SCOTTISH SALMON WATCH

CHEMICALS

FOI on Imidacloprid (BMK08/Ectosan/D10 Aquatic Blast)
& discharge/disposal via Benchmark's 'CleanTreat' since 2014

To:

The Scottish Government: ceu@scotland.gsi.gov.uk
Scottish Environment Protection Agency: foi@sepa.org.uk
Veterinary Medicines Directorate: postmaster@vmd.defra.gsi.gov.uk

Date: 17 March 2020

From: Scottish Salmon Watch

Please provide information on Imidacloprid (BMK08/Ectosan/D10 Aquatic Blast) including discharges and disposals via Benchmark's 'CleanTreat'.

Please provide information relating to any meetings with Benchmark - including emails, reports, data, test results, discussions and any other material. Fish Farmer magazine reported in February 2020:

> A Marine Scotland spokesman told Fish Farmer in January: 'At the moment we and Scottish Environmental Protection Agency and the Veterinary Medicines Directorate have been meeting with Benchmark on a regular basis to guide them through the regulatory framework to allow trials to start in Scotland; this work is ongoing.'

Please include information relating to Benchmark's FAI Aquaculture's laboratory at Ardtoe, salmon farms, well boats, trials, tests, experiments and other facilities in Scotland, Canada and Norway since 2014 (when the use of Imidacloprid was first alluded to - then called D10 Aquatic Blast).

For example, Benchmark's FAI laboratory at Ardtoe is listed via 'Scotland's Aquaculture' as FS0869 and under 'Licences' it states "No items found for this category":

Site Details

Site ID	FS0869
Site Name	BAHL Marine Research Facility Ardtoe
Address	Ardtoe Marine Research Facility Ardtoe, Acharacle Argyll PH36 4LD
Telephone Number	01397 709270
Date Registered	15/05/1996
Operator	Benchmark Animal Health Ltd
Aquaculture Type	Fish
Water Type	Seawater
Species	Atlantic Salmon, Cod, Lumpsucker, Rainbow Trout, Sea Bass, Turbot, Wrasse
Health Surveillance Frequency	Low
Production reported to Marine Scotland within last 3 years?	Yes
National Grid Reference	NM629708
Easting	162900
Northing	770800
Marine Scotland Management Area	15a - Moidart
Local Authority	Highland
Region	Highland
View on Map	View on map

Data supplied by Marine Scotland on 13/03/2020

Related Items

- Reports
  - Operator Transfers (2)
  - Site Facilities (17)
  - Movement Restrictions (2)
- Leases
  - No items found for this category
- Licences
  - No items found for this category

Data supplied by Marine Scotland on 13/03/2020

The operator transferred from SAMS to FAI Aquaculture (Benchmark Animal Health) in 2005:

Operator Transfer

Transfer Date	03/06/2005
Old Operator	SAMS Ardtoe Ltd
New Operator	FAI Aquaculture Ltd

Data supplied by Marine Scotland on 13/03/2020

Site Details

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Site Name	BAHL Marine Research Facility Ardtoe
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Telephone Number	01397 709270
Date Registered	15/05/1996
Operator	Benchmark Animal Health Ltd
Aquaculture Type	Fish
Water Type	Seawater
Species	Atlantic Salmon, Cod, Cod, Cod, Lumpsucker, Lumpsucker, Lumpsucker, Lumpsucker, Rainbow Trout, Sea Bass, Sea Bass, Turbot, Turbot, Turbot, Wrasse, Wrasse, Wrasse
Health Surveillance Frequency	Low
Production reported to Marine Scotland within last 3 years?	Yes
National Grid Reference	NM629708
Easting	162900
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Marine Scotland Management Area	15a - Moidart
Local Authority	Highland
Region	Highland
View on Map	View on map

Data supplied by Marine Scotland on 13/03/2020

The Ardtoe site includes a licence for Atlantic salmon:

Site Facilities	
Species	Atlantic Salmon
Stage	Fish weighing more than 5 grams
Facility Type	Seawater Tanks
Description	
Number of Facilities	0

Data supplied by Marine Scotland on 13/03/2020

Site Details	
Site ID	FS0869
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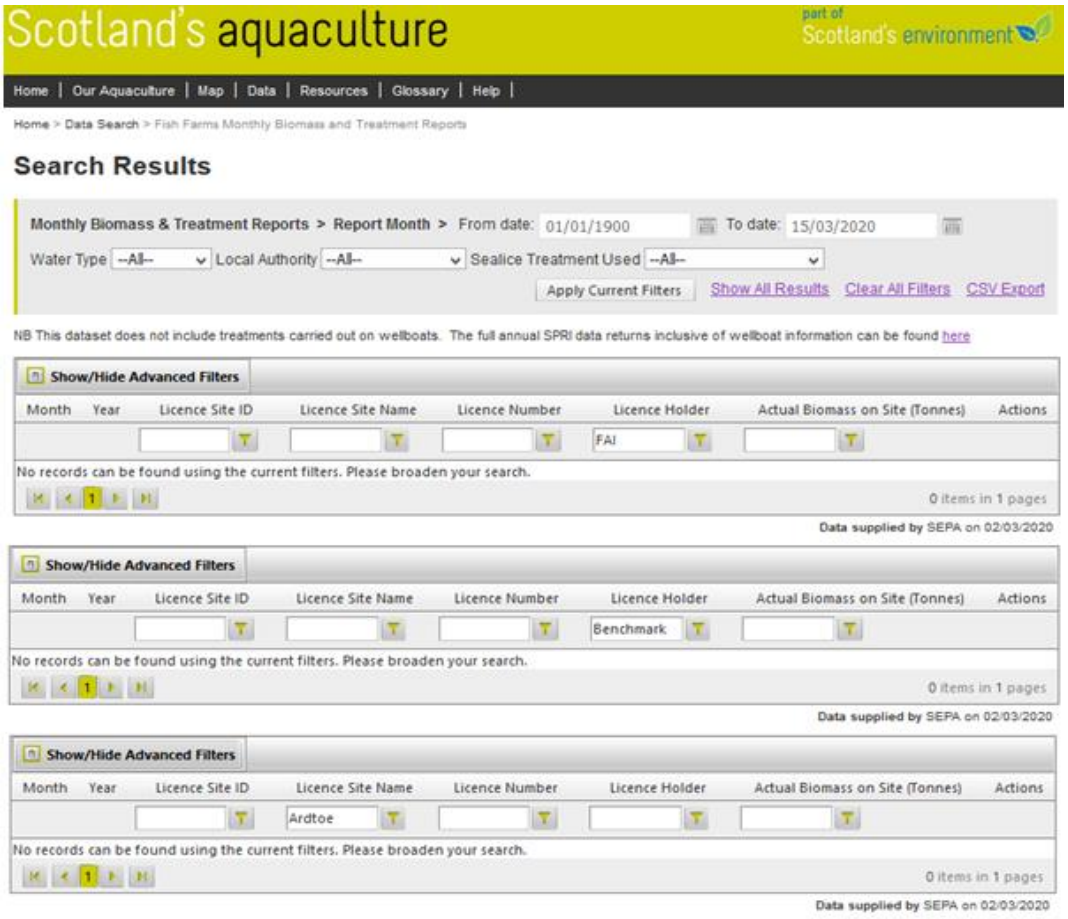
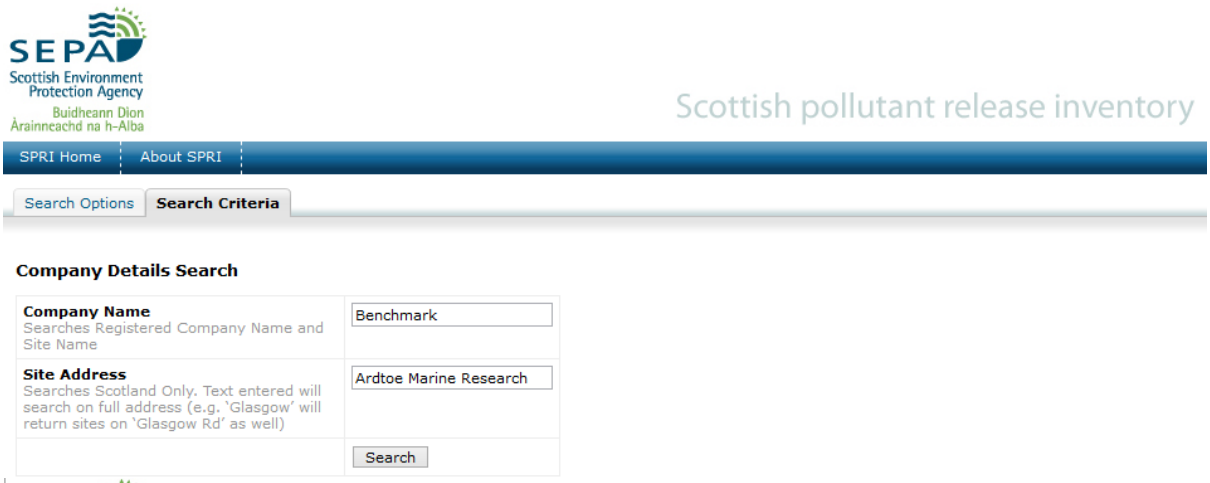
Local Authority	Highland
Region	Highland
View on Map	View on map

