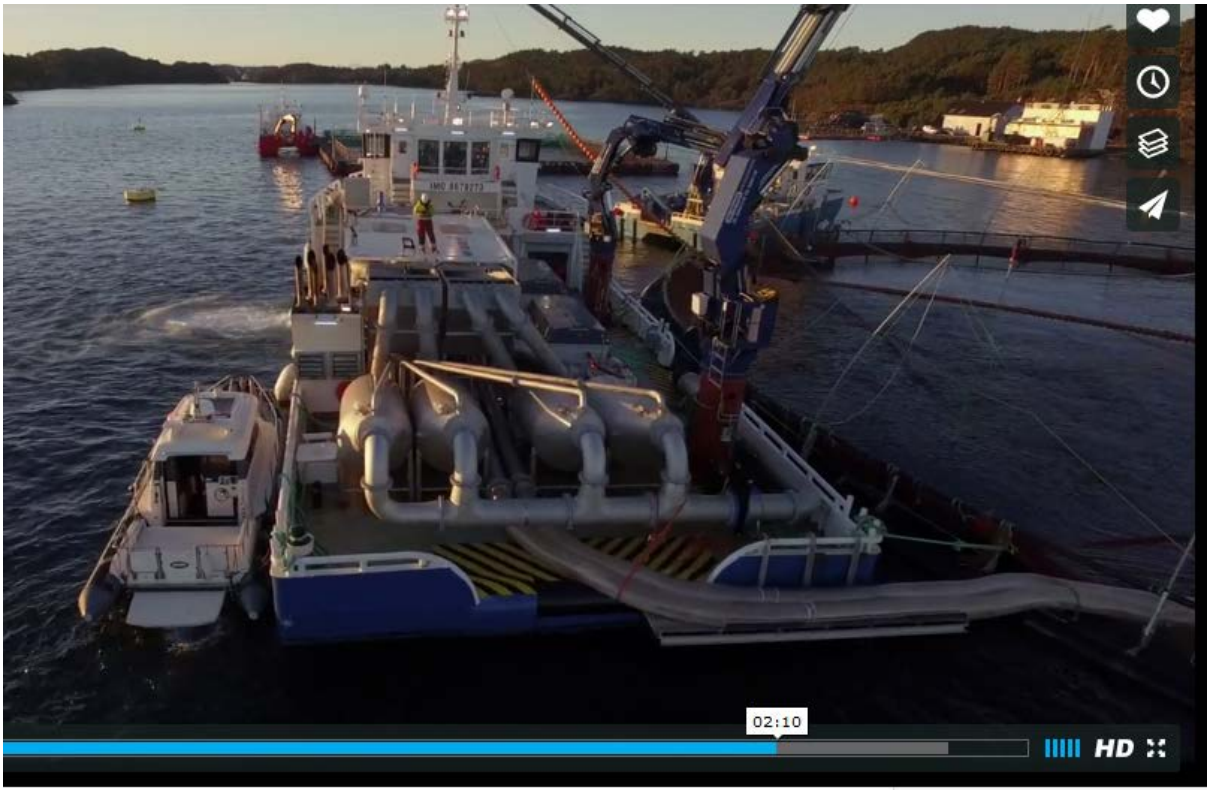

Intrafish reported in March 2016:

De-lousing kills 32,700 fish at Marine Harvest operation

Company says it is 'fine tuning' its operations to avoid future problems.

by **Vegard Solsletten**
March 30th, 2016 08:10 GMT Updated May 12th, 2016 06:14 GMT

Marine Harvest recently reported 32,700 fish died during a de-lousing procedure.

The incident occurred when the company carried out a de-lousing of all the cages at one of its farm sites, the company wrote in a report to the Norwegian Food Safety Authority (NFSA).

"Unfortunately we had excessive mortalities with this treatment," Eivind Naevdal-Bolstad, communications director at Marine Harvest, told **IntraFish**.

"The reason was the fish that were being treated were far weaker than had been anticipated."

Around 19,620 fish died immediately after treatment, but this figure increased to a total of 32,700 fish a week later.

"Even though we attempted to solve this as gently as possible, we figure it was the handling and overcrowding that led to the mortalities," Marine Harvest said in the report.

The fish groups had both a pancreatic disease (PD) diagnosis and circulatory system collapse. Retrieval of the dead fish was executed as quickly as was practicably possible, the company said.

Used Thermolicer

In the report the company also stressed a critical assessment would be made of the problems associated with Thermolicer usage.

The company said it will "fine tune" its best practices with the method.

"It's only a few months since we started treating with Thermolicer, and we are working continuously to optimize the treatment process to reduce mortalities," the company wrote.

Naevdal-Bolstad said lice figures in the area are fortunately low and under good control.

"From now on we will be working further with preventive measures to reduce the need for treatments, in that all handling of fish carries a level of risk. Therefore we have several initiatives ongoing with cleaner fish, lice skirts, deep-water feeding and lasers," he said.

Bergens Tidende reported in April 2016 (translated via Google Translate):

Debug: More livestock companies report increased mortality after the use of water treatment and so-called Thermolicer. Now IMR examine fish health. PHOTO: FRED IVAR UTSI KLEMETSEN

Much salmon die in alternative lice treatment

Driving salmon through hot water treatment is introduced as the new solution to louse problem. Now it turns out that the method not only kills the lice, but also a lot of fish.

Sysla reported (25 April 2016) - translation via Google Translate:

Much salmon die in alternative lice treatment

Driving salmon through hot water treatment is introduced as the new solution to louse problem. Now it turns out that the method not only kills the lice, but also a lot of fish.

By Einar Aarre

Several fish farming companies with hatchery report "increased mortality" under the alternative sea lice treatment, which avoids using chemicals in their cages.

FSA is responsible for fish welfare, and is concerned. They have asked IMR to consider their use.

- Tough treatment for fish

- The fish subjected to rough handling and applied a lot of stress when it is needed together and pumped into the hot water treatment. Experience so far suggests that the fish must be

robust to withstand handling, says senior advisor Inger embankment FSA to BT (requires login).

Marine Harvest reports including the increased mortality of plants Syltøy and Bull on the west side of Sotra. Of around 29,000 death of fish was reported in the first nine weeks, a ratio set in the context of the use of Thermolicer .

The company also reports the same problem at the plant on Haverøy outside Solsvik in Sotra. In the seven cages was report about 14.300 death fish for delousing.

- We've got more experience with Thermoliceren and see that it can be advantageously made some adjustments to be even more gentle to the fish, the company reported.

Increasingly resistance

The explosive growth of various chemical delousing agents in cages has led to increasingly lice are resistant to drugs, while concern for the consequences for the environment increases. The various delousing agents released in the fjord system after use.

Many people have had great expectations that Thermoliceren should be the solution.

This is a machine that performs bath treatment of fish. The fish is pumped up through the pipes, and bathed in water of between 30 and 34 degrees. The sudden rise in the water temperature kills lice. Each fish treated at 25 to 30 seconds before it is returned to sea.

Full story on BT.no (requires login)

Intrafish reported in September 2016 regarding Norwegian salmon supplier Bremnes Fryseri:

> Investments made last year include the purchase of the salmon lice vessel *Eva Elisabeth*, which was put to use from Dec. 4 last year.
>
> The boat has a Thermolicer installed and can de-louse 1,000 to 1,500 metric tons of salmon in a full day with a successful treatment result of 90-95 percent on salmon lice. The boat and its crew of five can operate all year round.
>
> "This is an innovation and a tremendous investment for us. We relish being at the forefront and developing both ourselves and the industry, said Managing Director Einar Eide in the annual report.

The Bremnes Fryseri 2015 Annual Report includes:

Eva Elisabeth - lakselusa si verste fiende

Å utvikle oppdrettsnæringa krev mot, kunnskap og investeringsvilje. Difor kjøpte Bremnes Seashore sitt største farty nokosinne, og utrusta båten med det aller beste utstyret. Resultatet er eit verkty som kan avlusa opptil 1500 tonn laks i døgeret.