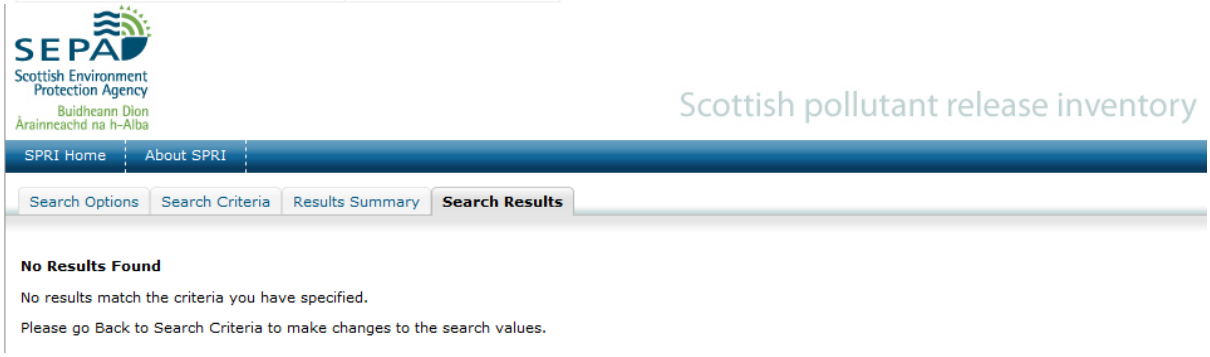
Data supplied by Marine Scotland on 13/03/2020

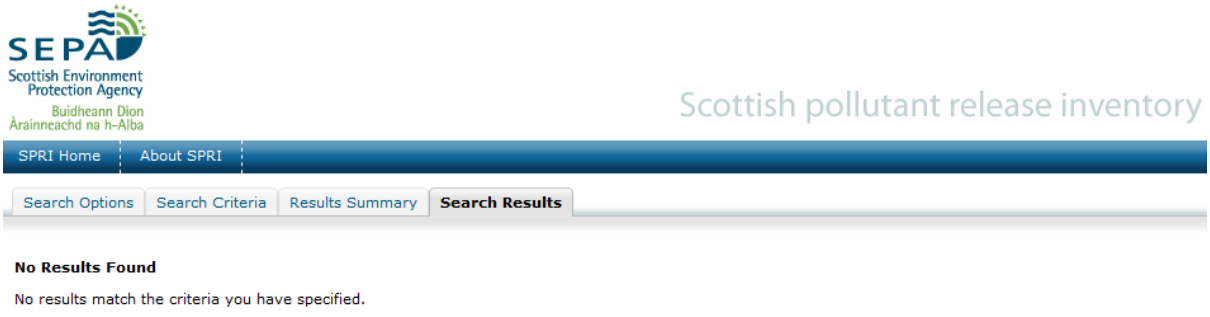
However searching for data on use of chemicals no information is listed for FAI Aquaculture, Ardtoe or Benchmark:



Searching via SEPA's Scottish Pollutant Release Inventory does not provide any information at all on Benchmark's FAI Aquaculture laboratory at Ardtoe let alone what toxic chemicals have been used over the last decade during the development of CleanTreat.







Is Benchmark's FAI Aquaculture laboratory at Ardtoe exempt from reporting the use and discharge of toxic chemicals or is it listed via another name?

We know from published articles that toxic chemicals - including Imidacloprid, Deltamethrin and Azamethiphos - have been trialled via CleanTreat which "was developed by Benchmark Animal Health at its Ardtoe Marine Laboratory in Scotland".

Fish Farming Expert reported in October 2018:

Ectosan has proven to be 100% effective in commercial trials in Norway, but Benchmark has warned it will take time to secure the patents or authorisations for it. It is waiting to complete regulatory procedures.

The chemical, which Benchmark describes as its "next generation" lice treatment, is used on wellboats in conjunction with the company's CleanTreat filtration system, which removes any detectable trace of medication from the treatment water before it is discharged into the sea, generating zero impact.

New molecule

Benchmark chief executive Malcolm Pye, visiting Chile for the Aquasur trade show, told Fish Farming Expert's Chilean sister site, Salmonexpert.cl, that Ectosan is a product that includes a new molecule and innovative technology.

Pye said Benchmark is in the process of patenting Ectosan in Norway and globally. "We still have work to do regarding patents and authorisations," he explained.

A clean break

- CleanTreat was developed by Benchmark Animal Health at its Ardtoe Marine Laboratory in Scotland.
- It uses a unique purification system to compound and solidify the chemicals used in bath treatments. These solids can then be incinerated at a specialist processing plant.
- So far CleanTreat has been trialled with a number of sea lice treatments compounds including pyrethroids, deltamethrin, azamethiphos, as well as Ectosan.

The CleanTreat system, which is available now, cannot be used with hydrogen peroxide but is suitable for all other currently available bath treatments used against sea lice, as well as several additional chemical classes.

According to Benchmark, the system is working well in field trials and will be available imminently for use with other chemicals. Benchmark is continuing to optimise its performance in terms of speed and efficiency.

Pye continued: "Our intention is that there will be no impacts on the sea after performing antiparasitic treatments on the fish.

"This is a step that the industry has wanted to take some time, to move away from carrying out treatments and discharging water containing antiparasitic products in the open sea."

The Fish Site reported in March 2018:

> John Marshall, head of Benchmark Animal Health, which developed the system at their Ardtoe Marine Laboratory, explained the latest updates at this week's Fish Vet Society conference, near Edinburgh.
>
> CleanTreat is, he explained, "suitable for all currently available bath treatments used against sea lice, other than hydrogen peroxide" and uses a unique purification system to compound and solidify the chemicals used in the treatments. These solids, he added, can then be incinerated at one of the world's three specialist processing plants for these operations.
>
> If has, so far, been trialled with a number of sea lice treatments compounds including pyrethroids, deltamethrin, azamethiphos, and Benchmark's new trial bath treatment.
>
> However, he also believes that – as the treatment water is processed through CleanTreat's unique triple purification system before being released back into the sea clean and free of medicinal residues – the system could open up a very wide range of treatment options.
>
> "There are at least two new products it could bring to market and I think it could open the door to other products not yet considered – perhaps from other areas, depending on regulations," he said.
>
> He reflected that it is not just sea lice treatments that can be run through the machine – with amoebic gill disease (AGD) being a likely candidate for being treated in the system in the future.
>
> The current trials are expected to further optimise CleanTreat – in particular through increasing its capacity and reducing its footprint.

Benchmark's written submission to the Scottish Parliament's salmon farming inquiry in 2018 included:

> Purification systems- systems which remove therapeutants from treatment water prior to discharge - have been proposed as a solution to this environmental challenge. Benchmark's CleanTreat® system - developed by our team in Scotland - is the culmination of many years of research and investment and is the first of its kind to be used in aquaculture.
>
> CleanTreat® ensures the safe use of compounds in the marine environment by removing therapeutants in discharge water following treatment to undetectable levels. CleanTreat® will be used in conjunction with Benchmark's next generation sea lice treatment, which is currently undergoing field trials in Norway. This represents a transformational change in the battle against one of the industry's greatest challenges, and a big step towards a future where no medicinal residues are discharged directly into the oceans. CleanTreat® can be used on well boats, tankers and platforms, is effective against most available bath treatments for sea lice and prevents treated lice from going back into the environment so that they do not contribute to resistance. More information can be found here: http://www.benchmarkplc.com/articles/cleantreat-by-benchmark/

Fish Farmer magazine [reported in February 2020](#) that "CleanTreat, developed over a 10-year period at Ardtoe in Scotland, has the potential to be used on well boats, tankers, platforms and onshore, and has proven to be effective on most available bath treatments for sea lice, including pyrethroids, deltamethrin, and azamaethiphos":

Fish Farmer

Sea Lice CleanTreat

Norwegian scale up for award winning UK innovation

11 Feb 2020

THE company behind the prize winning CleanTreat filtration technology that cleanses treatment water after delousing is looking to scale up the system. Benchmark Holdings said last month it plans to invest £19 million in the breakthrough innovation ahead of the launch of its new sea lice medicine, BMK8 (formerly known as Ectosan), due in the first half of 2021.

Over the past 24 months, more than 35,000 tonnes of salmon in five Norwegian farms have been treated with BMK08, achieving approximately 99 per cent efficacy, said Benchmark.

The compound must be used in conjunction with CleanTreat, which removes medicinal residues from treatment water.

Benchmark said there is growing interest from customers for the product and it estimates that BMK08/CleanTreat sales could reach £50 million in Norway alone and £75 million globally.

However, there have been no trials of the products in Scotland yet, due to regulatory bottlenecks. The slow pace of Scottish bureaucracy emerged during the Aqua Nor show in Trondheim last August, when Benchmark won the coveted Innovation Award for CleanTreat.

John Marshall, head of Animal Health at Benchmark, said at the time that his company had been approached by all the Scottish producers, interested in deploying CleanTreat at their farms, and he hoped there would be Scottish trials soon.