Det er vinter på Bømlo. Året er 2015. Nokre månader tidlegare har Bremnes Seashore kjøpt Noregs fyrste Thermolicer. Eit effektivt verktøy i kampen mot lakselusa. Med Thermoliceren gjev ein laksen eit bad i 30 grader i løpet av eit halvminutt. Resultatet er at lusa fell av laksen og døyr.

Men sjølv om verktyet visar seg å vera effektivt er ikkje lekteren Thermoliceren står på fleksibel nok i forhold til flytting frå anlegg til anlegg. Medan kalde vinterstormar herjar utanfor lokala i Kvednavikjo set kloke hovud seg saman og diskuterer korleis ein kan få ei meir effektiv løysing. Og det fort.

- Å bygga ny båt ville ta lengre tid enn om me kjøpte ein brukt båt og bygde den om, fortel prosjektleiar Ernst Olav Helgesen.

Bruktbåtmarknaden vart tråla. I Noreg og i nabolanda viste det seg å vera umogleg å finna ein båt som passa til formålet. -Me måtte heilt til Tyrkia for å finna båt. Kort tid etter kjøpet i april vart skuta sett på land ved eit verft i Istanbul. Alt utanom hovudmotorane vart fjerna. Ny innreiing vart montert og ny generatorpakke tilpassa Thermolicarane vart installert.

BBC News reported in July 2016 that farmed salmon were "unharmed" by the Thermolicer. Ralph Bickerdike, head of fish health for Scottish Sea Farms, told BBC News:

"The Thermolicer is the latest step in developing alternative tools to maintain a sustainable solution to fish health management."

SAIC chief executive Heather Jones said: "We are delighted to see this level of innovation and collaboration happening in Scotland. "The industry is tackling the biological issues it faces with energy and initiative, and with a strong commitment to sustainable practices."

Scottish Sea Farms starts sea lice device trials

16 July 2016 | Scotland business

Share

The Thermolicer is fitted on a boat or a barge and can treat up to 80 tons of fish per hour, according to its manufacturer

Salmon producer Scottish Sea Farms (SSF) has invested more than £4m in new equipment that uses a chemical-free approach to controlling sea lice.

Trials of the Thermolicer device are under way in Shetland.

It works by bathing fish briefly in lukewarm water, capitalising on the parasite's low tolerance for sudden changes in temperature.

No chemicals are used and the fish are unharmed in the process, according to SSF.

The Thermolicer, which is made by Norwegian firm Steinsvik, is fitted on a boat or a barge. Each machine can treat up to 80 tons of fish per hour.

Scott Landsburgh, chief executive of the Scottish Salmon Producers' Organisation, told The Daily Record (15 July 2016):

"Scotland's salmon farmers have always been at the forefront of new inventions creating technological solutions as needs have evolved. Collaboration and sharing knowledge and skills have been paramount in enhancing fish welfare. It also reinforces our commitment to environmental and industry sustainability - crucial in driving our industry forward. We look forward to hearing the results and seeing how it can integrate with established health management strategies to the benefit of the whole industry."

Scottish Sea Farms invest £4m in 'Thermolicer' device

13:07, 15 JUL 2016 | BY SCOTT MCCULLOCH

The device, manufactured by Norwegian firm Steinsvik, is a chemical and drug free treatment system which capitalises on sea lice having a low tolerance to sudden temperature changes

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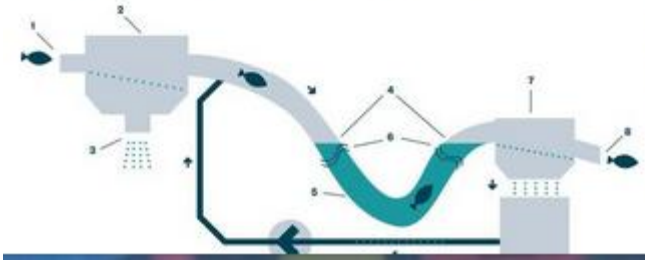
Thermolicer. Pic: Steinsvik

Scottish Sea Farms have invested more than £4 million bringing the first Thermolicer device to Scotland.

The device, manufactured by Norwegian firm Steinsvik, arrived in Scotland last week and is currently undergoing trials at the Scottish Aquaculture Innovation Centre in Shetland.