Marshall and head of CleanTreat Neil Robertson held meetings during Aqua Nor with Scotland's rural economy minister Fergus Ewing and Graham Black, director of Marine Scotland, to try to speed up Scottish trials.

Roberston said after the discussions: 'We're encouraged by the positive message from the minister and from Marine Scotland. I think there is a really strong incentive to support us from the industry, and certainly from government as well.'

Left: Benchmark's John Marshall (left) and Neil Robertson at Aqua Nor last August

Marshall added: 'The Innovation Award has helped in that everybody is saying this really works now, it's got that big stamp of approval.

'It's not a case of having to have new regulation. I think there is regulation in Scotland to deal with it but, of course, regulations are interpreted and it's about the interpretation of how you use the current regulation along with CleanTreat.'

CleanTreat, developed over a 10-year period at Ardtoe in Scotland, has the potential to be used on well boats, tankers, platforms and onshore, and has proven to be effective on most available bath treatments for sea lice, including pyrethroids, deltamethrin, and azamethiphos. The solution also removes treated sea lice, so they will not spread resistance.

Chemical based bath treatments that are released into the water are one of the biggest grounds for objections to the aquaculture industry.

Some farm sites have to treat over an extended period due to low discharge consents, but the CleanTreat system would allow treatments to be carried out over a reduced time as the

Medicine has been removed from the water before discharge.

Ewing, whose office met the Benchmark team shortly after Aqua Nor, said he wanted to ensure that such sustainable technologies like CleanTreat are not only developed in Scotland but that Scotland is also an attractive place to trial such technologies.

'Given the environmental benefits and sustainability credentials of the CleanTreat system, and huge potential for improvements in fish health, we would like to offer further support to reach a positon whereby trials could be started in Scotland.'

Representatives from Marine Scotland and the Scottish Environment Protection Agency (Sepa) toured a vessel fitted with the CleanTreat system last September, when it was docked in Leith before sailing for Norway to work on Norwegian salmon farms.

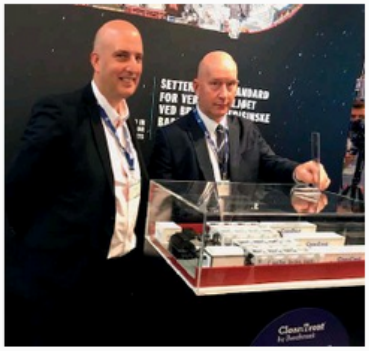
Norwegian agencies have been strongly supportive of the system's development and it will be the first market for a commercial roll-out.

Scotland was the preferred next market, but this is dependent on the regulatory process, said Benchmark.

'We continue to actively work with the various authorities to bring this innovative process to our Scottish and Norwegian customers,' said Robertson.

> "We have been meeting with Benchmark to guide them through the regulatory framework"

At Aqua Nor, they had had meetings with potential customers in the other big salmon producing



countries.

'Many of our customers based in Norway certainly have interests in Chile and Canada as well, and the Faroe Islands,' said Robertson during the exhibition.

Marshall added that their system is 'revolutionising the way that we use medicines and we want to make it available for everybody'.

Benchmark has revealed plans to raise a net sum of £41.5 million – to fund CleanTreat and other business- through share issues.

Executive chairman Peter George said last month: 'We are preparing to launch BMK08, our novel medicinal treatment to combat sea lice, one of the main biological challenges in salmon farming.

'This requires scaling up CleanTreat, our proprietary system that removes medicinal residues from treatment water, and which is integral to the delivery of BMK08.

'Having reviewed a number of funding options, we strongly believe that an equity raise is the optimal funding strategy to deliver this scale.'

A Marine Scotland spokesman told Fish Farmer in January: 'At the moment we and Scottish Environmental Protection Agency and the Veterinary Medicines Directorate have been meeting with Benchmark on a regular basis to guide them through the regulatory framework to allow trials to start in Scotland; this work is ongoing.'

A [FOI reply by the Scottish Government (FOI-19-01398) in December 2019] included an email to Fergus Ewing (Cabinet Secretary for the Rural Economy) from Benchmark in September 2018 which stated that CleanTreat "has had much of the initial development work in Scotland at our facility at Ardtoe":

From: Ewing F (Fergus), MSP <Fergus.Ewing.msp@parliament.scot>
Sent: 28 September 2018 12:49
To: Cabinet Secretary for the Rural Economy <CabSecRE@gov.scot>
Subject: Fwd: Follow up post Aquaculture UK, Aviemore

egin forwarded message:
From: [Redacted]
[Redacted]]
Date: 28 September 2018 at 12:32:16 BST
To:
"Fergus.Ewing.msp@parliament.scot<mailto:Fergus.Ewing.msp@parliament.scot>"
<Fergus.Ewing.msp@parliament.scot<mailto:Fergus.Ewing.msp@parliament.scot>>
Subject: Follow up post Aquaculture UK, Aviemore
Dear Fergus,

I wanted to follow up on our meeting at Aquaculture UK in June and to thank you again for supporting the event. We had extremely good feedback from the exhibition this year and people were very pleased to hear your strong words of support for an industry sector that has an important future and so much still to offer the Scottish economy.

I promised to stay in touch and keep you up to date with projects within the animal protein sectors that Benchmark supports and would like to follow up with you on two important - albeit very different items ? firstly, as introduced at Aviemore, we are now ready to apply for trials in Scotland for our CleanTreat system for salmon healt [Redacted]

1. Benchmark?s new technology for salmon health ? the CleanTreat system - is a ground-breaking cleaning system that removes medicines from salmon treatment water prior to release back into the sea. The system, which has had much of the initial development work in Scotland at our facility at Ardtoe, has been successfully undergoing extensive field trials in Norway and I wanted to bring you up to speed on the exciting progress we have made to date. As you know, we believe this is a game changing technology for the industry, and for its regulatory bodies, as it allows fish exposed to a disease challenge access to a full range of effective medicines but, for the first time, with no environmental impact. We are now in a position to apply for field trials in Scotland and would like to brief you on these proposals.

[Redacted]

Please therefore prove records, data, trial results, tests, development work output and other information relating to Imidacloprid use in salmon farming in Scotland - including via Benchmark's FAI Aquaculture laboratory at Ardtoe, well boats, salmon farms and any other facilities.

Please also provide copies of any discharge consents, special licences to use, emergency authorisations, marine discharge licences and any other documents detailing legal use and disposal of Imidacloprid.

In the absence of published information to the contrary, it is difficult for Scottish Salmon Watch not to conclude that Imidacloprid has been used illegally by the salmon farming industry in Scotland.

If the use of Imidacloprid has been used legally by Benchmark at their Ardtoe laboratory, via well boats or any other trials or uses please provide supporting documentation and proof of legality.

Please include any information detailing trials - in Scotland, Norway and Canada. Please indicate names of companies, quantities and other specific information in relation to the use, discharge and disposal of Imidacloprid which may date back to 2014.

Norwegian Fish Farmer magazine reported back in 2016 that an international patent had been obtained in 2015 for the use of Imidacloprid in salmon farming citing an investors presentation in 2014 calling the chemical D10 Aquatic Blast.

Patentert metode

To av dem som står bak AVSI, som er den kanadiske samarbeidspartneren i prosjektet, John O'Halloran og John Terence Drost, har nemlig patentert en fremgangsmåte for å belegge fiskefôr med en «bærer» som skal sørge for at legemidler i neonikotinoid-klassen i langt større grad blir spist og tatt opp av fisken når de gis i fôret.

I patentet viser de til et forsøk Novartis har beskrevet i deres patentsøknad for et neonikotinoid-middel som heter «clothianidin».

Der konkluderer Novartis med at det kun er clothianidin av neonikotinoidene de testet som gir full effekt. Og at for eksempel at et annet velkjent middel, imidacloprid, dermed ikke er egnet som fôrbasert lakselusmiddel. Se tabellen her

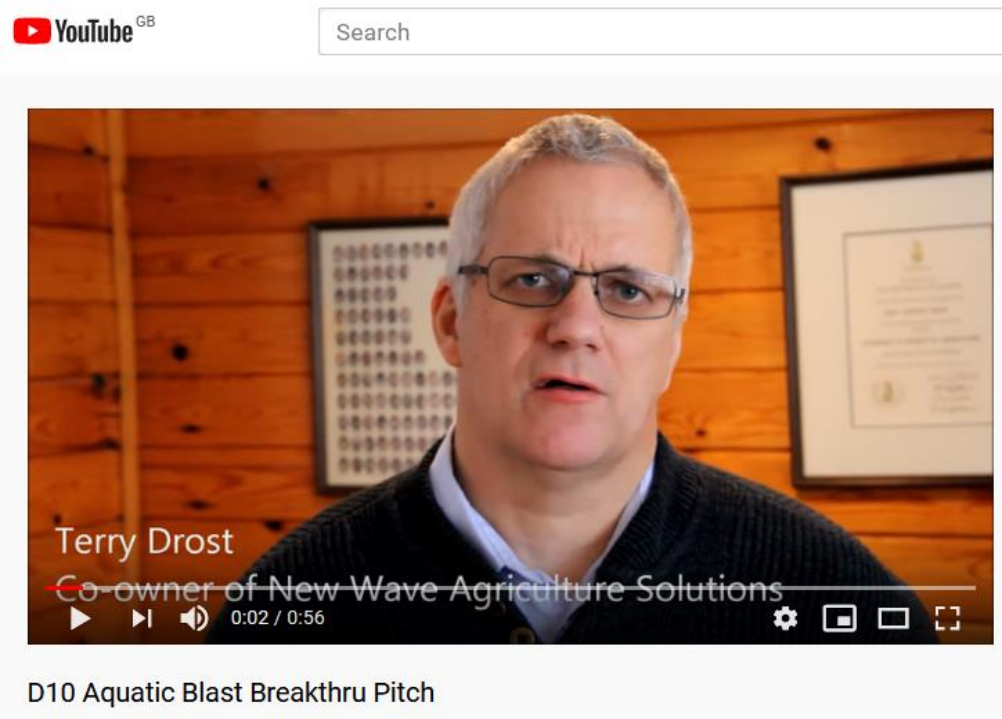
I patentet til O'Halloran og Drost hevder de derimot at de har funnet en bærersubstans som også gjør de andre stoffene egnet. Derfor krever de i patentet at denne metoden skal gjelde stoffer som imidacloprid, acetamiprid dinotefuran, nitenpyram, thiacloprid, thiamethoxam.

Selv om patentet ramser opp en rekke neonikotinoider, er det varianten «**imidalcloprid**» som vies mest fokus i patentet. Kyst.no spør Rikhardsen om det er dette konkrete virkestoffet det jobbes med?

- Jeg kan bare bekrefte at det i patentet er beskrevet en rekke varianter, men jeg kan verken bekrefte eller avkrefte at det er akkurat imidalcoprid, sier han.

The article ended by directing readers to a [You Tube presentation dated December 2014 by Terry Drost of New Wave Agriculture Solutions] which included:

"We have developed a new treatment for sea lice called D10 Aquatic Blast. D10 Aquatic Blast is based on a compound used in agriculture for the last 20 years. We are using it in salmon feeds in the marine environments for the first time in the world. We would like to talk to you about how we can get D10 Aquatic Blast approved for use in Canada and the rest of the world."



Fiskeribladet/Tekfisk [reported in June 2018]:

The article links to another article [published in Intrafish in June 2018]():

IntraFish Priser Stillinger FoU Kalender Ordforklaringer

Søker to FoU-tillatelser for nytt lusemiddel

Det nyetablerte selskapet Salmo Pharma har søkt Fiskeridirektoratet om to FoU-tillatelser for utprøving av et nytt fôrbasert legemiddel mot lakselus.

28. juni 2018 7:38 CET *OPPDATERT 28. juni 2018 7:38 CET*
Av **Anders Furuset**

Det fremgår av dokumenter IntraFish har fått innsyn i. Deler av dokumentene, som hele søknaden til Statens Legemiddelverk, er imidlertid unntatt innsyn grunnet forretningskritiske

It is difficult to access any information on New Wave Agriculture Solutions but there is an [online listing for J Terry Drost at tech funding start up F6S]():

F6S

F6S
where founders grow together
Finance · Jobs & Recruiting · Startups

J Terry Drost
Aquaculture Industry professional for 29 years.
General Business · Marketing Fredericton, Canada

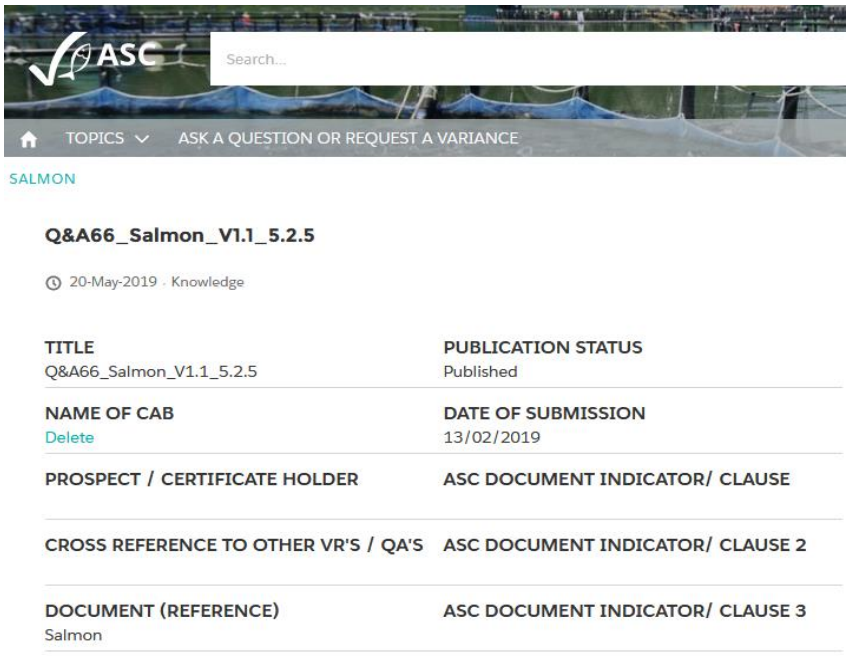
EXPERIENCE

New Wave Pharmaceuticals · Co-Founder
Aquaculture Pharmaceutical Company

Terry Drost, Vice-President/COO New Wave Pharmaceuticals Inc (based in New Brunswick in Canada), told Salmon Business in August 2018:

"Once a sea lice outbreak hits them, they are faced with the choice of doing nothing and allowing up to 100% of their fish to be eaten alive by sea lice or applying mechanical treatments that can result in large amounts of fish damaged or killed.....we need to be allowed the emergency use of innovative, safe and efficacious new treatments to control sea lice."

Scottish Salmon Watch first discovered that Ectosan (which was launched in 2017 and re-named by Benchmark as BMK08 in 2019) was Imidacloprid last week following a tip-off to view details on the Aquaculture Stewardship's web-site:



VERSION 1.1	ASC DOCUMENT INDICATOR/ CLAUSE 4
PRINCIPLE	
CRITERION	
INDICATOR	
SUPPORTING EVIDENCE	
COUNTRY	
REGION	
APPROVED REGION	
DATE INTERNAL CHECK STARTED	
DATE INTERNAL CHECK FINISHED	

BACKGROUND

Interpretation request (PTI for new sea lice medicine that is not released into the environment).
Mowi Norway AS and Benchmark Rationale for PTI calculation – Ectosan (Imidacloprid):
The ASC standard includes a number of indicators aimed at promoting the responsible use of therapeutic treatments. The environmental risks linked with using chemical therapeutants are linked with the release of such chemicals into a wild environment where non-target organisms may be affected. Therefore, the development of new medicinal treatments that avoid the release of active therapeutants into the environment is in alignment with the ASC aim of environmental stewardship.
Ectosan is a new therapeutic treatment against sea lice which fulfills this intention. Ectosan is administered as a bath treatment in wellboats or other closed contained treatment vessels only. This allows for accurate dosing of the medicine, control of water quality parameters, monitoring of fish welfare and the capture and retention of all treatment water. The fish are pumped into the wellboats with the medicine administered after all fish are onboard. Once the exposure period is completed, the fish are pumped out of the wellboat over a dewatering system fitted with a rinse bar to both separate fish from treatment water and ensure no residues of treatment water remain on the exterior of the fish. All water, including all rinse water, is collected and returned to the wells. Once all fish have been discharged over this system the treatment water is then transferred through CleanTreat, Benchmark's novel water purification system, whereby the medicine is removed from the water prior to the water being discharged back to the environment. The purified water is measured continuously using onboard equipment to ensure levels remain below quantifiable limits.
The Parasiticide Treatment Index (requirement 3.1.7) has been developed during the Aquaculture Salmon Dialogues (ASD) with the aim of "The ultimate goal would be that farms could meet the ASC Salmon Standard without using therapeutants or without the risk of those therapeutants negatively impacting the environment." (page 47 of the ASC salmon standard v1.1). As mentioned earlier the use of Ectosan does not lead to any release of chemical therapeutants into the environment. In addition, the toxicity factor of the active ingredient used in Ectosan (Imidacloprid) has already been established as 85 mg/l (LC 50 for Daphnia, Fossen, 2016) which is higher compared with H2O2 (7.7 mg/l, which is given a toxicity factor of 0 in the ASC-PTI calculation). Therefore, the therapeutant factor for Ectosan will be zero and as a result so will the PTI.

DNV GL response to ASC:
DNV GL can not find PTI calculation values for the therapeutant Ectosan (Imidacloprid) in the ASC Salmon Standard v1.1 – April 2017, Appendix VII: Parasiticide Treatment Index and therefore needs clarification and determination from ASC related to which values shall be used when PTI is calculated. The text below is from page 95 in the ASC Salmon Standard v1.1 – April 2017, Appendix VII: Parasiticide Treatment. DNV GL interpretation of this text is that it is ASC and the Technical Advisory Groups responsibility to determine which values shall be used when PTI is calculated for use of therapeutant Ectosan (Imidacloprid). DNV GL can not approve the given values from the user or producer of the therapeutant Ectosan (Imidacloprid) without a clarification and determination with acceptance of the given values from ASC.