Controlling sea lice is one of the biggest challenges faced by the fish farming industry.

The Steinsvik device is a chemical and drug free treatment system which capitalises on sea lice having a low tolerance to sudden temperature changes.



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Fish Farmer magazine reported in August 2016:

Thermolicer on trial in Shetland

Fish Farmer 10 Aug 2016

SCOTTISH Sea Farms has invested more than £4 million in a Thermolicer machine as part of its quest to deliver a natural solution to control sea lice.

The Thermolicer arrived in Scotland in July and trials are currently underway in Shetland. Scottish Sea Farms (SSF) will cooperate with other farmers in Scotland, sharing the use and knowledge of the machine.

Ralph Bickerdike, Scottish Sea Farms' head of fish health, said: 'Sea lice is a challenge for all fish farmers in most salmon producing areas. At Scottish Sea Farms we intend being part of the solution to this challenge.

Above: SSF's Thermolicer machine

'Our work with SAIC [the Scottish Aquaculture Innovation Centre] and other industry partners in this area has already reaped huge benefits through our work with wrasse and lumpfish – varieties of cleaner fish.

'The Thermolicer is the latest step in devel- oping alternative tools to maintain a sustainable solution to fish health management.'

The Thermolicer uses zero chemicals in the treatment of sea lice. The lice have a low tolerance for changes in temperature and the new machine uses water temperatures to eradicate the parasite. It is a simple and environmentally friendly method that goes beyond the traditional treatments.

This is the first Thermolicer to be used in Scotland and is part of Scottish Sea Farms' continued investment in its infrastructure and development.

Scott Landsburgh, chief executive of the Scottish Salmon Producers' Organisation, said: 'Scotland's salmon farmers have always been at the forefront of new inventions, creating technological solutions as needs have evolved.

'Collaboration and sharing knowledge and skills have been paramount in enhancing fish welfare. It also reinforces our commitment to environmental and industry sustainability - crucial in driving our industry forward.

'We look forward to hearing the results and seeing how it can integrate with established health management strategies to the benefit of the whole industry.'

Fish Farming Expert reported (14 October 2016):

Thermolicers are amongst the mechanical delousing methods used.

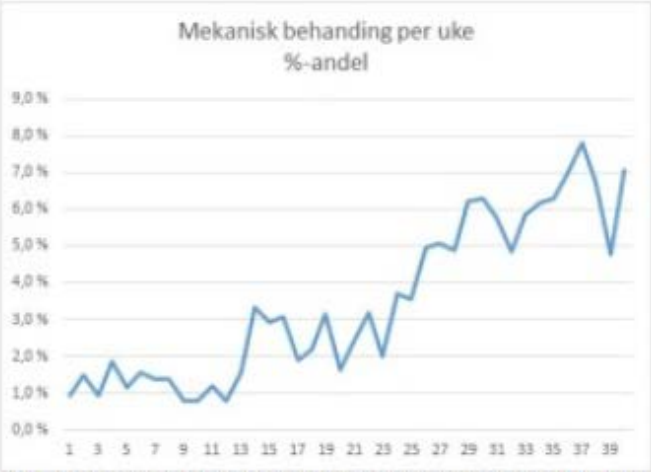
Mechanical delousing boom

397 mechanical delousing treatments were reported on Norwegian salmon farms in the last 11 weeks.

Author: ✉ Linn Therese Skår Hosteland

The figures, obtained by kyst.no from fish health statistics at Barentswatch and from lusedata.no, reveal that in 2016 so far there have been 771 reports of mechanical treatments, of which 363 (47%) have occurred over the last ten weeks.

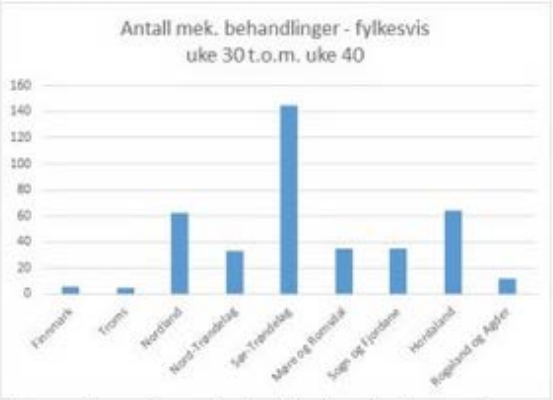
As farmers report these statistics on a weekly basis, the extent of each mechanical delousing treatment can vary – from a single cage to an entire site.