(page 95 in the ASC Salmon Standard v1.1 – April 2017)

QUESTION

(page 95 in the ASC Salmon Standard v1.1 – April 2017)
Updating PTI with new information:
If new therapeutants become available for sea lice treatment, or if new treatment method are developed, the Technical Advisory Group of the ASC may be asked to determine a therapeutic factor or treatment factor for that new parasiticide or new method, following guidelines for assignment of factors left by the SAD SC.

ASC INTERPRETATION

The PTI-index is calculated using the following formula:
PTIi= [(therapeutant factor) * (treatment factor) * (resistance factor) * (sensitive time factor)]
Within this formula, the therapeutant factor and treatment factor vary per used active ingredient. The resistance factor and sensitive time factor are based on other variables (i.e. number of treatments applied and lobster presence).
For the therapeutant factor, a classification of the parasiticides used at the time of the Aquaculture Dialogues is given in the table on page 93 (v1.1). This table does not include Imidacloprid (Ectosan). For this susbstance to qualify, the parameters that contribute to the toxicity factor need to be determined. These are:
1. Treatment mechanism (bath or oral)
2. Toxicity factor (0-2)
3. Daphnia LC50 (µg/L)
4. Persistence factor (0-3)
5. Dosage factor (0-3)

The final therapeutant factor is calculated as following:
Therapeutant factor = [(Toxicity factor) * (Persistence factor) * (Dosage factor)]
1. Treatment mechanism
Ectosan is applied through a bath treatment. It is noted that the treatment is applied within a well boat and treatment water is purified before released back into the environment.
2. Toxicity factor (0-2) and 3. Daphnia LC50 (µg/L)
The table on page 93 (v1.1) does not reference the sources from which the Daphnia LC50-scores are derived. In order to find consistency in toxicity scoring, the Pesticide Properties Database (PPDB – https://sitem.herts.ac.uk/aeru/ppdb/index.htm) was consulted to verify the referenced values in the ASC Standard. The majority of listed LC50-scores where confirmed by this database and as such this database is used as a proxy to derive ecotoxicity values from.
The toxicity factor of the active ingredient used in Ectosan (imidacloprid) has been established as 85 mg/L (Fossen, 2016). This score was confirmed by the PPDB-database (https://sitem.herts.ac.uk/aeru/iupac/Reports/397.htm).

As this score is 11 times less toxic as the stated value for H2O2 (7.7 mg/L), a similar rating as H2O2 for toxicity should be given as well (i.e. toxicity factor "0").
4. Persistence factor (0-3)
According to the PPDB-database, imidacloprid has a water-sediment and water phase only DT50-score ("half-life time") of 129 and 30 days, respectively. Compared to the other parasiticides listed in the table on page 93, these values are considered high (i.e. slow breakdown). For this reason a persistence factor of 3 is given.
5. Dosage factor (0-3)
As there is no information available on the dosage applied – a (maximum) score of 3 is given from a precautionairy approach.
Summary:
For the application of Ectosan (imidacloprid) via the described process, the following values for the toxicity factor in the overall PTI-calculation need to be used:
Therapeutant factor = [(Toxicity factor) * (Persistence factor) * (Dosage factor)]
- Toxicity factor = 0
- Persistence factor = 3
- Dosage factor = 3
Therapeutant factor = [(0)* (3) * (3)] = 0
Please note that the use needs to be registered through Appendix VI of the ASC Salmon Standard v1.1.

VR/Q STATUS
Closed

EFFECTIVE DATE
15/03/2019

URL NAME
Q-A66-Salmon-V1-1-5-2-5

We have released this information today via "Revealed: Toxic Neonicotinoid Insecticide Used to 'CleanTreat' Lousy Scottish Salmon".

Scottish Salmon Watch understands that previous FOI requests in relation to novel lice chemicals, Ectosan, BMK08 and CleanTreat have been filed and have either been refused due to 'commercial confidentiality' or heavily redacted to remove all reference to Imidacloprid (or perhaps the first correspondence did not specify/identify the chemical in question as Imidacloprid).

Read more via: CleanTreat FOI Disclosures by the Scottish Government to Scottish Salmon Watch

For example, the Global Alliance Against Industrial Aquaculture filed a FOI request in June 2017:

From: Don Staniford [mailto:salmonfarmingkills@gmail.com]
Sent: 11 June 2017 18:01
To: 'ati@vmd.defra.gsi.gov.uk'
Cc: 'Lewsey, David'
Subject: FOI re. new chemical treatments for sea lice on salmon farms

Please provide information on any new sea lice chemicals/treatments/medicines for use on salmon farms in Scotland i.e. over and above the licensed chemicals Salmosan (Azamethiphos), Excis (Cypermethrin), Calicide (Teflubenzuron), Alphamax (Deltamethrin) and Slice (Emamectin benzoate).

Please include details of any discussions, trials, commercial applications, pre-application data, correspondence with scientists and chemical companies and any other information pertaining to new sea lice chemicals/treatments/medicines for use on salmon farms in Scotland since 1 January 2016.

This FOI request (which was also filed with SEPA and the Scottish Government) cited the following article published on 2 June 2017 by The Fish Site:

Patent sought for neonicotinoid-based sea louse treatment

HEALTH · NUTRITION

by Rob Fletcher
2 June 2017, at 12:00am

Details of an application for a patent concerning a neonicotinoid-based in-feed sea louse treatment have been recently published in the US.

The treatment has been developed by two Canada-based scientists – John O'Halloran and John Terence Drost – and is set to be administered orally, via medicated feeds, to salmon ranging from 50 g to 5 kg. Trials conducted by the scientists have shown it to be effective against both Lepeophtheirus and Caligus lice species, although the principle target is *Lepeophtheirus salmonis*. According to the patent application, salmon can be safely harvested and consumed within 21-25 days after treatment, or when the neonicotinoid residue in the fish is below 0.02 parts per million.

Although the patent is still pending, independent research into the possible efficacy of noenicitinoids against sea lice has also been promising. Indeed, a paper published in the Journal of Fish Diseases last year by Aaen and Horsberg, from the Sea Lice Research Centre at the NMBU School of Veterinary Science, showed the nicotinic (neuronal) acetylcholine receptor (nAChR) to be a suitable target for compounds such as neonicotinoids.

These compounds consist of seven separate insecticides – imidacloprid, thiacloprid, thiamethoxam, acetamiprid, nitenpyram, clothianidin and dinotefuran – and are used to combat pest organisms
on a wide range of crops, as well as parasites on animals. In Australia and New Zealand, products containing compounds from this group are available for use on sheep; otherwise, companion animals are the main consumers of these substances.

A prominent feature of neonicotinoids is their specificity to invertebrate nAChR compared to vertebrate
nAChR and this group of compounds is reported to induce toxic effects on crustaceans when distributed in extremely low concentrations.

Despite this, neonicotinoids are not without controversy, as their use as pesticides on crops has been linked to a steep decline in bee numbers, while their relatively long persistence in aquatic environments could, the scientists suggest, complicate their use as antiparasitic compounds. Nevertheless their trials showed that imidacloprid – which is the compound included in the current patent application – was highly effective against *L. salmonis*. Exposing lice to imidacloprid for 30 minutes at a concentration of 50 mg L(-1), or for 24 hours at 5 mg L(-1) generated a high level of immobilization.

Although another neonicotinoid, nitenpyram, did not yield a similar effect, the researchers concluded that the nicotinic acetylcholine receptor was a sensitive target for novel salmon lice medicines.

Scottish Salmon Watch fully appreciates that SEPA's decision to refuse to disclose information was the subject of an appeal to the Scottish Information Commissioner in February 2020 and FOI reviews were filed with both SEPA and the Scottish Government on 21 February 2020. Read more via: Please Come Clean on BMK08!

A review request re. the VMD's refusal on 20 December 2019 was only not filed due to an oversight by Scottish Salmon Watch missing the two month deadline not because we were happy with the VMD's reply; namely:

From: **Sandra Russell** <s.russell@vmd.gov.uk>
Date: Fri, Dec 20, 2019 at 3:35 PM
Subject: OFFICIAL SENSITIVE: Response to Freedom of Information request ATI0634
To: salmonfarmingkills@gmail.com <salmonfarmingkills@gmail.com>

Dear Don

Thank you for your e-mail of 5 December 2019.

We are dealing with it under the Freedom of Information Act (FOIA) 2000.

Your Request

You asked for information on BMK08 and Ectosan (which may be one of the same) since 1 January 2018.

Our Reply

We fully recognise and respect the obligations imposed by the FOIA on the VMD to act in a manner that is transparent and open in the public interest. However, the very real harm likely to ensue from the disclosure of the information you request warrants the balance to be taken in favour of non-disclosure.

We consider that the disclosure of the information would be likely to prejudice the commercial interests of Marketing Authorisation holders and that Section 43 applies here. Section 43 is subject to a public interest test balance. After careful consideration we have concluded that the public interest in withholding the information strongly outweighs that for disclosure in this case. Through the marketing authorisation system, the VMD receives information from commercial entities that constitutes trade secrets and information protected by patent, the publication of which would create significant commercial harm to the manufacturer. The commercial entities are required by law to provide the information and are put to great expense to generate it. In this case, the information you request could be used by other manufacturers to formulate, develop or market products that would compete with these products. We consider such factors weigh against the public interest in disclosing the information in question.

We also judge that Section 41 of the FOIA applies to this request. Section 41 is an absolute exemption and it is engaged in this case because the information carries the necessary quality of confidence. In this instance publishing such information could undermine the veterinary pharmaceuticals industry's trust in the regulatory process as well as the companies' commercial position. This could lead to companies becoming unwilling to place product on the UK market, which would have a detrimental impact on animal welfare. Further, the market as a whole benefits from establishing and upholding a robust process for marketing authorisations; this in turn requires appropriate protection of confidentiality, and the honouring of expectations of confidentiality.

In conclusion, Scottish Salmon Watch believes that such ongoing reviews and appeal does not preclude the disclosure of information on Imidacloprid (BMK08/Ectosan/D10 Aquatic Blast) especially since the information has only just now entering into the public domain.

Indeed, you could argue that the appeal to the Scottish Information Commissioner and today's revelation that Benchmark's BMK08/Ectosan is a controversial neonicotinoid insecticide will inevitably flush out more information on Imidacloprid and Benchmark's 'CleanTreat' system.

When asked by Scottish Salmon Watch for a site visit to the Clean Treat operation and specific information on BMK08, Benchmark (who also sell the toxic chemical Azamethiphos) replied that it is "commercially sensitive" and that "the CleanTreat system is demobilised until further trials are planned".

From: **Rachel Aninakwah** <rachel.aninakwah@bmkholdings.com>
Date: Thu, Jan 23, 2020 at 8:21 AM
Subject: Re: Visit to CleanTreat's operations in early 2020?
To: salmonfarmingkills@gmail.com <salmonfarmingkills@gmail.com>

Dear Don,

Many thanks for your interest in Benchmark's CleanTreat purification system.

Our new sea lice treatment, BMK08, is currently in development phase and is therefore commercially sensitive and due to regulations we are constrained about the extent to which we can provide information. The CleanTreat system is demobilised until further trials are planned so we are unable to offer a visit at this time.

We would be happy to share with you the publicly available information on CleanTreat in the meantime. The CleanTreat webpage here explains the CleanTreat process in more detail.

Kind regards,
Rachel

RACHEL ANINAKWAH
COMMUNICATIONS MANAGER

T. +44 (0) 203 696 0630
rachel.aninakwah@bmkholdings.com
benchmarkplc.com
14 Red Lion Square, London WC1R 4QH

Please therefore provide the information requested which may involved re-visiting previous FOI requests.

Please consider this a formal request for information via the relevant FOI and Environmental Information regulations.

Please provide the information electronically and/or online.

Please provide a receipt of this FOI request.

Thanks,

Don Staniford

Director, Scottish Salmon Watch

SCOTTISH SALMON WATCH

CHEMICALS

FOI on Imidacloprid (BMK08/Ectosan/D10 Aquatic Blast)

To:

Norwegian Ministry of Trade, Industry & Fisheries: postmottak@nfd.dep.no
Norwegian Food Safety Authority: innsynshenvendelser@mattilsynet.no
Norwegian Ministry of Climate & Environment: postmottak@kld.dep.no

Date: 17 March 2020

From: Scottish Salmon Watch

Please provide information on Imidacloprid (BMK08/Ectosan/D10 Aquatic Blast) including discharges and disposals via Benchmark's 'CleanTreat' and Salmo Pharma.

Fish Farmer magazine reported in February 2020 that "over the last 24 months, more than 35,000 tonnes of salmon in five Norwegian farms have been treated with BMK08":

Fish Farmer

Sea Lice CleanTreat

Norwegian scale up for award winning UK innovation

11 Feb 2020

THE company behind the prize winning CleanTreat filtration technology that cleanses treatment water after delousing is looking to scale up the system. Benchmark Holdings said last month it plans to invest £19 million in the breakthrough innovation ahead of the launch of its new sea lice medicine, BMK8 (formerly known as Ectosan), due in the first half of 2021.

Over the past 24 months, more than 35,000 tonnes of salmon in five Norwegian farms have been treated with BMK08, achieving approximately 99 per cent efficacy, said Benchmark.

The compound must be used in conjunction with CleanTreat, which removes medicinal residues from treatment water.

Benchmark said there is growing interest from customers for the product and it estimates that BMK08/CleanTreat sales could reach £50 million in Norway

The article also reported:

Norwegian agencies have been strongly supportive of the system's development and it will be the first market for a commercial roll-out.

Please name the salmon farms including site name and company responsible for the operation.

Please provide details on the discharge and/or disposal of the Imidacloprid (BMK08).

Norwegian Fish Farmer magazine reported in June 2016 that Novartis had obtained a US patent for Clothianidin in 2014 and cited the 2015 US patent on Imidacloprid for use in salmon farming.

Patentert metode

To av dem som står bak AVSI, som er den kanadiske samarbeidspartneren i prosjektet, John O'Halloran og John Terence Drost, har nemlig patentert en fremgangsmåte for å belegge fiskefôr med en «bærer» som skal sørge for at legemidler i neonikotinoid-klassen i langt større grad blir spist og tatt opp av fisken når de gis i fôret.

I patentet viser de til et forsøk Novartis har beskrevet i deres patentsøknad for et neonikotinoid-middel som heter «clothianidin».

Der konkluderer Novartis med at det kun er clothianidin av neonikotinoidene de testet som gir full effekt. Og at for eksempel at et annet velkjent middel, imidacloprid, dermed ikke er egnet som fôrbasert lakselusmiddel. Se tabellen her

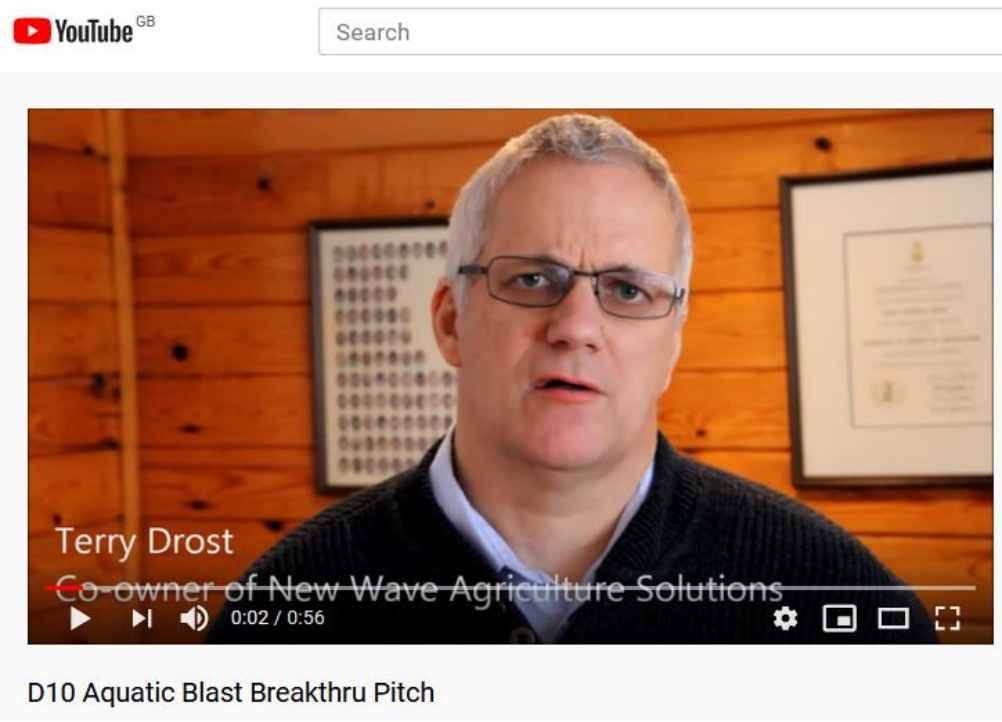
I patentet til O'Halloran og Drost hevder de derimot at de har funnet en bærersubstans som også gjør de andre stoffene egnet. Derfor krever de i patentet at denne metoden skal gjelde stoffer som imidacloprid, acetamiprid dinotefuran, nitenpyram, thiacloprid, thiamethoxam.

Selv om patentet ramser opp en rekke neonikotinoider, er det varianten «**imidalcloprid**» som vies mest fokus i patentet. Kyst.no spør Rikhardsen om det er dette konkrete virkestoffet det jobbes med?

- Jeg kan bare bekrefte at det i patentet er beskrevet en rekke varianter, men jeg kan verken bekrefte eller avkrefte at det er akkurat imidalcoprid, sier han.