The percentage of companies using mechanical delousing methods (by week) in Norway.

As the graph above illustrates, 7% of farmers in Norway conducted mechanical delousing last (week 40), and statistics also show that the number of reports has increased steadily week by week, since week 12.

According to statistics, the most mechanical treatments took place in Sor, Trondelag, Nordland and Hordaland.



The number of mechanical treatments, by region, week 30-40.

Updated lice reports from last week show little change from the week before, with all regions of Norway below the prescribed louse limits of an average of under 0.5 adult females per fish.

The counties that are the highest are Nordland, with an average of 0.37 adult females, and Sogn og Fjordane with an average of 0.32. In the rest of the country all the counties averaged less than of 0.2 adult females.

Published: 14/10/2016 at 10:58 am

The Herald reported (28 October 2016) that Marine Harvest were suffering mortalities across Scotland - including at Loch Greshornish:

Alert over salmon deaths crisis on Scots fish farms caused by infectious disease

Alert over salmon deaths crisis on Scots fish farms caused by infectious disease

2 days ago / **Martin Williams** , Senior News Reporter / @MWilliamsHT

2 comments

CONSERVATIONISTS have called for government action after raising concerns that hundreds of thousands of fish have died from an infectious disease in salmon farms in Hebrides and Wester Ross.

The Salmon and Trout Conservation Scotland has called on Scottish ministers to intervene to protect wild fish after an outbreak of Amoebic Gill Disease (AGD).

It is understood that four farm sites have been affected including West Loch Tarbert and East Loch Tarbert on Harris, Loch Greshornish on Skye and the Isle of Ewe in Wester Ross. Marine Harvest salmon farms have been particularly affected, it is said.

"Marine Harvest salmon farms in the Hebrides and Wester Ross are currently host to rampant Amoebic Gill Disease (AGD), which can cause severe losses amongst affected fish," reported the Salmon & Trout Conservation Organisation in a press release (28 October). "At least four sites are impacted including West Loch Tarbert and East Loch Tarbert on Harris, Loch Greshornish on Skye and the Isle of Ewe in Wester Ross. Up to 25 per cent of the fish at the afflicted sites are understood to have been lost, with hundreds of thousands of mortalities transported to Wigan (Greater Manchester) for incineration".

The Scottish Government's 'Scotland's Aquaculture' database reports significant mortalities (alsmot 40 tonnes) at Marine Harvest's Loch Greshornish farm in June 2016 (the latest data currently available):

Fish Farm Monthly Biomass and Treatments Details	
Year	2016
Month	June
Submitted By	Marine Harvest (Scotland) Ltd
Licence Number	CAR/L/1002890/V6
Licence active at time of report	CAR/L/1002890
Report for Site	GRE1 Greshornish
Max licensed biomass on site (tonnes)	2195
Actual biomass on site (tonnes)	2179
Biomass Exceedance (tonnes)	0
Feed (kg)	340437
Mortalities (kg)	39393.6696771169

Sealice Treatments Used	
Sealice Treatment Product	Quantity Used (grams)
Azamethiphos	1050
Cypermethrin	0
Deltamethrin	0
Emamectin Benzoate	0
Teflubenzuron	0

Data supplied by SEPA on 25/10/2016

Location Details	
Receiving Water	Loch Snizort
National Grid Reference	NG35005530
View on Map	View on Map

Data supplied by SEPA on 25/10/2016

In May 2016, 10 tonnes of morts were reported at Marine Harvest's Loch Greshornish salmon farm; with 6 tonnes of morts reported in April 2016; 10 tonnes of morts reported in March 2016; 10 tonnes of morts reported in February 2016; and 2 tonnes of morts reported in January 2016.