The article ended by directing readers to a [You Tube presentation dated December 2014 by Terry Drost of New Wave Agriculture Solutions] which included:

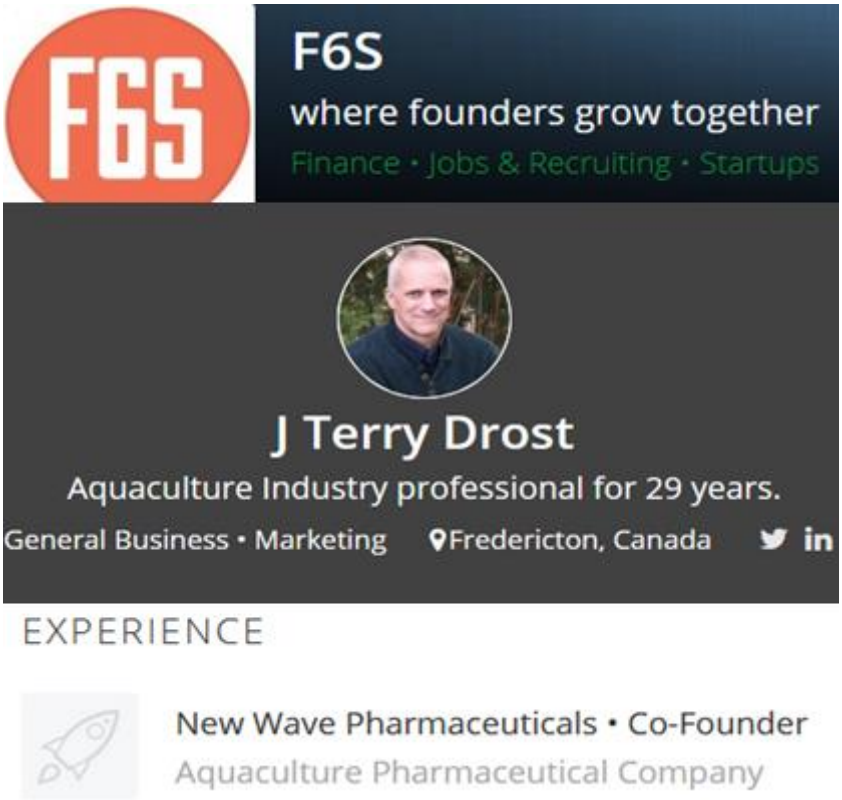
"We have developed a new treatment for sea lice called D10 Aquatic Blast. D10 Aquatic Blast is based on a compound used in agriculture for the last 20 years. We are using it in salmon feeds in the marine environments for the first time in the world. We would like to talk to you about how we can get D10 Aquatic Blast approved for use in Canada and the rest of the world."



Fiskeribladet/Tekfisk [reported in June 2018]:

The article links to another article published in Intrafish in June 2018:

It is difficult to access any information on New Wave Agriculture Solutions but there is an online listing for J Terry Drost at tech funding start up F6S:



Terry Drost, Vice-President/COO New Wave Pharmaceuticals Inc (based in New Brunswick in Canada), [told Salmon Business in August 2018]:

"Once a sea lice outbreak hits them, they are faced with the choice of doing nothing and allowing up to 100% of their fish to be eaten alive by sea lice or applying mechanical treatments that can result in large amounts of fish damaged or killed..... we need to be allowed the emergency use of innovative, safe and efficacious new treatments to control sea lice."

The Fish Site [reported in June 2017]:

Patent sought for neonicotinoid-based sea louse treatment

HEALTH · NUTRITION

by Rob Fletcher
2 June 2017, at 12:00am

Details of an application for a patent concerning a neonicotinoid-based in-feed sea louse treatment have been recently published in the US.

The treatment has been developed by two Canada-based scientists – John O'Halloran and John Terence Drost – and is set to be administered orally, via medicated feeds, to salmon ranging from 50 g to 5 kg. Trials conducted by the scientists have shown it to be effective against both Lepeophtheirus and Caligus lice species, although the principle target is *Lepeophtheirus salmonis*. According to the patent application, salmon can be safely harvested and consumed within 21-25 days after treatment, or when the neonicotinoid residue in the fish is below 0.02 parts per million.

Although the patent is still pending, independent research into the possible efficacy of noenicitinoids against sea lice has also been promising. Indeed, a paper published in the Journal of Fish Diseases last year by Aaen and Horsberg, from the Sea Lice Research Centre at the NMBU School of Veterinary Science, showed the nicotinic (neuronal) acetylcholine receptor (nAChR) to be a suitable target for compounds such as neonicotinoids.

These compounds consist of seven separate insecticides – imidacloprid, thiacloprid, thiamethoxam, acetamiprid, nitenpyram, clothianidin and dinotefuran – and are used to combat pest organisms
on a wide range of crops, as well as parasites on animals. In Australia and New Zealand, products containing compounds from this group are available for use on sheep; otherwise, companion animals are the main consumers of these substances.

A prominent feature of neonicotinoids is their specificity to invertebrate nAChR compared to vertebrate
nAChR and this group of compounds is reported to induce toxic effects on crustaceans when distributed in extremely low concentrations.

Despite this, neonicotinoids are not without controversy, as their use as pesticides on crops has been linked to a steep decline in bee numbers, while their relatively long persistence in aquatic environments could, the scientists suggest, complicate their use as antiparasitic compounds. Nevertheless their trials showed that imidacloprid – which is the compound included in the current patent application – was highly effective against *L. salmonis*. Exposing lice to imidacloprid for 30 minutes at a concentration of 50 mg L(-1), or for 24 hours at 5 mg L(-1) generated a high level of immobilization.

Although another neonicotinoid, nitenpyram, did not yield a similar effect, the researchers concluded that the nicotinic acetylcholine receptor was a sensitive target for novel salmon lice medicines.

Further details of the US patent for Imidacloprid are available online here

US 20170135956A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2017/0135956 A1**

O'HALLORAN et al. (43) **Pub. Date: May 18, 2017**

(54) **FISH FEED COMPOSITIONS CONTAINING A NEONICOTINOID FOR PREVENTING AND TREATING PARASITE INFECTIONS**

(71) Applicants: **John O'HALLORAN**, Old Ridge (CA); **John Terence DROST**, Douglas (CA)

(72) Inventors: **John O'HALLORAN**, Old Ridge (CA); **John Terence DROST**, Douglas (CA)

(21) Appl. No.: **15/321,896**

(22) PCT Filed: **Jun. 24, 2015**

(86) PCT No.: **PCT/IB2015/054749**

§ 371 (c)(1),
(2) Date: **Dec. 23, 2016**

Related U.S. Application Data

(60) Provisional application No. 62/016,389, filed on Jun. 24, 2014.

Publication Classification

(51) **Int. Cl.**

A61K 9/16	(2006.01)
A61K 9/00	(2006.01)
A23K 20/10	(2006.01)
A23K 20/158	(2006.01)
A23K 10/30	(2006.01)
A61K 31/4439	(2006.01)
A23K 50/80	(2006.01)

(52) **U.S. Cl.**

CPC ***A61K 9/167*** (2013.01); ***A61K 31/4439*** (2013.01); ***A61K 9/1617*** (2013.01); ***A61K 9/1658*** (2013.01); ***A61K 9/0053*** (2013.01); ***A23K 50/80*** (2016.05); ***A23K 20/158*** (2016.05); ***A23K 10/30*** (2016.05); ***A23K 20/10*** (2016.05)

(57) **ABSTRACT**

The present disclosure relates to methods of preventing or treating parasite infection in a plurality of fish in need thereof, comprising administering to the fish an effective amount of a medicated fish feed. The medicated fish feed comprises fish feed granules or pellets coated with a composition comprising a neonicotinoid such as imidacloprid and a carrier having a high apparent digestibility coefficient such as a processed/cooked corn protein concentrate.

A PhD thesis - "Chemotherapeutants against salmon lice Lepeophtheirus salmonis – screening of efficacy" - published by the Norwegian University of Life Sciences in 2016 identified Imidacloprid as a 'Test Substance':

Table 2. List of substances utilized in the studies, grouped according to the IRAC mode of action classification.

IRAC group	Substance	General mode of action	Mode of action	Substance group	Project candidate
1A	Propoxur	Nervous system	Acetylcholinesterase inhibitor	Organophosphates	Test substance
1B	Azamethiphos	Nervous system	Acetylcholinesterase inhibitor	Organophosphates	Model substance
2B	Pyriprole	Nervous system	GABA-gated chloride channel blocker	Phenylpyrazoles	Test substance
3	Cypermethrin	Nervous system	Sodium channel modulator	Pyrethroids	Model substance
4A	Imidacloprid	Nervous system	Nicotinic acetylcholine	Neonicotinoids	Test substance

Table 6: Concentrations immobilizing 50 (EC_{50}) and 90 (EC_{90}) % of preadult *L. salmonis* parasites exposed to neonicotinoids for 24 hours. The 90 % confidence intervals are provided in brackets when applicable.

Substance	EC_{50} (µg/L)	EC_{90} (µg/L)
Imidacloprid	97.6 (74.2-148.6)	334.2 (152.3-733.75)

North American Aquaculture reported in April 2018:

Aquaculture North America

MENU NEWS FEATURES PRODUCTS OPINION EVENTS ENEWS MAGAZINE

Pesticide banned in oyster farming

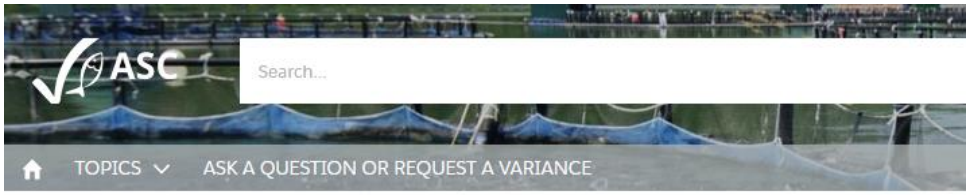
The Washington Department of Ecology has banned a pesticide that was approved two years ago for oyster growers to kill burrowing shrimp.