In 2013, SEPA bowed to pressure from the Scottish salmon farming industry to keep the actual numbers of mortalities secret (read more via "Scottish watchdog labelled 'lapdog' after agreeing to keep fish farm deaths secret").

Marine Harvest's Loch Greshornish salmon farm was audited by the Aquaculture Stewardship Council in 2014. There were various non-compliances including: sea lice, stock counts, fish feed, net maintenance, effluent treatment licence, fish health management, treatment of cage waste, mortality records, mortality reduction, therapeutant documentation, worker's right of freedom of association, diversity and non-discrimination, social responsibility, disciplinary action policy, abuse of working hours, labour standards and the use of Acoustic Deterrent Devices.

For example, the report by Food Certification International stated:

"Lice count data, ref 'Greshornish transparency checklist, showed exceedance of > 0.1 mature female lice per fish in period 11 April to 11 June (on 16 count occasions)"

"Transparency of stock figures is not clear. Marine Harvest routinely makes a 4% addition adjustment of smolt input figures on delivery to the sea sites. This adjustment equated to an unexplained 'gain' of 41,051 fish at harvest on the previously completed cycle. N/C This

figure (+5.9% of total stock recorded input) is outwith the 2% 'margin of error' allowed within the specification of the counting equipment."

"ADDs recorded as having been constantly in use from 6th December 2013 to 2nd August 2014, 95.6% of days stocked" [should be less than 40%]

The ASC full assessment report concluded:

15. Compliance statement and certification decision

Food Certification International determines that all the requirements of the standard are sufficiently met or addressed and recommends certification of Marine Harvest Scotland's Loch Greshornish farm to the ASC Salmon standard Version 1.0 subject to satisfactory corrective actions being put in place to close the outstanding Non-conformances listed in the report (Section 10 above).

Documents obtained by GAAIA in October 2016 included the following correspondence on the Thermolicer:

From:	Barber J (Jill)
Sent:	12 September 2016 16:55
To:	Cabinet Secretary for the Rural Economy and Connectivity
Cc:	Cabinet Secretary for the Environment, Climate Change and Land Reform; Communications Rural Economy & Environment; Director of Marine Scotland Mailbox; Cowan WJ (Willie); Mitchell A (Alastair); Haddon P (Paul); Allan C (Charles) (MARLAB); Smith K (Kate); Higgins K (Kate); Miller D (David); Meiklem PJ (Peter John); Purvis N (Neil) (MARLAB)
Subject:	Fish Farm Mortality ~ 115,000 4Kg fish - sea lice treatment - Skye

PS Cabinet Secretary for Rural Economy and Connectivity

The Minister will wish to be aware of mortalities reported at Greshornish salmon farm in Skye (Marine Harvest).

- Total: 115, 283 fish @ 4Kg fish lost since July [est. 460T]
- Cause: Failed sea lice treatments - 95,400 mortalities occurred during weeks of 31/07 and 07/08 following operational issues using a thermolicer.
- Action: Mortality levels have returned to 'background' levels. Accelerated harvest at site – to be fallow by end of September. FHI to remain updated with weekly mortality on site.

Further information

The Skye and Loch Torridon area suffered algal blooms in July [linked to mortality reports of 19 Aug and 2 September] which led to delayed sea lice treatments across the area. Greshornish fish farm has reported having a sea lice issue since Februrary 2016. They have been treating ineffectively on a monthly basis since.

The site made the decision to treat with a new thermolicer (a recent £4million investment by Scottish Sea Farms rented by Marine Harvest) - the device works by shocking lice with a sudden temperature change - which gave 95% lice clearance but also caused significant mortalities. As such, the treatment was stopped.

This report highlights the ongoing difficulties and costs (we estimate the financial loss of this mortality event was over £2.7 million) faced by industry with regards to sea lice management.

A fish health inspector is in the area this week. We will keep the Minister informed with any additional relevant information and/ or media interest.

Jill Barber
Aquaculture Policy Advisor
Marine Scotland – Performance, Aquaculture and Recreational Fisheries
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E-mail: jill.barber@gov.scot
Web: http://www.scotland.gov.uk/marinescotland
Mail: Scottish Government, 1B North, Victoria Quay, Edinburgh EH6 6QQ

From:	Walker A (Amanda) (MARLAB)
Sent:	12 September 2016 13:44
To:	Barber J (Jill); Smith K (Kate)
Cc:	Fraser D I (David) (MARLAB); Allan C (Charles) (MARLAB); Smith R (Ronald) (MARLAB); Purvis N (Neil) (MARLAB); Mckay P (Paul) (MARLAB)
Subject:	FW: Mortality figures for Greshornish

Hello,

Following on from my request for further details about the mortalities at Loch Greshornish last week the site manager, Bill Wright has forwarded the figures detailed below.

You will see from the figures the losses post Thermolicer use is about 95,400.

Mort levels at the site are now low (0.12%/site/wk) but I plan to call the manager on Wednesday to ensure mortality levels remain low.

Amanda

Amanda Walker
Senior Fish Health Inspector
Marine Scotland - Science

Scottish Government | Marine Laboratory | 375 Victoria Road| Aberdeen | AB11 9DB

From: Manager, Greshornish [mailto:manager.greshornish@marineharvest.com]
Sent: 12 September 2016 11:39
To: Walker A (Amanda) (MARLAB)
Cc: Hall, Jackie; MacLennan, Alasdair
Subject: RE: Mortality figures for Greshornish

As requested:

W/e 03/07/2016 – 3621 morts., **W/e 10/07/2016 – 8055 morts.**, W/e 17/07/2016 – 5051 morts., W/e 24/07/2016 – 2719 morts., **W/e 31/07/2016 – 40986 morts., W/e 07/08/2016 – 44019 morts., W/e 14/08/2016 – 4778 morts.**, W/e 21/08/2016 – 1641 morts., **W/e 28/08/2016 – 4005 morts.**, W/e 04/09/07/2016 – 260 morts., W/e 11/09/2016 – 148 morts.

Weeks 1% mortality exceeded are in red – the 1% is calculated against stock number at start of the week.

All morts are due to treatment losses – w/e 10/07 were following bath treatments and from 31/07 following Thermolicer treatments.

Best regards,
Bill Wright

Site Manager
MARINE HARVEST SCOTLAND LTD

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DIRECT: +44 01470 582 344
MAIL: greshornish@marineharvest.com
OFFICE: Greshornish, Edinbane, Isle of Skye IV51 9PN. UK

From: Amanda.Walker@gov.scot [mailto:Amanda.Walker@gov.scot]
Sent: 09 September 2016 12:48
To: Manager, Greshornish
Subject: Mortality figures for Greshornish

Hello William,

Thank you for providing information with regards to the mortality issues at Loch Greshornish. Following on from our conversation I am writing for some more detailed mortality figures that you mentioned would be available on Aqua-farmer.

Could you provide weekly mortality figures (% for site and numbers) for the period 28 July until end August. Also details of mortalities for any other period when the figures were more than 1% for the site for a week.

Many thanks

Amanda

Amanda Walker
Senior Fish Health Inspector
Marine Scotland - Science

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e: amanda.walker@gov.scot
w: http://www.gov.scot/marinescotland

Mortality Event Report

Site Name: Loch Greshornish

Site No: FS0015

Start date of mortality: 42579

Period of mortality: 5 weeks

Percentage mortality: 9, Explained

Reason (if explained): Treatment

Company: Marine Harvest (Scotland) Ltd (FB0119)

Species: SAL

Water Type: S

Weight (site average): ≥750g

Weight (affected population average): 4kg

Age: 2015 Q2

Estimated number of fish lost: 47000

Additional information: Morts occurred following treatment with theromolicer. Treatment was stoped when extent of mortality was realised. Lice tested as 60% resisitant to chemical treatments. Have been carrying out 3 hour salmosan treamtent in a well boat but this is causing increased morts. Harvest plan has been accelerated and site will be fallow by end of September 2016

MS action: PSI case 20160379 Mort levels have dropped, currently 0.132%/site/wk. Awaiting further details on mortality figures for the cycle.Site manager to be contacted next week to ensure mort figures remain low.

Read more via Mortalities & Disease at Marine Harvest during 2016 - FOI reply from Scottish Government (28 October 2016)