The department said it made the decision after a lengthy evaluation of the environmental impacts of the pesticide, imidacloprid. The pesticide belongs to a class of chemicals called the neonicotinoids, which act on the central nervous system of insects.

The state announced Monday that it is too harmful to the ecosystem and decided to deny a request for its approval.

"The science around imidacloprid is rapidly evolving and we can't ignore it. New findings make it clear that this pesticide is simply too risky and harmful to be used in Washington's waters and estuaries," state Ecology Director Maia Bellon said in a press release.

Scottish Salmon Watch first discovered that Ectosan (which was launched in 2017 and re-named by Benchmark as BMK08 in 2019) was Imidacloprid last week following a tip-off to view details on the Aquaculture Stewardship's web-site:



SALMON

Q&A66_Salmon_V1.1_5.2.5

20-May-2019 · Knowledge

TITLE Q&A66_Salmon_V1.1_5.2.5	**PUBLICATION STATUS** Published
NAME OF CAB Delete	**DATE OF SUBMISSION** 13/02/2019
PROSPECT / CERTIFICATE HOLDER	**ASC DOCUMENT INDICATOR/ CLAUSE**
CROSS REFERENCE TO OTHER VR'S / QA'S	**ASC DOCUMENT INDICATOR/ CLAUSE 2**
DOCUMENT (REFERENCE) Salmon	**ASC DOCUMENT INDICATOR/ CLAUSE 3**
VERSION 1.1	**ASC DOCUMENT INDICATOR/ CLAUSE 4**
PRINCIPLE	
CRITERION	
INDICATOR	
SUPPORTING EVIDENCE	
COUNTRY	
REGION	
APPROVED REGION	
DATE INTERNAL CHECK STARTED	
DATE INTERNAL CHECK FINISHED	

BACKGROUND

Interpretation request (PTI for new sea lice medicine that is not released into the environment).
Mowi Norway AS and Benchmark Rationale for PTI calculation – Ectosan (Imidacloprid):
The ASC standard includes a number of indicators aimed at promoting the responsible use of therapeutic treatments. The environmental risks linked with using chemical therapeutants are linked with the release of such chemicals into a wild environment where non-target organisms may be affected. Therefore, the development of new medicinal treatments that avoid the release of active therapeutants into the environment is in alignment with the ASC aim of environmental stewardship.
Ectosan is a new therapeutic treatment against sea lice which fulfills this intention. Ectosan is administered as a bath treatment in wellboats or other closed contained treatment vessels only. This allows for accurate dosing of the medicine, control of water quality parameters, monitoring of fish welfare and the capture and retention of all treatment water. The fish are pumped into the wellboats with the medicine administered after all fish are onboard. Once the exposure period is completed, the fish are pumped out of the wellboat over a dewatering system fitted with a rinse bar to both separate fish from treatment water and ensure no residues of treatment water remain on the exterior of the fish. All water, including all rinse water, is collected and returned to the wells. Once all fish have been discharged over this system the treatment water is then transferred through CleanTreat, Benchmark's novel water purification system, whereby the medicine is removed from the water prior to the water being discharged back to the environment. The purified water is measured continuously using onboard equipment to ensure levels remain below quantifiable limits.
The Parasiticide Treatment Index (requirement 3.1.7) has been developed during the Aquaculture Salmon Dialogues (ASD) with the aim of "The ultimate goal would be that farms could meet the ASC Salmon Standard without using therapeutants or without the risk of those therapeutants negatively impacting the environment." (page 47 of the ASC salmon standard v1.1). As mentioned earlier the use of Ectosan does not lead to any release of chemical therapeutants into the environment. In addition, the toxicity factor of the active ingredient used in Ectosan (Imidacloprid) has already been established as 85 mg/l (LC 50 for Daphnia, Fossen, 2016) which is higher compared with H2O2 (7.7 mg/l, which is given a toxicity factor of 0 in the ASC-PTI calculation). Therefore, the therapeutant factor for Ectosan will be zero and as a result so will the PTI.

DNV GL response to ASC:
DNV GL can not find PTI calculation values for the therapeutant Ectosan (Imidacloprid) in the ASC Salmon Standard v1.1 – April 2017, Appendix VII: Parasiticide Treatment Index and therefore needs clarification and determination from ASC related to which values shall be used when PTI is calculated.
The text below is from page 95 in the ASC Salmon Standard v1.1 – April 2017, Appendix VII: Parasiticide Treatment. DNV GL interpretation of this text is that it is ASC and the Technical Advisory Groups responsibility to determine which values shall be used when PTI is calculated for use of therapeutant Ectosan (Imidacloprid). DNV GL can not approve the given values from the user or producer of the therapeutant Ectosan (Imidacloprid) without a clarification and determination with acceptance of the given values from ASC.

(page 95 in the ASC Salmon Standard v1.1 – April 2017)

QUESTION

(page 95 in the ASC Salmon Standard v1.1 – April 2017)
Updating PTI with new information:
If new therapeutants become available for sea lice treatment, or if new treatment method are developed, the Technical Advisory Group of the ASC may be asked to determine a therapeutic factor or treatment factor for that new parasiticide or new method, following guidelines for assignment of factors left by the SAD SC.

ASC INTERPRETATION

The PTI-index is calculated using the following formula:
PTIi= [(therapeutant factor) * (treatment factor) * (resistance factor) * (sensitive time factor)]
Within this formula, the therapeutant factor and treatment factor vary per used active ingredient. The resistance factor and sensitive time factor are based on other variables (i.e. number of treatments applied and lobster presence).
For the therapeutant factor, a classification of the parasiticides used at the time of the Aquaculture Dialogues is given in the table on page 93 (v1.1). This table does not include Imidacloprid (Ectosan). For this susbstance to qualify, the parameters that contribute to the toxicity factor need to be determined. These are:
1. Treatment mechanism (bath or oral)
2. Toxicity factor (0-2)
3. Daphnia LC50 (µg/L)
4. Persistence factor (0-3)
5. Dosage factor (0-3)

The final therapeutant factor is calculated as following:
Therapeutant factor = [(Toxicity factor) * (Persistence factor) * (Dosage factor)]
1. Treatment mechanism
Ectosan is applied through a bath treatment. It is noted that the treatment is applied within a well boat and treatment water is purified before released back into the environment.
2. Toxicity factor (0-2) and 3. Daphnia LC50 (µg/L)
The table on page 93 (v1.1) does not reference the sources from which the Daphnia LC50-scores are derived. In order to find consistency in toxicity scoring, the Pesticide Properties Database (PPDB – https://sitem.herts.ac.uk/aeru/ppdb/index.htm) was consulted to verify the referenced values in the ASC Standard. The majority of listed LC50-scores where confirmed by this database and as such this database is used as a proxy to derive ecotoxicity values from.
The toxicity factor of the active ingredient used in Ectosan (imidacloprid) has been established as 85 mg/L (Fossen, 2016). This score was confirmed by the PPDB-database (https://sitem.herts.ac.uk/aeru/iupac/Reports/397.htm).

As this score is 11 times less toxic as the stated value for H2O2 (7.7 mg/L), a similar rating as H2O2 for toxicity should be given as well (i.e. toxicity factor “0”).
4. Persistence factor (0-3)
According to the PPDB-database, imidacloprid has a water-sediment and water phase only DT50-score (“half-life time”) of 129 and 30 days, respectively. Compared to the other parasiticides listed in the table on page 93, these values are considered high (i.e. slow breakdown). For this reason a persistence factor of 3 is given.
5. Dosage factor (0-3)
As there is no information available on the dosage applied – a (maximum) score of 3 is given from a precautionairy approach.
Summary:
For the application of Ectosan (imidacloprid) via the described process, the following values for the toxicity factor in the overall PTI-calculation need to be used:
Therapeutant factor = [(Toxicity factor) * (Persistence factor) * (Dosage factor)]
- Toxicity factor = 0
- Persistence factor = 3
- Dosage factor = 3

Therapeutant factor = [(0)* (3) * (3)] = 0
Please note that the use needs to be registered through Appendix VI of the ASC Salmon Standard v1.1.

VR/Q STATUS

Closed

EFFECTIVE DATE

15/03/2019

URL NAME

Q-A66-Salmon-V1-1-5-2-5

We have released this information today via "Revealed: Toxic Neonicotinoid Insecticide Used to 'CleanTreat' Lousy Scottish Salmon".

Further information obtained from the Scottish Government - which refers to trials in Norway - was published in December 2019 via CleanTreat: FOI Disclosures by the Scottish Government to Scottish Salmon Watch

Please consider this a formal request for information via the relevant FOI and Environmental Information regulations.

Please provide the information electronically and/or online.

Please provide a receipt of this FOI request.

Thanks,

Don Staniford

Director, Scottish Salmon Watch